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SMART PEDI UPDATE

Pedismart Newsletter
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Pedi smart News Letter
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Dear Doctor,
Greetings from Micro Labs Limited. We are happy to bring you **"PEDI SMART"** which contain latest and interesting news in the field of Paediatrics.

This issue contains:

1. **A study on the management of fever and acute painful crises in paediatric patients with sickle cell disease**
2. **A study on analyzing mortality risk factors in children with severe Adenovirus Pneumonia**
3. **A study on prevalence of open ductus arteriosus in full term newborns**
4. **A case on the management of pulmonary and systemic mycotic pseudoaneurysms in pediatric patient**

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Limited

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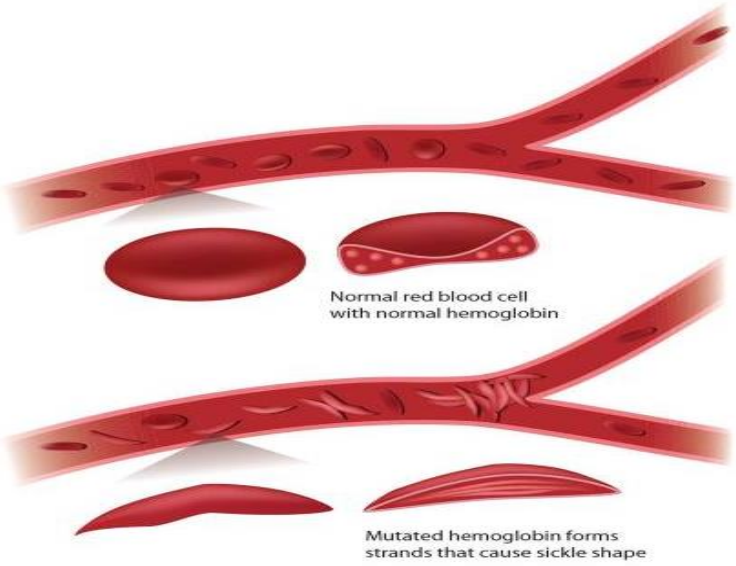
SMART PEDI UPDATE

A study on the management of fever and acute painful crises in paediatric patients with sickle cell disease

Introduction – Sickle cell disease (SCD) is an inherited haemoglobin illness that causes sickle-shaped red blood cells, progressive multi-organ damage, and higher mortality. SCD is characterised by the development of long chains of haemoglobin when deoxygenated within capillary beds[1]. One of the most common autosomal recessive inherited blood disorder is SCD, which is caused by mutation in sixth amino acid of β-globin gene[2]. Repeated episodes of severe acute pain and acute chest syndrome are hallmarks of SCD, as are complications such as stroke, chronic pain, nephropathy, retinopathy, avascular necrosis, priapism, and leg ulcers[1]. This study aims to assess the practices of managing SCD patients in emergency departments of tertiary hospital and prevalence and risk factors of invasive bacterial infections and Vaso-occlusive(VOC) in patients who presented with febrile illness to ED (Emergency department).



Sickle cell disease

Methods –

This is a retrospective cross-sectional study carried on all children <14 years of age with SCD who presented with pain or fever. This study was descriptive to the current practices and prevalence estimation. A total of 212 patient's data was considered for this study and it includes the managing SCD crises such as VOC and febrile episodes.

Results –

Upon review of the patient's data who were having SCD over three years it was found that 47.2%, 37.7% and 15% of the patients presented with pain, fever or both respectively (Fig1). Patient's blood group were A+ in 41.5% and O+ in 46.2%. Pain was main complaint in 64.6% of the patients and 13.8% of people had triage score above 5. During

