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Clinical Connect

Fostering a culture of innovation and excellence

Critical Care Special

Committed to Caring

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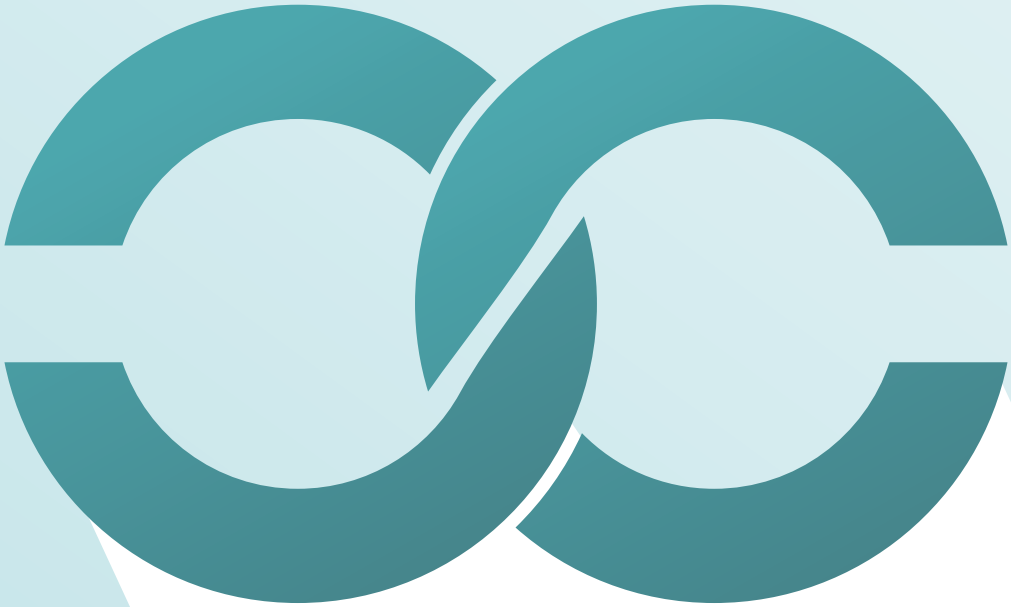


INSPIRATION

Leadership Messages

Dr Yashesh Paliwal
Director and Head- Critical Care
Fortis Hospital, Anandapur

I hope this message finds you well. The Clinical Connect from Fortis Healthcare is an excellent platform that allows its clinicians to showcase their new ideas, research and interesting work. This edition is dedicated to Intensive Care.

Intensive care is a relatively new speciality which roots in the early 1990s with the foundation of the Indian Society of Critical Care Medicine. It has since grown and developed at a fast pace to mature to its current form, where intensive care is at the heart of any leading tertiary hospital.

Fortis ICUs have the required modern infrastructure to provide advanced multisystem monitoring and organ support. Our hospitals are running critical care super-speciality training programs affiliated with the DNB board and the Indian Society of Critical Care Medicine.

I am very proud of our Fortis network critical care teams providing the best possible individualized and protocolized intensive care to a wide variety of complex medical, surgical, trauma, oncology and transplant patients. Robust clinical governance and processes ensure that the nuisance of nosocomial sepsis is minimised. The last couple of years has been extremely hard both mentally and physically for our ICUs, especially during the first and second waves of the Covid pandemic. Still, it also demonstrated our resilience in the face of adverse situations.

As we look towards the future, I am confident that we will continue to make a positive impact on the lives of our patients and their families. I look forward to seeing the continued growth and success of our Fortis network critical care services.

Dr Padmakumar A V
Director - Critical Care
Fortis Hospital, Bannerghatta Road, Bangalore

The last decade has seen critical care, as a speciality, grow by leaps and bounds. When I look back on my training days when we used the most basic ventilators, to the most technically advanced ones available today, it is indeed a significant step forward.

ECMO is now used much more effectively than ever before. Remote monitoring has become a reality. Infection control and AMS programs have taken a major step forward. As critical care specialists, most of us have to lead from the front and show the way to other specialties, which indeed we have done wonderfully well.

We thought that we were at the top. Invincible. Then came Covid!

During the covid crisis, we supported each other and were able to save many lives. It was a very difficult time for us in our specialty due to the physical and mental stress that we had to cope with.

Covid has taught us new things about our lives. We realised that we are as vulnerable as anyone else. We were worried about ourselves and our families. We were as resilient as ever. We lost some friends and family. We lost many patients who we thought we could save; at the same time many of them who had one foot in the grave, survived!

Even with all the advances in technology and monitoring, we could not save many young lives. It was an eye opener. Bed side teaching and training suffered significantly during covid time. But online teaching and discussions picked up. Despite the shortfalls, most of the students have done quite well during exams, which is remarkable.

The basics of critical care has not changed all these years, which was again emphasised during our fight against Covid. An area of concern since many years is the inability to address the end of life issues for the terminally ill, who invariably land up in ICUs. We may have to take a leadership role in educating the other specialists in this regard. As we move forward, I am hoping to see some progress on this front. My best wishes to all my beloved colleagues, friends and students for a better and healthier future.

Message From the Secretariat- Behind the Scenes

The Secretariat

Dr Vasundhra Atre

Dr Sulabh Tripathi

Dr Sukriti Sud

Dr Manhar Khullar

Mr Debasish Chakraborty

We are glad to introduce the latest edition of the Clinical Connect, the Fortis hospital e-newsletter by clinicians, for clinicians. A bi-monthly publication the Clinical Connect is an initiative, of the Fortis Medical Council and Fortis Medical Strategy and Operations Group (MSOG), to showcase and promote our collective clinical skills and excellence.

Each issue of the Clinical Connect consists of selected scientific articles published by our clinicians in various indexed journals, interesting clinical cases from across the Fortis network, and views of senior doctors and leaders, along with related trivia and informative pieces. It is heartening to note that what started as a 10 to 15-page newsletter is now converting into a full-fledged 100+ pages scientific journal!

Needless to say, putting together a publication like this in a short span of time requires significant teamwork and coordination. The Secretariat puts in a lot of hard work in the background to bring the content together for our Clinical Fraternity.

Work Behind the Scene

Each article that is received undergoes a preliminary screening to identify any major gaps and suitability for publication. A thorough check is done to assess accuracy and completeness of the shared information. The Secretariat ensures the availability of all the necessary components for each article i.e tables & figures, pictures of authors & links to the published articles.

The articles are evaluated depending on the scientific criterias; the considerations being:

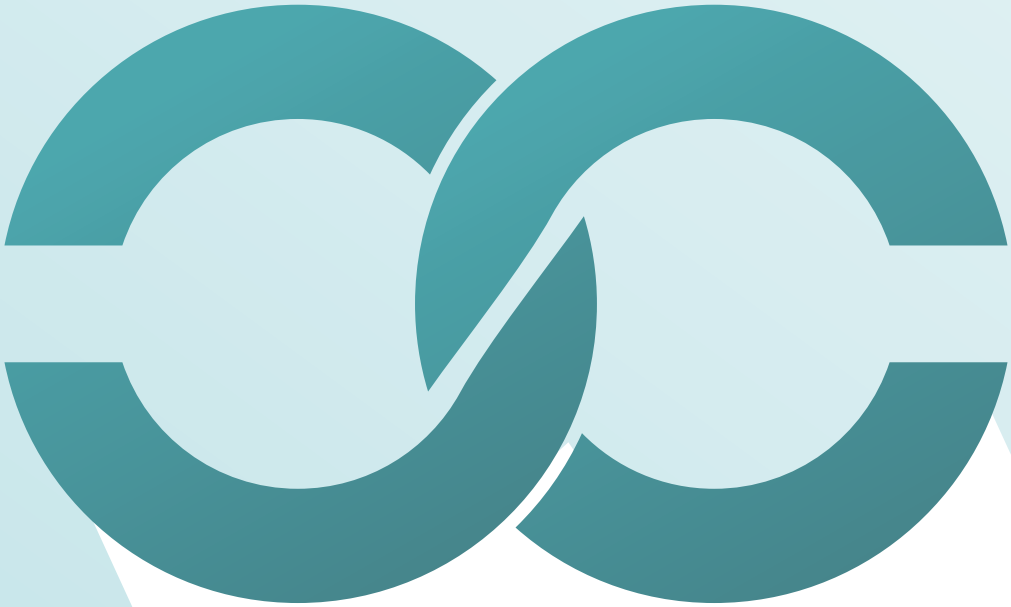
- Relevancy of the topic for the case study
- Whether the title accurately reflects the content of the article
- Whether or not the research work is peer reviewed
- Impact factor & Citation Scores for published articles

The entire journal is compiled to create a prototype in a structured format for the Editorial Board Review.

The editorial board critically evaluates the clinical value of the write up to ensure that the articles are logical and persuasive, such that the readers can easily follow the development of the argument. Required editing is then done to ensure that the paper / write up is effectively organised before submission to the publisher for Artwork & Printing.

All of our work put together in past one year has been possible only due to the phenomenal contributions from our Clinicians and the continuous support from the management.

We hope you continue enjoying and patronizing the 'Clinical Connect' - we look forward to bringing you more exciting content in our next issues.



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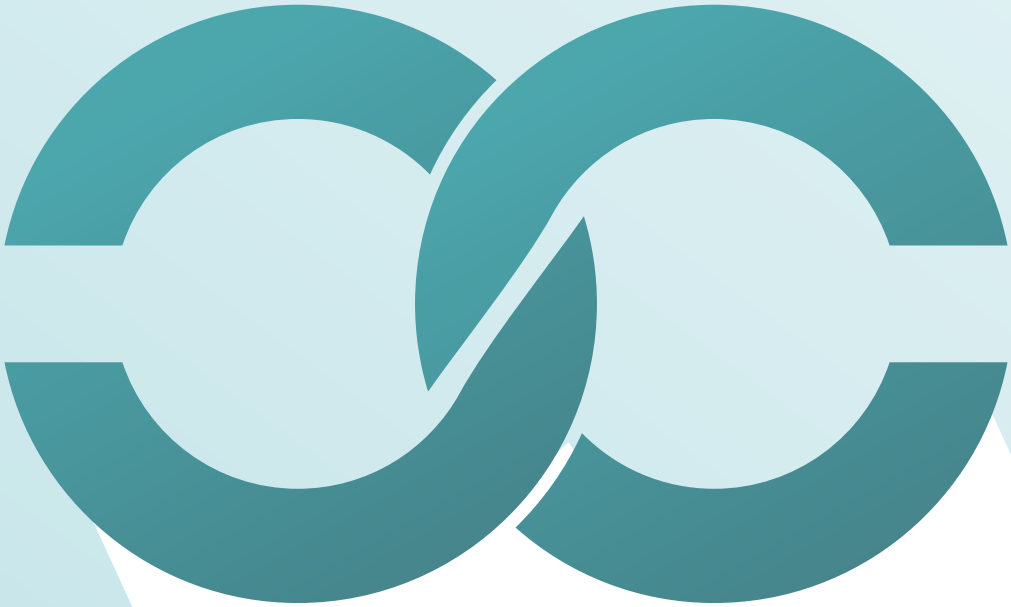

NEW HORIZONS

Issue: 8 | January 2023

EDAC - Difficulty in Weaning off the Ventilator

To cite this article: Bhirud, H. A. G. B. (n.d.). WJAHR | Abstract. https://www.wjahr.com/home/article_abstract/378*

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Introduction

Excessive Dynamic Airway Collapse (EDAC) along with tracheobronchomalacia (TBM) constitutes Excessive Central Airway Collapse (ECAC) which presents with a myriad of respiratory symptoms. [1,2,3] In some EDAC may be suspected in a patient when it is difficult to wean off the ventilator, when other causes have been excluded. [4] Confirmation of diagnosis is by Fiber Optic Bronchoscopy (FOB) and dynamic CT scanning. [5, 6, 7] EDAC is an entity characterized by >50% reduction in the lumen of the trachea with anterior bowing of the post membranous wall of the trachea. [5] The symptomatology in a non-surgical patient may vary from asymptomatic to wheezing refractory to treatment, dyspnea, stridor, and coughing. [8]

Difficulty to wean can be due to various factors such as bronchopleural fistulae, pulmonary embolism, post-thoracic surgery non-cardiogenic pulmonary edema, atelectasis, bronchospasm and pneumonia leading to respiratory failure. The challenge lies in ruling out these complications and treating EDAC after appropriate diagnosis. We report successful management of this patient with EDAC.

Case Description

An 86-year-old female weighing 65 kg with a BMI of 33.2 (Obese), a known hypertension with cirrhosis of liver with portal hypertension taking Tab. Amlodepine 5 mg OD & Ciplar LA 20 mg OD came with complaints of night snoring which would subside on awakening and day time somnolence, though a diagnosis of sleep apnea was not confirmed with a sleep study. She presented to ER with complaints of hemoptysis for one day. With a known history of cirrhosis of liver with portal hypertension it was suspected that she might have bled in the stomach which she aspirated causing hemoptysis.

She underwent emergency upper gastroscopy which revealed bleeding from the oesophageal varices. All four-quadrant sclerotherapy was done. She had episode of desaturation during the procedure hence she was intubated and shifted to ICU on IPPV mode of ventilation. She was mechanically ventilated with TV – 350ml, RR- 16/min, PEEP- 5, FiO2- 50%, PIP- 26. She was sedated with an infusion of Fentanyl 50mcg/hr and Midazolam 2mg/hr. She was also started on Noradrenaline infusion (4/50) @ 5 ml/hr in view of hypotension. She was transfused with two Packed Cell Volume for low Hemoglobin. Her ABG showed a mixed picture of metabolic with respiratory acidosis (FiO2 100% - pH - 7.18, pCO2 56.5 paO2 63.6 SaO2 83.3%, HCO3 18.5). Diagnostic ascitic tapping was done to rule out spontaneous bacterial peritonitis. She went into acute renal failure and was started on Lasix drip. She was stabilized over next two days and all supports were slowly weaned except the ventilatory support. Her morning X-Ray chest showed a left pneumonic patch with patchy consolidation on the right side. She was gradually weaned to CPAP with PS – 14, PEEP- 6, FiO2 – 50%. ABG on FiO2 50% showed pH - 7.01, pCO2 103 paO2 95.8 SaO2 91.3%. She was drowsy and unresponsive to deep painful stimulus. On auscultation she had reduced air entry bilaterally.

Bronchoscopy showed minimal secretions and hence the patient was sedated and ventilated on IPPV with previous settings. Her ventilation improved & vitals stabilized and it was planned to ventilate her till the next day.

Next day a second weaning trial was attempted during which the patient developed bradycardia with hypotension with desaturation. One dose of Adrenaline (1/10) was given and Noradrenaline was increased. She reverted to sinus rhythm. The patient was again sedated and mechanically ventilated overnight. Next day a weaning trial was initiated again and the patient was weaned till CPAP with PS – 12, PEEP- 5, FiO2 – 40%. She became tachypneic and hypoxic. FOB was planned again, which revealed the posterior wall of trachea to be floppy which collapsed on expiration along with collapse of both the left and right main bronchus. These FOB findings confirmed the diagnosis of EDAC and a plan to gradually wean the patient off the ventilator was undertaken.

The patient was kept on CPAP with settings of PS – 18, PEEP- 8, FiO2 – 50% on which her respiration stabilized but she developed Atrial Fibrillation which was treated with Amiodarone infusion. Percutaneous Tracheostomy was done in view of diagnosis of EDAC and prolonged ventilatory support which mandated a slow weaning from ventilator. Over the next four days she was weaned to minimum CPAP support and maintained on same. On the 8th day FOB was repeated to evaluate the upper airway & vocal cord, which were reported normal.

The patient was maintained on T piece on 6 lit O2/min from day 10 onwards, decannulation of Tracheostomy was planned on day14. The patient withstood the decannulation well.

Discussion

EDAC along with TBM are pathophysiologic entities comprising ECAC. [3]

EDAC is characterized by excessive forward displacement of the membranous wall due to weakness and atrophy of the longitudinal elastic fibers of the posterior wall. [3] It is an exaggeration of the normal narrowing of the trachea during exhalation. [5,9] In EDAC the posterior wall is thinner and histologic evaluation of the affected segments has shown changes in the elastic fibers of the paramembranacea. [10,11]

Symptoms may present with severe dyspnea, intractable cough, recurrent infections, and respiratory failure. [1, 2, 3, 5, 8] Diagnosis of ECAC should be based on dynamic flexible bronchoscopy and/or dynamic CT scan and clinical symptoms that are not fully explained by another disease. [6,7] Initial treatment includes treatment of recurrent infections, medical therapy for concomitant airway diseases, pulmonary physiotherapy, airway clearing device, pursed lip breathing, continuous positive airway pressure (CPAP) and pulmonary rehabilitation. Patients should undergo evaluation for vocal cord dysfunction and gastro esophageal reflux disease since both are highly prevalent in this patient population. CPAP can be an effective treatment option for patients awaiting definitive surgery or for patients who cannot undergo surgery.[3]

Our patient had BMI of 33.2 and had symptoms of mild OSA though not confirmed with sleep studies. Increased work of breathing due to bilateral pneumonia, secretions, residual muscle paralysis itself on a prior setting of OSA could have contributed to symptoms of EDAC in our patient. Asymptomatic central airway collapse with exhalation may be a relatively common finding as suggested by a recent study of dynamic CT scans. [6]

EDAC in a patient after anesthesia presenting for the first time in the post-procedure period has been reported by other authors in different clinical situations. [4] Morbid obesity and the resulting increased intrathoracic pressure, especially in the supine position, would contribute to an exaggeration of normal expiratory airway collapsibility. [4]

CPAP is a well-established treatment modality for EDAC and we were able to wean our patient to CPAP. Tracheostomy may stent the proximal part of the collapsible trachea and give respite to the patient as observed in our patient whom we were able to wean better after tracheostomy.[5]

A gradual weaning course of CPAP with intubation and later with diagnosis of EDAC confirmed, tracheostomy and BIPAP helped our patient recover.

Conclusion

EDAC can be triggered in a previously asymptomatic patient in the post-procedure period due to various factors such as airway edema, secretions, and increased work of breathing due to respiratory muscle weakness. Clinicians need to be aware of the entity to arrive at a diagnosis of EDAC. FOB and dynamic CT as diagnostic modes and judicious use of CPAP and if needed tracheostomy to help ventilation and eventual recovery from EDAC.

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Implementation of a Revised Montpellier Bundle on the Outcome of Intubation in Critically Ill Patients: A Quality Improvement Project

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Abstract

Compared to operation theatres, endotracheal intubation in intensive care unit (ICU) is associated with significantly higher risk of complications. In 2010, a ten-component care bundle employing a group of evidence-based interventions which could significantly reduce the number of peri-intubation complications in ICU (the now famous "Montpellier Bundle") was created. However, with newer evidence showing benefits of several other interventions during ICU endotracheal intubation, it is now necessary to revisit the Montpellier bundle. We tested the feasibility of implementing a revised Montpellier intubation bundle incorporating recent evidences was in a quality improvement project. It was hypothesized that this revised care bundle implementation would reduce intubation-related complications.

Materials and Methods

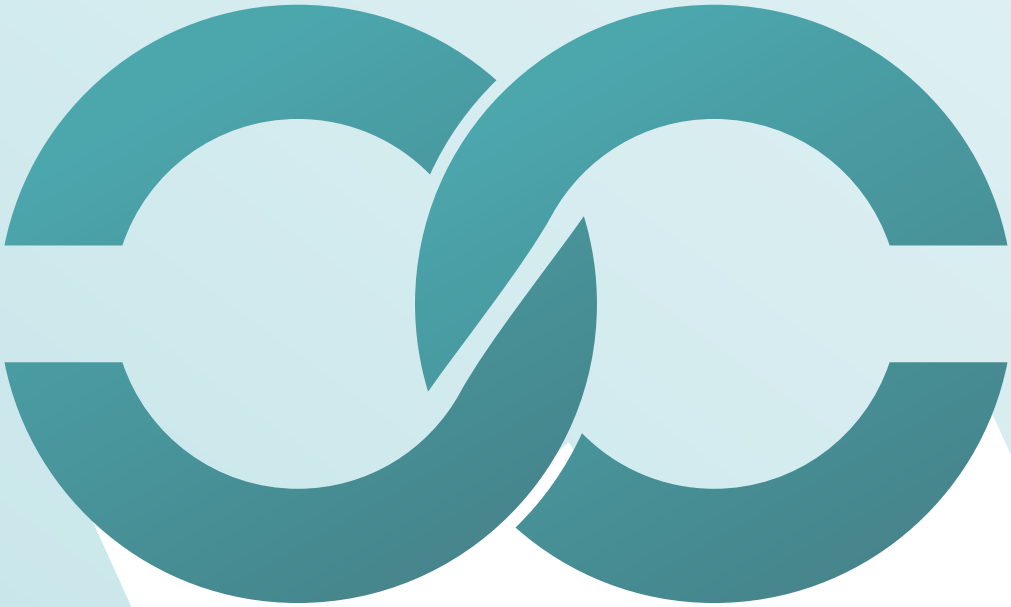
The quality improvement project was conducted in the 18-bed multidisciplinary intensive care unit of Fortis Escorts Hospital, Faridabad. The study was approved by Institutional Ethics Committee (EC/2021/28 dated 08 October 2021) and need for informed consent was waived off. Baseline data for intubations were collected over 3-month "Control Period" from 16 June 2021. During the 2-month "Interphase" (16 September 2021 to 15 November 2021), a revised intubation bundle was developed, and staff members (including doctors and nurses) involved in the intubation process were extensively trained on different aspects of intubation with emphasis on bundle components. Various components of the bundle were: 1. Pre-intubation fluid loading, 2. Pre-oxygenation with non-invasive ventilation plus pressure support, 3. Positive-pressure ventilation post-induction, 4. Succinylcholine as a first-line induction agent, 5. Routine use of stylet, and 6. Lung recruitment within 2 minutes of intubation. Intubation data were collected again in the 3-month "Intervention Period" starting from 16 November 2021. The study was registered in the national clinical trial registry of India (CTRI/2021/11/038089).

Results

61 endotracheal intubations were performed on 54 patients during control period. In the intervention period 57 patients underwent total 63 episodes of intubation. Pre-intubation parameters in both periods were matching except lower baseline oxygenation in control period and some differences in reasons for ICU admission. Apart from pre-intubation fluid loading, compliance to other five components of the bundle showed significant improvement. There was also numerical improvement in compliance to pre-intubation fluid loading, but it did not reach statistical significance (61.90% versus 50.82%; p .213). Overall, at least 3 components of the bundle were complied with in over 92% of intubations in the intervention period. However, whole-bundle compliance was limited to 14.3%. Overall, incidences of major complications were reduced significantly in the intervention period (23.8% vs 45.9%, p 0.01). There was a significant reduction in profound hypotension (21.77% vs 29.51%, p 0.04). Incidence of profound hypoxemia was 12.7% during intervention period compared to 24.59% in the control period; however, this 11.89% reduction was not statistically significant. There were no differences in death associated with intubation, cardiac arrest or minor complications.

Conclusion

Implementation of an evidence-based revised Montpellier intubation bundle is feasible. Revised bundle implementation could significantly reduce rates of major complications related to intubation compared with an unwritten strategy closely resembling the original Montpellier bundle.



DEFINING CONCERNS

Legal Issues in Critical Care Practice

Dr Amit D Nabar
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and Emergency Medicine
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"IGNORANTIA JURIS NON EXCUSAT"

Ignorance of the law excuses no one

Introduction

India is seeing a significant rise in cases of medical negligence. There has been a nearly 400% rise in medical negligence cases which is next only to matrimonial disputes. 90% of cases involve the hospital as one of the respondents and the average compensation is Rs 25 -75 lakh which is increasing due to the recent amendments in the pecuniary limits in the Consumer Protection Act.

The courts while awarding damages assess the monetary loss based upon loss of concurrent and future earnings of the patient, treatment costs and reduction in the quality of life. It is also worth mentioning that medical practitioners can be held liable not only under the Consumer Protection Act but the criminal laws as well.

So, what is it that makes intensive care physicians more vulnerable to medico-legal disputes?

If we were to dwell upon the root cause of this rising medicolegal hazard, we can say that the in the 21st century there has been a tremendous explosion of information. This may not have made the patients wiser but has certainly made them more aware and has also led to eroding of the doctor-patient relationship which was based on trust in the days gone by.

The critically ill patients are admitted to the intensive care unit of the hospital resulting in ICU morbidity and the mortality rate is 20% higher than the other hospital areas. This fact itself increases the risk of litigation due to the higher probability of undesirable outcomes in this group of patients.

Modern medicine and modern ICU in today's times are increasingly technologically intense. All this comes at a cost, an overall rise in the cost of care being billed to the patient. The higher monetary implication leads to an increased sense of discontentment in the patient and their family members especially when the outcome is not desirable, potentiating the risk of litigation by the aggrieved party.

The last decade has seen hospitals undergoing corporatization. This changing focus from socialistic values to monetization/profit has prompted the courts to not shy away from applying stiff fines on the hospitals that are party to a case of medical negligence.

Hospitals in today's time invest a significant amount in creating Brand Equity. The ICU is the first line of defence to protect the Brand Equity of the hospital.

Some of the common legal pitfalls in critical care practice can be summarized as follows:

Negligence in medical management including complications of procedures. Lack of improper informed consent. Hospital-associated infections.

Failure of communication between the treating team and patient and his relative and lastly Issues related to end-of-life care.

Medical Negligence

Medical negligence can be defined as a lack of reasonable care and skill or wilful negligence on the part of a doctor in the treatment of a patient whereby the health or life of a patient is endangered.

Negligence is simply the failure to exercise due care.

To be called medical negligence, there must be a duty which is an obligation to conform to a recognized standard of care. Then there is a breach of duty due to a deviation from the recognized standard of care which is the causative factor leading to injury.

Bolams Test

The courts have been applying the "Bolams test" for many years to see if a doctor meets the standard of a responsible body of medical opinion to adjudicate if he has been negligent in his dispense of care.

The courts state that a man need not possess the highest expert skill at the risk of being found negligent. It is sufficient if he exercises the ordinary skill of an ordinary competent man exercising that art.

A doctor is not guilty of negligence if he has acted in accordance with a practice, accepted as proper, by a responsible body of medical men skilled in that particular art.

Standard of Care

The Law of Torts defines standard of care as a degree of care, watchfulness, attention, caution and prudence that a reasonable person should exercise who is under a duty of care.

The doctor does not have to adhere to the highest or sink to the lowest degree of care and competence. He must ensure that he confers a reasonable degree of care and competence in the light of knowledge available at that point of time.

The Covid pandemic added a further twist to the medicolegal perils faced by clinicians. Though it resulted in lowering the standards of acceptable safe care, one needs to adhere to the basic acceptable principles of safe practice and thus it also applies to the clinicians redeployed to areas outside their area of expertise.

It is mandatory for clinicians to keep themselves updated with the recent guidelines and stay abreast of ever-evolving treatment strategies in the current pandemic.

Documentation

The role of documentation in preventing medicolegal hazards can never be over-emphasized. Proper documentation goes a long way in insulating critical care physicians from litigation and allegations of negligence as what is not documented is considered as not done. It is imperative that the documentation is clear, factually correct, comprehensive, chronological, and contemporaneous.

Consent

Consent is another pitfall for critical care physicians. Though the consents are of various types, consent in an ICU is always an 'informed written consent'.

As autonomy is the core principle that defines the doctor-patient relationship, modern medicine has embraced the concept of shared decision-making between patients and their physicians. This approach more often than not gets more complicated in the critical care practice as patients are frequently incapable of being part of the decision-making process.

Treatment without valid consent is not only considered ethically wrong but can attract criminal charges of assault or battery.

Hospital Associated (Not Acquired) Infections

Hospital Associated (Not Acquired) Infections are another cause for litigation of negligence. In an era of public reporting, transparency may lend itself to either staving off or encouraging HAI-related litigation, depending on the intent of the individual using the data.

To recover damages for HAI the burden of proof lies on the patient who has to establish that he acquired an infection at the hospital. The hospital has to ensure that a robust infection control policy is documented and practised that can withstand legal scrutiny.

Communication

A critical patient due to the complex nature of the disease may involve a multidisciplinary team approach. This comes with its inherent risk of failure of communication between not only the doctor–patient & his relatives but also within the team caring for the patient. It is imperative that a unified picture is presented to the family about the patient's progress or outcome.

End-of-Life Care

End-of-life issues and withdrawal of life support is a situation faced by critical care practitioners on a day-to-day basis. There is a legal ambiguity surrounding End-of-Life care.

The 'DNR' 'Do Not Resuscitate' consent practised in a few hospitals will not withstand legal scrutiny, at the same time the procedure for living will or advance directive (though legal) is not only arduous but also unfeasible in critical care settings.

