Critical Rounds
Vol 4 | Issue 45 | 2023

Critical Rounds Newsletter
VOL 5 | Issue 46 | 2024

Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you **"Critical Rounds Newsletter"** which contain latest and interesting news in the field of Critical Care.

This issue contains:

1. Relationship Between Red Cell Index and Hospital Mortality in Patients with Chronic Obstructive Pulmonary Disease Admitted to the Intensive Care Unit

2. Comparison of bleeding and thromboembolic events in low body weight patients receiving reduced-dose venous thromboembolism (VTE) prophylaxis versus standard-dose VTE prophylaxis

3. Characteristics and outcomes of patients admitted to intensive care unit (ICU) for pneumococcal community-acquired pneumonia who developed meningitis

4. A newborn case of an inguinoscrotal hernia that revealed a testicular hemangioma

Should you require any article or, medical information, please feel free to contact us medicalservices@microlabs.in
free to contact us at medicalservices@microlabs.in
Looking forward to your valuable feedback

Best Regards,
Medical Team, Micro Labs Limited

Critical Rounds
Vol 4 | Issue 45 | 2023

Relationship Between Red Cell Index and Hospital Mortality in Patients with Chronic Obstructive Pulmonary Disease Admitted to the Intensive Care Unit

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of death and morbidity due to chronic respiratory symptoms and limited airflow. Acute exacerbations in patients with COPD frequently necessitate hospitalization or ICU admission.[1] Complications have been linked to COPD exacerbations, which can signal instability or deterioration of the patient's clinical condition and the disease's progression. A recent comprehensive analysis found that anemia and inflammatory indicators contribute to COPD development.[2] Prolonged mechanical ventilation and delayed weaning were linked to the presence of COPD, which was also an independent risk factor for higher mortality. In order to lower the disease burden and death rates, it was crucial to identify readily available and technically simple indicators during hospitalization for COPD patients that were linked to hospital mortality. There was a new indicator red cell index [RCI] (Figure 1) derived from full blood count readings. RCI has been linked to impaired lung function and disease severity. Greater levels of RCI were related with poorer FEV1/FVC and greater PCO2. RCI was linked to poor hospital outcomes in individuals with acute exacerbation of chronic obstructive pulmonary disease (AECOPD). However, it was unclear if hospital mortality in severely sick COPD patients were correlated with RCI level.[1] Therefore, the purpose of this study was to look into the relationship between RCI and hospital mortality among ICU patients with COPD.

A higher red cell index (RCI) was closely associated with an increased risk of mortality in severely ill COPD patients.

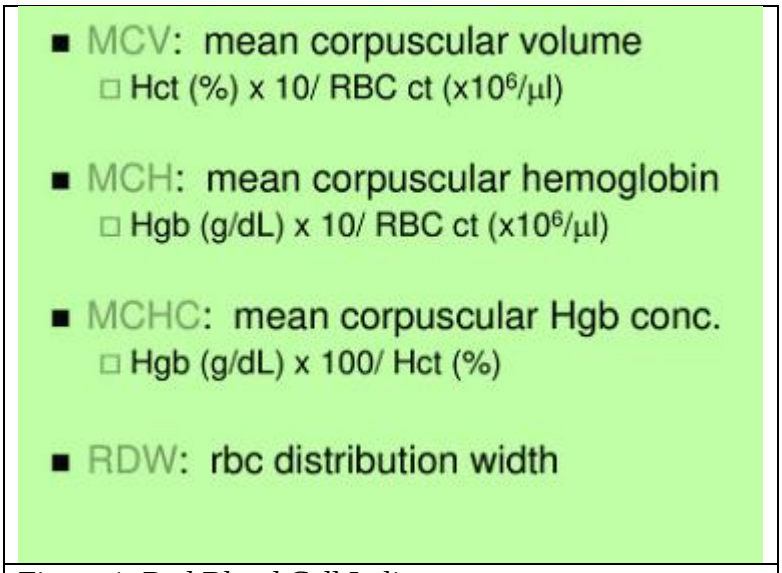

Figure 1. Red Blood Cell Indices

Methods

This was a retrospective cohort study and 821 COPD patients were included in the study. Study was done using clinical data from the MIMIC-IV (Medical Information Mart for Intensive Care IV) database. The relationship between RCI and in-hospital mortality was examined using multivariate logistic regression analysis. The following factors were taken into account for the subgroup analysis: age, SOFA score, diabetes mellitus, cerebrovascular illness, congestive

heart failure, and mechanical ventilation. The following equation was utilized to determine the RCI: RCI = (RBC × Hb)/ (Lym × PLT). All patients were categorized into tertiles based on RCI at 24 hours. Hospital mortality was the outcome of this study.