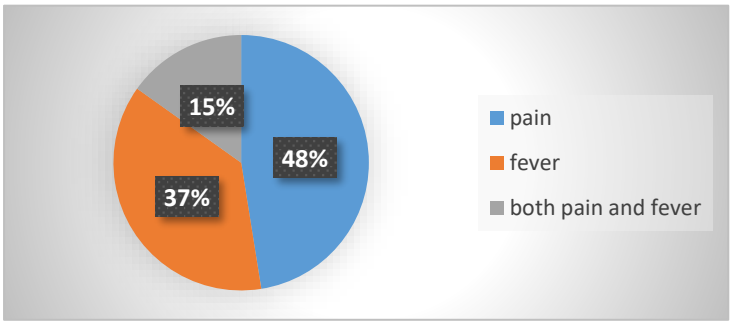


Fig.1-percentage of clinical symptoms in sickle cell disease

first 2 hours, 86% of the patients received at least one fluid bolus and 79% of them received appropriate analgesia for pain crises. Pain management includes treatment with Morphine in 39.6% of the patients, followed by ibuprofen in 33% and 20% of patients received acetaminophen. Vaso-occlusive crises were reported higher in girls (52.8%) and treatment option for VOC was hydroxyurea. Approximately 41.5% of the patients with fever were admitted and received ceftriaxone as single intravenous antimicrobial agent. None of the patients had bacteremia. Data shows 2.4% of the patients had urinary tract infection.

Discussion-

This study has shown the emergency practices and related factors in management of acute pain and febrile condition in children with SCD. It also showed the timely management of SCD with fluids, antibiotics and analgesia. Pain crisis was most common in girls. Most of the patients received morphine sulfate followed by ibuprofen and acetaminophen and VOC was treated with hydroxyurea[2]. Sharon Shih et al.'s study, revealed that Hydroxyurea makes the body have fewer sickled red blood cells, which makes vaso-occlusive episodes less frequent or intense[3]. Another study by Yousef AA et al., showed that to control pain in SCD paracetamol was used in higher proportion (82.4%), then non-steroidal anti-inflammatory drugs (39.6%) followed by morphine (2.2%) was used. Azithromycin (82.4%), ceftriaxone (75.8%), vancomycin (47.3%), and cefuroxime (23.1%) were the antibiotics used[4].

Conclusion – This study provided an information on emergency department services provided in SCD. This study evaluated the rate of bacterial infections and VOC and their treatment option to control SCD.

Sickle cell disease management includes providing fluids, analgesia, and antibiotics in timely manner in Emergency department.

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A study on analyzing mortality risk factors in children with severe Adenovirus Pneumonia

Introduction-

Human adenovirus (HAdV) are the pathogens that causes a wide range of human illness, including pneumonia, upper respiratory tract illness, conjunctivitis, gastroenteritis and cystitis. Adenovirus pneumonia (ADVP) is a common type of respiratory infectious disease in children, accounting for 4-10% of pneumonia cases in children[1]. In children under 5 years of age, acute respiratory tract infections are the leading cause of hospitalization and mortality worldwide[2]. This study aimed to assess the mortality risk factors of severe adenovirus pneumonia in children's.

Methods –

This is a retrospective observational study carried by including 189 patients divided into survival (n-176) and non-survival (n-13) groups. Out of 189 patients, 123 were male (65.08%), and 66 were female (34.92%). All the clinical data were collected from patient's medical record. Independent mortality risk factors for severe adenovirus pneumonia were identified through the use of binary logistic regression analysis following univariate analysis.

Results –

Out of 189 cases of children with severe adenovirus pneumonia the most common symptoms were fever and cough in which fever lasted for a median duration of 13days. Among the non-survival group, the most symptoms were shortness of breath, hypoxia, gastrointestinal symptoms and neurological symptoms. Laboratory parameters in non-survival group showed elevated levels of LDH, Leukocytopenia, anemia, HsCRP (highly sensitive C-reactive protein), elevated liver enzymes, thrombocytopenia as well as leukocytosis. The most common infection was Mycoplasma pneumonia (41.27%), combined bacterial infection (32.28%) and other viruses (29.10%). Chest radiographic results showed diffuse infiltration of both lungs in most cases(fig1). Chest imaging finding showed pleural effusion in 40.21% of patients. 13 patients died due to severe ADVP. Age 1 year, hypoxia, and thrombocytopenia were found to be the independent risk factors for mortality in children with severe adenovirus infection by multivariate analysis.