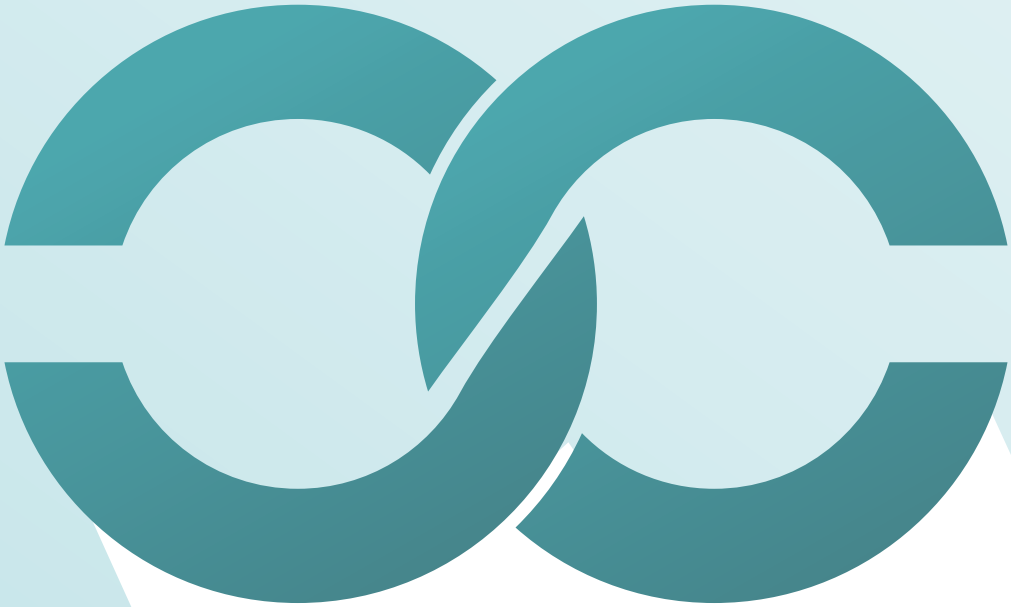
A Joint Position Statement from ISCCM & IAPC mentions that ambiguous legal position should not deter physicians from providing the best and ethical care to their patients. However, the law of the land always prevails.

The cardinal principles of medical ethics include honest, transparent & compassionate communication, meticulous documentation and effective palliative care ensuring a good death for the patient.

Conclusion

To conclude, critical care is a complex field with multidisciplinary teams being part of the caregiving.

One must always adhere to the acceptable standard of care and not compromise on the cardinal principles of medical practice. Lastly, documentation and communication would always remain central in safeguarding critical care physicians from medicolegal hazards.



THE WAY WE DO IT AT FORTIS

Observational Study on SavenG Protocol of Glucose Control in Intensive Care Unit

Sources: J Diabetol 2022;13:106-15

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Background

Hyperglycemia (>180 mg/dL or >10.0 mmol/L) has serious health implications in intensive care unit (ICU) patients. The aim of the present study was to explore the effectiveness of SavenG (Sanjith's Very Easy Nurse managed glucose control) protocol in the maintenance of glucose concentration in ICU patients.

Materials and Methods

In this observational study, a total of 108 patients admitted to the ICU unit of SL Raheja hospital, a tertiary care institute in Mumbai, were enrolled. The patients received insulin therapy as proposed in SavenG protocol. The glucose in serum was measured using a glucometer and was categorized into three levels: <150mg/dL, 150–200mg/dL, and >200mg/dL. The collected data were statistically analyzed by using SPSS version 24.0.

Results

Patients were primarily male (69%), with an average age of 63.96 ± 13.14 years, reporting at least two complications (1.49 ± 1.03), and with a greater risk of hypertension (60%). Higher doses of insulin (~59.9 units) were administered on the first two days of protocol. By day 5, the requirement of insulin dose was gradually decreased to 36.8 units. The insulin was administered for totally seven days. The insulin dosing that was administered was sufficient to maintain the glucose level of 150–200 mg/dL for 12 h ($F = 79.35$, $P < 0.01$) and this sugar level showed a comparatively lower level of variation within a day ($F = 13.123$, $P < 0.01$). Further, the sugar level was not influenced by demographic characteristics such as age, gender and concomitant complications such as hypertension, ischemic heart disease, coronary artery bypass grafting, and kidney disease.

Conclusion

The proposed SavenG protocol validates the effectiveness of insulin doses to regulate and maintain the glucose level at 150–200 mg/dL for 12 h within a day in ICU patients.

Indications of ECMO

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ECMO is a modality where venous blood from the patient is pumped out to an extracorporeal circuit for oxygenation and carbon dioxide removal, and then returned to the patient's body through a vein or an artery. The two major ECMO modalities are venoarterial (VA ECMO) and venovenous (VV ECMO).

Venovenous ECMO (VV ECMO)

VV ECMO provides respiratory gas exchange (oxygen loading, CO2 removal) in venous blood before it reaches the right ventricle, and is useful in the management of severe respiratory failure when conventional support is unsuccessful. Since blood is drained from and returned to central venous circulation, no hemodynamic support is derived from this mode of extracorporeal life support (ECLS).

VV ECMO system functions "in series" with the native cardiopulmonary system. In other words, blood that is drained, undergoes gas exchange and is returned to the central venous circulation before leaving the right side of the heart.

The most common indication of VV- ECMO is severe ARDS not responding to the conventional therapies. Having the option of VV-ECMO does not mean that it is applicable to all cases in all circumstances. It is important to understand for an ECMO specialist that there are several options available to manage a case of ARDS before we even start thinking of this modality.

Early institution of measures to treat the cause of ARDS should be done initially like:

- Sepsis, pancreatitis, trauma, shock etc to be managed early and appropriately
- Restricted use of fluids and blood transfusions
- Early antimicrobial use
- Lung protective ventilator strategies to prevent VILI
- Appropriate use of sedation and paralysis: self-inflicted lung injury prevention
- Recruitment maneuvers
- Advanced mode of ventilator
- Proning the patient

Due to several risks involved and complexity of the procedure, ECMO is considered when all conventional therapies have been exhausted. An objective prediction score has been developed to identify early the patients who need to be transferred or considered for ECMO as early as 12 hours of initiation of ventilation by Bohman et. al in 2016 and was published in the Journal of Critical Care.

Indications

- Primary or secondary hypoxic respiratory failure , ECLS
  a. Considered if risk of mortality is 50% or greater
  b. Indicated if risk of mortality is 80% or greater
- 50% mortality risk: PaO2/FiO2 < 150 on FiO2 > 90% and/or Murray score 2-3, AOI score 60, or by APSS score
- 80% mortality risk: PaO2/FiO2 < 100 on FiO2> 90% and/or Murray score 3-4, AOI >80 APSS 8

Despite optimal care for 6 hours or less. The decision for ECMO should be taken within 1-2 days of onset for best outcomes.

- Hypercarbia on mechanical ventilation with high Pplat (>30 cm H2O)
- Severe Broncho-pleural fistula
- Need for intubation in a patient on lung transplant list

Several other conditions are also coming under the ambit of this modality as it progresses. But whatever the disease conditions, it should be reversible or one should have an exit strategy in mind.

Venoarterial ECMO (VA ECMO)

In contrast to VV ECMO, for which the primary focus is gas exchange, VA ECMO allows for blood to be drained from a central vein and returned to the arterial system. This allows for both respiratory (to a certain extent) and circulatory support. Here, the ECMO circulation bypasses the heart and the lungs completely or partially and resulting into dual arterial or systemic circulation; the net circulation is the mixture of native and ECMO circulation. VA-ECMO support decreases cardiac work and reduces cardiac oxygen consumption while providing adequate systemic organ perfusion with oxygenated blood. Basically, a circulation in parallel to the native circulation is made.

Indications

Any form of extracorporeal support aims at normalizing organ perfusion till the endogenous system is not normalized or replaced. It means that the aim of any mechanical support should be to act as a bridge to recovery of the organ OR to it

transplant OR to a destination therapy like Ventricular Assist Devices OR even as a bridge to another bridge. It can also act as a bridge to a diagnosis in cases which present in life threatening conditions with little time to find out the cause. But a word of caution: not all diagnosis if made after ECMO has been initiated, will be amenable to treatment or recovery. Exit strategies in such cases should be pre-defined and pre-explained to the family (and patient in rare cases) as ethical dilemmas are very common in such cases. For example, if a young patient is in ER in refractory arrest with no family or records to tell you the cause, you may proceed with E-CPR and tide over the crisis. Now the best-case scenario can be massive pulmonary thromboembolism which is managed followed by recovery. Worst case is that this embolism is a result of a terminal malignancy which you might find out later with poor recovery of the cardiogenic shock and no option of transplant/VAD. This is called as a "bridge to nowhere" when the patient becomes stuck with no option to go further for transplantation, VAD or recovery. Moreover, the occurrence of hypoxic ischemic encephalopathy and fear of a vegetative state can complicate things.

Clear communication, exit strategies and careful patient selection can be helpful but as you do more cases, you will realise that you can never be too careful. The ultimate emotional burden and drain of vital resources can be a daunting reality that the family and the medical team will have to face.

With this as a background, major indications of VA ECMO are outlined below. As we gain more knowledge, the indications are growing, but the basic principles of reversibility and exit strategies should never be forgotten. A few of the common indications are discussed later in this chapter.

Cardiogenic Shock: Severe Cardiac Failure Due to Almost Any Cause

- Acute coronary syndrome
- Cardiac dysrhythmic storm refractory to other measures
- Sepsis with profound cardiac depression
- Drug overdose/toxicity with profound cardiac depression
- Myocarditis
- Pulmonary embolism
- Isolated cardiac trauma
- Acute anaphylaxis

- **Post cardiotomy: inability to wean from cardiopulmonary bypass after cardiac surgery**
- **Post heart transplant: primary graft failure after heart or heart-lung transplantation.**
- **Chronic cardiomyopathy**
  - As a bridge to longer term VAD support
  - Or as a bridge to decision
- **Periprocedural support for high risk percutaneous cardiac interventions**
- **Bridge to transplant**

Contraindications to ECMO

Sometimes contraindications become more important than indications to avoid a catch-22 situation

Various contraindications are:

- Advanced age (more than 75-80 years old)
- Disseminated malignancy
- Severe degenerative brain disease
- Unwitnessed cardiac arrest
- Post CPR time (more than 45-60 minutes)
- Aortic dissection

- Severe peripheral vasculopathy
- Irreversible renal disease (dialyzed patient)
- Severe aortic regurgitation
- Ungraftable coronary arteries
- Non-eligibility to heart transplant or VA

Further Reading

1. Extracorporeal Life Support: the ELSO Red Book 5th Edition.
2. ECMO Specialist Training Manual 3rd Edition :ELSO
3. ELSO Guidelines for Adult Cardiac Failure v1.3
4. ELSO Guidelines for ECPR Cases v1.3
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Indirect Calorimetry Versus Usual Care: A Retrospective Cohort Study

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Abstract

Introduction

This is a study evaluating the effect of indirect calorimetry on the length of stay. The study comprises of the comparison between the use of indirect calorimetry versus usual care in critically ill mechanically ventilated patients with respect to the length of stay in the intensive care unit, and duration of time on ventilator. Patients were divided on basis of their nutrition risk to study the effect of indirect calorimetry on the length of stay.

Material and Methods

This was a retrospective cohort study of 166 mechanical ventilated patients in S .L Raheja Hospital. Data was collected from 83 patients who were mechanically ventilated between January 2019 and November 2019 on whom indirect calorimetry was used to measure energy requirements. This cohort was compared to 83 patients between January 2018 and November 2018 where the energy requirements were calculated with the use of predictive equations. Both groups were matched for age, sex, comorbidities, APACHE score and use of vasopressors.

Results

Significant difference in the sicker group of patients was seen in the length of stay in the intensive care unit (9.23 ± 8.14 vs. 11.52 ± 5.65, p = 0.0034). Patients at risk for malnutrition demonstrated reduced length of time on ventilation as compared to those not at risk (10.2 ± 11.01 vs. 13 ± 5.87; p = 0.0042).

Conclusion

The use of indirect calorimetry may be associated with a lower length of ICU stay among ventilated patients in a reasonably sick group of mixed surgical patients.

Catatonia: An Enigma in ICU

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Abstract

Catatonia is a well-known entity as a psychiatric disorder, however there is evolving evidence of it being occurring in several medical and affective disorder. Familiarity with the diagnosis and presentation of catatonia in ICU is often lacking among the intensivists. We hereby report a case of catatonia in a young patient with no past psychiatric disorder. He underwent battery of test for determining the cause of altered mental status. He was treated with benzodiazepines following a lorazepam test when catatonia was suspected leading to improvement in his condition. Awareness about catatonia among the physicians and intensivist will lead to a early diagnosis of such cases.

Keywords: Catatonia, Altered mental status, Benzodiazepines, Intensivist

Introduction

Catatonia was previously being defined exclusively under and as a psychiatric disorder, however the current evidence clearly suggest it can also occur in several medial and affective disorder (depression, anxiety or bipolar disorder)[1]. Catatonia in ICU is often misdiagnosed or there is a delay in diagnosis mainly because of lack of familiarity with the disease/syndrome or the way intensivist approaches such cases are often based on in search of a organic cause. There is lack of literature on catatonia and its management in ICU with very few case series describing its occurrence in ICU and the need for awareness among intensivist[2,3].

The DSM-V defines catatonia as the presence of three or more of the following: Catalepsy, waxy flexibility, stupor, agitation, mutism, negativism, posturing, mannerisms, stereotypies, grimacing, echolalia, and echopraxia[4] . There is a need to define catatonia as an independent diagnostic entity.[5]

Case

A 26-year-old man, an army personnel by profession was admitted to ICU with acute onset of encephalopathy following a one-week routine training. There was no history of fever, seizures, vomiting, headache or photophobia. He also has no past psychiatric disease. On examination he had rigidity involving all 4 limbs and his GCS was E2V1M5. There were periods of agitation and mutism during the initial phase. A battery of test were done to rule out organic cause which involved MRI brain with venogram, CT scan of brain, EEG and a toxicology screen, which turned out to be non-significant. His lab reports were unremarkable other than serum CPK of 4800 IU/Litre. He was hydrated adequately with IV fluids till his CPK started trending below 1000 IU/Litre. Patient was started on treatment in lines of meningoencephalitis with IV antibiotics and antivirals. CSF examination was planned immediately. While doing the procedure we decided to give midazolam 2mg bolus to facilitate the procedure. Immediately post IV midazolam, we noticed that patient's symptoms improved dramatically in regards to mobility and speech. His symptoms reappeared within 30 minutes after that brief period of improvement. That is when an alternate diagnosis of catatonia was contemplated and after psychiatric opinion, patient was started on lorazepam 2mg intravenous every 8 hourly. CSF analysis and cultures were negative of bacterial/viral meningoencephalitis. His symptoms improved within 24 hours. He was discharged after 1 week with tapering doses of lorazepam and to be followed up after 1 week by psychiatrist/physician.

Table 1: DSM Criteria for Catatonia (Ref DSM)[6]

Symptoms	Description
Stupor	No psychomotor activity; not actively relating to environment
Cataplexy	Passive induction of posture held against gravity
Waxy flexibility	Slight, even resistance to positioning by examiner
Mutism	No, or very little, verbal response
Negativism	Opposition or no response to instruction or external stimuli
Posturing	Spontaneous and active maintenance of posture against gravity
Mannerism	Odd, circumstantial caricature of normal actions
Stereotypy	Repetitive, abnormally frequent, non-goal-directed activities
Agitiation	Without apparent cause
Grimacing	Facial expression of disgust, disapproval, or pain
Echolalia	Mimicking another's speech
Echopraxia	Mimicking another's movements

Discussion

Catatonia is a neuropsychiatric syndrome of altered mental status and characteristic psychomotor findings, which can occur in response to a wide variety of psychiatric, neurological, and medical conditions. The misconception that catatonia is exclusively seen or related to psychiatric disorders were challenged by few authors in their case series.[2,3] In a letter to editor, Rizos DV argued that catatonia, based on current diagnostic criteria is difficult to diagnose in ICU and moreover it strongly coincides with symptoms of common presentation like hypoactive delirium.5 Hence there is a need to accurately diagnose and manage catatonia, which can help the intensivist in avoiding inappropriate interventions. Incidence of catatonia secondary to medical illness ranges from 7% to 45% in various clinical settings; however, its exact prevalence within ICU is unknown and can affect up to 4% of critically ill patients.7-9 There is heterogenicity in the pathophysiological mechanism of catatonia with dysregulation of basal ganglia- thalamic cortical circuit leading to changes in neurotransmitter function as main precipitating factor[10-11].

Our patient had no prior psychiatric issues and with symptoms of altered mental status along with overall rigidity led to a diagnosis of meningoencephalitis after ruling out organic cause. It was only accidentally we stumbled upon improvement in symptoms with benzodiazepines. This is when we went back to literature and strongly considered a differential diagnosis of catatonia. Retrospectively we found symptoms like waxy flexibility, posturing, and staring present in our patient. As an intensivist we ideally do not do a detail psychiatric assessment, nor we give importance to these differentials when the patient has no psychiatric problems previously. Hence, it's likely that the diagnosis of catatonia is often delayed or missed.

There is a long list of differential diagnosis for catatonia in ICU, most commonly septic encephalopathy, delirium, metabolic disorders, neuroleptic malignant syndrome, serotonin syndrome, CNS infections, cerebrovascular events, vegetative states, non-convulsive seizures, and autoimmune encephalopathy. Whenever catatonia is suspected, a "lorazepam test" i.e., 1-2 mg of lorazepam IV can be given to look for improvement in symptoms and to diagnose catatonia. This test is associated with improvement in symptoms within 10 minutes and overall response rate of 60-80% within hours to days[12,13].

Other treatment option includes ECT therapy which is reserved for benzodiazepine resistant catatonia. Pharmacological therapies like memantine, amantadine, valproate, zolpidem, and phenobarbital have also been tried as an adjuvant to benzodiazepines[14-16].

Sudden withdrawal of benzodiazepines in elderly when they present to ICU is also one of the common causes of catatonia[17,18].

Differentiating catatonia from delirium which is a more common occurring phenomenon in ICU is quite important. In a randomised study by Wison et al, they found that delirium is more common than catatonia (43 % vs 3 %) but can co-exist in 31% of critically ill ICU patients requiring mechanical ventilation / or vasopressor support19. Sorting a psychiatric opinion also becomes important in patients with delirium in ICU who are concomitantly showing signs and symptoms of catatonia.

Conclusion

Catatonia is a clinical entity often underdiagnosed or overlooked in patients presenting to ICU. Intensivists and clinicians need to look actively for presence of features of catatonia in patients presenting with altered mental status with or without prior psychiatric disease.

A Complex Case of Dysphagia

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Introduction

Guillain-Barré Syndrome (GBS) is an acute inflammatory polyradiculoneuropathy presumed to result often from an infection triggered autoimmune reaction. It is one of the most common causes of acute, acquired weakness and may be complicated in some cases by respiratory failure or autonomic dysfunction. In about more than two-thirds of the cases, an episode of infectious disease is observed in the weeks before the onset of GBS. [1] The prevalence of GBS is estimated to be 1–3 per 100,000 worldwide, and the disease is more common in males than in females, more commonly associated with C.jejuni and Influenzas, CMV, Mycoplasma Pneumoniae and recently with COVID-19, zika virus. The pathogenesis of this acute polyneuropathy is often triggered by autoantibodies and molecular mimicry affecting all myelinated nerves causing demyelination [AIDP, Miller Fischer Syndrome (MFS)] or axonal loss [AMAN, AMSAN].[2]

GBS also is classified as localized forms grouped under GQ1b syndromes viz., PCB (pharyngeal-cervical-brachial) weakness, MFS variant with optophthalmoplegia areflexia and ataxia and Bickerstaff brainstem encephalitis with encephalopathy, optophthalmoplegia and ataxia.3 The initial symptoms are classically described as symmetrical weakness or paralysis of extremities rapidly progressing from one end to other (distal or proximal) with the involvement of trunk and cranial nerves manifesting as ptosis, ophthalmoplegia vision defects, facial or bulbar palsy.4-6 Though the diagnosis of GBS is based on history and clinical examination, the electrodiagnostic testing with the absent or prolonged H-reflexes and /or F-wave latencies and CSF analysis with the classic albumin-cytological dissociation provide a support to the diagnosis.7,8 Patients who present with atypical symptoms pose a significant diagnostic challenge. We describe a rare case of GBS presenting with throat pain and dysphagia which mimicked as Upper respiratory tract infection or probable abscess.

Case Description

A 52-year-old male presented with complaints of odynophagia and dysphagia for the past 3-4 days. There was history of fish intake four days prior. There was no history of any recent viral illness diarrhoea or history of fever, the medical history was unremarkable except for hypertension on regular treatment. On presentation, his vitals were stable, with pooling of secretions in the oral cavity, his GCS was 12/15 and he was drowsy with inappropriate phonation. He had no focal neurological deficit and power was grade 5 with sensory perception and reflexes intact in all four limbs. He was electively intubated in view of airway protection and procedure was smooth and uneventful and continued on sedation, during intubation it was noted his pharynx and larynx were inflamed. He underwent CT imaging of the brain. CT brain showed no significant findings. A probable diagnosis of fish bone impaction with parapharyngeal or retropharyngeal abscess or upper respiratory infection with laryngitis was made. His laboratory parameters were within normal limits except elevated total leucocyte count. ENT surgeon's opinion was taken, direct bronchoscopy was performed which showed inflamed, swollen posterior pharyngeal wall and did not yield a diagnosis. The MRI neck showed diffuse soft tissue edema and thickening involving the posterior nasopharynx extending to the oropharynx with non-visualisation of uvula and soft palate and no obvious fluid densities. He was continued on antibiotics and other supportive measures. On day 2, he developed proximal weakness of both upper limbs with power 0/5 and distal muscle power of with power of 4/5 with simultaneous ptosis and ophthalmoplegia in both eyes, and the patient was encephalopathic with GCS 12/15. The proximal muscle weakness later progressed to distal

muscle weakness with power 0/5. His power in both lower limbs were initially preserved and later he developed similar pattern of proximal weakness followed by distal weakness. A probable diagnosis of variant of GBS-BBE was made, nerve conduction studies concluded diffuse motor axonal dysfunction with reduced CMAP, SNAP and absent F waves. Repetitive nerve stimulation showed no significant decremental response. CSF analysis showed classical albumino-cytological dissociation with cells of 4 cells/cumm and proteins of 94mg/dl (normal:15-45mg/dl). On day 2, he was planned for 1st cycle of plasma exchange. Totally he underwent 7 cycles of plasma exchange since there was no significant neurological improvement. It was further planned to administer IVIg and a total of 7 doses [30grams over 3-4hrs] were administered. During the course of treatment there was significant dysautonomia which was managed with antihypertensives and other supportive measures. He was tracheostomised in view of prolonged requirement of ventilator support and gradually weaned off to T piece with intermittent speaking valve trails. He was discharged home with physiotherapy and rehabilitation advice.

Discussion

and/or paraesthesia usually preceded by a mild respiratory or gastrointestinal viral infection that induces an aberrant immune response targeting peripheral nerves and their roots. Molecular mimicry between the microbial and nerve antigens as well as the interplay between microbial and host factors play a major role in pathogenesis.9,10 Demyelinating and axonal forms of the syndrome occur in varying proportions across different geographical regions, and clinical variants such as PCB weakness, MFS and BBE are sub grouped under GQ1b syndromes. Even today an atypical presentation with heterogeneity of symptoms constitutes a diagnostic challenge for medical specialists. In the present case, patient had symptoms of throat pain, difficulty in swallowing and altered sensorium with no history of any preceding illness with normal findings on CT brain. MRI neck ruled out the possibility of any pre- or para-pharyngeal abscess. With the acute onset of bilateral ptosis with rapid progression to quadriplegia with normal neuro-imaging led us to think in terms of GBS. Unfortunately, due to non-availability of testing for anti GQ1b antibody we could not test this patient for the same. Hence, close monitoring and timely diagnosis played a significant role. At least, two-third of patients have preceding illness with 25-50% even higher in Asian population having C.jejuni as the predominant infection.[12]

Though the weakness is classically described ascending, and usually starts in lower extremities in GBS, exceptional cases can have weakness starting more proximally in arms or legs. Miller-Fischer syndrome is described as a triad of ophthalmoplegia, ataxia and areflexia. However, in one quarter of patients it can involve other cranial nerves leading to bulbar palsy and can progress to weakness of the limbs (MF-GB overlap syndrome). In Bickerstaff brainstem encephalitis, the presentation features are characterised by ophthalmoplegia, ataxia, areflexia, impaired consciousness and overlapping sensorimotor GBS.13,19,20 In general, GBS variants are rarely pure and often overlap in part with the classic syndromes or variant forms.[14]

GBS is diagnosed clinically but nerve conduction studies are required to support the diagnosis, to discriminate the axonal or demyelinating types and for the prognosis as well. These measurements might be normal in early course of illness (<1week) or in mild disease, proximal weakness or clinical variants and in these patients a repeat study 2-3 weeks later may be helpful.15 To increase the diagnostic yield, at least four motor nerves, three sensory nerves, F-waves, and H-reflexes, should be examined and low compound muscle action potentials (CMAPs) are the most consistent findings predictive of poor outcome.[16]

Treatment aspects of GBS involves both general medical care and immunological therapy. Meticulous attention to supportive care is needed to prevent or manage complications. Ventilatory support, cardiac and hemodynamic monitoring (autonomic dysfunction), deep vein thrombosis prophylaxis, management of bowel and bladder, early initiation of physiotherapy and rehabilitation and psychosocial support become salient part of treatment.10, 17immunological therapy with plasma exchange or IVIg should be started in principle as soon as possible before irreversible nerve damage has taken place. Trials have demonstrated that IVIg started within 2 weeks and plasma exchange started within 4 weeks of onset of weakness are equally efficacious beyond which evidence of efficacy is lacking.18 The decision of plasma exchange or IVIg with comparable risks of adverse events depends on the patient's clinical circumstance and local factors. In our patient, we initially started him on a plan of Plasma exchange and with no significant motor improvement he was given IVIg therapy also.

Summary and Conclusion

With this case report we would like to highlight that patients with atypical symptoms of GBS can still be

overlooked and hence close monitoring and timely diagnosis with neuro-imaging, nerve conduction studies along with cerebrospinal study and other supportive care are essential part of treatment to improve the outcome.

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International Airlifting in a Commercial Bird – A Unique Challenge

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Introduction

Intensive care has improved by leaps and bounds over the years. Modern day practices have given us the knowledge and opportunity to think out of the box. The availability of affordable private healthcare centers with their improved infrastructure equipped with latest technology in our part of the world makes it convenient for even foreign patients to avail of medical help in India. Foreign nationals can avail of healthcare for both elective as well as emergency services, with the latter posing a different challenge altogether.

Over the years we have witnessed a sharp rise in the number of airlifted patients. This is mainly due to the considerable improvement in air ambulance services, both in and out of the country. Some of the challenges apart from the patient's condition include language barriers, cutting through the bureaucratic red tape and working around the permissions for transporting medical equipment.

We here report a case of a tracheostomized foreign patient on ventilation who was airlifted via a commercial airbus.

Case Report

A 44-year-old female, a tourist from South Korea, was referred from a peripheral hospital on the same day of meeting with a road traffic accident. She had suffered severe head injury after being hit by a car from behind. On arrival she was immediately put on mechanical ventilation in view of her low GCS (7 /15) and unstable hemodynamics. Her immediate CT scan brain showed hemorrhagic contusions over both frontal lobes.

After stabilization in the ICU, over the next few days, the MRI brain revealed diffuse axonal injury. With conservative management she showed further improvement over the next few days and was taken off the ventilation. However, she experienced bronchospasm and severe respiratory distress (ARF type II) few hours after extubation, following which she was switched back on ventilation along with sedation. Subsequently she developed ventilator associated pneumonia (VAP) with fever which was confirmed by both a tracheal (Acinetobacter MDR) and blood culture (Enterococcus). The antibiotics were escalated and tracheostomy was performed due to repeated weaning failure.

Over the next few weeks, she improved clinically and was gradually weaned off the ventilator. However, she experienced episodes of bronchospasm, for which the tracheostomy tube was left in situ, and was managed with nebulization, regular suction and few hours of spontaneous mode of ventilation a day. Neurologically she remained violent and needed regular sedation.

On the request of her family to shift the patient to her native place Seoul, South Korea options were sorted from Aeroambulance companies all over the state, but

none materialized mostly due to logistic issues, the destination being distantly located and financial restrains.

After multiple discussions with the family and explaining of the risks, in presence of an interpreter, a decision was taken to shift her by the hospital ambulance to the New Delhi airport, followed by air transfer in a makeshift commercial airbus. Both the South Korean and Indian Embassies were contacted, and multiple meetings were held with the concerned airline to discuss the way forward. As an anaesthesiologist and a practicing Intensivist, the challenges ahead and the importance of prior planning critical to fulfil this mission especially when all alone in air with the patien, were known.

We prepared an extensive list of instruments, drugs along with all other essentials required for the long journey. What followed in the next 10 days was cutting through tedious red tape from the immigration departments of both the countries and working around special permissions with the airline company to allow us to carry narcotics, sedatives, emergency drugs and battery operated machines (suction machines, nebulizers, infusion pump, pulse oximeter, BP machine, laryngoscope). The airline company arranged three portable oxygen cylinders inside the cabin for emergency usage and fixed a makeshift stretcher on top of nine commercial seats.

As our long journey was divided into two parts, we needed to be prepared for both - road and air travel, simultaneously. Since our ambulance was well equipped with essentials including suction and ventilator, all battery-operated machines that we would be needing while airborne were kept on charging mode throughout our five-hour road trip. We prepared three separate bags: one for all drugs and prefilled syringes, the second for all essential equipment and consumables like diapers, Foley's catheter and extra tracheostomy tubes, endotracheal tubes, etc. and the third included all battery-operated machines with extra batteries for each.

On the day of journey, the risks relating to transportation were again explained with the help of an interpreter to the sole family member who was to also accompany the patient on the journey and a final consent was taken.

The shift from the ICU to the ambulance was safely executed and the patient was strapped and the pressure points padded during the transport. Mild sedative/anxiolytics (Midazolam) along with antiemetic were given and a Dexmedetomidine infusion was initiated. Prophylactic nebulization along with multiple suctions of tracheostomy tube prevented any crisis with the airway. Her vitals were monitored via multipara monitor during transportation with two halts on the way, one for change of diapers and the other for emptying the urine chamber.

