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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. **Preterm-born school children with and without bronchopulmonary dysplasia with different lung structures and functions on MRI.**
2. **Pulse oximeter and auscultation in screening of neonatal congenital heart disease.**
3. **An 11-year experience from a tertiary referral hospital on the long-term effects of lymphatic malformations in children**
4. **Rare Presentation of Bilateral Large Pulmonary Hydatid Cyst in a Young Child.**

Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Limited

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1. Preterm-born schoolchildren with and without bronchopulmonary dysplasia with different lung structures and functions on MRI.

Introduction:

The term "bronchopulmonary dysplasia" (BPD) refers to a chronic form of lung damage brought on by barotrauma and oxygen injury in premature infants who require mechanical ventilation.[1] Bronchopulmonary dysplasia (BPD), which alters the structure of the lungs and impairs respiratory outcomes, is the most frequent respiratory consequence of preterm. However, preterm children who do not have BPD may exhibit same negative respiratory outcomes. For the assessment of disease severity and risk stratification in preterm children with and without BPD, a safe imaging method is required.[2] The aim of this study was to develop an MRI procedure for preterm children with and without BPD at school age.

Chest MRI can identify structural and functional lung damage at school age in preterm children with and without BPD, showing good correlation with spirometry

Methods:

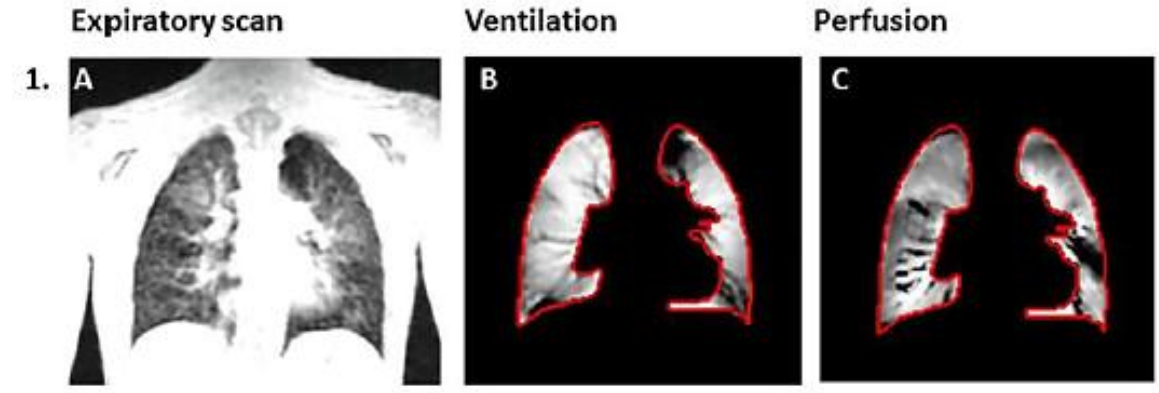
Researchers invited all of the children aged between 6 and 16 who were being followed up on at the BPD outpatient clinic and had severe BPD identified at 36 weeks of gestation (GA) to take part in the trial. Children with BPD were compared with healthy volunteers (born >37 weeks post menstrual age) and preterm children (28 weeks post menstrual age) without BPD or other lung abnormalities who were randomly chosen from the general neonatal follow-up clinic. Eleven preterm children with BPD (11.0(7.2-15.6) years), nine healthy volunteers (11.1(10.7-12.6) years), and nine without BPD (11.0(7.2-15.6) years) had MRI. Images were graded based on architectural distortion, bronchopathy, and hypo- and hyperintense anomalies. Spirometry data were connected with MRI data. Fourier Decomposition (FD) MRI was used to analyse ventilation and perfusion abnormalities.