Results

Out of the 821 individuals included in this study, 124 (821) or 16.5% experienced hospital death. RCI and hospital mortality were strongly correlated in the multivariate logistic regression model, with a 3% increase in hospital mortality for every unit increase in RCI (odds ratio [OR] =1.03; 95% confidence interval [95% CI] =1.01–1.06). Compared to the lowest RCI group, greater RCI groups had an increased risk of hospital mortality (OR [95% CI] 2.33 [1.27-4.27]) (Table 1). Furthermore, the results of the subgroup analysis were consistent across all groups.

Variable	Crude model		Model 1		Model 2		Model 3		Model 4	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
RCI continuous	1.05 (1.02–1.07)	<0.001	1.05 (1.02–1.07)	<0.001	1.04 (1.01–1.06)	0.006	1.03 (1.01–1.06)	0.006	1.03 (1.01–1.06)	0.012
RCI tertiles										
RCI<1.18	1(Ref)		1(Ref)		1(Ref)		1(Ref)		1(Ref)	
1.18≤RCI<2.62	1.18 (0.67–2.08)	0.557	1.15 (0.64–2.04)	0.642	1.23 (0.67–2.27)	0.509	1.21 (0.64–2.28)	0.55	1.4 (0.73–2.7)	0.31
RCI≥2.62	3.42 (2.09–5.59)	<0.001	3.37 (2.02–5.6)	<0.001	2.55 (1.45–4.49)	0.001	2.41 (1.35–4.3)	0.003	2.33 (1.27–4.27)	0.006
p for trend		<0.001		<0.001		0.001		0.002		0.005

Table 1: Relationship Between Red Cell Index and Hospital Mortality in Different Models

Discussion

This retrospective cohort study found a favourable correlation between high RCI levels and hospital mortality in severe COPD patients in the ICU.[1] In Previous study by Cao Y et al. showed that, in COPD patients, lymphocytopenia has been linked to all-cause mortality.[3] In this study, patients with severe COPD have lower lymphocyte counts in the higher RCI group.[1] In another similar study by Acanfora D et al. showed a correlation between older COPD patients' increased mortality and a low relative lymphocyte count.[4]

Conclusion

In severely sick COPD patients, a greater RCI was strongly correlated with a higher chance of death. Additional research was required to validate these results.

References

1. Shi Y, Shi Y, Xu Z, Wang Y. Association of Red Cell Index and Hospital Mortality in Chronic Obstructive Pulmonary Disease Patients Admitted to the Intensive Care Unit: A Retrospective Cohort Study. Int J Chron Obstruct Pulmon Dis. 2023 Oct 16;18:2267-2276.
2. Kanwal A, Bashir A, Gohier A, Habib B. Association of red blood cell indices and erythrocyte sedimentation rate in chronic obstructive pulmonary disease (COPD) patients. Pakistan Armed Forces Medical Journal. 2021 Apr 29;71(2):610-13.

3. Cao Y, Xing Z, Long H, et al. Predictors of mortality in COPD exacerbation cases presenting to the respiratory intensive care unit. Respir Res. 2021;22(1):77.
4. Acanfora D, Scicchitano P, Carone M, et al. Relative lymphocyte count as an indicator of 3-year mortality in elderly people with severe COPD. BMC Pulm Med. 2018;18(1):116.

Critical Rounds
Vol 4 | Issue 45 | 2023

Comparison of bleeding and thromboembolic events in low body weight patients receiving reduced-dose venous thromboembolism (VTE) prophylaxis versus standard-dose VTE prophylaxis

Introduction

In critically ill patients with low body weight, a low-dose Venous thromboembolism (VTE) preventive approach decreased composite bleeding risk while retaining a comparable rate of thromboembolism.