The team was received at the New Delhi airport by an equally equipped airport ambulance, with a swift shift to the runway. Immigration and other security formalities were taken care of by the embassy and airline crew. Shifting of the patient from ambulance to the makeshift stretcher bed inside the airbus via a narrow door passage was a challenge but fortunately many helping hands came forward.

Once inside the cabin the patient was strapped, secured and monitored using a finger pulse oximeter throughout the journey. Anticipating the problems associated with rapid ascent, Duolin nebulization was administered before take-off. The Oxygen cylinder was kept by the makeshift beds, fixed by a seatbelt, attached with a Bains circuit ,ready to use in case of an emergency. Midazolam and Haloperidol boluses were also given along with Dexmedetomidine infusion to keep her sedated throughout the flight. During takeoff, she had cough with spasm as anticipated and assisted breathing was given with the Bains circuit and repeated nebulization was performed with the battery-operated machine. The long length of the Bains circuit allowed comfort of operation as compared to the traditional AMBU bag. Fortunately, the rest of the flight including the touchdown was uneventful.

On arrival a green corridor was created for the ambulance from Incheon airport to Seoul National University Hospital. The patient maintained stable vitals and on reaching the pre designated bed in the ICU, she was handed over to the on duty resident. Finally, after a total transit time of 20 hours, the team heaved a sigh of relief and enjoyed the South Korean hospitality.

Discussion

As anaesthesiolgists and intensivists, our careers are chequered with challenges of varied proportions. We are trained to deal with all lifesaving maneuvers in operation theatres and in the intensive care. Transporting a sick, agitated patient with an artificial airway singlehandedly and that too in a commercial airline flying 150 other passengers on board, was a challenge of different proportions. Meticulous planning and preparedness to face all adversities, were crucial to a successful mission. A humungous task like this needs Herculean coordination between hospitals, multinational immigration departments, embassies, ground crew, airlines support, language interpreters and above all the determination to pull this off.

Physiotherapy in Critical Care

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Physiotherapy is an important intervention that prevents and mitigates the adverse effects of mechanical ventilation during critical illness. For mechanically ventilated patients, early physiotherapy has been shown to improve the quality of life and to prevent ICU-associated complications like deconditioning, ventilator dependency, and respiratory conditions. Despite the recent progress in medical treatment and mechanical ventilation, critical illness in the intensive care unit is still associated with high mortality rates. Furthermore, ICU survivors may suffer from muscle weakness, physical disability, and cognitive problems.

Physiotherapy includes patient mobilization based on a progressive sequence of activities like decubitus change and functional positioning; passive, supported-active, and active mobilization; cycling and sitting in the bed; and standing, static walking, transferring from bed to chair, and walking. Early physiotherapy is aimed at improving a patient's quality of life and preventing ICU-associated complications like deconditioning, ventilator dependency, and respiratory conditions.

Management of Airway Secretions

Mechanically ventilated patients in the ICU may suffer from retained secretions due to many causes. Furthermore, immobilized patients may suffer from atelectasis, impaired cough mechanism, and related inability to expel secretions. Associated expiratory muscle weakness decreases cough strength; in addition, fluid restriction contributes to secretion retention.

Helping airway clearance in patients under mechanical ventilation includes different techniques:

- Postural drainage- traditionally includes gravity-assisted positions
- Deep breathing exercises
- Respiratory muscle strengthening
- Clapping, shaking, vibration and suctioning
- Incentivized cough to move airway secretions toward the upper airways

Mobilisation, Deconditioning and Musculoskeletal Therapy

Physiotherapists have a role in maintaining joint and muscle function in those who are at risk of contractures, for example in neurological injuries and patients with prolonged paralysis

There is increasing emphasis on exercise rehabilitation over respiratory management; increasingly evident as survivors of a prolonged ICU stay can suffer deconditioning, muscle atrophy, and weakness that may impact their quality of life.

Early Mobilization

Early mobilization can be performed also in unconscious or sedated patients. Protocols include semi recumbent positioning with the bed head positioned at 45°, frequent change in posture, daily sessions of joint passive movement, and passive bed cycling and electrical stimulation.

Conclusion

Physiotherapy for the critically ill patients is extremely important. The choice of technique and protocol is individually tailored and multidimensional. But the effects of early physiotherapeutic rehabilitation are undoubtedly affirmative in ensuring speedy and maximal possible recovery of patients with critical illness.

Nutrition in Critical Care

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Nutrition is the foundation for a healthy life and more so during hospitalization. Studies carried out in ICUs across the world estimated that about 30 to 50% of critically ill patients have clinical evidence of malnutrition. It is a problem which is underrecognized and undertreated.

Undernutrition develops because of reduced appetite, reduced food intake, increased requirements associated with a disease condition, cachexia and complications of an underlying illness such as poor absorption and excessive nutrient losses.

Malnutrition is consistently associated with adverse clinical outcomes, including increased morbidity, mortality, and length of hospital stay as well as reduced quality of life.

A good preoperative nutritional status increases the ability of the patient to tolerate the surgical stress, reduces the time for wound healing, fastens the post-operative recovery, reduces the length of stay while also reducing the risk of infection. Overall, it helps the patient to recoup faster, and improves outcomes.

Critical care nutrition considers the metabolic changes happening with the patients like hypermetabolism, protein catabolism, insulin resistance induced due to stress because of invasive procedures, medications and the changes that the body undergoes during hospitalization.

Nutrition is planned for a patient in critical care considering the requirement based on clinical condition, gastrointestinal tolerance, blood sugar levels and biochemical parameters.

Nutritional support is required to meet the requirements both during and after the stay at ICU to reduce the adverse effect of severe catabolism and prevent significant deconditioning. Appropriate supply of energy and protein can avoid both underfeeding and overfeeding, which are detrimental.

Enteral nutrition (EN) is always preferred over parenteral unless and until there is a contraindication to enteral route. EN is noninvasive, preserves the gut integrity, prevents bacterial translocation, has a reduced risk of infection, is more physiological and affordable. The feeds chosen for the enteral nutrition is based on the requirement for energy, protein, and other nutrients of the patient. While choosing the formulas, osmolarity, calorie and nutrient density of the feed, type of feed (polymeric, oligomeric or elemental), tolerance of the patient, route (prepyloric or post pyloric) is considered. Disease specific formulas like hepatic, renal, immune modulating and diabetic is used as per the need.

Goals of enteral nutrition in ICU include:

- Provision of adequate energy, protein, and micronutrients.
- Maintenance or improvement of nutritional status.
- Maintenance or improvement of function, activity, and capacity for rehabilitation.
- Maintenance or improvement of quality of life. Reduction in morbidity and mortality.

The nutrition practices, setting and policies may differ from hospital to hospital. The following guidelines of medical nutrition therapy (MNT) should be followed for the benefit of the patient.

- Nutrition screening and assessment must be carried out for all the patients admitted in the hospital.
- Oral diet should be preferred over enteral nutrition (EN) or parenteral nutrition (PN) in critically ill patients who are able to eat.
- If oral intake is not possible, early EN (within 24 to 48 h) in critically ill adult patients should be performed/initiated rather than delaying EN.
- In case of contraindications to oral and EN, PN should be implemented within three to seven days.
- To avoid overfeeding, early full EN and PN should not be used in critically ill patients but should be prescribed within three to seven days.
- In patients with gastric feeding intolerance not solved with prokinetic agents, postpyloric feeding should be used.

- In patients deemed to be at high risk for aspiration, postpyloric, mainly jejunal feeding can be performed.
- Hypocaloric nutrition (not exceeding 70% of EE) should be administered in the early phase of acute illness
- After day 3, caloric delivery can be increased up to 80-100% of measured EE.
- Scientific formulas should be preferred over blenderized feeds for appropriate nutrient delivery and to minimize feed contamination and tube blockage.
- Obese patients can be subjected to underfeeding (interms of energy and not protein). It may add some benefit to the metabolic outcomes and decrease in the length of ICU stay.
- Holding EN for GRVs <500 mL in the absence of other signs of intolerance should be avoided.
- GRV of <300 ml can be considered, if it is not blood stained.
- EN should not be interrupted in the event of diarrhea.

The reasons for diarrhea in a critically ill patients can be multifactorial. Lactose free, semi elemental, soluble fibre containing or less concentrated feeds can be tried in a patient passing three or more times of loose stools a day.

The nutritional status of a patient during hospital admission influences the outcome of the patient, and nutritional intervention during hospital stay improves the outcomes of surgery or treatment.

Nutritional support should be considered as being of therapeutic benefits and not just supportive or adjunctive. A good coordination among Dietitians with other disciplines to implement evidence-based practices will help in improving the outcome of the patients.

Unanticipated Complications in ICU- 'Doctors and Nurses' Hands are the Real Tools That Save Lives

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Saving a life in a critical situation does not necessarily require a higher technology. It just needs timely action, perfect basics and sincerity of the effort. In a year, uncountable lives are saved in Intensive Care Units by just following protocols perfectly and usually passed as routine work. We present one such case, which developed completely unrelated and multiple unforeseen complications after a routine knee replacement surgery. Any one of those suddenly developing complications could have been fatal within seconds, but timely interventions at odd hours and perfect management ensured not only saving a life but also that the patient was discharged without any deficit after 30 days of ICU stay.

Diagnosis

1. Bilateral Total Knee Replacement
2. Duodenal perforation- Peritonitis and Surgery done
3. Cardiac arrest secondary to cardiac event- Stress Cardiomyopathy/ Acute coronary syndrome. EF 20% - Improved completely
4. Sepsis- Chest infection
5. Renal impairment- Recovered
6. Critical illness neuropathy – recovered

Course in the Hospital

A 73-year-old male patient, visited the hospital for a planned TKR, a routine surgery, without any significant co-morbidity. The patient was taken up for surgery (TKR) on 13/06/2022 under regional anesthesia (CSEA). He was observed in SICU for 24 hours and shifted to ward in a stable condition. In the ward, the patient complained of pain abdomen on 14/06/2022. The

patient was shifted to the ICU in view of persistent pain abdomen and suspected upper GI bleed. CT scan whole abdomen was done and he was advised laparoscopic repair for duodenal perforation.

The patient underwent, laparoscopic duodenal perforation repair with peritoneal lavage on 15/06/2022 by GI surgery team. Post operatively patient was shifted to ICU on ventilator support.

He was extubated on 16/06/2022 and was put on NIV support. On 17/06/2022 early morning, the patient suddenly became unresponsive after an episode of bradycardia followed by asystole, for which CPR was immediately started. The patient was revived, intubated and put on mechanical ventilator and noradrenaline infusion. Echocardiography revealed EF 20%. Possibility of stress Cardiomyopathy/ Acute coronary syndrome was kept in mind. After three weeks in the ICU, the patient was weaned off from ventilator and ultimately the tracheostomy was closed. The ejection fraction also improved in a week's time. He regained power in the limbs and was able to walk.

The patient developed completely unrelated and multiple unforeseen complications after knee replacement surgery in the post-op period. This single patient tested our ICU systems in the hardest way.

Conclusion

The team work of surgeons, critical care doctors and nurses at odd hours, efficacy of CPR, response to unanticipated suddenly developing complications, infection control practices and perfection of basic ICU protocols saved this patient from a certain death and he recovered without any deficit.

Care for the Caregiver

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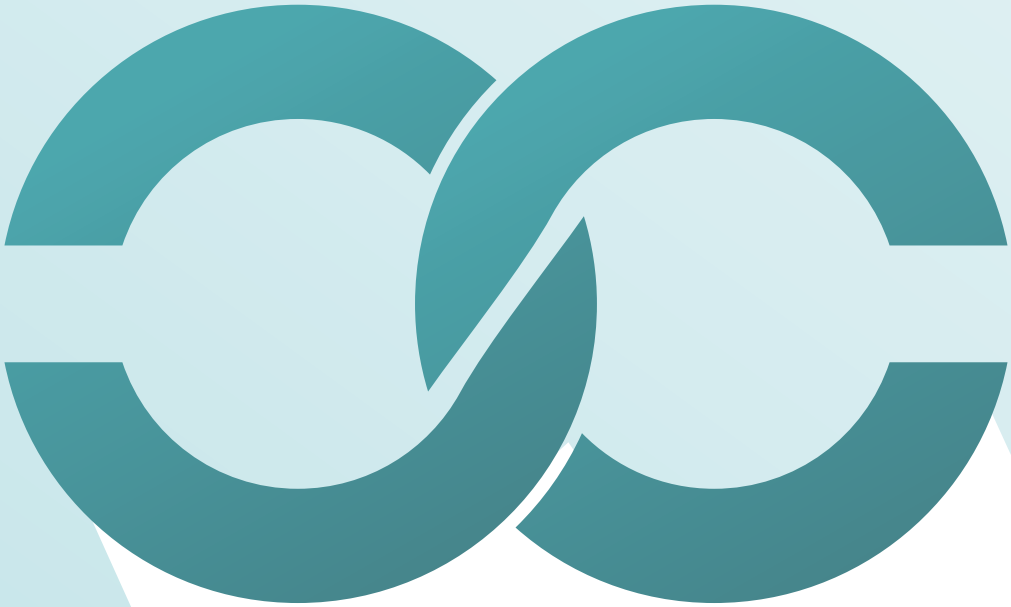
A loved one admitted to the ICU is a harrowing experience for us all. It's natural to feel a range of emotions from sadness to fear and anger. And so, even as we care for our patients, it's just as important that we care for the families of these patients.

The key to caring for caregivers is an empathetic approach, and to do that we must first understand their lived experience. ICU admissions are typically very sudden and so people may experience a sudden shock. The hospital environment can be intimidating, as can the medical terminology used by doctors, making them feel lost and confused. As a result of their worry and nervousness, they may seek more information or end up asking the same questions over and over. They may feel lonely, sitting all by themselves in isolation. At the same time, they may also not have been eating, hydrating themselves or have had a night's sleep. For the caregivers of patients who've been in the ICU for a few days, other aspects of their day-to-day life, including work and home may also get neglected.

Sensitive communication is probably the most important aspect when it comes to caring for caregivers. Understanding their distress, let's take few moments more out of our schedule to talk to family members in a kind and compassionate manner. Don't get annoyed or exasperated when relatives don't understand or ask the mundane or repetitive questions – answer with patience and respect. At the same time, we must ensure consistency in communication – since relatives cannot spend a lot of time with patients, regular updates from within the ICU would be helpful. It is also a good idea to take a moment to check in on their well-being, asking them how they've been doing. Integrating counselling to help cope with the anxiety of hospitalization or at times, with grief and loss, can also go a long way in caring for caregivers.



CONTAINING INFECTIONS & AMS-CONVERSATIONS

A Retrospective Review of a 2 Year Strong Antimicrobial Stewardship Program in a Tertiary Care Institute in Mumbai

Source: Indian J Pharmacol. 2022 Jul-Aug;54(4):253-257 doi: 10.4103/ijp.IJP_466_20. PMID: 36204808

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Abstract

Background information: Many institutes have implemented a strict antimicrobial stewardship (AMS) program in the post antibiotic era.

Aim: To investigate how the resistance pattern changes after implementation of a stringent AMS programme.

Methodology

It employed a defined daily dose methodology (DDD). The formulae listed below are used to compute this for two periods: October 2015 to October 2017 (Period 1) and October 2017 to October 2019 (Period 2).

DDD = Antibiotics used in total (g) per year.

DDD = Total antibiotics usage (g)in a year

DDD (from WHO)

The length of stay was determined using the data from the hospital information system (HIS). The patterns of resistance to the limited antibiotics were vancomycin, linezolid, tigecycline, and colistin. In both Periods 1 and 2, skin and soft-tissue infections, urinary tract infections, bloodstream infections, and respiratory tract infections were studied.

Results

From October 2015 to October 2017, 4569 patients received limited antibiotics out of a total of 14,544 admissions. The average length of stay was 7.48 days in Period 1, however, it was reduced to 3.96 days in Period 2 out of 15,199 patients. In vitro isolate sensitivities to vancomycin, linezolid, tigecycline, and colistin were increased.

Conclusion

Some of the most common antibiotics were used less frequently. This appears to be linked to a shorter stay in the hospital and increased antibiotic susceptibility.

Keywords : Antibiotics; antimicrobial stewardship; sensitivity.

New Antibiotic Prescription Pattern in Critically Ill Patients ("Anti-critic"): Prospective Observational Study from an Indian Intensive Care Unit

Source: Indian Journal of Critical Care Medicine (2022): 10.5005/jp-journals-10071-24366

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Abstract

The first step in the direction of a successful antibiotic stewardship programme is to understand existing antibiotic prescription processes, including motives for antibiotic use. Currently there is only limited data available on this crucial aspect of antibiotic prescription from Indian Intensive Care Units (ICUs). The present study aimed to address this hitherto unmet need, aiming to understand the process of antibiotic initiation, pattern of changing prescriptions including de-escalation strategies, and outcome of prescription in an Indian ICU. The study also aimed to look for epidemiological differences between patients receiving new antibiotic(s) in ICU from remaining patient cohorts and factors associated with favourable outcome of prescription.

Materials and Methods

In a prospective longitudinal study, all adult patients admitted between 01 June 2020 and 31 July 2021 in the multi-disciplinary ICU of Fortis-Escorts Hospital for at least 24 hours, were screened for any new antibiotic prescription throughout their ICU stay. All new antibiotic prescriptions were assessed for baseline variables at prescription, any modification(s) during the course, and the outcome. This study was approved by the institutional ethics committee (EC/2020/27, 17/06/2020) and was registered with the Clinical Trial Registry of India (CTRI/2020/06/026257). Considering the observational nature of the study, need for informed consent was waived off.

Results

1014 patients admitted in the study period fulfilled entry criteria. At least one antibiotic episode was prescribed in 502 patients. In another 98 patients, antibiotics were prescribed before ICU admission and were continued during ICU stay. 103 patients received prophylactic antibiotics. Overall, in 59.2% and 7.2% of ICU-days, patients were on therapeutic or prophylactic antibiotic(s) respectively. Patients, who were prescribed therapeutic antibiotic(s), had worse ICU outcomes including death, days on mechanical ventilation, days on vasopressor support, need for renal replacement therapy and ICU length of stay. 552 episodes of new antibiotics were prescribed in 502 patients. 92.13% of these prescriptions were empirical. Blood or other specimens were sent for culture in 78.81% and 60.04% of instances respectively. Overall, 31.7% of episodes were microbiologically proven and these episodes were more likely to be prescribed by an ICU consultant. 169 modifications were done in 142 prescription episodes; 73 of them after sensitivity results. Thus, the overall rate of de-escalation was 13.95%. Apart from the negative culture result (36.05%), other important reasons for a relatively low rate of de-escalation were absence of microbiological sampling in 12.32% patients and no scope for de-escalation in another 8.15% as patients already on single antibiotic with narrowest possible spectrum. 19.93% of patients were transferred out of ICU and another 8.15% were dead before culture result. Longer ICU stay before antibiotic prescription, underlying chronic liver disease (CLD), worse organ dysfunction, and septic shock were independently associated with unfavourable treatment outcomes. No such independent association was observed between antibiotic appropriateness and patient outcome.

Conclusion

Future antibiotic stewardship strategies should address issues of high empirical prescription. Less than desired rate of microbiological sampling as a hindrance to de-escalation, should encourage clinicians and healthcare administrators to develop a system to improve the same.

TRIVIA

Crossword

CONCEPT & CREATION
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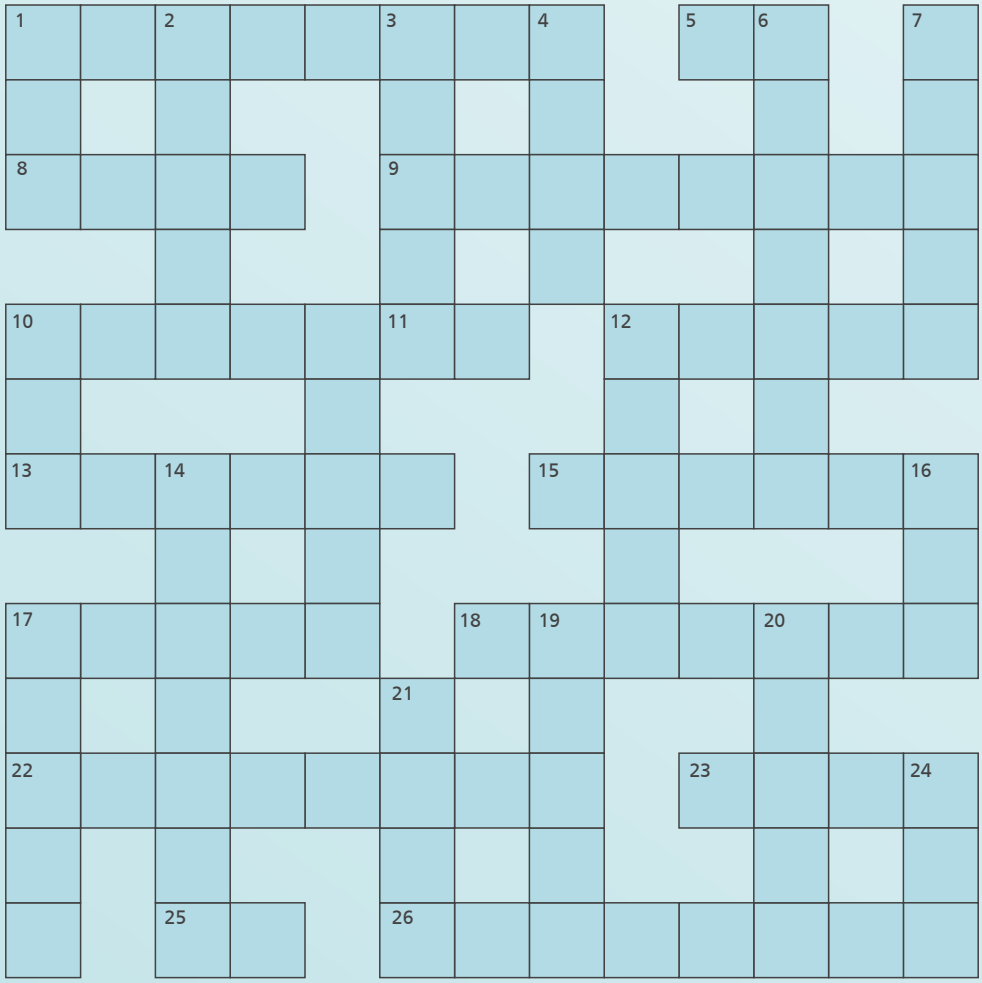


Down

1} Plasma Renin Activity (3)

2} Polyunsaturated fatty acids that are essential nutrients for health (5)

3} No need for doctors to write patient notes- the hospitals are becoming _____less (5)

4} Organs of vision (4)

6} Sudden, severe chest pain may be a sign of (5, 2)

7} Tricarboxylic acid cycle (5)

10} Energy emitted by the body, as per Chinese medicine

11} Common Acute Lymphoblastic Leukemia Antigen – acronym (5)

12} An individual who gives living tissue (kidney, liver or heart) to be used in another person (5)

14} Another name for cleft _____lip (7)

16} Angiotensis-converting enzyme (3)

17} A white or grey opaque ring in the corneal margin is called _____ senilis (5)

19} Individual with BMI (Body Mass Index) of 30 or above(5)

20} Premier medical institute and teaching hospital in Delhi (5)

21} Wearing _____ size clothing indicates obesity (4)

24} Emergency Medical Services (3)

Across

1} The mitral valve buckles into left atrium (8)

5} The mineral that is routinely assayed with vitamin D (2)

8} Concluding words for prayers and hymns (4)

9} Hypertension is elevation of blood _____ (8)

10} The painless primary lesion of syphilis (7)

12} The doctors/nurses have to follow a _____ code (5)

13} To take into lungs by breathing (6)

15} Pain in chest due to myocardial ischemia (6)

17} Main arterial trunk originating from the left ventricle (5)

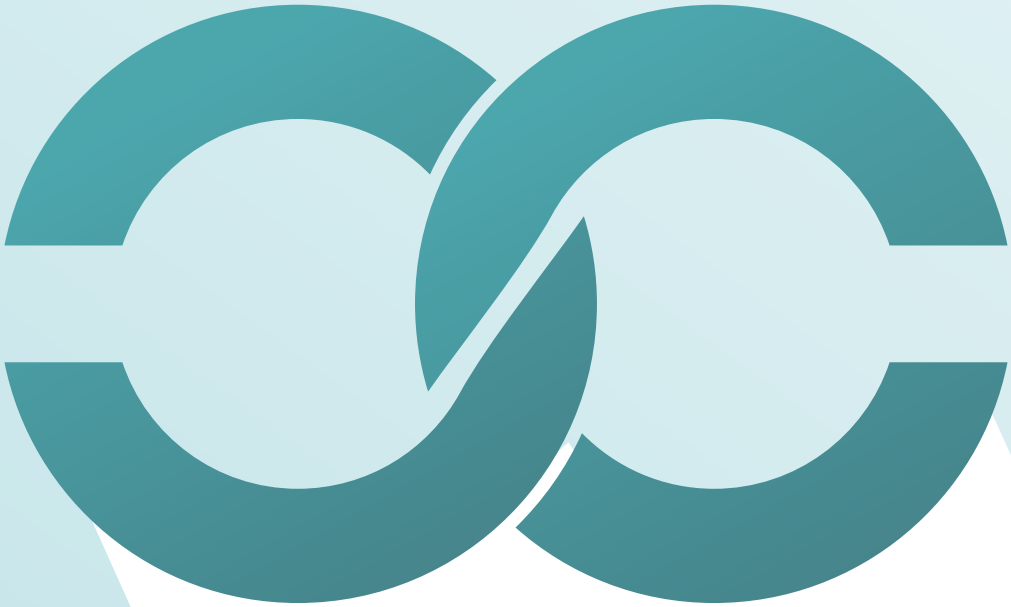
18} An event of rapid ventricular tachycardia with waxing and waning of QRS amplitude (7)

22} Pleural of cellulae-which in anatomy is a small more or less enclosed space (8)

23} The lateral (right or left) portion of the body (4)

25} Prolongation of this interval on ECG indicates a heart block (2)

26} Abnormal narrowing of a duct or canal (8)



CLINICAL CONVERSATIONS

Posterior Reversible Encephalopathy Syndrome (PRES) Post Normal Delivery

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Abstract

Posterior Reversible Encephalopathy Syndrome (PRES) is a clinicoradiological syndrome with multifactorial risk factors, most commonly preeclampsia and eclampsia. It should be considered in all pregnant and postpartum females with neurological signs and symptoms along with radiological features. Early diagnosis and management are vital to arrest further deterioration of this reversible condition. We report the case of a 26year-old female who presented to our hospital post normal vaginal delivery (NVD) with seizures and accelerated hypertension. She was diagnosed as PRES on clinical grounds along with MRI features and was managed in the Intensive Care Unit (ICU) where she recovered completely. Prompt diagnosis and early management are of prime importance in managing such a reversible condition.

Key Words: Posterior reversible encephalopathy, PRES, pregnancy, neurological complications, neurologic deficit, eclampsia, preeclampsia, clinicoradiological syndrome

Introduction

Posterior reversible encephalopathy syndrome (PRES) is an acute neurotoxic syndrome initially described in 1996 by Hinchey.[1] It is characterized by a spectrum of neurological and radiological features from various risk factors and most commonly develops in patients with preexisting preeclampsia and eclampsia.

The common neurological symptoms include headache, altered level of consciousness, seizures, hypertensive encephalopathy, cortical visual disturbances, and focal neurological deficits.[2] The classic MRI brain features include symmetrical edema of white matter involving occipital, posterior parietal and temporal lobes.[3]

While it is still unclear whether PRES is always a part of the clinical picture of preeclampsia, it is important to remember that PRES can present in many atypical ways, also as a consequence of hypertensive encephalopathy.

A high level of anticipation is needed to diagnose and swiftly manage such a reversible condition.[4] We here discuss a case of PRES managed in our ICU.

Case Report

A 26-year-old multipara was shifted to our hospital 5 hours after a full-term normal delivery at a peripheral health post with complaints of recurrent generalized tonic clonic seizures (GTCS), vertigo, occipital headache and blurred vision. Detailed history revealed a two hours long NVD with high blood pressure (170/100 mm of Hg maximum), 2 hours subsequent to which the first episode of seizure was reported. She was initially managed with Inj. Magnesium 2 gm and Inj. Midazolam 1 mg and eventually referred to our hospital. There was no history of any such events during her last pregnancy and the medical history of chronic illness was negative.

On arrival she was conscious but disoriented, restless, nauseated, with bipedal pitting edema. Her heart rate was 120/min, blood pressure 180/100, oxygen saturation of 94% at room air with mild tachypnea 27/min. Along with other systemic examinations, the neurological examination was unremarkable with bilateral reactive pupils, normal plantar flexors with no neurological deficits. Apart from mild proteinuria (+) and hypoalbuminemia (serum albumin 2.2 gm/ dl) other laboratory reports were normal. The chest X-ray, ECHO and ECG were normal. The MRI brain showed prominent white matter edema of the bilateral occipital and posterior temporal region without any evidence of bleeding.

Immediate ICU management in consultation with the neurology team included administration of magnesium and labetalol infusion, mannitol, frusemide, levetiracetam along with close monitoring of the vitals and GCS.

Attempt was made to lower the blood pressure gradually over the next 24 hours with Inj Labetolol and frusemide. Injectables were then replaced with oral amlodipine and torsemide. On day 2 when the patient stabilized, magnesium was stopped, oral feeding and oral antiepileptics (levetiracetam) was started. By day

three she recovered completely from visual disturbances and was shifted out of the ICU subsequently. She was discharged on day 5 from the ward, completely recovered of her neurological signs and is now on regular follow up.