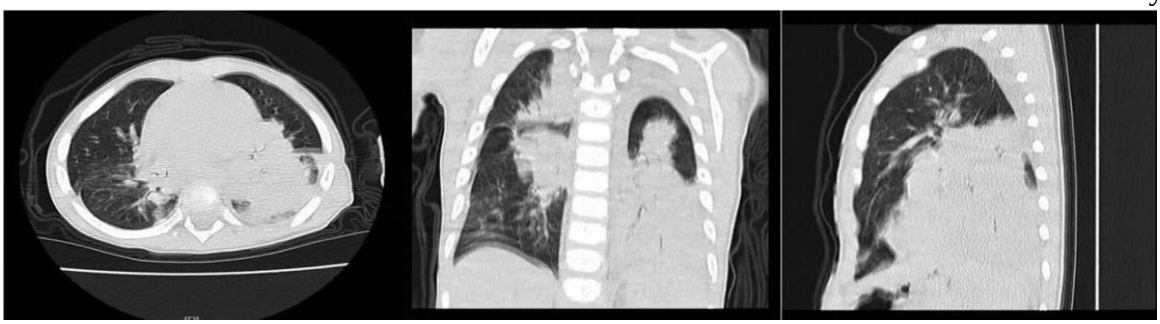

Fig.1- CT scan of the chest revealing areas of extensive consolidation mainly involved the left lower lobe and right upper lobe with a slight pleural in a 12-months-old child with severe adenovirus pneumonia.

Discussion –

In this study children with severe adenovirus pneumonia had the most common symptoms fever and cough which was persistent. Elevation in the laboratory parameters such as LDH, leukocytopenia, anemia, HsCRP, elevated liver enzymes and thrombocytopenia were seen in patients and it was more reflecting in non-survival group. The most common infection was Mycoplasma pneumonia[2]. A study by Choi YJ et al., revealed that elevated levels of serum lactate dehydrogenase, ferritin and Interleukin-18 were the biomarkers for predicting the infection of Mycoplasma Pneumoniae[3].

Conclusion –

This study concludes that age less than 1 year, hypoxia and thrombocytopenia were the independent risk factors associated with mortality in children with severe adenovirus pneumonia.

Independent risk factors for mortality in case of severe adenovirus pneumonia were young age < 1 year, hypoxia and thrombocytopenia.

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A study on Prevalence of open ductus arteriosus in full term newborns

Introduction –

Among the pre-term infants Patent ductus arteriosus (PDA) is the most common cardiovascular condition. Spontaneous closure of DA (ductus arteriosus) is commonly observed in infants born at >28 weeks of gestation (i.e., at the end of the first week of life), persistent patency of the DA is observed in 50–70% of infants born at <28 weeks of gestation, and lasts for weeks after birth[1]. The foetal circulation depends on the ductus arteriosus. By allowing a shunt from the pulmonary circulation to the systemic circulation and avoiding the lungs in utero, it joins the pulmonary artery to the aorta. [2]. This study aimed to assess the prevalence of open ductus arteriosus in full-term new-borns according to age.

Methods –

This is a multi-centre, cross-sectional, population-based cohort study carried out on new-born infants by using data from Copenhagen baby heart study (CBHS). A total of 21649 full term neonates were included in this study. Data collection included echocardiograms, ECGs, blood samples, questionnaires, and birth registry. The study included full-term new-borns who had an echocardiography within 28 days of delivery. In every echocardiography, the ductus arteriosus was inspected for patency.

Results – Out of 21,649 infants examined during the first 28 days of life, an open DA was found in 485 (2.2%). Scanning on the day 1 of life, 47 out of 130 neonates had an open DA (36.2%). Later this declined to 84 out of 1090 neonates at day two (7.7%). Only 6 out of 1,080 neonates (0.6%) had an open DA at day 7 (Fig. 1). 377 out of 4,603 neonates (8.2%) had an open DA during their first week of life. The mean prevalence was 0.6% from the first week of life and remained constant until age 28, when the study period's range ended.