Venous thromboembolism (VTE), which includes deep-vein thrombosis and pulmonary embolism, was the third leading cause of vascular death globally. About two thirds of VTE events in clinical practice present as DVT, and one third present as PE, either with or without DVT. Venous stasis-promoting factors, blood hypercoagulability-promoting factors, and endothelial injury/inflammatory factors were the three categories of risk factors for VTE.[1] Critically sick individuals have a greater chance of getting VTE because they frequently have more than one risk factor, such as older age, immobilization, surgery, cancer, mechanical ventilation, and central venous catheters. Low-molecular-weight heparin (LMWH) and unfractionated heparin (UFH) were recommended for prophylaxis in order to lower the risk of VTE. While chemoprophylaxis was an effective strategy for reducing the incidence of VTE, medical professionals also need to take bleeding into account. Previous studies investigating therapeutic anticoagulation has shown that individuals with low body weight were more likely to have bleeding. According to current guidelines, LMWH or UFH can lower the incidence of VTE; however, there is still debate over the frequency and dosage of prophylaxis for patients with low body weight. In critically sick patients with low body weight, there is not enough data to determine the proper dosage for VTE prevention.[2] This study aimed to evaluate the safety and effectiveness of conventional versus reduced-dose VTE prevention in critically sick patients with low body weight.

Methods

This was a multi-center, retrospective cohort study. Patient records were reviewed using an electronic medical record that was shared between the various hospital locations. Participants were included if they had undergone VTE chemoprophylaxis with UFH or enoxaparin for more than 48 hours, were hospitalized to an intensive care unit, and weighed ≤50 kg at admission. The primary outcome compares the incidence of composite bleeding (in-hospital major bleeding + clinically relevant non-major bleeding [CRNMB]) across patients who received standard or reduced-dose prophylaxis. SPSS version 28.0 was used to analyse all the data, and statistical significance was indicated by a P value of less than 0.05.

Results

A total of 419 patients satisfied the inclusion criteria, with 279 in the standard-dose group and 140 in the reduced-dose group, with a mean weight of 44.1 ± 5.1 kg in the reduced-dose prophylaxis group and 45.1 ± 4.2 kg in the standard-dose group (P=0.02). Patients on reduced-dose prophylaxis saw considerably less composite bleeding (5% vs. 12.5%, P=0.02). Consistent findings were obtained with reduced-dose prophylaxis, showing decreased composite bleeding (odds ratio: 0.36, 95% confidence interval: 0.14-0.96) after confounding factor adjustment. Significant bleeding episodes happened in 3.6% of patients on decreased dosage compared to 8.6% of patients on standard dosage (P=0.056). There was no significant difference in clinically significant non-major bleeding (5.4% vs 2.9%, P=0.24) or VTE (2.2% vs 0%, P=0.08) between the groups (Table 1).

Outcome	Standard group (n = 279)	Reduced group (n = 140)	*P* value
Major bleeding	24 (8.6%)	5 (3.6%)	.056
CRNMB requiring medical intervention	15 (5.4%)	4 (2.9%)	.24
Venous thromboembolism	6 (2.2%)	0	.08

Abbreviation: CRNMB, clinically relevant nonmajor bleeding.

Table 1: Results for secondary outcomes such as major bleeding events, CRNMB events, and VTE events

Discussion

In critically sick patients, venous thromboembolism prophylaxis was frequently utilized to avoid thrombosis after hospital admission; nevertheless, there was a lack of safety information about individuals with low body weight. After controlling for covariates, this trial indicated that using reduced-dose prophylaxis led to a 60% decrease in the likelihood of composite bleeding.[2] A previous study by Buckheit et al. assessed VTE prophylaxis in patients who were not critically sick found that underweight individuals getting standard-dosage prophylaxis had a major bleeding risk that was almost five times higher than that of patients receiving lower dose prophylaxis with comparable rates of CRNMB and VTE.[3]

Conclusion

In critically sick patients with low body weight, a reduced-dose VTE prophylactic method lowered composite bleeding risk while maintaining a comparable rate of thromboembolism.