Discussion

PRES in eclampsia patients is diagnosed by clinical features of altered mental status, headache, visual disturbances along with MRI findings of bilateral symmetrical hyperintensities on T2- weighted images in the parietal and occipital lobes, and no other alternative differential diagnosis consistent with PRES.

PRES is observed, not only in patients of preeclampsia, but in a variety of other conditions. The most common conditions are post-transplant status, infection/sepsis, autoimmune diseases, and during cancer chemotherapy.

Two different theories are debated for pathophysiology.2 The hyper perfusion theory, also called the "Vasogenic theory," and the "hypo perfusion/ischemic theory," also called the "Cytotoxic theory". The vasogenic theory postulates that rapidly developing hypertension with failure of cerebral autoregulation causes breakdown of the blood brain barrier and secondary vasogenic edema. When the rise in blood pressure is rapid and severe, the auto regulatory response is insufficient resulting in hyperperfusion, and extravasation of plasma and macromolecules. The relative lack of sympathetic innervation in the posterior circulation is the likely mechanism for the preferential involvement of the posterior part of the brain from PRES. The hypertension hyperperfusion theory is supported by the fact that prompt treatment of hypertension leads to rapid clinical and radiological improvement.

PRES is also seen in patients without hypertension and thus makes the assumption of another theory "The cytotoxic theory." It suggests that the primary insult is from endogenous stimulants or exogenous toxins like chemotherapy or immunosuppressive agents and T-cell activation with cytokine release causing endothelial dysfunction and deranged autoregulatory response. Activation of the cerebral AVP receptors (V1aR) leads to cerebral vasoconstriction, endothelial dysfunction and cerebral ischemia and activation of the peripheral (renal) receptors (V2R) which may potentially lead to the development of hypertension, renal impairment and is responsible for the symptoms and complications of PRES.

It is thought that patients with chronic hypertension have hypertrophic artery walls, including in the CNS, causing reduced permeability of the blood–brain barrier. Patients with preeclampsia do not have this compensatory effect and even small increases in blood pressure, can cause them to respond with increased permeability of the blood–brain barrier. The above theory may be relevant in our patient's condition since her blood pressure had been in the normal range throughout the pregnancy as per her records. Blood pressure was seen to be elevated for the first time in relation to the birth which was assumed to be due to advanced labor.

MRI FLAIR remains the gold standard imaging modality for early diagnosis and prompt management to avoid irreversible neurological consequences.

Recent study has shown PRES predominance amongst the younger (<25 years) age group. 56% of PRES eclampsia patients had no comorbidities and pregnancy-associated risk factors, and only 28% had preeclampsia. Blood pressure fluctuations were found to be more causal of the event rather than a sudden rise.[5]

If treated and managed promptly with gradual lowering of blood pressure, anti-epileptics, diuretics and close monitoring of GCS, PRES is a reversible condition. However delayed treatment may lead to multiple secondary complications, like status epilepticus, ICH and infarcts.

Conclusion

PRES is very unpredictable with varied manifestations. We should always keep in mind the diagnosis as differential among all pregnant patients with altered behavior and hypertension. The sudden alteration of blood pressure poses a significant risk among pregnant predisposed patients towards PRES complication.

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Boerhaave Syndrome : Multidisciplinary Management Makes a Difference

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Introduction

Spontaneous transmural rupture of oesophagus (Boerhaave syndrome) is a rare (incidence 3.1 in per 10^6) condition that carries high morbidity and mortality.[1] The classical Meckler triad (lower thoracic pain, subcutaneous emphysema, vomiting) is present in less than half of the cases.[2] Early diagnosis, surgical intervention and multidisciplinary management are essential to prevent mortality.[3]

Here we are presenting a case of 61year old male that was managed by multidisciplinary management to control sepsis, allowing for a delayed definitive oesophageal repair.

Case Presentation

A 61-year-old man presented to emergency room with left side chest pain, fever, epigastric pain radiating to back and breathing difficulty for last 4 days following one episode of forceful vomiting. On examination there was stony dullness and reduced breath sounds over left hemithorax. Chest x-ray showed bilateral pleural effusion with pneumomediastinum (Fig 1).

Ultrasound chest showed internal septations in left pleural cavity. His CECT chest showed bilateral pleural effusion with pneumomediastinum (Fig 2).

Intercostal drainage was inserted on left side, turbid greenish yellow coloured fluid was drained. His epigastric pain was persistent and UGI endoscopy showed a rent in oesophageal mucosa 2cm above gastro-oesophageal junction.

A repeat CECT chest and abdomen with oral contrast revealed leakage of contrast into the mediastinum through the lower end of oesophagus, pneumomediastinum with loculated left hydropneumothorax (Fig 3).

Pleural fluid for amylase was positive and a diagnosis of Boerhaave Syndrome was established. Thoracic surgery and gastroenterology consultations were obtained. Patient was shifted to ICU in view of new onset Atrial fibrillation. A self-expanding oesophageal stent was placed endoscopically and oral diet was gradually initiated (Fig 4). Patient was shifted out of ICU after 5 days of stay.

Over the course of next few days patient became febrile with increased TLC counts and increased in turbidity and volume of the intercostal drainage. Repeat USG chest showed loculated pleural effusion with entrapped left lung. A video-assisted thoracic surgical (VATS) debridement was done (Fig 5).

Chest x-ray a week later showed the migration of oesophageal stent into stomach and this was confirmed

by the CT scan. Repeat oesophageal stenting with a wider and longer stent with nasojejunal tube inserted endoscopically. Repeat VATS debridement, drainage of left pleural cavity and adhesiolysis of mediastinum was done in view of persistent loculation in left pleural cavity and entrapped left lung. Subsequently partial migration of stent was observed and managed with endoscopic repositioning and endo-clipping of stent. Stent partial migration occurred again. This was managed by pulling up the displaced stent from stomach and deploying within the distal end of second oesophageal stent in a "stent within stent" configuration. (Fig 6)

This long stent did not migrate again. His hospital course was complicated by mechanical ventilation, tracheostomy, lower respiratory tract infection and septic shock.

After 58 days (32 days in ICU) of hospital stay he was discharged in hemodynamically stable condition with an ICD in-situ on left side. He was followed up in out-patient department and an ICD was removed after 10 days. He has been recovering, taking normal diet. He will be evaluated at 3 months post stenting for possible stent removal.

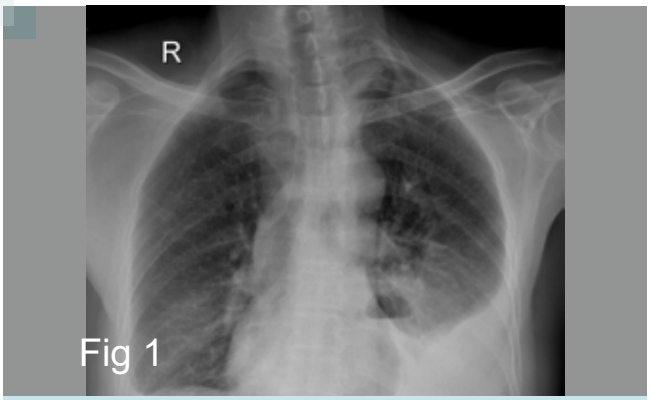

Figure 1 : Chest x-ray showing bilateral pleural effusion with pneumomediastinum

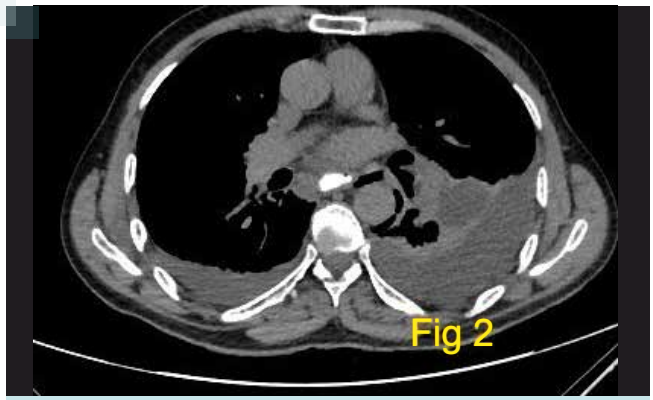

Figure 2 : CECT CHEST showing bilateral pleural effusion with pneumomediastinum

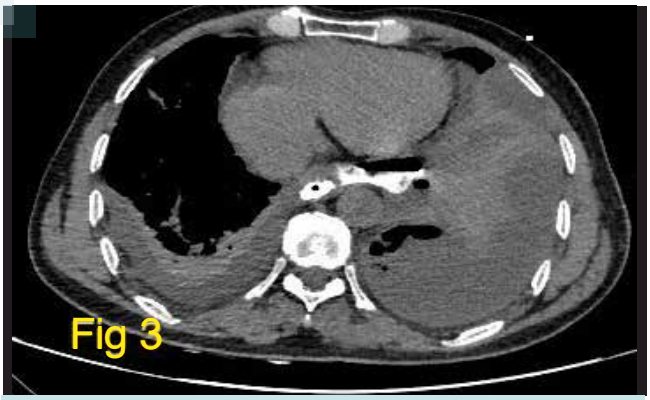

Figure 3 : CECT CHEST with oral contrast showing contrast leak in mediastinum with bilateral pleural effusion

Figure 4 : Endoscopic view of oesophageal stent placement

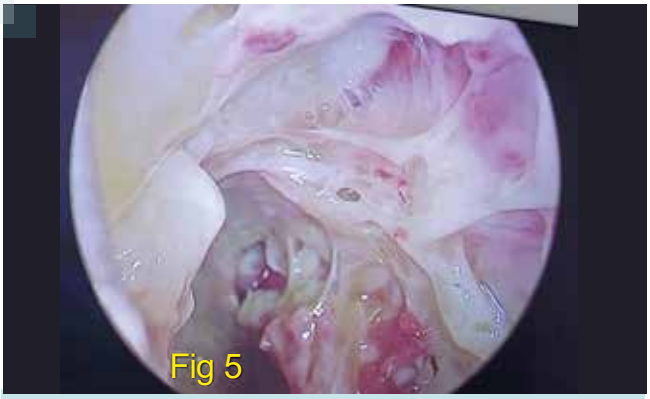

Figure 5 : Intraoperative image of VATS debridement

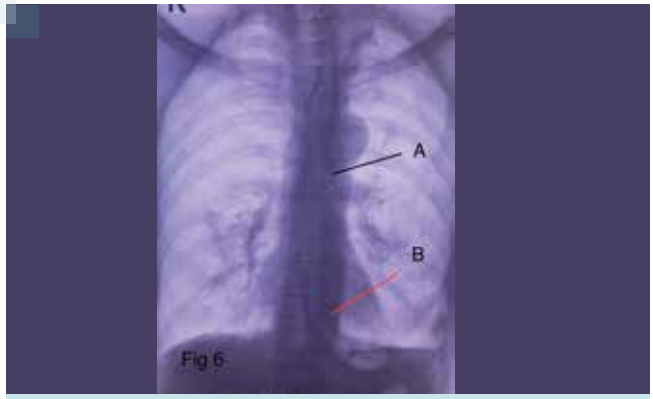

Figure 6 : Invert-grayscale Chest X-ray Film Showing 2nd stent(A) with First stent(B) in "stent within stent" configuration

Conclusion

Transmural tear of oesophagus (Boerhaave syndrome) is a rare clinical condition needs high index of clinical suspicion, raised pleural fluid amylase and CECT chest with oral contrast to diagnose. Definitive surgical repair is possible only when diagnosed within 24 hours of occurrence. Early diagnosis and multidisciplinary management helps improve the outcome of patient with Boerhaave syndrome.

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A Miracle in the Middle of the Night

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A 66 yrs old patient with multiple comorbidities- HTN, IHD, varicose veins, Bell's Palsy (old), diagnosed to have Ca Bladder underwent TURBT in a private hospital. Five days later he complained of urinary retention following which a clot was identified on ultrasonography and an attempt to remove the clot under anesthesia was made. Post the procedure, the patient's condition deteriorated, could not be identified. In an unstable condition by around 11 pm on the night on 31 Oct 2022, the patient has shifted to Fortis Rajajinagar ER with advice for blood transfusion.

On arrival, clinical examination showed that the patient was drowsy, the BP not recordable and room air oxygen saturation was 82%. Blood parameters (INR 1.79, Hb 8.5gm /dl, Troponin T :0.59ng/ml (positive)) showed that the patient was in severe metabolic acidosis. The patient also had atrial fibrillation with a fast ventricular rate. The patient was started on fluid resuscitation, acidosis correction, put on Inotropes and shifted and electively intubated in the ICU. Emergency blood grouping and cross matching was done and blood and blood products were arranged.

Since there was a suspicion of a bleeder in the bladder causing the hypotension leading to hemorrhagic shock, the patient family was counselled for an emergency cystoscopy and a high risk consent was obtained.

Intra-operatively, some clots, multiple bleeding points from the raw area of the resected tumor were identified. The clots were removed, and TURBT was done. However, there was a persistent large bleeding spot at the neck of the bladder at 10 o'clock position. Due to the location of the bleeder, it could not be coagulated with regular resectoscope. By pure intuition, a 22 Fr catheter was inserted and balloon traction with 50 cc of inflation was done. With this procedure the bleeding stopped and the patient stabilized.

In view of the deranged coagulation profile & hematuria (hemorrhagic shock) four units of FFP & four units of PRBC transfusion was done under aseptic condition on 01/11/2022 & 02/11/2022. The patient was extubated on 02/11/2022. On 02/11/2022 deflated 10ml from catheter balloon and bladder traction removed and bladder irrigation stopped. During stay in the hospital, the patient was treated with IV fluids, PPI's, antibiotics, analgesics, antiemetic, and other supportive measures. Patient was hemodynamically stable and got discharged with a Foley's catheter in situ.

Timely teamwork can saved the life of a patient. It was really a miracle in the middle of the night.

Secondary Organising Pneumonia Caused by Aspergillus Flavus in Immunocompromised Patients

Source: https://doi.org/10.1093/mmy/myac072.P204

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Abstract

Fungal pneumonia is a known complication in immunocompromised patients. However fungal infection leading to organizing pneumonia (OP) is a rare entity. Here we present two cases of co-occurrence of OP with aspergillus lung infection.

Case 1

IA 33-year-old male with history of recurrent oral–genital ulcerations and low-grade fever for last 3 months presented with shortness of breath and high-grade fever for 10 days. On presentation he was hypotensive, tachycardic and tachypnoeic and the chest examination revealed bilateral crackles. His initial investigation reports showed Haemoglobin (Hb) -8.8 gm%, Total Leucocyte Counts (TLC) - 13000/cu mm, Platelet count 190000/ microliter, the liver function tests (LFT) and the kidney function tests (KFT) were normal. High resolution commuted tomography (HRCT) revealed multifocal areas of interlobular septal thickening with ground glass opacity and patchy areas of consolidation seen in bilateral lung fields (Figure 1). He was initially managed with broad spectrum antibiotics and oxygen support by high flow nasal cannula (HFNC); as the condition deteriorated, he was mechanically ventilated. Fibreoptic bronchoscopy with bronchoalveolar lavage (BAL) was performed. Investigations for Tuberculosis, Nocardia, Pneumocystis Carinii and bacterial infection in BAL was negative. Galactomannan index (GMI) in BAL was 3.15 and grew Aspergillus flavus. Transbronchial biopsy revealed features consistent with organizing pneumonia. He was started on voriconazole and steroids. He was diagnosed with undifferentiated

connective tissue disorder. As the patient's condition improved in due course of time, he was extubated and discharged in stable condition on voriconazole and steroids and is currently doing fine.

Case 2

A 56-year-old male known case of Mantle cell lymphoma on consolidation therapy, presented with 15 days history of shortness of breath and high-grade fever. Chest examination revealed decreased breath sounds bilaterally in the lower lung zones with lower zone crackles. Initial investigations showed Hb- 10.9 gm%, TLC -3.90/cu mm, Platelet -150000/ microliter, the KFT and LFT were normal. The HRCT scan revealed multilobular areas of consolidation showing air bronchogram with ground glass opacities in bilateral lung (Figure 2). Bronchoalveolar lavage fluid (BALF) revealed the growth of Aspergillus flavus and was GMI 1.97. Investigations for Tuberculosis, Nocardia, Pneumocystis Carinii and bacterial infection was negative. Transbronchial biopsy revealed features consistent with organizing pneumonia. He was started on combination therapy with voriconazole and micafungin along with steroids. Initially he was managed with oxygen support but his oxygenation gradually worsened, he was mechanically ventilated and received multiple proning sessions. The patient had refractory organising pneumonia, did not show any improvement even after one month and left against medical advice.

Figure1 : HRCT scan - multifocal reas of interlobulor septal thickening with ground glass opacity and patchy areas of consoliadation seen in bilateral lung fields

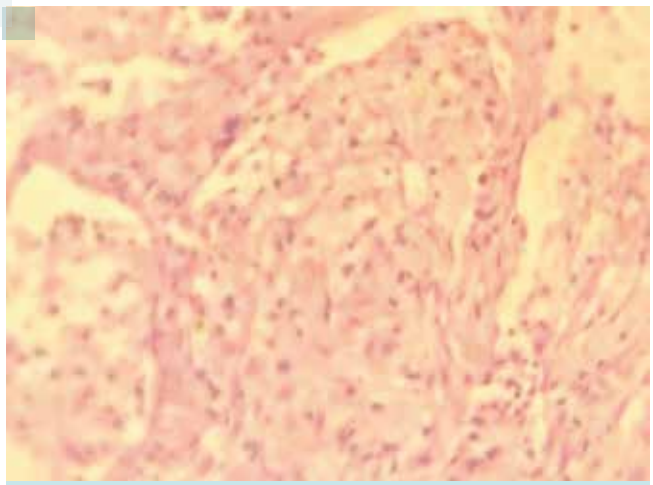

Figure2 : Transbronchial biopsy revealing organizing pneumonia

Conclusion

Bacterial and viral infections are the common causes of secondary OP. Fungal infections implicated in secondary OP are rarely described, of which there are reports of Pneumocystis Jiroveci (PJP) and Penicillium infection leading to secondary OP. Aspergillus flavus is an ubiquitous fungal agent and is considered as pathogenic in immunocompromised settings, it can lead to secondary organizing pneumonia. High index of suspicious for OP is always to be kept in mind while treating Aspergillus flavus pneumonia.

A Fatal Case of Severe Acute Organophosphorus Pesticide Poisoning Complicated with Secondary Hemophagocytic Lympho-Histiocytosis, Severe Lower Intestinal Hemorrhage and Intestinal Mucormycosis

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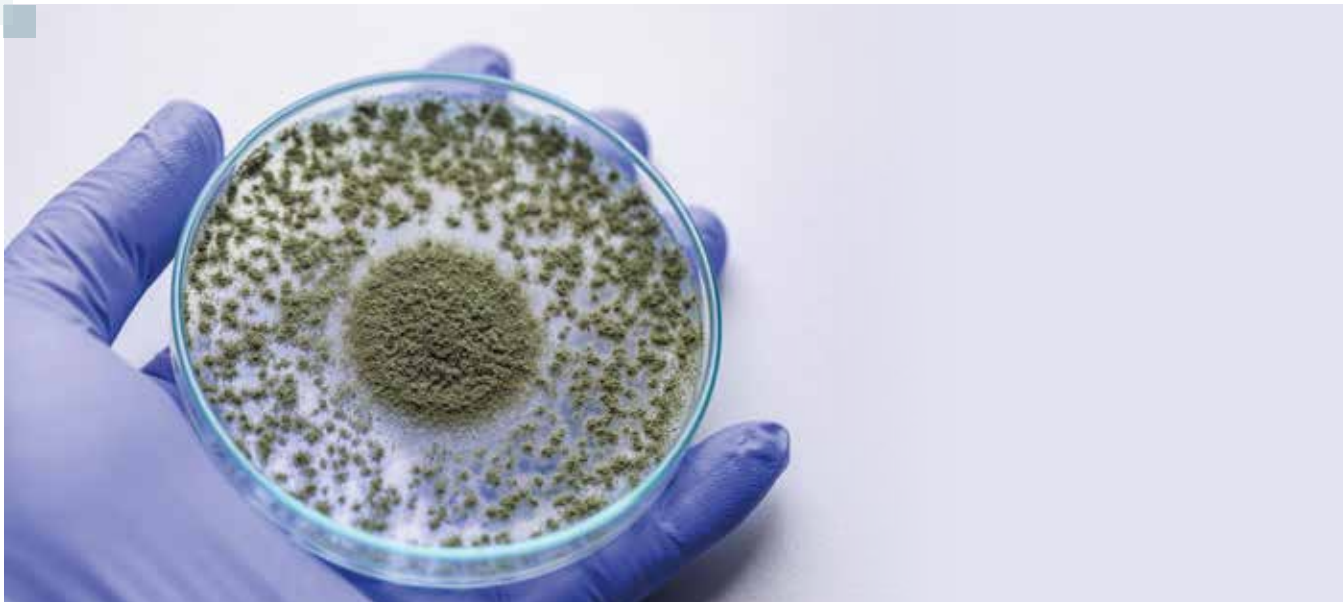
Abstract

A man in his 50's, under influence of alcohol, accidentally ingested a pesticide, and was referred for further management and admitted to our hospital. An empty can of Curacron® was found at the site in his farm where he took the alleged pesticide. This raised the suspicion of organophosphorus pesticide poisoning and he was managed at two medical centres before getting admitted to our hospital. His hospital course was complicated with multiorgan dysfunction, shock, respiratory failure and intermediate syndrome. On day five he developed secondary hemophagocytic lymphohistiocytosis (sHLH) and had hematochezia on day six. Colonoscopy revealed multiple circumferential ulcerations in descending and sigmoid colon with luminal narrowing. Biopsy of colonic tissue showed evidence of intestinal Mucormycosis. The clinical presentation of organophosphorus pesticide poisoning in this patient was complicated with multiple issues and included sHLH, chemical gastroenteritis, hemorrhagic ulcers and intestinal zygomycosis. The organophosphorus pesticide ingested by the patient was a 50% emulsifiable concentrate of profenofos along with vegetable oil, soyabean oil and polyglycol ether alkyl aryl sulphate calcium salt 5.25% w/w as an emulsifier/spreading agent. The management of the patient is discussed. Due to the possibility of the emulsifier adhering to the gastrointestinal tract and causing mucosal injury, it is necessary to identify the drug composition and ingredients of the pesticide as soon as possible when managing organophosphorus poisoning.

Keywords: Gastrointestinal bleeding, hemophagocytic lymphohistiocytosis, mucormycosis, organophosphorus pesticide poisoning, profenofos, spreading agent.



Extracorporeal Carbon Dioxide Removal ($ECCO_2R$) in ARDS Using Pediatric Membrane Oxygenator – A Case Report

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Introduction

$ECCO_2R$ is a technique of removal of CO_2 from the blood through a low blood flow (0.4–1 L/min) circuit.[1] The rate of CO_2 removal will depend on: sweep gas flow, blood flow, the partial pressure of CO_2 in the blood and the membrane properties.[2] VV-ECMO too clears CO_2 but the primary aim there is oxygenation.

In clinical practice $ECCO_2R$ could even provide some oxygenation but it is very minimal. We present a case of ARDS where we used $ECCO_2R$ along with lung protective ventilation.

Case Presentation

A 57 year old male patient presented with eight days of high grade fever, dry cough and breathing difficulty for three days. He was initially treated by a general practitioner with oral antibiotics and paracetamol but later had to be admitted at a hospital in another city due to worsening of cough and desaturation. Initially he had a SpO2 of 35% on room air and was started on oxygen supplementation, intravenous antibiotics and bronchodilators were nebulized. A day later, he needed progressively higher oxygen support. His chest X-ray showed bilateral infiltration and a clinical diagnosis of viral pneumonia was made. He was started on Oseltamivir after obtaining a throat swab for H1N1 RTPCR. His saturation dropped to 31% despite being on non-rebreathing mask. He was intubated and transported to Fortis hospital, Noida on a portable ventilator.

On arrival at Fortis Noida Emergency Room, he was restless and agitated with a pulse of 126/min, BP 126/72 mm Hg on Noradrenaline 0.5microgram/kg/min, Spo2-38% on 100% O_2, PEEP-14, RR-28/min on transport ventilator. There were bilateral crepitations on chest auscultation and normal heart sounds. The patient was admitted in the ICU. The first ABG showed hypoxemia and hypercarbia, (pH 7.13 pCO_2 91 pO_2 76 HCO_3 29). The patient was sedated, paralyzed and ventilated in the prone position. After prone positioning and lung protective ventilation (tidal volume however couldn't be increased beyond 5ml/Kg as plateau pressure was exceeding 30cm of H_2O), there was improvement in oxygenation, but pCO_2 progressively increased with drop in pH below 7.2. A dual-lumen catheter was inserted percutaneously into the femoral vein using ultrasonography guidance with patient in supine position. Veno-venous extracorporeal carbon dioxide removal ($ECCO_2R$) was commenced utilizing a pediatric oxygenator and a dialysis machine as the driving pump. Oxygen was used as sweep gas at 9L/min and the blood flow was kept at 300ml/min. Systemic anticoagulation was achieved with intravenous heparin to prevent circuit thrombosis (hourly ACT was checked). The patient was proned while on $ECCO_2R$. We were able to reduce arterial carbon dioxide levels and could further reduce the tidal volume and plateau pressure.

His investigations showed TLC 7.90/mm^3, Platelet 1.30 lakhs/mcL, Creatinine 0.93 mg/dl, Na^+145 meq/L, K^+ 5.63meq/L, SGOT 48 IU/L, SGPT 80 IU /L. His COVID-19 RTPCR was negative. His CRP-119 mg/L, Ferritin-281 mcg/L, IL6-33.39 pg/ml, LDH-375 U/L, PCT-4.29 ng/ml, D-dimer 4.750 ng/ml. The patient was initially given Meropenem, Teicoplanin, Doxycycline and Oseltamivir. Mini BAL (bronchoalveolar lavage) was done on the second day, bronchoalveolar lavage BAL Bio fire pneumonia panel confirmed Influenza A infection and negative for bacterial infection and this was confirmed by a negative culture. The referring hospital confirmed presence of H^3N^2 in throat swabs. Patient was ventilated with several episodes of prone session. $ECCO^2R$ was stopped after 20hrs and thereafter pCO^2 remained within tolerable limits with pH >7.2. Noradrenaline was gradually tapered off. On the 7th day, the patient had a single episode of seizure and intravenous midazolam was given. His LFT showed isolated hyperbilirubinemia,

Position	Prone	Supine	Prone
pH	7.131	7.314	7.27
pCO2	91.8	57.1	70
pO2	76.8	52.1	71.9
HCO3	29.9	28.4	31.5
FiO2	1.0	1.0	0.8
Mode	VC	VC	VC
IE ratio	1:2	1:2	1:2
PEEP	15	15	15
O2 Flow	-	5L/min	5L/min
Blood flow	-	500ml/min	500ml/min

while the USG whole abdomen showed mild hepatosplenomegaly. On the 10th day of admission, patient developed septic shock with worsening liver and renal functions. He was initiated on vasopressor support. His blood and endotracheal aspirate grew Acinetobacter Baumani sensitive to Colistin. His antibiotics were modified accordingly. The patient was tracheostomized on the 11th day of admission. Oxygen requirement gradually reduced; noradrenaline was tapered off and he could be weaned off the ventilator. He was decannulated after a week of tracheostomy, and shifted out of ICU with 2L oxygen support. Total leukocyte counts normalized and his fever subsided. His kidney function improved. He was discharged on 1l/min O2, with full neurological recovery and able to mobilize out of bed though somewhat weak. He was advised to undergo rehabilitation under guidance of a physiotherapist at home. He revisited us with his family in OPD after four weeks of discharge and with all smiles. His chest X-ray had significantly cleared up (Fig 3b) in comparison to the admission X-ray (Fig 3a). His PFT showed persistent restrictive pattern.

Discussion

Our patient had severe ARDS with stiff lungs. Even after proning that improved oxygenation patient's pCO2 kept increasing till it went beyond 90mm Hg and pH dropped below 7.2. Tidal volumes set were limited to a maximum of 5ml/Kg ideal body weight and at 35/min respiratory rate plateau pressures reached 30cm of H2O without controlling the respiratory acidosis. We decided to go for ECCO^{2}R. Specialized equipment like Novalung/Hemolung are not easily available in India. We therefore used a pediatric membrane oxygenator coupled with dialysis machine pump. This has been described in some of the case reports.[3,4] Although a single cartridge usually is designed for use for up to 8 hours we were able to use it for over 20 hours. Thereafter the patient's gases had improved to the extent that ECCO2R could be discontinued. Different publications have demonstrated the utility of ECCO2R systems in severe ARDS. Among them, the SUPERNOVA study confirmed the benefits of ECCO^{2}R in this group of patients, minimizing the respiratory acidosis and achieving ultraprotective mechanical ventilation.[5] The clinical use of ECCO^{2}R systems has been described not only in ARDS but also in chronic obstructive pulmonary disease patients, severe asthma, weaning from mechanical ventilation and as a bridge therapy for lung transplant.[6-9] This is also less invasive, needs less anticoagulation and is less expensive than ECMO therapy. In this case of severe respiratory failure, ECCO^{2}R was able to stabilize gas exchange of the patient and contribute to the patient's recovery.