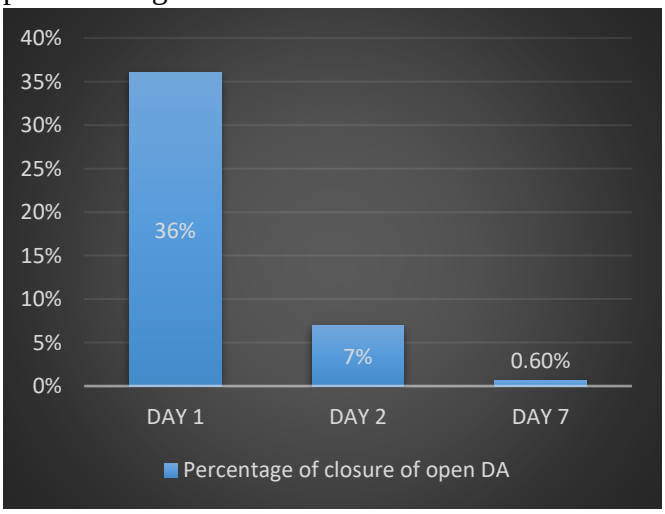

Fig.1- Percentage of closure of open ductus arteriosus in infants

Discussion –

In this current study, 485 new-borns had open DA within the first 28 days of life out of 21,649 full-term neonates. The prevalence of DA was 36% on the first day of birth and steadily dropped to 0.6% between days 7 and 28 days[2].A study by De Klerk JC et al., showed that spontaneous closure of DA increases with both gestational and postnatal age. This study results showed that 34% of premature infants, the DA has closed on the 3rd day of life. This rate increased to 41% at day7. It also showed that patients with gestation age <28 weeks (GA) have the lowest chances of spontaneous closure of DA in 1st day of life[3]. Another similar study showed that incidence of PDA is inversely related to the gestational age. In 10% of new-borns born between 30 and 37 weeks, 80% of those born between 25 and 28 weeks, and 90% of those born 24 week's gestation, it is still open at 4 days of age[4].

Conclusion –This study found that the prevalence of open DA rapidly reduced between day 1 and day 7 and that more than one-third of full-term neonates had it on their first day of life.

Open ductus arteriosus closure rate increases with both gestational age and postnatal age in infants.

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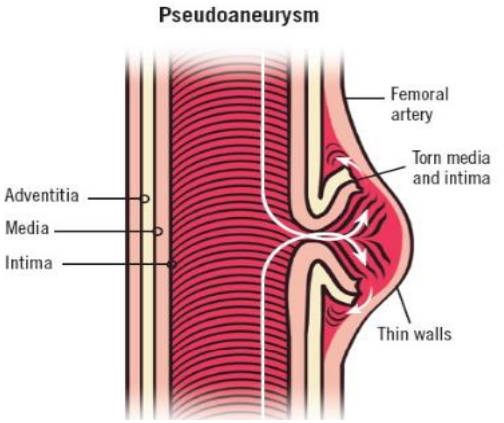
A case on the Management of Pulmonary and Systemic Mycotic Pseudoaneurysms in Pediatric Patient

Introduction – Pseudoaneurysms are the false aneurysms that usually occurs at the site of arterial injury. Damage to the artery wall results in a locally contained hematoma with turbulent blood flow and a neck that often does not spontaneously close once it has grown over a certain size, which is the origin of an arterial pseudoaneurysm, also known as a fake aneurysm. A pseudoaneurysm, in contrast to a real aneurysm, lacks any vessel wall layers[1]. An infectious form of PSA known as a mycotic pseudoaneurysm is brought on by arteritis and manifests as a saccular outpouching containing perivascular tissue, hematoma, or fibro-inflammatory tissue. The major vessels, pulmonary vasculature, visceral arteries, and peripheral systemic arteries have all described these[2]. This case presents the concomitant pulmonary and systemic arterial mycotic pseudoaneurysms in a pediatric patient.



Pseudoaneurysm

Case presentation-

A 11 years old female patient with systemic methicillin – resistant staph aureus (MRSA) infection presented with the symptoms of febrile, tachypnea, tachycardia, and hypoxic and was admitted to pediatric intensive care unit (PICU). Blood culture showed positive for MSRA and patient was started on intravenous antibiotic therapy. The patient was encouraged to undergo MRI of spine and CT scans of the chest, abdomen, and pelvis as the symptoms persisted. These scans revealed multifocal fluid collections and inflammation involving the right psoas muscle, right thoracolumbar paraspinal soft tissue, cervical and thoracic prevertebral soft tissues, as well as multifocal septic arthritis. Numerous lung nodules, multifocal opacities, and bilateral pleural effusions were also observed, raising suspiciousof septic emboli (fig.1)