References

1. Nicholson M, Chan N, Bhagirath V, Ginsberg J. Prevention of venous thromboembolism in 2020 and beyond. Journal of Clinical Medicine. 2020 Aug 1;9(8):2467.
2. Knox H, Edwin SB, Giuliano C, Paxton RA. Venous Thromboembolism Prophylaxis in Low Body Weight Critically Ill Patients. Journal of Intensive Care Medicine. 2023 Dec 18:8850666231217693.
3. Buckheit D, Lefemine A, Sobieraj DM, Hobbs L. Venous thromboembolism prophylaxis in underweight hospitalized patients. Clin Appl Thromb Hemost. 2021;27:10760296211018752.

Critical Rounds
Vol 4 | Issue 45 | 2023

Characteristics and outcomes of patients admitted to intensive care unit (ICU) for pneumococcal community-acquired pneumonia who developed meningitis

Introduction

Pneumococcal bacteremia during an ICU stay was related with a higher incidence of meningitis and a higher frequency of neurological disorders upon ICU discharge.

Community-acquired pneumonia is the leading cause of ICU admissions and death from infectious diseases. It can also cause acute respiratory distress syndrome and invasive pneumococcal illness, both with significant mortality rates. Meningitis has been found to occur in people who have pneumococcal pneumonia.[1] Community-acquired acute bacterial meningitis (CABM) is a highly feared infectious illness due to its high morbidity and mortality rates, particularly when severe enough that it requires ICU hospitalization. In adults, *streptococcus pneumoniae* is the most common cause of CABM, accounting for 75–80% of cases of bacterial meningitis. Even with continuous improvements in diagnosis, therapy, and vaccination approaches, mortality in all *S. pneumoniae* CABM patients is still as high as 15%, and in the severely sick population, it is as high as 33%.[2] Lumbar puncture is not commonly suggested for individuals with pneumococcal pneumonia, even with bacteremia or invasive illness. As a result, it might be challenging to identify people who need a lumbar puncture to confirm the diagnosis of meningitis. Studies on meningitis in ICU patients with pneumococcal community-acquired pneumonia was limited.[1] This study was aimed to identify the features and outcomes of individuals who acquired meningitis after developing pneumococcal community-acquired pneumonia.

Methods

This retrospective study included all consecutive patients admitted to the ICU for severe pneumococcal community-acquired pneumonia based on American Thoracic Society criteria. At ICU discharge, days 30, and 90, or until the patient's death if it happened before day 90, outcomes were evaluated. The Glasgow Outcome Scale (GOS), which goes from 1 (death) to 5 (excellent recovery), was utilized to assess the patients' level of neurological damage at the time of ICU discharge. The primary outcome was the percentage of patients experiencing meningitis during their ICU stay. Secondary outcomes were the characteristics of lumbar puncture patients, meningitis risk factors, death rate, length of mechanical ventilation, length of stay in the intensive care unit, and percentage of patients with neurological abnormalities.

Critical Rounds
Vol 4 | Issue 45 | 2023

Results

A total of 262 patients [64(52–75) years old] were enrolled; of them, 154 (59%) were men, 80 (30%) had long-term respiratory conditions, 105 (39%) had compromised immune systems, and 6 (2%), had received a *S. pneumoniae* vaccination. A lumbar puncture was done on 88 (34%) patients, with a delay of 10.5 (2.8–24.1) hours from the time of ICU admission to the puncture, and 81 (92%) patients after the start of pneumococcal antibiotic therapy. Meningitis was diagnosed in 14 individuals, representing 16% of those with lumbar puncture and 5% of the overall population. In comparison to patients without meningitis, patients with meningitis had higher rates of neurological deficits at ICU admission (43 vs. 16%, p=0.03), pneumococcal bacteremia (71 vs. 30%, p<0.01), and human immunodeficiency virus positive status (29 vs. 5%, p=0.02). Patients with and without meningitis did not differ in the ICU death rate (14 vs. 13%, p=0.73) or the day-90 mortality rate (21 vs. 15%, p=0.83). Patients with meningitis had a greater percentage of neurological abnormalities at ICU discharge (64 vs. 23%, p<0.001) compared to those without the illness (Table 1).