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Fig1 a : Using Paediatric membrane oxygenator with dialysis pump

Fig1 b : ECCO2R system used in prone position

Fig 2 : Patient visiting OPD after 4 weeks of discharge

Fig3 a : Chest x-ray on admission

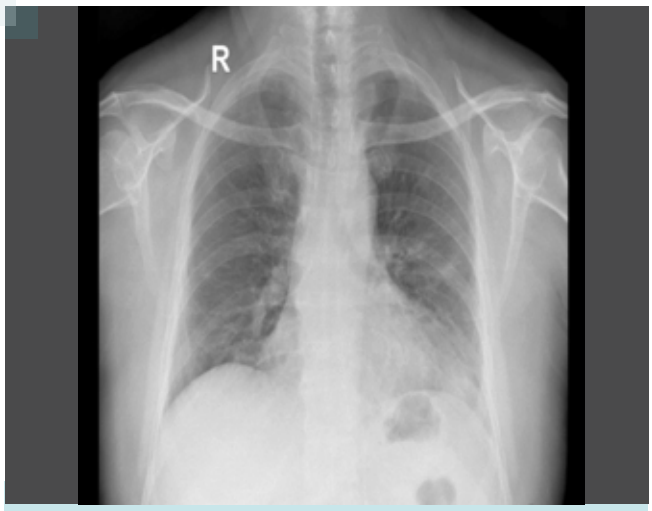

Fig3 b : Chest x-ray on follow up visit after 4 weeks

Intrahospital Transport of Mechanically Ventilated Patients in Prone Position: A Case Series

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Objective

We present five patients with severe acute respiratory distress syndrome (ARDS) who were being ventilated in prone position and transported from one ICU to another on a different floor within the hospital.

Method

All five patients were admitted from the emergency department between 16th Aug to 15th Oct 2022 to the first floor holding ICU for initial management and screening for COVID-19. Four of them were intubated and initiated on mechanical ventilation in the ICU, while one was brought to the hospital already on mechanical ventilation. All 5 were proned in the ICU. Once found to be COVID-19 RTPCR negative they were transported to the main ICU on the second floor in prone position on a transport ventilator (figure 1a and b). All patients were put on 100% oxygen for transport and continued on protective lung ventilation. All syringe pumps were checked to ensure that the drugs would be on continuous flow during transport and the oxygen cylinder was checked for full tank status. The elevator was stopped and the main ICU was informed before leaving the holding ICU. All patients were transported accompanied by an intensivist, an ICU technician, two ICU nurses and a general duty assistant (Figure 1a and 1b). All case records were reviewed for peri-transport vital signs, ABG, PaO2:FiO2 ratio (PFR), vascular catheter or endotracheal displacement or need for cardiopulmonary resuscitation.

Fig1 a : Figure 1a: During transport entering a lift

Fig1 b : During transport exiting the holding ICU

Results

Patients included four males with median age 50 (range 18-60) years. Their median weight was 78 (range 58-131) kg. They were all on high oxygen concentrations with median FiO^2 60 (range 40-100)%, median positive end expiratory pressure (PEEP) of 12(range 10- 16) cm of H_2O and PFR of 114.32 ± 30.8. They were all switched to

100% oxygen just before transport and achieved a mean PFR of 184(range100-190) before transport. Only one patient was on a noradrenaline infusion. All patients were on atracurium infusion along with sedatives. There was no significant change in their vital signs, PaO^2 and PFR during transport (see Table 1 and 2 and figures 2 and 3). There were no endotracheal tube dislodgement or vascular line displacement or cardiac events during patient transport.

Table 1:-Comparison of vitals between pre and post prone transfer.

Vitals	Pre prone transfer (n=5)	Post prone transfer (n=5)	P value
Heart rate (per minute)	97.8 ± 17.81	94.2 ± 14.53	0.562*
Systolic blood pressure (mmHg)	117(108-137)	115(111-116)	0.5†
Diastolic blood pressure (mmHg)	68.8 ± 16.77	63.6 ± 10.85	0.627*
SpO2(%)	98(95-98)	96(96-98)	0.785†

* Paired t test, † Wilcoxon Signed Ranks Test

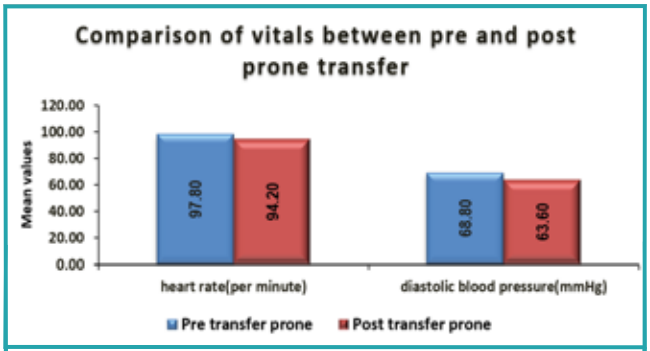

Figure 3: Comparison of vital signs between pre and post prone transfer.

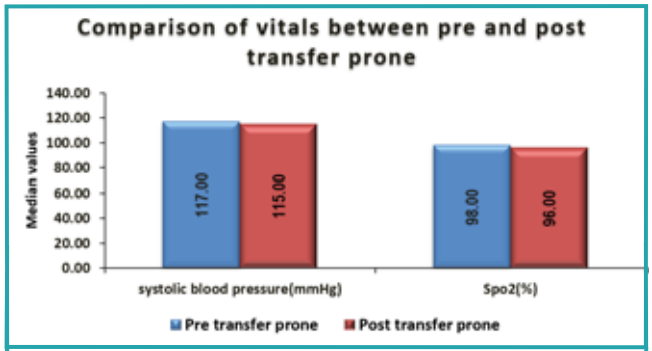

Figure 3: Figure 4: Comparison of vital signs between pre and post prone transfer (non-parametric variables).

Table 2: Comparison of arterial blood gas parameters between pre and post prone transfer.

Arterial blood gas parameters	Pre transfer (n=5)	Post transfer (n=5)	P value
PO2(mmHg)	90(85-99)	99.5(90-140)	0.225†
P/F ratio	114.32 ± 30.8	134.74 ± 44.22	0.14*

* Paired t test, † Wilcoxon Signed Ranks Test

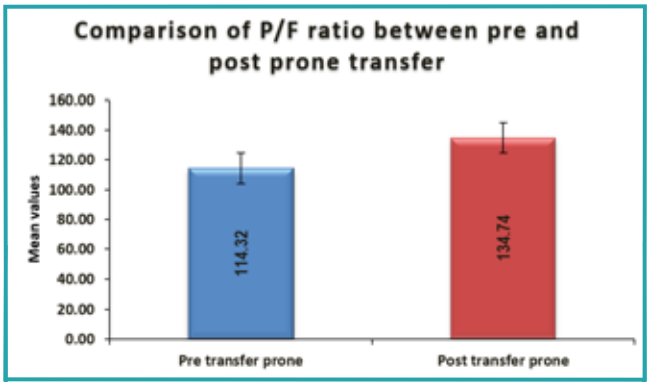

Figure 5: Comparison of P/F ratio between pre and post transfer prone.

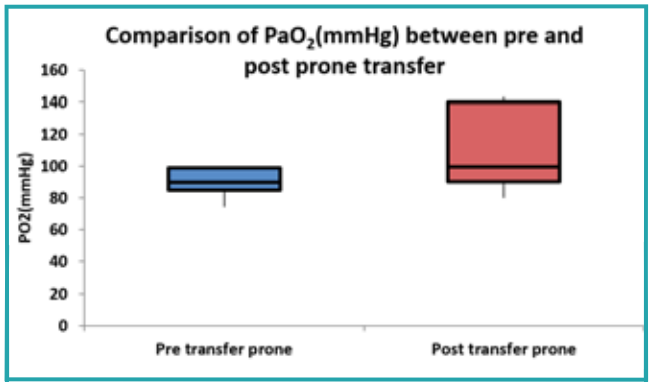

Figure 6: Comparison of PO2(mmHg) between pre and post prone transfer. (non-parametric variable, Box-whisker plot)

Conclusion

The intra-hospital transport of mechanically ventilated patients with severe ARDS in the prone position is feasible and safe when done with due care by an intensive care team.

Systemic BCG Infection: A Rare and Severe Complication of Intravesicle BCG Therapy for Superficial Bladder Cancer

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Objective

Among various types of bladder carcinoma, transitional cell carcinoma is the predominant histological type and approximately 70% of it is classified as non-muscle invasive type (Ta, Tis, T1).[1] In view of high recurrence rate (40–80%) after surgery, intra-vesicle chemotherapy has emerged as an adjuvant therapy after surgery.[2] Intravesical Bacillus Calmette-Guerin (BCG) [live-attenuated strain of Mycobacterium bovis] has been established as an effective alternative to standard chemotherapeutic regimens for the treatment of superficial bladder cancer [3]. Though the exact mechanism is still unknown, it is postulated that BCG induces a local immune response, triggering an attack against malignant cells. [4] Though this therapy is generally well tolerated, rarely it is associated with severe life-threatening complication. Here we present a case of systemic BCG infection following intra-renal BCG instillation for superficial bladder cancer.

Case Report

A sixty years old female, known case of type-2 diabetes mellitus and hypertension, presented with complaints of intermittent fever, abdominal distension and decreasing urine output for last two weeks, following bladder neck dissection with ureteroscopy, followed by intra-renal immunotherapy with mitomycin C and BCG for recently diagnosed grade-1 transitional cell carcinoma of urinary bladder and bilateral ureters.

On initial examination, she was found to have fever, jaundice, abdominal distension with mild basal crepitations in both the lungs and other features of SIRS (systemic inflammatory response syndrome). She was managed conservatively with broad-spectrum antibiotics – Meropenem, Colistin and Teicoplanin (due to recent urological intervention) and other supportive care. Her initial laboratory investigations showed raised inflammatory and infective markers (WBC count, CRP, procalcitonin), deranged liver function (direct hyperbilirubinemia, mildly raised liver enzymes) and features of acute kidney injury (raised urea, creatinine). Other imaging results revealed features of polyserositis like pleural effusion, mild ascites, mild pericardial effusion with normal heart function and enlarged liver and kidneys. In view of the persistent hyperbilirubinemia, MRCP (Magnetic Resonance Cholangiopancreatography) was done but failed to show any biliary obstruction and any specific diagnosis. Other serological tests like HBsAg, Anti-HCV, HIV-1&2 and leptospira IgM were negative.

In spite of all supportive care including broad spectrum antibiotics covering MDR gram positive and negative organism, on day seven onwards the patient's hemoglobin level and platelet count started decreasing gradually although the coagulation parameters remained within the normal range. Though her liver function tests showed mild improvement, the renal parameters deteriorated further (rising urea and creatinine). She received packed RBC and random donor platelet transfusion to maintain her hemoglobin and platelet count within the acceptable range. Relevant investigations in suspicion of TMA (thrombotic microangiopathy), peripheral blood smear, reticulocyte count, LDH level, were done and reported as normal. Gradually her neurological status starts deteriorating, she became delirious and drowsy. Her CT brain did not reveal any significant abnormality. She was put on renal

replacement therapy to correct uremic encephalopathy.

On the 12th day of admission, she started requiring supplemental oxygen support which was gradually increasing and eventually needed invasive mechanical ventilation. The findings on HRCT of thorax were bilateral diffuse ground glass opacities with consolidation raising the suspicion of pulmonary-renal syndrome. Systemic steroid, Methylprednisolone 40mg was added and relevant investigations- ANA, c-ANCA, p-ANCA, anti GBM antibody were sent. This was followed by intercostal drainage of bilateral pleural effusion and fibre-optic bronchoscopy with broncho-alveolar lavage (BAL). The BAL fluid and pleural fluid failed to show any evidence of bacterial, fungal or atypical infection as well as malignant cells and pulmonary hemorrhage.

The gradually sinking patient condition even with broad spectrum antibiotics, antifungal, systemic steroid therapy with negative culture-sensitivity report and auto-immune marker, raised the possibility of systemic BCG infection in the patient in the background of intra-renal BCG therapy. Then modified Anti-tubercular drugs regimen (Ethambutol & Levofloxacin) were started due to deranged LFT and renal function test. Combination of lung -protective ventilation, modified ATD regimen, low dose systemic steroid coupled with RRT was continued. After couple of days, the patient started showing signs of improvement; the oxygen requirement decreased, the neurological status improved as did the renal and liver function parameters. After a week on mechanical ventilation, the patient was weaned off mechanical ventilation, became hemodynamically stable with improving normal renal function (not needing dialysis). Though bone-marrow biopsy was planned for tissue diagnosis of suspected BCGiosis it was deferred in view of the clinical improvement. Gradually antibiotics and antifungal were stopped, and the patient was discharged home on modified ATD regimen and tapering dose of steroid. During one year follow-up, her general condition gradually improved to independent activities of daily life with normalized liver and renal functions.

Discussion

Bacillus Calmette-Guerin (BCG) is the most commonly used agent for intravesical therapy in the treatment of non-muscle invading bladder cancer.[5] It has been found to be superior to TURBT alone or intravesicle mitomycin C, at decreasing the risk of recurrence and disease progression. [6]

Local complications like cystitis (27-95%), granulomatous prostatitis (10%), epididymo-orchitis (0.4%), bladder neck contracture (<1%), pyelonephritis, balanitis (5.9%) etc. usually present with fever, malaise, and bladder irritation (urination frequency, dysuria, or mild hematuria) which are usually self-limiting. [7]

Systemic complications vary depending on the organ involvement like granulomatous hepatitis (0.5-5.7%), pneumonitis (0.4%), lymphadenitis, mycotic aneurysm (0.7-4.6%), spondylodiscitis (3.5%), reactive arthritis (0.5-5.7%) and disseminated BCG infection (0.4%). [8] Among all these complications systemic BCG-osis is the severest and rarest complication. Our case report demonstrates this devastating systemic side effect of intravesicle BCG therapy.

Though the exact pathophysiology is still not clear, it is postulated that intravesicle BCG (mycobacterium antigen) triggers a type-IV hypersensitivity reaction with the help of various mediators like IL-1, IL-2, CD-28, CD80 etc. within the mucosal surface of bladder.[9] Usually it remains confined to the bladder mucosa, but can disseminate to systemic circulation in the presence of an immunocompromised state, mucosal breach and local inflammation.[10] Therefore, intravesicle BCG therapy is prohibited in cases of (1) TURBT in 2 weeks prior to BCG administration,(b) bacterial cystitis, (c) hematuria, and (d) traumatic catheterization. [11]

The clinical presentation of systemic BCG-iosis varies from weeks to months and starts with non-specific constitutional symptoms like fever, malaise, chills, anorexia etc. and gradually progress to sepsis with high grade fever, bone marrow suppression, miliary tuberculosis and multiorgan failure. [12,13] Clinically, high grade temperature (≥38.5°C) for more than 48hours after BCG instillation raises a suspicion of disseminated infection and the patient should be hospitalized and evaluated. [14]

Lack of reliable diagnostic test and non-specific symptomatology, make it very difficult to diagnose systemic BCG infection. Though blood and body fluid AFB culture, tissue biopsy and culture can be done, the yields of these tests are very poor (30% approx.). [15] Therefore, a high index of clinical suspicion and improvement of the patient's condition after initiation of ATD therapy indirectly proves the diagnosis of systemic BCG infection.

The management of disseminated BCG infection depends on early detection and prompt initiation of ATD, systemic steroid and another organ support. Anti-tubercular therapy [including Rifampicin, Isoniazide, Pyridoxine, Ethambutol] should be started and continued for a total of three to six months. Systemic steroid therapy should also be commenced along with ATD medication (in view of type IV hypersensitivity reaction) and it should be gradually tapered off according to improvement of patient's symptoms over a

month to avoid exacerbation of systemic BCG-osis on abrupt withdrawal of steroid. [16] In our case, modified ATD regimen was given due to deranged liver and kidney function and continued for three months and systemic steroid (solumedrol) was tapered over a month. The patient's condition improved only after initiation of ATD along with systemic steroid and there was no recurrence of symptoms further.

Though intravesical BCG therapy is generally known to be safe and well-tolerated, it can have rare life-threatening complication like systemic BCG infection. As there is no specific laboratory test, high level of clinical suspicion and early initiation of anti-tubercular therapy along with systemic steroid is the critical step in the management. Therefore, close vigilance needs to be maintained in every step of intravesicle BCG therapy.

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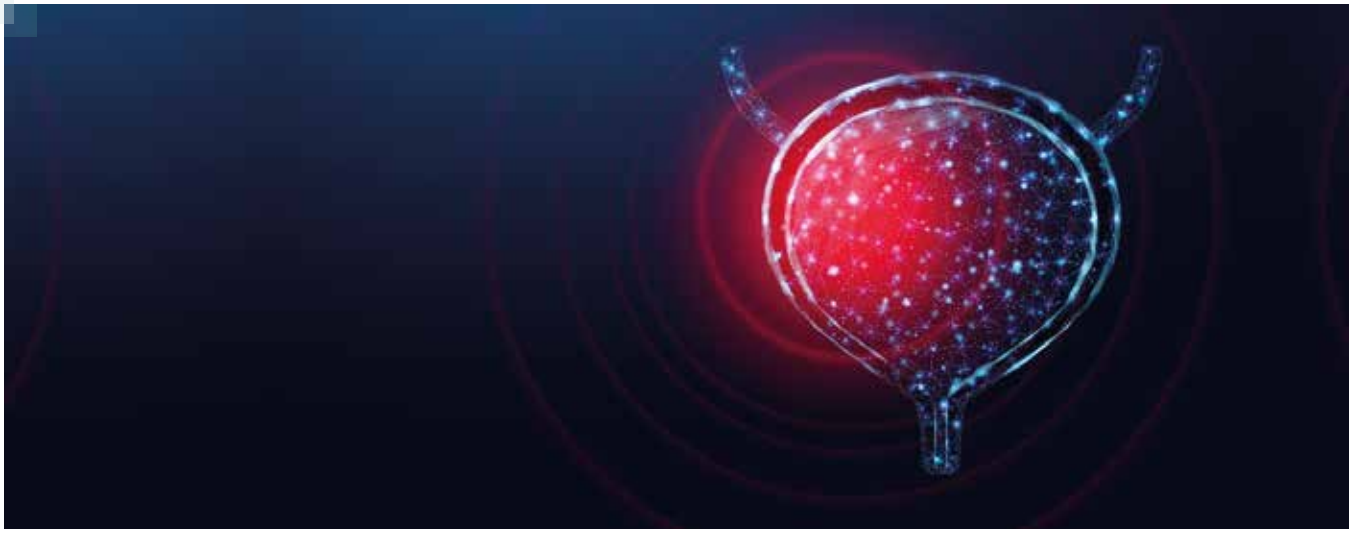

Difficult to Diagnose Gastrointestinal Mucormycosis Presenting as HLH: A Case Report

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Abstract

Mucormycosis is a severe and life-threatening infection caused by a filamentous fungi that belongs to the order Mucorales. It is characterized by angioinvasion leading to infarction of tissues. Diabetes mellitus (DM) and immunocompromised states including hematological malignancy and solid organ transplant recipients are common predisposing factors. It carries a very high mortality of up to 85 %. [1] It may present rarely as Hemophagocytic lymphohistiocytosis (HLH). A high index of suspicion is warranted in such cases as the signs and symptoms may not be severe except in the most immunocompromised patients such as hematological malignancies.

Introduction

Mucormycosis is a severe and life-threatening infection caused by filamentous fungi that belong to the order Mucorales. Rhizopus, Mucor and Rhizomucor are the common genera responsible for human infections.[2] Diabetes mellitus and immunocompromised states including hematological malignancy and solid organ transplant recipients are common predisposing factors. Characteristic of this infection is angioinvasion which causes tissue infarction. Based on the organ involved, the mucormycosis ranges from rhino-cerebral, pulmonary, cutaneous, gastrointestinal and disseminated forms. Histological evaluation of mucormycosis is the mainstay of diagnosis. Microscopy showing non-septate or minimally septated broad, ribbon-like hyphae (10 to 20 microns) invading the blood vessels which clinches the diagnosis. GI mucormycosis usually occurs by ingestion of contaminated food and herbal and homeopathic medicines due to which stomach and colon get affected. It has the highest mortality amongst the various forms, though the degree of immunosuppression also affects the outcomes. The usual presenting symptoms include nausea, vomiting, diarrhoea, hematemesis and melena. The diagnosis usually relies upon CT scan followed by endoscopy and biopsy.

Meanwhile HLH, is a life-threatening syndrome caused by severe hypercytokinemia and excessive activation of lymphocytes and macrophages.[3] HLH can be either hereditary or acquired. Acquired HLH has been linked to infections (viral, bacterial, fungal and parasitic), autoimmune diseases and malignancies. HLH is characterized by fever, pancytopenia, splenomegaly, and hemophagocytosis in the bone marrow. HLH left untreated, can lead to rapid deterioration and death.

Case

A 69-year-old diabetic and hypertensive patient presented to our hospital after being referred from a hospital in Bareilly, after two days with complaints of high-grade fever and loose motion and oral ulcers since one month. His blood work done there revealed bicytopenia (TLC-620 cells/mm3 and platelet counts 25000 cells/mm3), renal and liver dysfunction. He received treatment with broad spectrum intravenous antibiotics with a diagnosis of acute gastroenteritis.

On presentation to our ED, he was tachypneic, had

tachycardia and unrecordable blood pressure with a Spo2 94% on room air and a clear chest with no heart murmurs. He was resuscitated with intravenous fluids and his blood pressure improved although he still required vasopressor support; he was shifted to the MICU.

Initial blood investigations revealed Hb-11.7g/dL, TLC-400 cells/mm3, platelet count 12000 cells/mm3, serum bilirubin-10.46 mg/dL, SGOT-9 mg/dL, SGPT-22 mg/dL & serum creatinine-1.30 mg/dL. He tested negative for dengue, malaria, leptospirosis, chikungunya and typhoid. NCCT chest revealed fibro atelectatic changes in the right upper and middle lobe without any obvious consolidation. NCCT abdomen was done which did not reveal any significant abnormality. The stool was negative for ova, parasites and for Clostridium difficile toxin.

He was managed with broad spectrum intravenous antibiotics. Bicytopenia, liver dysfunction and serum ferritin 2953 mg/dL strongly pointed towards HLH. The hematologist was consulted and bone marrow biopsy was done which revealed plasmacytosis, histiocytosis with hemophagocytosis (Fig 1a and 1b), confirming HLH.

Chromosomal analysis in the bone marrow did not reveal any abnormality. Leukemia translocation panel was sent which was negative. The patient was planned for intravenous immunoglobulin (IVIG) therapy, however he responded to the treatment that also included (granulocyte monocyte colony stimulating factor) GM-CSF. Gradually the vasopressors were tapered. Stool frequency decreased and the stool consistency improved. There was however a rising trend of serum bilirubin, which reached a peak of 13.85 mg/dL and later gradually started decreasing. The patient started accepting liquid diet and was shifted to the ward after six 6 days of ICU stay.

He was initiated on soft diet in the ward, which gradually led to abdominal distension. The abdominal X-ray showed features of subacute intestinal obstruction. UGI endoscopy was done which was normal. The patient was managed conservatively with nil per oral, proctoclysis enema and continuous Ryle's tube drainage. A general surgery consultation was sought as CT abdomen with oral contrast revealed dilated jejunal and ileal loops-maximum 4 cm in diameter with narrowing in the proximal ileum suggestive of subacute intestinal obstruction. Conservative management was continued. Blood culture revealed Klebsiella pneumonia for which the antibiotics were escalated to Ceftazidime, Avibactam and Aztreonam. Gradually, the renal functions recovered. However, mild abdominal distension persisted but without any tenderness. Later, the patient developed fever and had a rise in TLC with worsening of renal functions. Inj. Anadulafungin was added empirically in view of the possibility of fungal infection. CT abdomen with oral contrast was repeated which revealed increase in maximum diameter of jejunal and ileal loops to 6 cm (compared to 4 cm in the previous scan) with transition point in distal ileum, suspicious wall thickening with surrounding mesenteric fat stranding seen at the proximal transverse colon region and no obvious mass lesion (Fig 2). The patient was shifted to the ICU.

The patient was planned for a diagnostic laparoscopy, but consent could be obtained only after 36 hours. During this period the patient became drowsy and required oxygen supplementation. He underwent diagnostic laparoscopy which was converted to an exploratory laparotomy. There were two perforations in the ileum three and four feet proximal to ileocecal junction, a firm and thickened right 1/3rd of transverse colon with a gangrenous patch with perforation 3cm x 3cm in colon with interbowel adhesions. (Fig 3a and 3b). He underwent a right hemicolectomy with resection of the ileal segment with ileostomy with a mucous fistula. The resected segment was sent for histopathological and microbiological analysis. In the post operative period he required high dose vasopressors and ventilatory support. He became anuric and was started on renal replacement therapy. He continued to deteriorate and succumbed to his illness after 19 days of hospitalization. Histopathological analysis of tissue sent during surgery revealed inflammation and ulceration of colonic and small intestinal mucosa, extensive purulent serositis with necrosis in the mesenteric fat with numerous trapped hyphae invading medium sized blood vessels suggestive of mucorales. (Fig 4)

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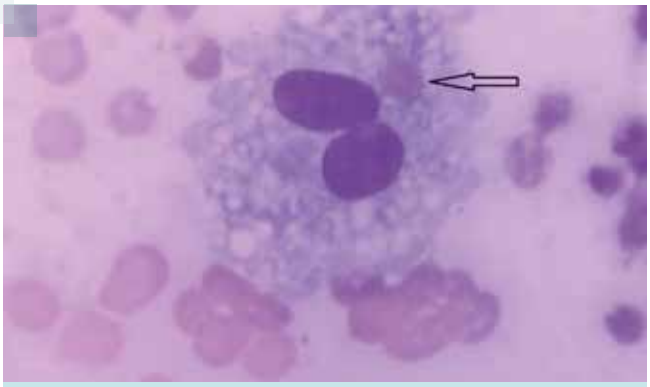

Fig 1: Macrophage with engulfed RBC

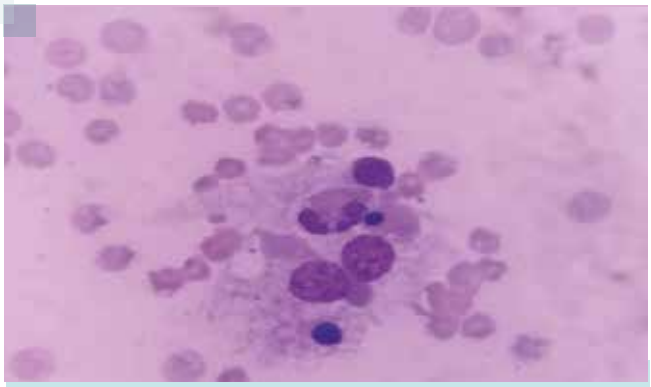

Fig 1b: Macrophage with engulfed eosinophil, erythroid precursor and lymphocyte

Fig 2: CT abdomen with oral contrast showing dilated small bowel

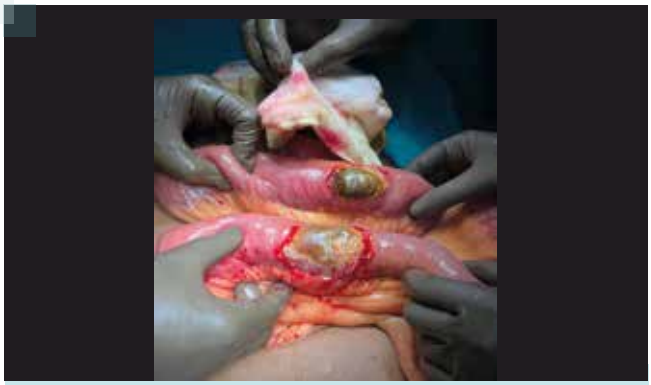

Fig 3a: Distal ileum showing 2 perforations

Fig 3b : Resected small and large bowel

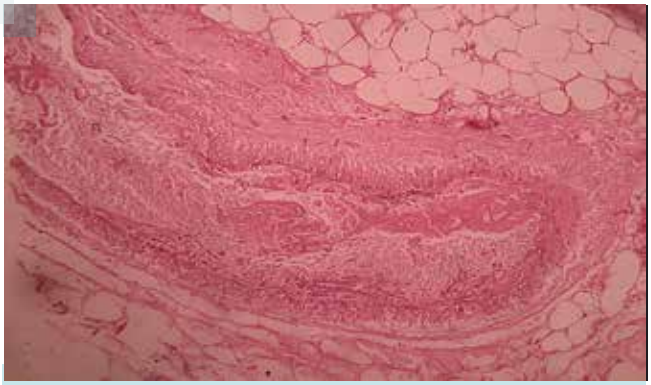

Fig 4a : Fungal hyphae invading a muscular-walled blood vessel - Low power H&E stain

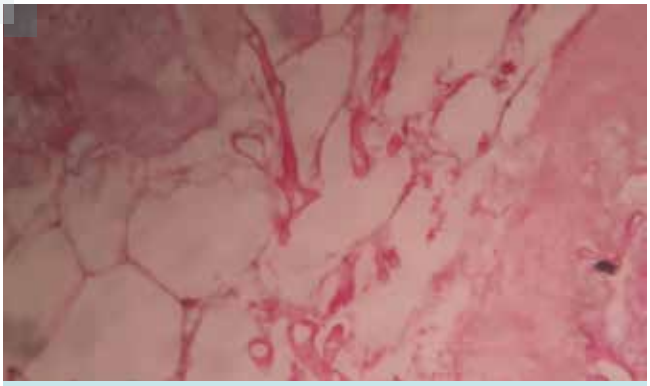

Fig 4b : Higher magnification of Fig 4a

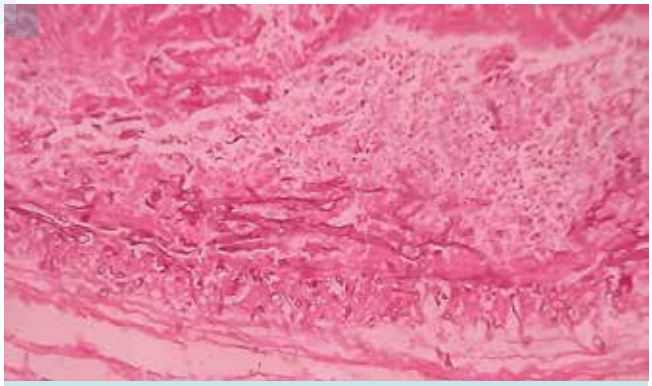

Fig 4c : PAS stain - Broad sparsely septate branching fungal hyphae in serosal fat

Interesting Case Of PUO: MTCD With Kikuchi Lymphadenitis and Macrophage Activation

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Introduction

Pyrexia of unknown origin (PUO) are always diagnostic challenge. The final diagnosis can vary from common entities like tuberculosis, lymphoma to rare disorders. Here we report a case of autoimmune disorder presenting as PUO. The Kikuchi lymphadenitis and macrophage activation occurring in this context can be potentially life-threatening.