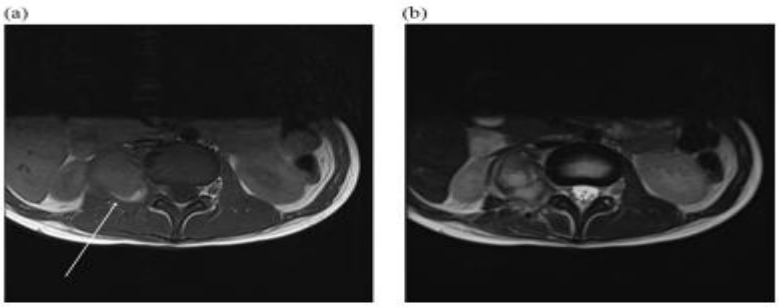


Fig 1. MRI images (a)Axial pre-contrast T1-weighted. (b) T2-weighted

Magnetic resonance imaging (MRI) of the brain demonstrated signs of meningitis and ventriculitis. Patient remained on antibiotics for 9 days and blood culture was cleared. Upon which she improved clinically and was transferred to rehabilitation. Upon arrival from rehabilitation patient was stable. CT imaging of her chest, abdomen and pelvis obtained 8 days after transfer to monitor showed fluid

collection decrease, increase size of right psoas collection prompted MRI showing increased T1 signal intensity. CT angiography showed lesions in left medial lower lobe, right posterior mediastinum and right psos showing consistency with Pseudoaneurysms. Considering the risk of life threatening haemorrhage, interventional radiology services was conducted for embolization. Firstly, for pulmonary lesion access was made through right common femoral vein. Left pulmonary artery was catheterized selectively and angiogram was done for left lower lobe artery in which PSA which measured 12mm. Using the multiple detachable coils, the pulmonary artery branch was selectively catheterized, and the feeding vessel and PSA sac were embolized. The right T9 intercostal artery's angiography was then used to detect the PSA in the posterior mediastinum. Similar embolisation techniques were used on this, and post-embolization angiography revealed no antegrade flow. A CT angiography taken six days after the surgery revealed a stable embolisation location, no signs of recurrent pulmonary, lumbar, or intercostal PSA, and a significant shrinkage of the right psoas. Patients were released from the hospital on post-procedure day 7 after an uneventful stay. (fig2).

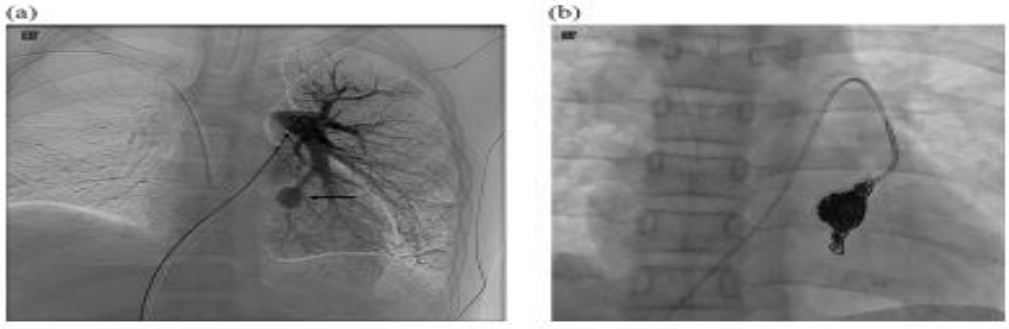


Fig 2. (a) Angiography showing 12 mm pseudoaneurysm, (b) Post-embolization images shows embolization coils in place without residual filling of the pseudoaneurysm sac.

Follow up of CT angiogram obtained 17days post-procedure showed further decrease in multifocal fluid collection with no evidence of new or recurrent PSAs.

Discussion – This case report described the Pulmonary and Systemic arterial Pseudoaneurysms with MSRA infection. Usually Mycotic PSAs are uncommon in children are most cases are reported due to iatrogenic arterial injury. PSAs are associated with the risk of haemorrhage and can cause life threatening condition[2]. Qureshi TN et al., reported PSA which describes it as a life threatening condition leading to morbidity and mortality. It can result in >50% mortality if left untreated. Mycotic pseudoaneurysm accounts for 1% to 3% of all arterial aneurysms. The common organisms responsible for pseudoaneurysm formation are gram-positive cocci; Staphylococcus aureus accounting for 45% of cases, while streptococci are responsible for around 10% of cases[3]. Boateng G A et al., study showed that Pulmonary artery PAs form due to pulmonary artery lacks an adventitial wall therefore, repeated seeding of the pulmonary artery with septic emboli creates saccular dilations that are more likely to rupture than systemic arterial aneurysms[4].

Conclusion – This study concludes that pseudoaneurysms can be successfully treated with coil embolization of pseudoaneurysms sac and feeding vessel and there was no re-occurrence.

Coil embolization can successfully treat pulmonary and systemic pseudoaneurysms in pediatric patients.

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