Variables	No meningitis (*n* = 74)	Meningitis (*n* = 14)	*p* value
At ICU discharge			
Mortality rate, *n* (%)	10 (13)	2 (14)	0.73
Neurological disorders, *n* (%)	17 (23)	9 (64)	< 0.001
Glasgow Outcome Scale (1–3), *n* (%)	24 (32)	4 (29)	1.00
Glasgow Outcome Scale (4–5), *n* (%)	50 (68)	10 (71)	1.00
At hospital discharge*			
At home, *n* (%)	38 (57)	5 (45)	0.53
Rehabilitation, *n* (%)	16 (24)	3 (27)	1.00
Mortality rate, *n* (%)	13 (19)	3 (27)	0.69
At Day-30*			
At home, *n* (%)	26 (37)	3 (23)	0.53
Rehabilitation, *n* (%)	3 (4)	0 (0)	0.97
Hospitalized outside ICU, *n* (%)	20 (28)	5 (39)	0.52
Hospitalized in ICU, *n* (%)	12 (17)	3 (23)	0.69
Mortality rate, *n* (%)	10 (14)	2 (15)	1.00
At Day-90*			
At home, *n* (%)	43 (71)	4 (50)	0.42
Rehabilitation, *n* (%)	2 (3)	0 (0)	1.00
Hospitalized outside ICU, *n* (%)	3 (5)	1 (13)	0.39
Hospitalized in ICU, *n* (%)	2 (3)	0 (0)	1.00
Mortality rate, *n* (%)	11 (18)	3 (37)	0.19

Table 1: Patient outcomes categorized by meningitis diagnosis

Discussion

In this study, 34% of patients who were hospitalized to the intensive care unit (ICU) due to severe community-acquired pneumonia underwent a lumbar puncture while in the ICU, but no lumbar puncture was done for pneumococcal bacteremia. In 16% of patients, meningitis was identified, and *S. pneumoniae* was isolated in 64% by cerebrospinal fluid culture.[1] Patients hospitalized to the intensive care unit for severe pneumococcal community-acquired pneumonia with meningitis had a decreased death rate compared to those admitted for pneumococcal meningitis.[3] This was due to the fact that refractory shock or neurological causes (mostly refractory intracranial pressure or stroke) account for the majority of meningitis deaths.[4] In current study, one patient died from a non-neurological reason, and only 14% experienced intracranial pressure on brain CT scans throughout their ICU stay.[1]

Conclusion

Meningitis was found in 16% of patients admitted to the ICU for severe pneumococcal community-acquired pneumonia who had a lumbar puncture. Meningitis was linked to a higher frequency of neurological problems at the time of ICU discharge and was more common in individuals who had pneumococcal bacteremia throughout their ICU stay.

References

1. Jaubert P, Charpentier J, Benghanem S, Cariou A, Pène F, Mira JP, Jozwiak M. Meningitis in critically ill patients admitted to intensive care unit for severe community-acquired pneumococcal pneumonia. Annals of Intensive Care. 2023 Dec 18;13(1):129.
2. María Martín Cerezuela, Maialen Aseginolaza Lizarazu, Patricia Boronat García et al. Severe community-acquired Streptococcus pneumoniae bacterial meningitis: Clinical and prognostic picture from the intensive care unit. Crit Care. 2023 Feb 23;27(1):72.
3. Figueiredo AHA, Brouwer MC, Bijlsma MW, van der Ende A, van de Beek D. Community-acquired pneumonia in patients with bacterial meningitis: a prospective nationwide cohort study. Clin Microbiol Infect. 2020;26(4):513.
4. Koelman DLH, Brouwer MC, Ter Horst L, Bijlsma MW, van der Ende A, van de Beek D. Pneumococcal meningitis in adults: a prospective nationwide cohort study over a 20-year period. Clin Infect Dis. 2022;74(4):657–67.