Case Report

A 33-year-old male from Moradabad, Uttar Pradesh presented with low grade fever with occasional night sweats along with fatigue and dry cough for 30 days, history of macular lesions appearing in crops on face and upper trunk since the last three years. He also complained of oral ulcers, occurring occasionally in the past year. His past history and personal history were not significant; there was history of rheumatoid arthritis in the mother. On examination, patient was conscious and oriented to time, place and person. He was tachypneic, the oxygen saturation was 86% at room air, blood pressure was 90/70 mm Hg and the pulse was around 110/min. Systemic examination showed soft abdomen with diffuse tenderness in epigastric and paraumbilical regions and decreased air entry on the left side; rest of the systemic examination was normal. Arterial blood gases revealed metabolic acidosis pH -7.2 with lactate 2. Initial investigations revealed bi cytopenia (Hb -7.5, Platelet -28000), deranged liver function and kidney function test (AST – 103, ALT- 146, ALP- 254, GGT - 253; Blood urea nitrogen – 68, Serum creatinine- 5.73, Uric acid - 9.5), there were electrolyte imbalances(Calcium – 6.2, Phosphorus – 11.4). Imaging showed left sided pleural effusion with multiple axillary lymph nodes, along with few subcentrimetric mediastinal and abdominal lymph nodes, Hepatomegaly with mild bulky pancreas associated with peripancreatic fat stranding, mesenteric lymphadenopathy and moderate ascites (Figure 1). Multidisciplinary teams were involved - medicine, infectious disease, nephrology and the critical care specialist. In view of fever and bicytopenia, bone marrow aspiration and biopsy were done. Patient was started on conservative management and all relevant investigations were sent. Axillary LN biopsy was done. Patient creatinine and metabolic acidosis were worsening, and the patient received one session of dialysis. Further investigation revealed that ANA was positive (1 :160), U1 SM/ RNP antibody and Ro 52 antibody strongly positive +++. C3 and C4 was low; diagnosis of mixed connective tissue was made, and patient was started on steroids. Bone Marrow biopsy showed reactive cellular marrow with erythroid hypoplasia. (Figure 2). Based on criteria: fever, bicytopenia, raised ferritin, triglyceride, lactate dehydrogenase (LDH – 958, serum Ferritin – 3800, serum triglyceride – 269), liver enzymes and presence of hemophagocytosis in bone marrow, a diagnosis of secondary macrophage activation syndrome (MAS) made. GeneXpert was negative on axillary lymphnode biopsy, tissue sections were suggestive of Kikuchi Lymphadenitis (Figure 3). ZN stain for AFB was negative and no fungal elements were highlighted by SM and PAS

stains. The final diagnosis of mixed connective tissue disorder with kidney involvement, Kikuchi lymphadenitis with macrophage activation syndrome was made. Patient was started on high dose methyl prednisolone pulse therapy 500 mg for 3 days along with all supportive management. There was improvement in laboratory parameters, but further follow-up could not be done as patient left against medical advice.

Conclusion

A thorough history and clinical examination along with awareness of uncommon association is important to target investigations in cases of PUO.

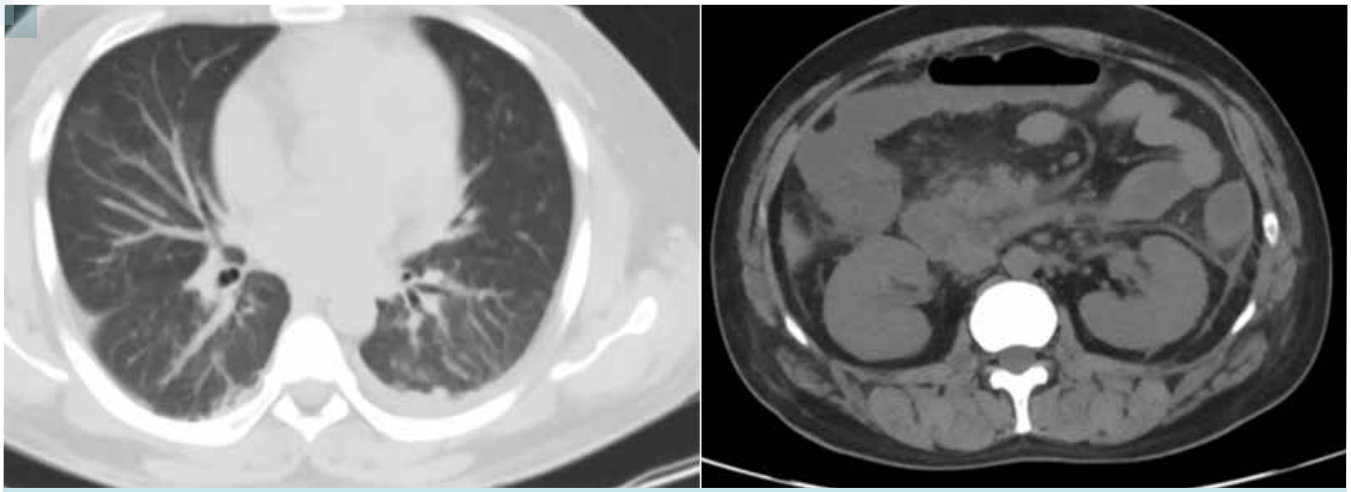

Figure 1: Non contrast CT scans chest and abdomen: left sided pleural effusion with multiple axillary lymphnodes, along with few subcentrimetric mediastinal and abdominal lymph nodes, Hepatomegaly with mild bulky pancreas associated with peripancreatic fat stranding, mesenteric lymphadenopathy and moderate ascites.

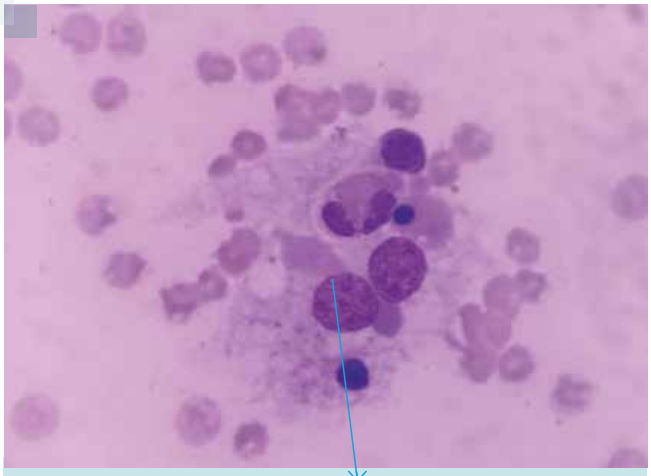

Figure 2 : Macrophages with ingested erythroid precursors, eosinophils suggestive of hemophagocytosis

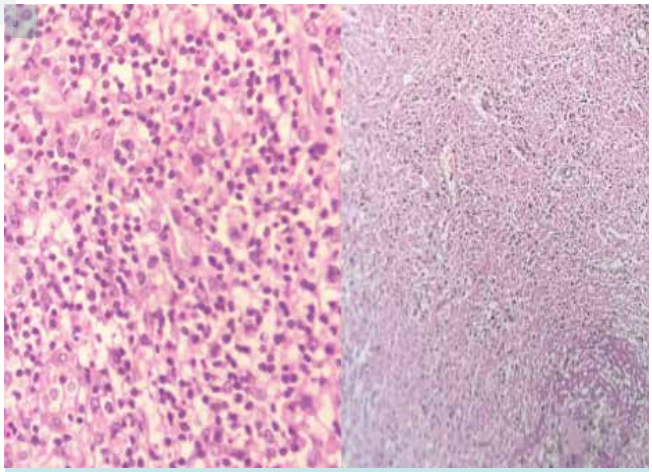

Figure 3 : Axillary lymphnode biopsy showing extensive necrosis and features suggestive of kikuchi lymphadentis

ECMO in Secondary ARDS Due to Pancreatitis: A Case Report

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A 47-year-old male, known diabetic, hypertensive with CAD-post PTCA presented to the emergency room with chief complaints of abdominal pain and vomiting. His initial investigations showed increased serum amylase and lipase levels. MRCP was suggestive of acute edematous pancreatitis. He was managed with IV fluids and analgesics as per protocol, however he progressed to severe pancreatitis with Acute Kidney Injury and ARDS over the next 2-3 days and was thus shifted to the ICU for further management. His RANSON Score at ICU admission was 2 and after 48 hours of ICU admission was 5. His BISAP score 2 was and his GLASGOW Score was 2. His SOFA score was 11 and APACHE-II Score was 26. APACHE-II Score more than 25 is associated with 50% mortality in ICU patients. He was initiated on empirical broad spectrum antibiotics in view of ongoing sepsis, initially managed with High Flow Nasal Cannula (HFNC) in view of tachypnea and fall in saturation. However, his lung parameters kept worsening despite high flows on HFNC. He also developed abdominal distension along with metabolic acidosis and anuria. In view of anuric AKI, metabolic acidosis and requirement of fluid removal (worsening intra-abdominal hypertension and oxygenation), he was started on CRRT along with Cytosorb® application for cytokine removal required due to severe acute pancreatitis.

In view of the worsening oxygenation, he was intubated and put on mechanical ventilation. His ventilation was optimized as per ARDSNet protocol. His ventilatory settings increased over the course with progressive deterioration in the PaO2 values. He could not be prone ventilated in view of raised intra-abdominal pressures. In view of raised intra-abdominal pressures and presence of peri-pancreatic fluid collection of approximately 100 ml, peripancreatic and peritoneal drain were inserted using ultrasonographic guidance. His course was further complicated by the development of septic shock and vasopressor support was initiated. Around Day 9 in ICU, his intra-abdominal pressures had decreased and the nasojejunal tube was inserted to start trophic feeds. Unfortunately, there was a new onset of fever which was investigated, and culture reports showed the growth of Acinetobacter Baumannii in the endotracheal tube. The antibiotics were modified according to the sensitivity reports.

Despite all these measures, his respiratory function continued to deteriorate with P:F ratios falling below 60. Recruitment maneuvers were not fruitful. Ultimately, on Day 12 of ICU, in view of poor oxygenation and high ventilatory requirements, it was decided to take the patient on veno venous ECMO for severe ARDS. The family was counselled about the modality and its pros and cons. They were fully supportive of the decision. V-V ECMO was thus initiated via the femoro- femoral configuration on Rotaflow II, Getinge machine. The draining cannula used was 23 Fr (Getinge HLS, Venous cannula) in the right femoral vein and the return cannula of 21 Fr (Getinge HLS Arterial cannula) was inserted in the left femoral vein. Stool management device (Flexiseal) was inserted to monitor the stool output. Anticoagulation was initiated with a heparin infusion to target an ACT of 160-180 seconds to prevent clot formation in the extra corporeal circuit. He was continuously monitored for any signs of bleeding. His GCS and pupillary charting were done strictly to rule out any evidence of intracranial bleed. Base ventilatory settings were kept as per ECMO protocol. On Day 4 of ECMO, patient suddenly developed desaturation. Hypoxia protocol on V-V ECMO was initiated. The culprit for hypoxia was found to be left lung collapse which was identified on bedside lung ultrasonography and was confirmed by a chest X-Ray. In view of left lung collapse,

bedside fibreoptic bronchoscopy was done by the ICU team. The oxygenation improved and the lungs opened up. He was maintained on VV ECMO as per the protocols. Over the next few days, he started showing some signs of improvement with reversal of shock and decrease in the vasopressors requirement. The vasopressors were gradually weaned off and stopped. Urine output was still absent, and he was managed on SLEDD. As the lung parameters improved, the ECMO flow requirements also started to decrease. The ECMO parameters which were used to monitor the improvement were sweep gas flow, ECMO RPM, blood flows, pO2 and PCO2 values. The patient was given sedation breaks and spontaneous breathing trials daily on ECMO. He was conscious and co-operative and was able to tolerate these trials on these ECMO and ventilatory settings. On Day- 12 of ECMO, a trial-off was attempted but it failed. But subsequently, the second trial-off was successful and the patient was successfully decannulated on day 13 of ECMO and day 24 of ICU stay. He maintained his respiratory parameters well on ventilatory support. He was then gradually weaned off from mechanical ventilation. It was then decided to do a percutaneous tracheostomy in view of prolonged intubation. He was weaned off from the ventilator to T piece on 27th day of ICU stay. Later his urine output and AKI improved and he no longer required dialysis support. On day 30 of hospital admission he was discharged. He was on regular follow-up with us post discharge and his tracheostomy was removed two weeks post-discharge. He is still on regular follow-up with us and is leading a near normal life.

Conclusion

Severe ARDS secondary to severe pancreatitis has a high mortality and is associated with poor outcomes. This case had several complications which were associated with severe acute pancreatitis, like AKI requiring dialysis, intra-abdominal hypertension, septic shock and ARDS, which are associated with high mortality. Severe ARDS refractory to conventional Ventilation and requiring VV ECMO support was a special challenge as intra-abdominal hypertension and septic shock in severe pancreatitis can cause inadequate flows on ECMO. Moreover, the risk of intra-abdominal hemorrhage was also high with the anticoagulation that is required for ECMO. In this case, especially the events of hypoxia even on high flows of ECMO, ongoing septic shock and AKI further complicated the scenario. There are very few case reports of ECMO being used for secondary ARDS due to severe acute pancreatitis. He was successfully managed on VV ECMO . The journey on ECMO was further complicated with hypoxia, ongoing sepsis and acute kidney Injury. Despite all odds, our patient recovered well.

Fig 1: Patient on Veno-Venous ECMO

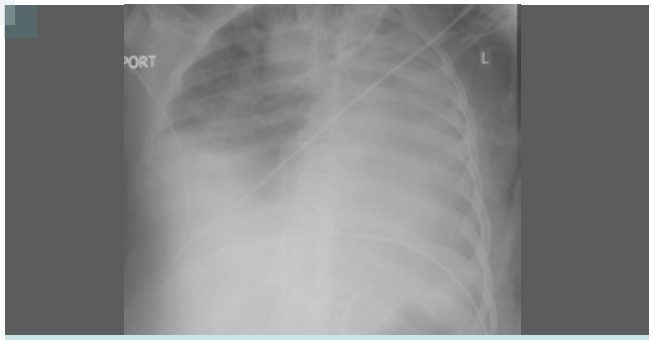

Fig 2: Chest X- Ray showing ARDS, pre ECMO

Fig 3: Chest X ray post ECMO

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Retrospective Observational Study of Hemodynamic Alterations During Hemodialysis

https://www.ijocs.org/clinical-journal/retrospective-observational-study-of-hemodynamic-alterations-during-hemodialysis.pdf

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Abstract

Critically ill patients have unstable hemodynamics when presenting to the ICU. In such instances, procedures like hemodialysis and slow low-efficiency daily dialysis may subject the patient to high variability in hemodynamics which may cause increased morbidity and mortality in susceptible individuals.

No Indian study has studied the hemodynamic alteration during the initiation of hemodialysis by continuous cardiac output monitoring. Hemodynamic variables of 10 matched patients subjected to hemodynamic monitoring were studied retrospectively and conclusions were drawn. The results of this study help us to understand the hemodynamics at the initiation of dialysis and thus develop protocols for monitoring.

A retrospective observational data (collected between January 2019 and December 2019) of 10 patients with chronic renal failure requiring hemodialysis due to volume overload and hyperkalemia.

These 10 patients were subjected to hemodialysis in the Intensive Care Unit (ICU). As a protocol in our intensive care unit such patients are subjected to hemodynamic monitoring and consent was sought for insertion of the central line and the femoral line for the EV1000 set up (Edwards Lifesciences, Irvine, USA). A baseline transpulmonary thermodilution was done using 20 ml cold saline followed by which continuous monitoring was done. Hemodynamic parameters like Cardiac Output (CO), Stroke Volume Variation (SVV), Systematic Vascular Resistance (SVR), and Stroke Volume Index (SVI), Systematic Vascular Resistance Index (SVRI), Pulse Rate (PR), Mean Arterial Pressure (MAP), Central Venous Pressure (CVP) were monitored with the help of inserting EV1000 continuous cardiac output monitoring system. The data were collected before initiation of dialysis and after the start of hemodialysis at the interval of every 5 min till 30 minutes.

Inclusion Criteria

- Patients admitted to the ICU requiring conventional hemodialysis due to volume overload and hyperkalemia due to chronic renal failure.

Exclusion Criteria

- Patient having concomitant or newly developed systolic dysfunction (with EF<40%)
- Patient in bacterial Sepsis and septic shock defined as (two out of hypotension (BP<100), altered mental status, or tachycardia (Hr>90)
- Patient with neurological insult
- Patient on previous antihypertensive agents
- Patients who have been diagnosed with autonomic neuropathy or manifest signs or symptoms suggesting autonomic neuropathy
- Patient with hypotension or tachycardia (Hr>120)
- Moribund patient
- Patient on any form of vasopressor support
- Patients who have not been adequately resuscitated demonstrated delayed capillary refill and no correction of lactates
- Patient on pacemakers
- Patient not having a functioning AV fistula
- Patient who has been intubated and mechanically ventilated

Statistics

Two-way repeated measures ANOVA using the SPSS software version 26 was used to analyze the data. Mean, standard deviation, median, interquartile range, F value, and P value were obtained. As per convention p-value, less than 0.05 was taken for the F value to be significant.

It was found that the mean SVRI was different as compared to the baseline. P value <0/001 and the

difference was found to be significant.

Results

Readings of hemodynamic monitoring were documented immediately after the initiation of the dialysis and after the start of hemodialysis at the interval of every 5 mins till 30 mins. The results were analyzed and then compared. 10 patients who were admitted to the ICU for dialysis were taken into consideration. For each result obtained mean, standard deviation, median, interquartile range, F value, and P value were obtained.

Conclusion

When the SV, SVR, and SVRI is compared amongst the study group at various intervals it was found that the mean was statistically different as compared to the baseline ($p<0.001$) after applying the multiple paired comparison the difference was found to be significant at various interval of starting the HD.

As per our results, we found that HD leads to a significant drop in the SVR, SV, and SVRI, possibly due to the vasodilatory effect of HD thus reducing the sympathetic activity. Although it was not compensated with an increase in the HR/MAP/CVP which suggests the chronotropic incompetence effect of the HD.

This hypothesis-generating study thus lays the impetus for a larger study to validate these findings and thus generate more data in the management of patients who would be susceptible to changes in stroke volume and systemic vascular resistance. However, this study seems to suggest that the first 15 minutes of hemodialysis does lead to a hemodynamic consequence which may demand a higher level of monitoring in susceptible individuals.

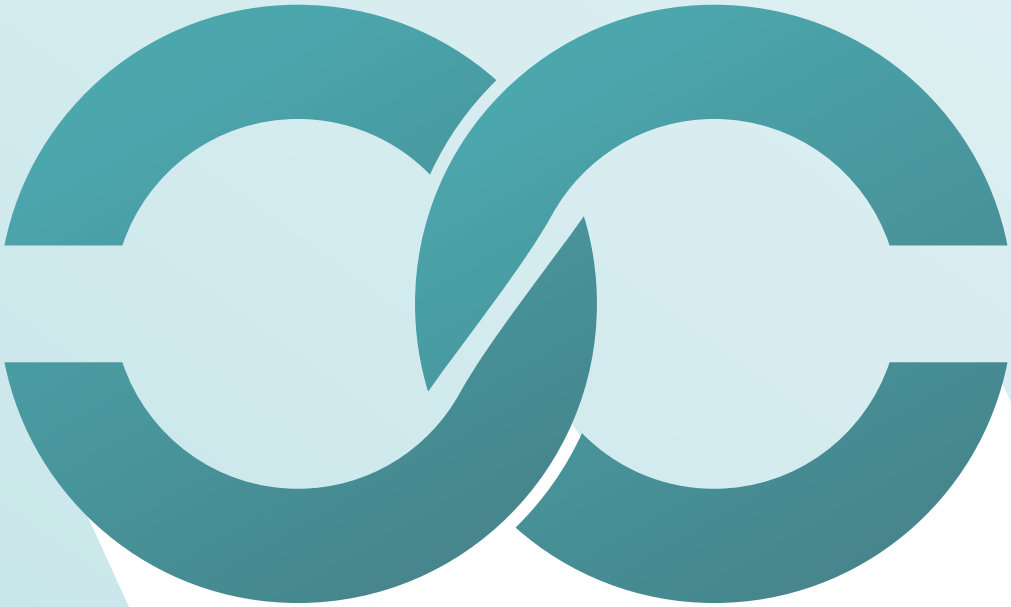
Keywords : Hemodialysis; Hemodynamic; ICU; Cardiac output

ECMO Machine (Getinge) Cardio Help

Location: Fortis Memorial Research Institute /Fortis Hospital, Shalimar Bagh

Key Features

1. State-of-the-art extracorporeal membrane oxygenation machine, can be used for both the cases of cardiac and respiratory Failure.
2. The Cardiohelp System can be used for both types of ECMO- veno-arterial (VA) and veno-venous (VV)
3. Portable device can be used for Air Ambulances also.
4. Colour coded parts for easy recognition.
5. PLS(Permanent Life Support) with blood flow 0.5 l/min to 7 l/min.
6. Better usable life of PLS which can be used for up to 30 continuous days.
7. Independent calibration solution.
8. Battery backup of 90 min makes its very useful while shifting the patient.



COVID 19

Clinical Application of Non-Bronchoscopic Bronchoalveolar Lavage in Critically Ill Covid-19 Patients

This will be presented at NAPCON at Udaipur as a poster (Abstract No: ABS740)

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Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is the virus responsible for the Coronavirus disease 2019 (COVID-19) pandemic affecting millions of people worldwide1. In COVID-19 patients, routine fibreoptic bronchoscopic BAL is associated with risk of aerosol generation and requires technical expertise. Non-bronchoscopic BAL (NB-BAL) can overcome these limitations. The feasibility, safety and clinical applications of NB-BAL have not been well studied in patients with COVID-19 pneumonia.

Our study evaluates the clinical application and safety of non-bronchoscopic bronchoalveolar lavage (NB-BAL) and its contribution in the diagnosis and modification of ongoing therapy in critically ill mechanically ventilated patients with COVID-19 associated pneumonia.

Materials and Methods

Between April 2020 to June 2021, 38 patients with suspected or diagnosed COVID-19 pneumonia who had bronchoalveolar lavage (BAL) done with NB-BAL catheter (©Kimberly Clark BAL-Cath Systems, figure1A) were included retrospectively in our study. Endotracheal aspiration (ETA) was also done within 48hrs of BAL in 14 of 38 patients. BAL samples were sent for smears and cultures, PCR (©Biofire Pneumonia Panel) and SARS COV-2 RTPCR.

NB- BAL is a minimally invasive distal airway sampling method and is done using an endobronchial catheter that is wedged in the tracheobronchial tree (figure1 B, C, D). Results were used to diagnose COVID-19 cases and lower respiratory tract infection, for antibiotic modifications, in decision to use Tocilizumab and to transfer patients to non-COVID-19 ICU. Physiological changes and any complications were also recorded.

Figure (1A) : Kimberly Clark BAL Cath system

Figure (1B) : NB-BAL in COVID 19 patients wearing PPE

Figure (1C) : Insertion of catheter through access port in NB-BAL catheter

Figure (1D) :Instillation of sterile saline for lavage.

Result

Non-bronchoscopic BAL was done for 38 out of 171 mechanically ventilated Covid-19 patients 61.7+17 years age, 34 males: with APACAHE 2 score 13.1+6.87. COVID-19 was confirmed on NB-BAL in 5(62.5%) of 8 suspects with negative nasopharyngeal RTPCR. Bacterial infection was identified on cultures in 25(65.7%) of 38 patients using NB-BAL. Simultaneous PCR (Biofire) was sent in 17 (44.7%) of 38 patients, microorganisms were identified in 8 (47%) of 17 samples, 7 being concordant with culture results. In 7 (50%) of 14 patients ET aspirate (ETA) reports were concordant with NB BAL cultures, additional organisms were identified in NB-BAL sample of 5 (35.7%) of 14 cases, NB-BAL sample was positive and ETA negative in one case, and NB-BAL was negative with a positive ETA in one patient. NB-BAL and ETA results led to modification of antibiotics for 23 (60.5%) of 38 patients (descalation in 4 and escalation in 19) patients. Tocilizumab was withheld in 10 (76.9%) of 13 due to positive NB-BAL cultures while the remaining 3 (23.07%) of 13 were given Tocilizumab. Shift to the non-Covid ICU was facilitated by negative COVID-19 NB-BAL RTPCR in 9(81.8%) of 11 evaluated patients. The procedures were uneventful with transient decrease in PaO2/FiO2 ratio from 149.5 to135.3 (p value=0.042).

Table 1: Patient Demographics

Charecterstics	Total n = 38
Age (years), mean (range)	61.7 (27-84)
Sex (male/female), n (%)	34/4 (89.4/10.5)
APACHE 2 score, mean (range)	13.1 (6-33)
SOFA score, mean (range)	4.1 (1-9)
FiO2 1 hr before NB-BAL (%), mean (range)	67.2 (30-100)

Table 2. Blood gas parameters before and after NB-BAL

	Measure Mean		Before-After Mean Change
Variable	1 hr Before	After 6hr	p-value
Fio2 %	66.6	66.7	0.842
Pao2	103.1	837	0.024
Pco2	50.7	59.5	0.106
PFR	154.11	135.01	0.042

Discussion and Conclusion

Our study shows that NB-BAL is a feasible and safe alternative to bronchoscopic BAL procedure in mechanically ventilated patients with COVID-19 pneumonia. We experienced no major complications and despite a drop in PFR post procedure, no increase in FiO2 requirement was noted. As compared to endotracheal aspirate (ETA), NB-BAL identified growth of additional microorganism and therefore contributed

to decision regarding administration and withholding of Tocilizumab and antibiotic modification. Positive NB-BAL RTPCR for COVID19 confirmed the diagnosis and similarly negative report facilitated shifting of patient to the non-COVID ICU in significant proportion of patients. Tasbakan et al. demonstrated a strong correlation between performance of bronchoscopic BAL and NB-BAL for detection of respiratory pathogens in immunocompromised patients with pneumonia and respiratory failure[2]. Vanbellinghen et al. found similar percentage of positive test results in NB-BAL lavage and bronchoscopic BAL samples in patients with suspected COVID-19–associated pulmonary aspergillosis[3]. In a prospective study by Arora et al. comparing standardized non-bronchoscopic bronchoalveolar lavage (sNB-BAL) and non-specific endotracheal aspirate (NsETA) in the microbiological diagnosis of pneumonia in mechanically ventilated patients, found sNB-BAL to be significantly more specific (0.73) compared to NsETA (0.35) for the microbiological diagnosis of pneumonia. Colonization rates with NsETA were significantly higher compared to sNB-BAL (P value <0.0001) and no patient had complications attributable to the sNB-BAL procedure.[4]

In another prospective comparative study by Khilnani et al. 25 patients, clinically diagnosed with VAP, were evaluated by bronchoscopic and non-bronchoscopic procedures for diagnosis. Endotracheal aspirate (ETA) yield was only 52% and showed poor concordance with BAL (-0.351; P-0.064) and NBAL (k-0.272; P-0.161), however there was a good microbiologic concordance among different bronchoscopic and non-bronchoscopic distal airway sampling techniques.[5]

There are some limitations to this study that need to be addressed. First, patients who were critically ill and had clinical suspicion of VAP were prohibited from receiving NB-BAL and this study had no control group, therefore NB-BAL lavage cannot exactly confirm the safety and application conditions in these patients. This is a single centre, retrospective study with a small sample size, therefore, a validated prospective study is warranted in the future to investigate the diagnostic accuracy and usefulness of NB-BAL.

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Efficacy and Safety of Intravenous and/or Oral Levonadifloxacin in the Management of Mecondary Bacterial Pulmonary nfections in COVID-19 Patients: Findings of a Retrospective, Real- World, Multi-Center Study

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Source: https://www.msjonline.org/index.php/ijrms/article/view/10146

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Introduction

Owing to dysregulated immune response, secondary bacterial pulmonary infections involving both gram-positive and gram-negative pathogens are common in COVID-19 patients and are often associated with higher mortality. This is a first ever report on the safety and efficacy of levonadifloxacin in the treatment of secondary bacterial pulmonary infections in patients with COVID-19 pneumonia.

Methods

This multi-center, retrospective, post-marketing and real-world study assessed the safety and efficacy of IV and/or oral levonadifloxacin in the treatment of bacterial infections encountered in COVID-19 patients. Data for 154 male/female patients above 18 years of age who received levonadifloxacin (injectable and/or oral) was collected from 44 participating sites. Study outcomes were the clinical and microbial success at the end of therapy. Safety was assessed based on clinical and laboratory adverse events.