Critical Rounds
Vol 4 | Issue 45 | 2023

A newborn case of an inguinoscrotal hernia that revealed a testicular hemangioma

Introduction

Testicular hemangiomas (TH) are rare benign vascular tumors that form in the inner layer of the tunica albuginea. It was frequently observed in infants and children with minimal discomfort.[1] TH can originate from the testicular parenchyma (intratesticular) or from the adnexal tissues of the testis (extratesticular). Hemangiomas appear to be rather uncommon in the testis, despite their widespread occurrence in other organs of the organism.[2] This case report described an infant who had swelling in his right scrotum and was taken to the emergency room. The examination findings were in line with a TH and related hernia.

Inguinal hernias can prevent some malignancies from being detected. A pathological examination is required in order to provide a final diagnosis.

Case Presentation

A 21-day-old male neonate with a right inguinoscrotal hernia presented to emergency department. Upon clinical examination, it was found that the right testicles were there, but larger, and that there is a large right inguinoscrotal hernia that was impulsive when crying. There were no obvious abnormalities in his left testis, spermatic cord, or epididymis. To assess any potential intra-scrotal defect, then conducted a scrotal Doppler ultrasonography (USG). The USG revealed a heterogeneous mass in the right testicle's inferior pole that had both arterial and venous vascularization as well as a fatty and tissue component. The patient underwent surgery to remove a tumor from the left testicle (Figure 1) and repair a hernia through an inguinal incision. An infantile hemangioma was confirmed by pathologic testing. The patient was discharged 4 days later and has had no problems or recurrences following a 5-year follow-up.

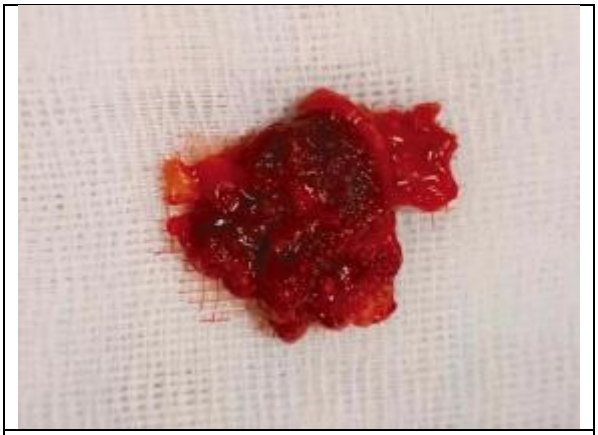

Figure 1. Removed hemangioma

Discussion

Hemangioma is an uncommon benign testicular tumor. Scrotal Doppler ultrasonography (USG) was used in this case to assess any possible intra-scrotal defects. The USG revealed a heterogeneous mass in the right testicle's inferior pole that had both arterial and venous vascularization as well as a fatty and tissue component.[2] Futhermore, in previous studies by Kutsal C et al. and Li F et al. demonstrated that ultrasound was an effective procedure for diagnosing hemangiomas.[3,4]

Conclusion

The first case of neonatal TH in the literature was described in this study. It's important to know that newborns can also have TH. Misdiagnoses of TH as malignant testicular tumors are possible. An inguinal hernia can prevent malignant tumors from being detected. A pathological examination was required in order to provide a final diagnosis. It was crucial to safeguard fertility during infancy. Testicular sparing surgery was necessary in this case.

References

1. Zhang K, Zhang Y, Chao M. Testicular hemangioma in a child: A rare case report and review of literature. Indian J Pathol Microbiol. 2023 Jan-Mar;66(1):222-225.
2. Laarif S, Trabelsi F, Daïb A, Abdallah RB, Hellal Y, Kaabar N. Inguinoscrotal hernia revealing a testicular hemangioma: Report of a neonatal case. Urology Case Reports. 2023 Sep 1;50:102491.
3. Kutsal C, Baloğlu İH, Albayrak AT. Hydrocele accompanying testicular cavernous hemangioma: A infant case report. Int J Surg Case Rep. 2021 May;82:105844.
4. Li F, Han S, Liu L, et al. Benign testicular cavernous hemangioma presenting with acute onset: a case report. Molecular and clinical oncology. 2020;13(1):19–22.