Results

Among the 154 patients assessed, 121 (78.6%) were males and 142 (92.2%) were hospitalized. Majority of the patients (119) received all-IV therapy while 11 patients were prescribed with IV followed by oral regimen. All- oral therapy was received by 24 patients. The most common co-morbid conditions were diabetes (19.6%) and hypertension (19.2%). Post-treatment with levonadifloxacin, the clinical and microbial success rates were 96.8% and 97.0% respectively.

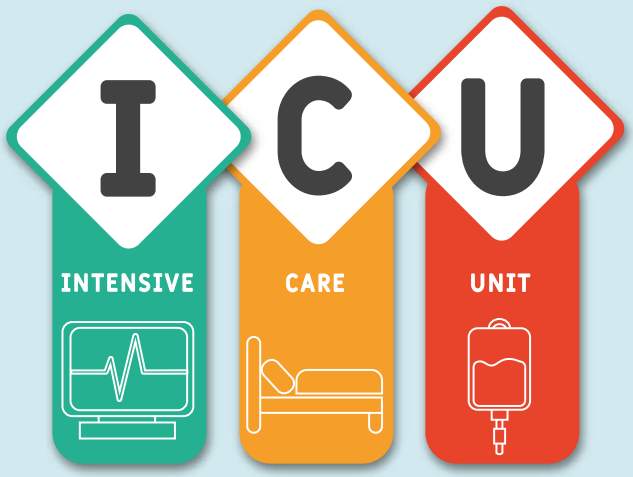
Conclusion

Levonadifloxacin showed promising safety and efficacy when used as IV and/or oral therapy for the treatment of secondary bacterial pulmonary infections in COVID-19 patients. Clinically relevant features of levonadifloxacin such as availability of both IV and oral options, broad spectrum coverage and reassuring safety in patients with significant co-morbidities could help simplify the management.

Trial registration no. CTRI/2020/09/028152 [Registered on: 30/09/2020].

Keywords

COVID-19, Levonadifloxacin, Secondary bacterial infections, Real world study



Issue: 8 | January 2023

Inflammatory Markers as Early Predictors of Disease Severity in COVID-19 Patients Admitted to Intensive Care Units : A Retrospective Observational Analysis

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Source: Indian Journal of Critical Care Medicine (2022): 10.5005/jp-journals-10071-24171

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Abstract

In pandemic situations, it is essential that the limited resources are used judiciously to achieve maximum benefits. Prediction of the disease severity at the earliest will help in better allocation, thus, positively affecting prognosis and treatment.

Aim and Objective

To investigate patient characteristics and specific biomarkers as possible early predictors of disease severity of SARS-COV-2 infection.

Materials and Methods

Retrospective single-centric observational study conducted at a 70-bedded intensive care unit of tertiary care hospital at Haryana, India. 100 consecutive RT-PCR positive coronavirus disease-2019 (COVID-19) adult patients. Demographics, acute physiology and chronic health evaluation II (Apache-II) score, and inflammatory markers were compared with respect to oxygenation defect (PaO2/FiO2 ratio: <300 or ≥300 mm Hg), need of invasive ventilation, ICU length of stay and 28-day mortality.

Findings

Mean age was significantly more in lower PF ratio group (58.01 ± 15.33 vs 50.97 ± 13.78, p = 0.023) whereas sex ratio was comparable among patients in two groups. Significantly, higher APACHE-II score (p ≤0.001) and presence of hypertension (43.54% vs 23.68%; p = 0·045) in low PF ratio group along with higher C-reactive protein (171.78 ± 124.45 vs 101.52 ± 88.70), IL-6 (173.51 vs 53.18) and ferritin (1677.60 ± 2271.13 vs 643.54 ± 718.68) levels. Procalcitonin, lactate dehydrogenase, and creatine phosphokinase (CPK) levels were not significant.

Interpretation: Age and APACHE II score and among laboratory parameters CRP, ferritin, and IL-6 levels were significantly higher in low PF ratio group, patients requiring invasive ventilation and in mortality group. Use of this triad (CRP, ferritin, and IL-6 levels) at admission may predict the disease severity early in the course. Addition of APACHE-II may further improve the accuracy of the score.

Keywords : APACHE II, Conservative oxygen therapy, COVID-19 ARDS, Hypoxemia, Indian Intensive care unit, Inflammatory biomarker.

Energy Expenditure in COVID-19 Mechanically Ventilated Patients: A Comparison of Three Methods of Energy Estimation

Source: JPEN J Parenter Enteral Nutr. 2022 Nov;46(8):1875-1882 doi: 10.1002/jpen.2393. Epub 2022 May 28. PMID: 35526145; PMCID: PMC9348140

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Abstract

Indirect calorimetry (IC) is the gold standard for measuring resting energy expenditure. Energy expenditure (EE) estimated by ventilator-derived carbon dioxide consumption (EEVCO2) has also been proposed. In the absence of IC, predictive weight-based equations have been recommended to estimate daily energy requirements. This study aims to compare simple predictive weight-based equations with those estimated by EEVCO2 and IC in mechanically ventilated patients of COVID-19.

Methods

Retrospective study of a cohort of critically ill adult patients with COVID-19 requiring mechanical ventilation and artificial nutrition to compare energy estimations by three methods through the calculation of bias and precision agreement, reliability, and accuracy rates.

Results

In 58 mechanically ventilated patients, a total of 117 paired measurements were obtained. The mean estimated energy derived from weight-based calculations was 2576±469kcal/24h, as compared with 1507±499kcal/24h when EE was estimated by IC, resulting in a significant bias of 1069 kcal/day (95% CI [−2158 to 18.7 kcal]; P < 0.001). Similarly, estimated mean EEVCO2 was 1388 ± 467 kcal/24 h when compared with estimation of EE from IC. A significant bias of only 118 kcal/day (95% CI [−187 to 422 kcal]; P < 0.001), compared by the Bland Altman plot, was noted.

Conclusion

The energy estimated with EEVCO2 correlated better with IC values than energy derived from weight-based calculations. Our data suggest that the use of simple predictive equations may potentially lead to overfeeding in mechanically ventilated patients with COVID-19.

Keywords : COVID-19,EEVCO2, energy expenditure, indirect calorimetry, predictive equation

CARDIOLOGY PUZZLE

I don't let him run
I don't let him have fun

If he is at rest
He is at his best

I sit on his chest
I grab on his throat

He needs pills and graphy
And may need plasty

My Name is:_____

Answer to the Puzzle
ANGINA

Medicine and Law in the Times of COVID-19 Pandemic : Understanding the Interphase

Source: Indian J Crit Care Med. 2020 Oct;24(10):971-974 doi: 10.5005/jp-journals-10071-23553 PMID: 33281324; PMCID: PMC7689127.

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Abstract

Coronavirus disease-2019 (COVID-19) has heralded a wide set of challenges involving not only the medical management of the patients but also the legal dilemma with regards to provision of healthcare services. The medical professionals have experienced difficulty in balancing their obligations and duties toward the patients, and their own right to safeguard self, family, and their clinical establishments. The professional regulatory bodies and government have formulated new policies and amended laws to control the current situation. It is the need of the hour to be mindful of the existing laws and our rights and duties in the era of current pandemic. Collaborative efforts are needed to provide best possible care in the current unpredictable environment. The commonly encountered problems and their possible solutions are discussed in the context of medicolegal framework applicable to Indian medical practitioner.

Conclusion

The COVID-19 situation is a dynamic situation and evolving with regional variances. The pandemic is here to stay and many more may just be knocking at the door. We have definitely struggled, not because of the disease but the fear of unknown.

The Indian laws while imposing regulations on practice, does simultaneously provide provisions to safeguard the interest of the medical practitioner.

The professional governing bodies all over the world, including the AMA (Code of Medical Ethics Opinion 8.3) command professionals to have an obligation to provide urgent medical care during disasters. However, the code recognizes that the physician workforce is a limited resource and should be utilized judiciously while maintaining a fine balance between the present-day risks and need to provide care in the future.

The physicians have a moral duty to treat, but they do have the same human rights as all citizens and need to be protected against infectious diseases. The hospitals, professional regulatory bodies, and governments must ensure and provide the necessary resources, to protect the staff caring for the infected patients—not just PPE, but also training, environmental controls, and policies and procedures to prevent spread.

A balance of efficiency and innovation is a pressing priority. It is the need of the hour to be mindful of the existing laws and our rights and duties in the era of current pandemic.

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A Diagnostic Dilemma of Post-Operative Hypoxic Ischemic Encephalopathy as a Presentation of Multisystem Inflammatory Syndrome – Children (Mis-C)

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Introduction

Multisystem inflammatory syndrome in children (MIS-C) is a known but serious complication of SARS-CoV-2 infection. The first published study of multisystem inflammatory syndrome in children (MIS-C) described eight children from the United Kingdom with hyper inflammatory shock[1]. These patients had varied presentation but the diagnostic criteria used by the CDC was:

An individual aged < 21 years presenting with fever*, laboratory evidence of inflammation**, and evidence of clinically severe illness requiring hospitalization with multisystem (>2) organ involvement (cardiac, renal, respiratory, hematologic, gastrointestinal, dermatologic or neurological) and

No alternate plausible diagnosis and Positive for current or recent SARS-CoV-2 infection by RT-PCR, serology or antigen test; or exposure to a suspected or confirmed COVID-19 case within the 4 weeks prior to the onset of symptom.

*Fever > 38 C for > 24 hours, or report of subjective fever lasting > 24 hours

**Including, but not limited to one or more of the following: an elevated C-Reactive Protein (CRP), erythrocyte sedimentation rate (ESR), fibrinogen, procalcitonin, D-Dimer, ferritin, lactic acid dehydrogenase (LDH) or interleukin 6 (IL-6), elevated neutrophils, reduced lymphocytes and low albumin.

Case Report

A 16-year-old male, who previously underwent hypospadiasis correction, developed urethro-cutaneous fistula and was admitted for urethro-cutaneous fistula closure. After pre-operative evaluation, patient underwent urethra-cutaneous fistula closure under general anaesthesia. The intra-operative period was uneventful.

The next day early morning, the patient became suddenly unresponsive and was immediately shifted to the MICU. In view of low GCS and desaturation he was intubated. Post intubation the patient developed seizures which were managed by anti-epileptic agents. MRI brain was done which showed features of hypoxic ischemic encephalopathy and subsequent EEG done was showing generalized epileptic wave forms. 2D echo was done which showed global hypokinesia with ejection fraction of 40%, coronary angiogram which was done in view of global hypokinesia showed normal coronaries. At the same time, he had acute kidney injury and acute liver injury; which was managed conservatively. The inflammatory markers were elevated. With multi system involvement and elevated inflammatory markers, The Covid Ig G was sent with the possibility of MIS-C which turned out to be positive, and a diagnosis of MIS-C was established by meeting the criteria described by CDC.

He was started on methylprednisolone 1mg / kg. His clinical condition gradually improved over the period of next two weeks with resolving acute kidney injury, liver function and inflammatory markers along with improvement in the overall clinical condition of the patient. Repeat 2D echo, EEG, MRI were done which was normal. ANA, ANCA, complement levels were checked to rule out other connective tissue disorder.

Discussion

The pathophysiology of MIS in both children and adults is currently unknown. Morris, S.B., et al. has described that 45% of 440 children with MIS who reported to CDC through July 29, 2020, had negative PCR and positive SARS-CoV-2 antibody test results, suggesting that MIS-C might represent post infectious process[2].

In our patient, who was a healthy young child with no previous comorbidity and with no possible involvement,

this could have been missed without a very high index of suspicion.

Since the patient underwent surgery in general anaesthesia initially, a suspicion of post anaesthesia complication like delayed recovery from anaesthesia due to soda lime exhaustion or inadequate muscle relaxant reversal leading to respiratory depression thus leading to hypoxia and brain damage was considered. At the same time we considered the possibility of mitochondrial myopathies that could have flared up due to surgery and anaesthesia and muscle biopsy to rule out the same was considered. However, he had undergone a previous surgery which was uneventful. Reviewing the history, the recent lower respiratory tract infection was identified and MIS-C was considered. A COVID IgG was sent that turned out to be positive, following which he was started on steroids.

His transthoracic echo after arrival in MICU showed global hypokinesia with reduced ejection fraction although the coronary angiogram done showed normal coronaries. With hypoxic ischemic encephalopathy features in MRI brain, acute kidney injury, deranged liver functions along with elevated inflammatory markers with COVID IgG positive multi-inflammatory syndrome secondary to COVID-19 was diagnosed.

One of the theories proposed for MIS is persistent infection outside the respiratory tract. Other theories include endothelial damage, thrombo inflammation and dysregulated immune response3. Zachary most et al. described a group of patients with positive tests for COVID-19 at presentation and features of fever, elevated enzymes, biventricular dysfunction, elevated troponins and ST-T wave changes [4].

Why some children develop MIS is presently unknown. Many children with MIS have no history of symptomatic respiratory infection and test negative for SARS-CoV-2 by PCR, but have developed SARS-CoV-2 specific IgG antibodies as in our case, suggesting that the initial infection occurred at least 2 weeks before the development of MIS-C [4]

The treatment described for MIS has been inconsistent. In children, IV corticosteroids, IV immunoglobulin, IL-6 inhibitors [5] has been tried. In this case IV methylprednisolone (1mg / kg / day) was used.

His acute kidney injury, liver functions, ventricular function improved over a period of two weeks, along with improvement in his neurological status. Although MIS-C carries a high mortality when compared to MIS-A, with high index of suspicion, multi disciplinary team care with monitoring in an intensive care setup, the mortality can be reduced [6].

Conclusion

Clinicians should be aware of MIS associated with COVID-19. MIS may lead to life threatening complications and death. This can be avoided by having a high index of suspicion and then maintaining the appropriate approaches for managing MIS-C.

Acknowledgement

We thank Dr Chandran Gnanamuthu, Senior Consultant Neurologist and Dr Yogesh Gupta, Senior Consultant Pediatrician for their expert advice in the management of this patient.

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The Role of Tele ICU During a Pandemic: A Retrospective Observational Study

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Introduction

Tele-ICU can be defined as the provision of critical care by a team via computer and audio visual, or telecommunication systems.1,2 It allows the intensivist to remotely see the patients and the biomedical devices and access electronic records of the patient. These along with the information provided by a bedside caregiver, help the intensivist manage the patient, remotely, from a command centre.[3,4]

Telemedicine's role during the current coronavirus pandemic remains two-fold: to connect clinicians with patients and to support frontline bedside teams, each accomplished regardless of location.[5]

Aims and Objectives

To study the impact of tele ICU in the management of suspected as well as confirmed COVID-19 patients based on the following parameters

1. The overall mortality of patients
2. Healthcare worker infection and mortality

Materials and Methods

The study was conducted in the COVID-19 isolation/ suspect area and COVID-19 ICU at Fortis Medical Research Institute, Gurugram. This was a retrospective observational study

Patients with age > 18 years, suspected cases of COVID-19 infection (patients admitted to emergency room isolation ICU awaiting COVID-19 RT PCR reports) & laboratory confirmed [COVID-19 RT PCR positive] cases of COVID-19 requiring COVID-19 ICU admission were enrolled in the study. Patients with age < 18 years & laboratory confirmed [RT PCR Negative] COVID-19 negative patients were excluded from the study. A suspected patient awaiting RT PCR report was excluded from the study once COVID-19 negative RT PCR status was confirmed.

A total of 133 patients- COVID-19 suspects and confirmed cases were included in the study. These patients were managed in a Tele ICU. The intensivists were stationed at a designated area outside the COVID-19 ICU. They took rounds twice per day and further as per need. The patient management orders were communicated over a software group to the nursing staff posted in the COVID-19 ICU.

Result

Out of the patients admitted during the study period, a mortality of 12.5% was seen while 87.5% of patients recovered and were subsequently discharged. The p-value of the difference in predicted vs observed mortality was 0.146. A total of 43 doctors, from various specialities, were actively involved in the clinical decision-making via the software group. None of the doctors were infected during the study period. During the study period, 6 of the 27 nursing staff members were reported as infected. They had mild illnesses and made full recovery. No mortality was reported.

The distribution of patients and respective mortality by APACHE II score is depicted in Table 1.

Table 1: Distribution of patients and respective mortality according to APACHE 2 score

Apache 2 Score	Percentage Of Patients	Morality
<3	11.8	6.2
3-10	44	6.7
11-20	36	20.4
21-30	5.9	25
>30	2.2	0

The p-value of the difference in predicted vs observed mortality was 0.146.[6]

Discussion

The World Health Organization defines telemedicine[1] as "the delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for the diagnosis, treatment and prevention of disease and injuries, research, and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities.[7]

Tele ICUs reduce the transmission of communicable diseases by reducing the exposure of healthcare workers. In our Tele ICU, none of the doctors were infected while working in the COVID-19 ICU. During the study period, 22% of the nursing staff members working in the COVID-19 ICU, tested positive. Thus, only 0.075% of the healthcare workers tested positive during the study period.

The management of a patient infected with COVID-19 is challenging. Apart from the medical costs involved, it also involves a number of consumables. A single PPE kit includes a pair of nitrile gloves, a single-use coverall, goggles with transparent glasses, an N-95 mask, shoe covers, and a face shield. Since each of these items is separately considered as a consumable, there is a significant increase in the number of consumables used in the treatment of COVID- 19 infection.

No wonder, the shortage of PPE kits and other protective gear like face masks has been in the global news ever since the pandemic broke out. Tele ICU can help lower the utilisation of consumables.

The Acute Physiology and Chronic Health Evaluation II (APACHE II) score has been used as a predictor of the severity of critical illness and has been used previously as a predictor of mortality. In a recent study by Xiaojing Zou, the APACHE II score has been validated for use in COVID-19 patients.8 They concluded that APACHE II score was an effective clinical tool to predict hospital mortality in patients with coronavirus disease 2019 compared with the Sequential Organ Failure Assessment score and CURB65 score. APACHE II score greater than or equal to 17 serves as an early warning indicator of death and may provide guidance to make further clinical decisions.8

Thus, our data shows, that as far as mortality is concerned, tele ICUs were comparable to conventional ICUs.

Conclusion

The current study shows that there is no significant difference between the APACHE II score-specific mortality among patients managed in a Tele ICU vs a conventional ICU.

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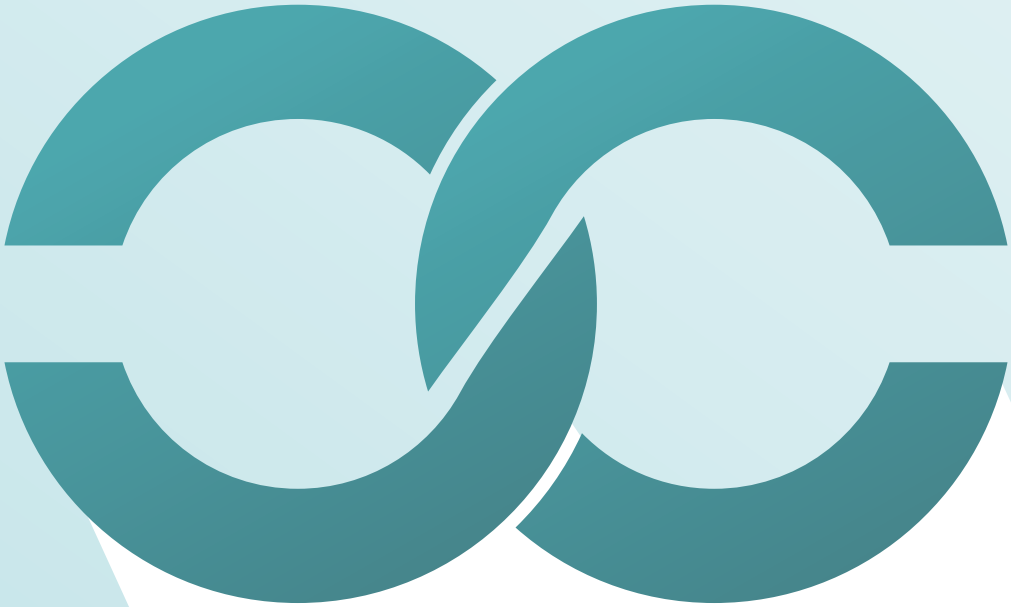

NEWS AT FORTIS

World Antimicrobial Awareness Week - Winning Article

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"Scarcity is an illusion that results from inefficient systems."

-Hendrith Vanlon Smith Jr

Introduction

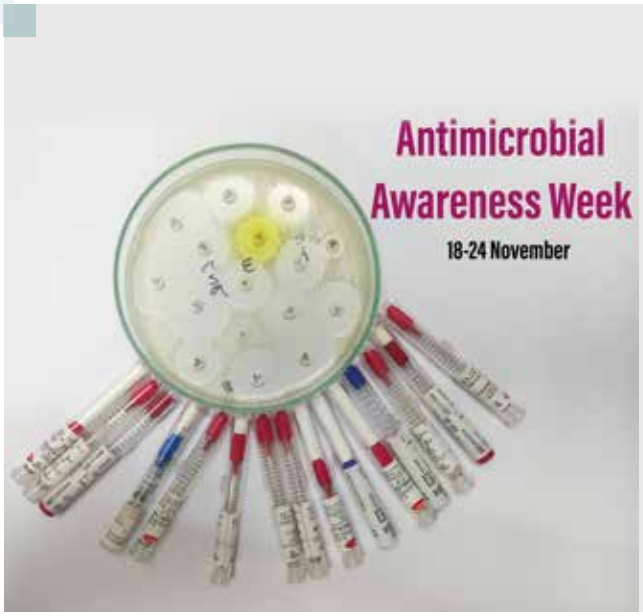
The quote is apt to describe the current scenario of uprising antibiotic resistance in hospital care. The emphasis of the article is not to point out shortcomings of clinicians, nursing staff, pharmacists, management team. Insistence is to ameliorate antibiotic stewardship program which has been meticulously designed by the experts in the institute.

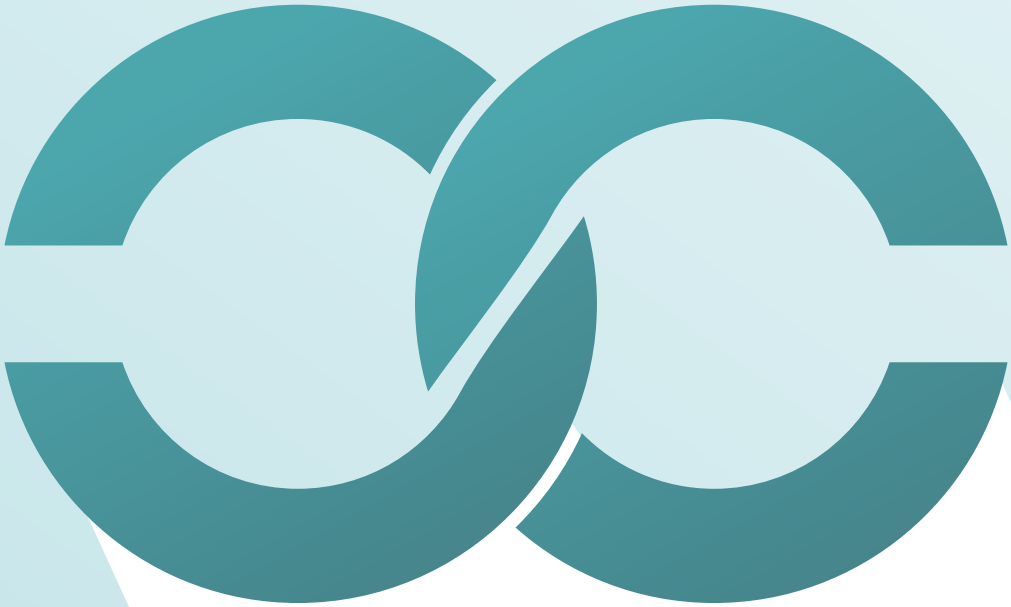
Seemingly, the process of implementation is persistent and requires comprehensive efforts of multidiscipline specialities. The most intriguing challenge is dynamic exodus and incorporation of the grass root level employees. The spectra include nursing staff, especially novice trained nurses recruited in wards, fresh medical graduates. Despite stringent teaching classes on daily schedules, errors of prescription and administration occur. The errors contribute to the antibiotic resistance. Proactive efforts of senior team members and elaborate clinical rounds are suitable answers to the solution. Procrastination of the negative response to such errors will boost morale of the novel inductees. Also, active involvement of novel inductees to boost their interest in antibiotic stewardship would improve prescribing practices. Active involvement could be made by interactive sessions, quizzes with prize, appreciation display for nurses and doctors abiding JCI standard prescription. Distribution of placards posters, regular videos, digital posters at displays on the floor and ICU could be a pragmatic solution.

Large dynamic inflow of patients at emergency and triage blurs judgement of an emergency physician to prescribe an antibiotic. With 1 hour bundle imbibed after 2021 surviving sepsis guidelines, pressure of administering antibiotic within an hour to sepsis and septic shock patient is imminent. Stringent and harsh duties and overburdened department leads to further ignorance of antibiotic stewardship. Hence, expert help all round the clock will be of great help to our emergency physicians. Most of the time, a simple chart of simplified antibiogram of the NCR region and nearby corporate hospitals and eminent nursing homes, would be of great help to emergency physicians. As being a tertiary institute, a huge chunk of patients is referred from nursing homes and they already have received broad spectrum antibiotics like Carbapenems, piperacillin tazobactam, fluoroquinolones. Regular updates by critical care medicine, infectious disease medicine physician, microbiologist and anaesthesiologist would help formulate and regularly modify the policy of prescribing antibiotics at emergency department. 24 hours on call infectious disease expert or intensivist helpline might be an answer for over engaged shifts, allowing emergency physicians to focus more on resuscitation and less on deciding which antibiotic to prescribe, as opinion could be taken even by a nursing staff who is novice.

ICU too suffers mixing of the infectious and non-infectious patients as allotment to RRT, emergency and code blue patients depends on availability rather than speciality. Strict implementation of policies for prevention of cross infection is irremediable.

Ending with the note, perseverance with regular inputs of dynamic changes of antibiotic spectrum can help dissolve antibiotic resistance. As all of have miles to go before we sleep, regards to Sir Robert Frost.





ONCO CONNECT

Elimination of Cervical Cancer in India : Where Do We Stand ?

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Globally cervical cancer is the fourth most common cancer among women, with an estimated 604, 000 new cases and 342,000 deaths in 2020; of these more than 58% of all cases and deaths globally were estimated in Asia. India accounts for 21% of total cervical cancer cases and 23% of total deaths, followed by China. In India, the incidence of cervical cancer ranges from 6-29%. Papumpore district in Arunachal Pradesh has the highest rate in Asia(27.7%).The majority of patients are diagnosed in the locally advanced stage (60%).

Two human papillomavirus (HPV) types (16 and 18) are responsible for nearly 50% of high grade cervical pre-cancerous lesions. HPV is mainly transmitted through sexual contact and more than 90% of them clear the infection eventually. A large majority of cervical cancer (95%) is due to HPV. It takes 15 to 20 years for cervical cancer to develop in women with normal immune systems and 5 to 10 years in those with weakened immune systems, such as due to HIV infection. About 5% of the cervical cancers are associated with HIV.

There is no comprehensive cervical cancer screening program in India at present. A lifetime screening prevalence of 29.8% among women aged 30-49 has been reported from a nationally reported survey. There is no National HPV immunization program in India though the efforts are on.

Vaccination against HPV and screening and treatment of precancerous lesion is a cost effective way to prevent cervical cancer. Cervical cancers can be cured if diagnosed early and treated promptly. Comprehensive cervical cancer control will include primary prevention (HPV vaccination), secondary prevention (screening and treatment of precancerous lesions) and tertiary prevention (diagnosis and treatment on invasive cervical cancer). The Ministry of Health & Family Welfare has recommended the visual inspection with Acetic acid (VIA) screening method for women aged 30-65 with a 5 year interval since 2016 as per the operational frame work.

National data at a glance –

Country population 1360 million, female population (20 – 29) 137.8 million, female population (30 – 59) 230.5 million. HPV prevalence 2.3 – 36.9%, cervical cancer incident rate (age adjusted) - 18 / 100,000, cervical cancer mortality (age adjusted) - 11.4/100,000. Available / recommended screening method – VIA, Type of screening – opportunistic. Strategy program dedicated to cancer – national control program, national strategy /program dedicated to cervical cancer formed for 2017- 2022 and the target group in this project is 35 – 55 years.

Effective screening and vaccination program can potentially eliminate cervical cancer in the future by offering services to all girls and women. In particular, women who live in rural areas and who have low socioeconomic status and are at higher risk.

The Papilloma Virus Rapid Interface of Modelling & Economies (PRIME) study concluded that HPV vaccination if introduced in the countries where it is not available, by 2070 would reduce the cases by 400,000 cases and the deaths by 200,000 deaths. Obviously, India will be biggest the beneficiary. Furthermore the benefit extends beyond cervical cancer as HPV is associated with head & neck, penile, vulvar & vaginal cancers and anogenital warts.

WHO in 2020 launched a global strategy and included the following targets for the elimination of cervical cancer by 2030:

- 90% of girls to be fully vaccinated with the HPV vaccine by age 15
- 70% of women to be screened with a high performance test (such as the HPV test) by 35, and again by 45 years.
- 90% of women identified with cervical precancer or invasive cancer to receive adequate treatment and care.

If these three pillars of elimination are established, India could eliminate cervical cancer by 2063, and half the mortality rates by 2036 by preventing a total of 98,811 cervical cancer deaths.

Moreover, India needs to formulate a comprehensive cost-effective strategy and seek endorsement from the government, the country heads, involve parents and teachers, ensure communication and increase public outreach.

Central Gyne Oncology Tumour Board

Dated- 16th November, 2022

COORDINATOR	**Dr Rashmi Rekha Bohra** Consultant - Gynae Oncology Fortis Memorial Research Institute, Gurugram
CHAIR	**Dr Rama Joshi** Principal Director and Head - Gynae Oncology Fortis Memorial Research Institute, Gurugram
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GyneOncology Tumor Board Cases

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Presenter
Dr Mala Sinha

Case 1 : Cutaneous metastatic recurrence in ovarian carcinoma

A 72-year-old female, known case of hypertension and hypothyroid, diagnosed with high grade serous carcinoma ovary, stage IVB in 2018 presented to us after three cycles of neoadjuvant chemotherapy. She was BRCA 1&2 negative, HRD negative and MSI negative.

She underwent interval cytoreductive surgery with a PCI score of 14, to CC0 on 05.06.2018 and received three cycles of adjuvant chemotherapy with Carboplatin, Paclitaxel and Bevacizumab, last in August 2018 followed by maintenance therapy with Bevacizumab twelve doses till May 2019 and then was put on hormonal treatment with Tab Letrozole 2.5 mg. After a disease free interval of 41 months there was peritoneal, pelvic and para aortic lymph nodal recurrence on PET CT in November 2021 and the CA 125 was 221IU/L. She received six cycles of Bevacizumab (600mg), Nabpaclitaxel (160mg) and Carboplatin (150mg) till 24.05.2022. After one and half months of chemotherapy she had progression of the pelvic and nodal diseases on PET CT. In view of the same she received external beam radiation therapy including brachytherapy to the pelvis, the peritoneal deposits and the para-aortic lymph nodes, the last on 30.08.2022. After two months of completion of radiation therapy, she developed multiple cutaneous lesions over the suprapubic region. Her CA125 was 367 IU/L and FNAC from skin nodules reported positive for malignancy.

Final Impression of recurrent progressive platinum sensitive high-grade serous carcinoma ovary with cutaneous metastasis was made.

Point of interest : Rate of cutaneous metastasis in ovarian carcinoma is rare and estimated rate is 1.9% to 5.1%.

Question to the Board : What should be the next line of treatment.

Board Opinion : Systemic therapy: Irinotecan 100mg and Gemcitabine 1000mg.

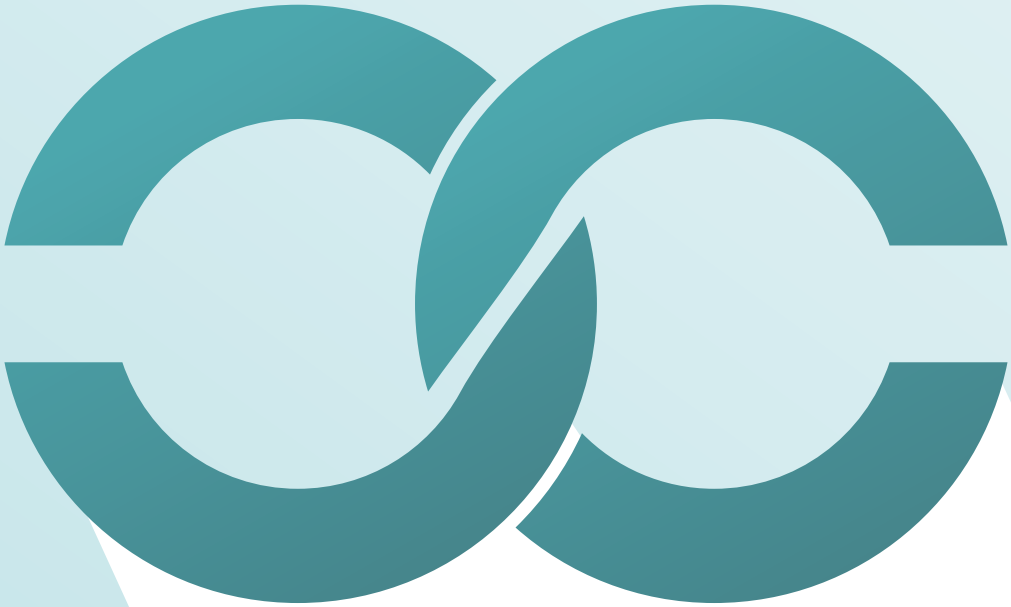
Presenters
Dr Tarini Sonwani
Dr Raj Kiran

Case 2 : Title: Will Endometrial Cancer Treatment be Enhanced by New Risk Stratifications?.

A 60-year-old lady with comorbid conditions of hypertension and diabetes, with history of previous two LSCS, presented with post-menopausal bleeding per vaginum and backache. She underwent diagnostic hysteroscopy and D&C. The histopathology revealed moderately differentiated endometroid carcinoma; a clinical diagnosis of uterus confined carcinoma endometrium was made. After preoperative work up, the patient was taken up for robot- assisted type 1 hysterectomy with bilateral salphingo-oophorectomy and frozen evaluation. The frozen section was reported as endometrioid carcinoma with > 50% myometrial invasion. In view of which staging was done with bilateral pelvic lymph node dissection and generous omental biopsy. Post operatively the patient's recovery was uneventful and smooth. On POD-1 she was started on a soft diet and discharged the same day. The final histopathology was reported as grade 2, endometrioid carcinoma, stage IB with 74% myometrial invasion, negative pelvic lymph nodes, extensive LVSI. Immunohistochemistry showed - ER patchy positive, PR 40%, P53 mutant, MMR proficient and POLE negative.

Question to the Board: Role of adjuvant therapy in view of extensive LVSI and POLE negative status in Grade 2, endometroid carcinoma, stage IB.

Board Opinion: As there is no randomized data on treatment based on molecular classification, the opinion of the board was to give external beam radiotherapy to the pelvic region.



CLINICAL TRIALS

Role and Effectiveness of Ceftazidime-Avibactam in Gram-Negative Nosocomial Pneumonia and Ventilator Acquired Pneumonia: A Real-World Study in India/ HAP/VAP STUDY (THBIISR22-001)

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Dr Yashesh Paliwal
Director and Head - Critical Care
Fortis Hospital, Anandapur

Dr Sanjith Saseedharan
Head - Critical Care
S.L. Raheja Hospital (A Fortis Associate)

- Title of the study – Role and Effectiveness of Ceftazidime-Avibactam in Managing Critical Patients with Gram-Negative Nosocomial Pneumonia and Ventilator Acquired Pneumonia: A Real-World Study in Three Tertiary Care Hospitals in India
- Total number of sites in India – 9
- Total sample size from India – 100

S. No.	Principal Investigator	Number of Patients Enrolled from Fortis
1	Dr Neha Gupta	61
2	Dr Yashesh Paliwal	52
3	Dr Sanjith Saseedharan	5

A Brief Introduction of the Study

These nosocomial infections are found to be significantly associated with worse outcomes and death despite antimicrobial therapies., Ceftazidime Avibactam, a novel BL-BLI, has an important role to play in the management of gram-negative nosocomial pneumonia

Primary Objective of the Study

1. To assess the effectiveness and usage patterns of Ceftazidime-Avibactam in gram-negative HAP and VAP.
2. To evaluate the clinical outcomes of critically ill patients with gram-negative HAP and VAP treated with Ceftazidime-Avibactam.
3. To examine the safety of Ceftazidime-Avibactam in patients with gram-negative HAP and VAP.

Potential Benefits of the Study

- Data collection for Clinical outcomes (cure rates) in gram-negative HAP and VAP patients treated with Ceftazidime-Avibactam with or without other antibiotic combinations.
- Microbiological outcomes (microbiological clearance) in patients of gram-negative HAP and VAP treated with Ceftazidime-Avibactam with or without other antibiotic combinations.
- Epidemiology of gram-negative bacteria involved in HAP and VAP
- Effectiveness and usage patterns of Ceftazidime-Avibactam in gram-negative HAP and VAP

Principal Investigator Opinion of the Study- Dr Neha Gupta

Nosocomial pneumonia (NP), also called hospital-acquired pneumonia (HAP), is one of the most common hospital-acquired infections with high rates of mortality. The treatment options for HAP and ventilator acquired pneumonia (VAP) are limited as infections are predominantly caused by carbapenem resistant Gram-negative infections. The current study aimed to assess the effectiveness and usage pattern of ceftazidime-avibactam in Gram-negative HAP-VAP in real-world settings in India.

In this retrospective, observational study the electronic medical records of hospitalized patients with nosocomial pneumonia and having documented gram-negative infections with OXA-48 and KPC carbapenemase producing Klebsiella pneumoniae and other carbapenem-resistant Enterobacteriaceae (CRE) were collected. Clinical presentation, comorbidities, diagnostic details, any reported adverse event, overall

outcome in terms of morbidity and mortality at the time of discharge were collected. Clinical and microbiological cure of the patients while on ceftazidime –avibactam is being evaluated.

Principal Investigator Opinion of the Study – Dr Yashesh Paliwal

Hospital Acquired Pneumonia and more so Ventilator Associated Pneumonia is one of the very common healthcare associated infection that leads to significant morbidity, mortality to the patient and burden for the hospital. Such infections are often caused by MDR Gram negative bacteria with very few available options to successfully treat them. There are not many new antibiotics in the pipeline to tackle this global crisis.

Ceftazidime-avibactam has shown reasonably good response in several studies where it was found to effective against many extended-spectrum -lactamase-, AmpC-, Klebsiella pneumoniae carbapenemase and OXA-48-producing Enterobacteriaceae and drug-resistant Pseudomonas aeruginosa isolates. It has been recommended by ICMR and IDSA for management of certain MBL producing CRE too. It also helps in reducing Polymyxin use in the hospital.

This study gives us an opportunity to assess the effectiveness of this novel antibiotic combination against HAP/VAP cases along with a detailed epidemiological analysis of such infections and their clinical outcomes.

Comprehensive Online Database for Antimicrobial Resistance (CODAR)

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Fortis Hospital, Anandapur

Total Number of Sites: 26

Minimum Sample size from each Fortis Site - 50

About the Study

The emergence of drug-resistant organisms, both in the hospital environment and in the community, is a major concern for healthcare providers. Surveillance studies have provided important information about changes in the spectrum of microbial pathogens and trends in the antimicrobial resistance (AMR) patterns in both nosocomial and community-acquired infections.

The Primary Objective of the Study

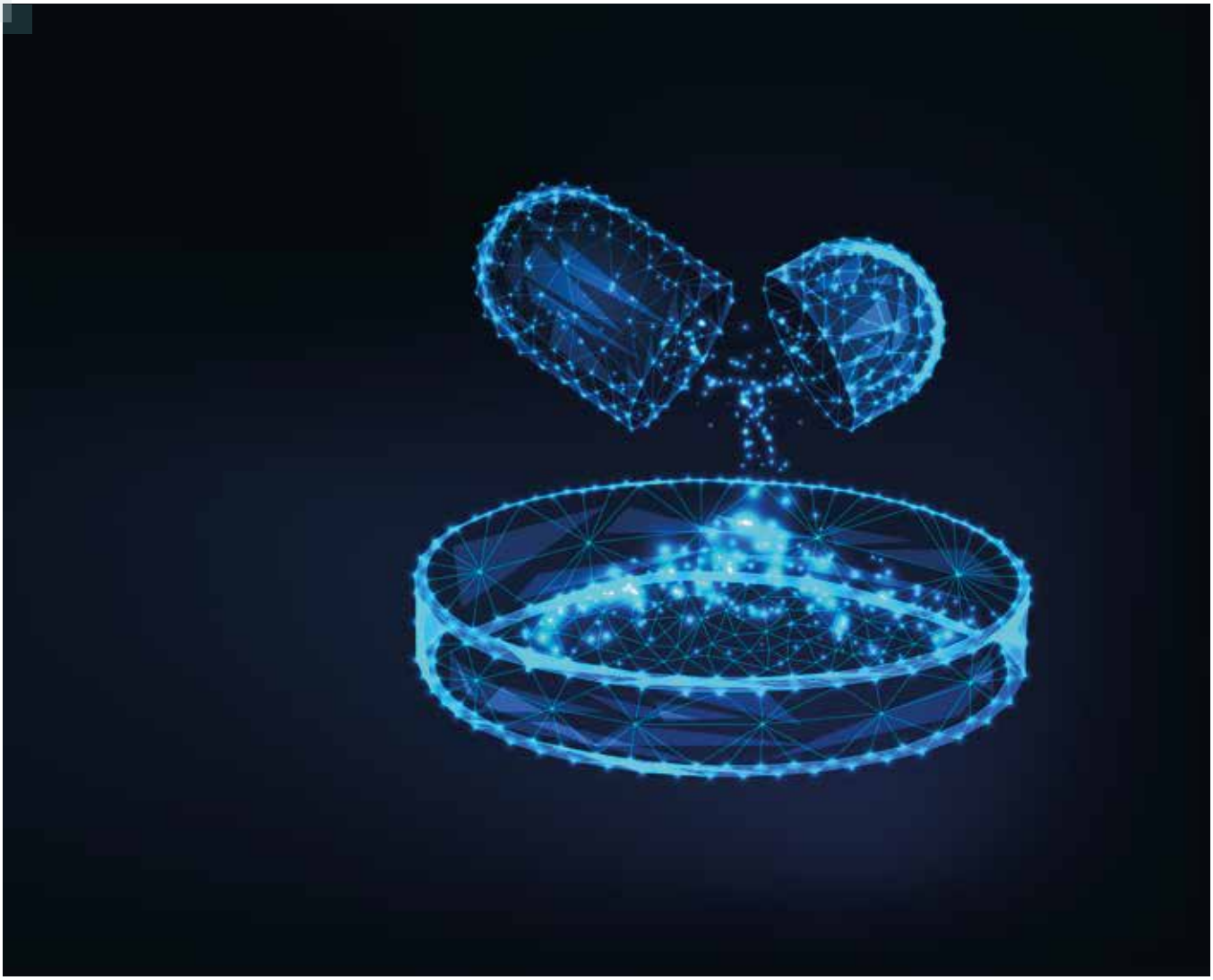
- Harmonise microbiological, clinical and epidemiological data from multiple hospital sites into one coherent database to facilitate analysis and reporting
- Explore correlations between microbiological resistance, antimicrobial treatment and clinical outcomes

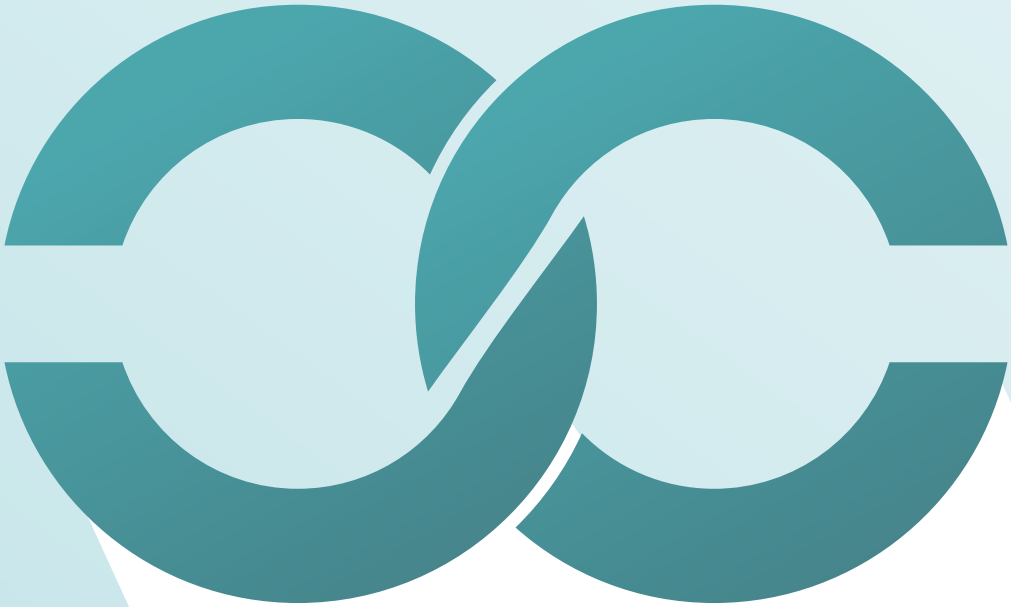
Potential Benefits of the Study

The study will make use of data being generated routinely in the hospital setting, to provide up-to-date antimicrobial susceptibility data (that can be stratified by patient profile). These data combined with epidemiology (based on the hospital's annual reporting of data), treatment management and outcomes data will aid in improving patient care.

PI Opinion

Antimicrobial resistance (AMR) is a global public health concern which can be tackled with a good AMR surveillance system in the hospital. By integrating and analysing antimicrobial resistance, patient management and outcome data on a real time basis, CODAR (Comprehensive Online Database for Antimicrobial resistance) study can help us strengthen our antimicrobial stewardship programme. We are happy to be associated with this multi-centric study which can give us a meaningful insight on prevalence of AMR in correlation with clinical data.





MEDICATION SAFETY UPDATE

MEDICATION SAFETY UPDATE

CEFTAZIDIME-AVIBACTAM:
As a rescue drug on rare occasions

Ceftazidime–avibactam (CAZ-AVI) is a combination of a cephalosporin and a -lactamase inhibitor, which has the potential to treat serious infections caused by carbapenem-resistant organisms

A promising characteristic of Ceftazidime–Avibactam is its potential to treat infections caused by carbapenem-resistant Enterobacteriaceae (CRE) or carbapenem-resistant Pseudomonas aeruginosa. Avibactam recovers the activity of ceftazidime by inhibiting Ambler class A, class C and some class D beta-lactamases, including the Klebsiella Pneumoniae Carbapenemase (KPC) and OXA48 carbapenemases.

Ceftazidime–avibactam is not active against Metallo- -lactamases (MBLs) such as new Delhi metallo -lactamase (NDM) , imipenemase (IMP), and Verona integron-mediated Metallo- -lactamase (VIM). Clinical data on the efficacy of ceftazidime–avibactam against carbapenem-resistant organisms in humans are limited. [1]

Ceftazidime-avibactam (CAZ-AVI) susceptibility was more than 90% when it came to use in 2021. But, gradually that has worsened over the next one year and at present it is in range of close to 50 % at many of FHL hospitals.

The worsening trend of CAZ-AVI susceptibility is a matter of great concern as it is supposed to be the last resort in treating certain types of Carbapenem-resistant Enterobacteriaceae (CRE) it helps in reducing the use of Polymyxins & other combinations. But in the process, we are observing different ways of injudicious uses of this novel antibiotic. Moreover, it is prone to become resistant by means of the spread of resistant genes (blaKPC-3 & bla PDC) while in hospital. So, to prevent the emergence of resistance against CZA-AVI we may follow certain strict antimicrobial stewardship measures in our daily practice:

1. **Definitive Usage:** CZA-AVI is indicated for the treatment of infections in adult patients caused by aerobic multidrug-resistant Gram-negative microorganisms for which there are limited treatment options. It should be used as a definitive treatment of option in culture-positive patients with no other available treatment options.
2. **Justification for Empiric Use:** CZA-AVI should be limited to the treatment of high-risk critical patients with anticipated MDR pathogen. But in all those cases the threshold for de-escalation and /or stopping the therapy must be kept low with AMS SOP protocol such as Antimicrobial Justification Form' must be filled by the ordering physician / surgeon preferably at the time of dispensing 1st dose and definitely by the 3rd dose for all prescriptions listed restricted antimicrobials.
3. **Surveillance and Optimization of Usage:** We should look to optimize the decision-making in all such cases by involving Infectious Disease Specialists and Clinical Microbiologists.
4. **Equipped Lab Facilities:** Our Microbiology labs should be equipped to test and report CZA-AVI susceptibility and if possible CZA-AVI-Aztreonam synergy to help the stewardship process.
5. **Restriction for Controlled Usage:** Strict restriction of CZA-AVI supply at the first dose itself from pharmacies across the network.
6. **Contact Precautions:** We should identify all those patients with CAZ-AVI-Resistant CRE infected patients and isolate (contact precaution) them appropriately to limit spread to other non-infected patients.

PATIENT STICKER

RESTRICTED ANTIMICROBIAL USAGE FORM

Fortis

(To be filled by ordering physician / surgeon preferably at the time of 1st dose and definitely by the 3rd dose. Completed Form to be kept in Pharmacy or with Clinical Pharmacist)

1. Patient type (see table): ☐ TYPE 1 ☐ TYPE 2 ☐ TYPE 3
2. Dose: ☐ DOSE 1 ☐ DOSE 2 ☐ DOSE 3

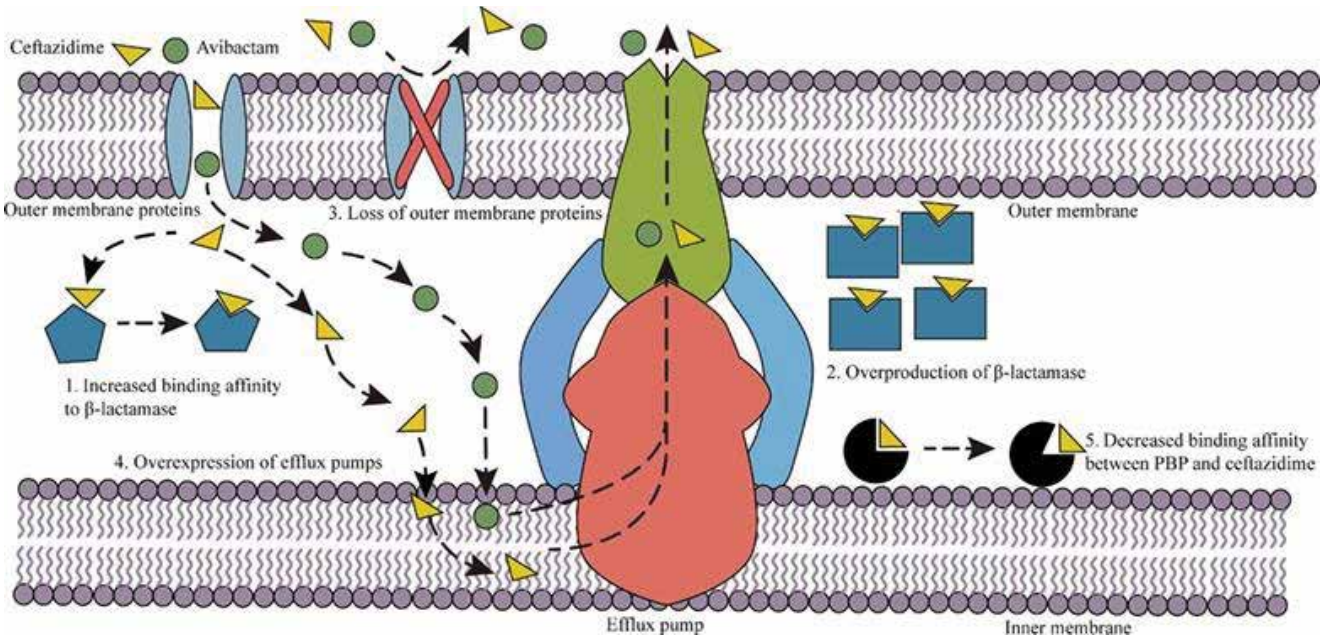
3.a. Details of Antimicrobials:

Name	Dose	Frequency	Date & Time of starting	Duration expected (Days)
☐ COLISTIN				
☐ VANCOMYCIN				
☐ FOSFOMYCIN				
☐ MINOCYCLINE				
☐ LEVOFLOXACIN				
☐ TIGECYCLINE				
☐ TEICOPLANIN				
☐ LINEZOLID				
☐ DAPTOMYCIN				
☐ IMIPENEM				
☐ MEROPENEM				
☐ DORIPENEM				
☐ CEFTAZIDIME + AVIBACTAM				
☐ MICAFUNGIN				
☐ CASPOFUNGIN				
☐ ANIDULAFUNGIN				
☐ POSACONAZOLE				
☐ AMPHOTERICIN				

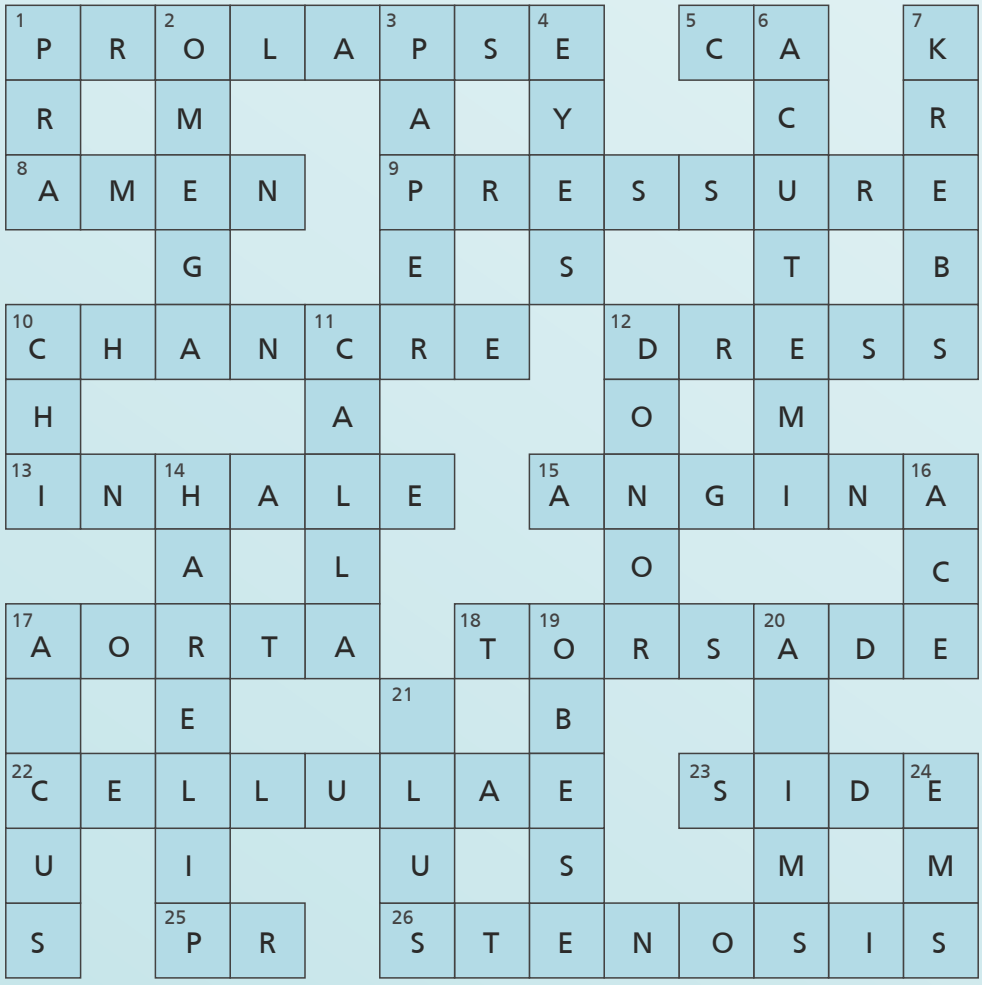
3.b Additional Restricted Antimicrobial (Unit defined): (Select from below)

Name	Dose	Frequency	Date & Time of starting	Duration expected (Days)
1.				
2.				
3.				
4.				
5.				
6.				

4. **Reason for starting:** ☐ EMPIRICAL ☐ DEFINITIVE



Answer To The Crossword



Down

1} Plasma Renin Activity (3)

2} Polyunsaturated fatty acids that are essential nutrients for health (5)

3} No need for doctors to write patient notes- the hospitals are becoming _____less (5)

4} Organs of vision (4)

6} Sudden, severe chest pain may be a sign of (5, 2)

7} Tricarboxylic acid cycle (5)

10} Energy emitted by the body, as per Chinese medicine

11} Common Acute Lymphoblastic Leukemia Antigen – acronym (5)

12} An individual who gives living tissue (kidney, liver or heart) to be used in another person (5)

14} Another name for cleft _____lip (7)

16} Angiotensis-converting enzyme (3)

17} A white or grey opaque ring in the corneal margin is called _____ senilis (5)

19} Individual with BMI (Body Mass Index) of 30 or above(5)

20} Premier medical institute and teaching hospital in Delhi (5)

21} Wearing _____ size clothing indicates obesity (4)

24} Emergency Medical Services (3)

Across

1} The mitral valve buckles into left atrium (8)

5} The mineral that is routinely assayed with vitamin D (2)

8} Concluding words for prayers and hymns (4)

9} Hypertension is elevation of blood _____ (8)

10} The painless primary lesion of syphilis (7)

12} The doctors/nurses have to follow a _____ code (5)

13} To take into lungs by breathing (6)

15} Pain in chest due to myocardial ischemia (6)

17} Main arterial trunk originating from the left ventricle (5)

18} An event of rapid ventricular tachycardia with waxing and waning of QRS amplitude (7)

22} Pleural of cellulae-which in anatomy is a small more or less enclosed space (8)

23} The lateral (right or left) portion of the body (4)

25} Prolongation of this interval on ECG indicates a heart block (2)

26} Abnormal narrowing of a duct or canal (8)

The Fortis Network

Amritsar


Anandapur, Kolkata


Bannerghatta Road, Bangalore

Chirag Enclave, New Delhi


Cunningham Road, Bangalore


Faridabad


FEHI, New Delhi


FHKI, Kolkata


FLF Greater Kailash, New Delhi


FMRI, Gurugram


Greater Noida


Jaipur

Kalyan


Ludhiana


Malar, Chennai


Mohali


Mulund, Mumbai


Nagarbhavi, Bangalore


Noida


Raigarh, Chhattisgarh


Rajajinagar, Bangalore


Richmond Road, Bangalore


Shalimar Bagh, New Delhi


SL Raheja, Mumbai

Vadapalani, Chennai


Vasant Kunj, New Delhi


Vashi, Mumbai

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