Results:

In comparison to preterm children without BPD (3.4 (IQR 2.5-5.4)%) and healthy volunteers (0.4 (IQR 0.1-0.8)%), children with BPD had greater percentages of diseased lung on MRI (9.1 (IQR 5.9-11.6)%). FEV1/FVC (r=-0.49, p=0.009), FEV1/FEF75 (r=-0.63, p0.001), a % predicted FEV1 (r=-0.40, p=0.04) all had negative correlations with the % diseased lung. The hypointense areas on the expiratory MRI corresponded to ventilation and perfusion abnormalities on the FD sequence.

Discussion:

This is the first study to use MRI to image changes in the lungs' structure and function in preterm infants with and without BPD at school age. These results demonstrate that MRI can detect clinically significant alterations in lung structure and function in these populations. Researchers suggest chest MRI as a sensitive and secure imaging technique, free of ionising radiation, contrast materials, or the need for anaesthesia, for the extended monitoring of preterm infants.[2] Compared to pretermborn children without BPD and healthy volunteers, children with BPD displayed a greater percentage of hyperintense areas and bronchopathy on free-breathing MRI sequences. These results are consistent with earlier studies on this cohort that used chest CT. [3,4]



Example images of the comparison between the expiratory MRI scans and FD ventilation and perfusion maps. Black on the FD maps corresponds to a defect. 1) expiration image showing hypointense regions in the right lower lobe and apical part of the left lung (a), corresponding FD ventilation map showing a defect in the apical part of the left lung (b) and FD perfusion map showing a defect in the right lower lobe (c) in a child with BPD

Conclusion:

Researchers conclude by demonstrating the ability of MRI to safely assess lung structural and functional abnormalities in preterm born children with and without BPD at school age. The results of spirometry are negatively correlated with an increase in MRI abnormalities. These findings underline the need of integrating imaging in the comprehensive follow-up of all preterm infants in order to identify those requiring more frequent monitoring due to a higher risk of respiratory illness.

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2. Pulse oximeter and auscultation in screening of neonatal congenital heart disease

Introduction:

Congenital heart disease (CHD) is the most common birth condition, and despite medical technology advancements, children with CHD still experience high rates of morbidity and mortality.[1] Although echocardiography is the gold standard for diagnosing CHDs, it typically takes longer than 10 minutes to complete, making it impractical to conduct it on every infant in places with little resources. Instead, pulse oximetry (POX) is simple to use and takes only two to three minutes to examine the results.[2] The purpose of this study was to conduct a retrospective evaluation of a significant clinical implementation of a fast-screening tool for CHD using a combined pulse oximeter (POX) and cardiac auscultation

Pulse oximetry could be used in conjunction with standard cardiac auscultation to provide a reliable and practical early CHD screening for newborns.

Methods:

The Maternal and Child Healthcare Hospital served as the site of this retrospective investigation. Without regard to gestational age, NICU admission, the presence of symptoms, or prenatal diagnosis, all subsequent newborns were eligible. Within 24 hours of birth, every newborn in a large maternity hospital underwent an auscultation and a POX screening. The diagnosis of CHD was confirmed by an echocardiography when an abnormal cardiac murmur or SpO2 level was found.

Results:

At the hospital under study, there were 44,147 live births; 498 probable CHD were discovered; 27 infants were found through POX screening, and 471 with cardiac auscultation. An echocardiography was used to further confirm the diagnosis in 458 new borns. A diagnostic rate of 92.0% was presented by this outcome. When compared to POX, which only screened 20 (4.4%) cases, cardiac auscultation found 438 (95.6%) of the CHD patients. Remarkably, neither the auscultation examination nor the POX screening identified any CHD cases. Most common kinds of CHD were discovered by auscultation, although POX was superior at spotting unusual and serious instances. The positive predict value for POX screening alone was just 74.07%, which is a very poor accuracy (PPV). However, the addition of POX increased the total screening performance, resulting in 100% NPV. In contrast, auscultation functioned well in terms of PPV and negative predict value (NPV) (92.99 and 99.95%, respectively). Researchers further validated the results using data collected six months after the investigation period.

Discussion:

The combined use of POX and cardiac auscultation in routine CHD screening for all newborn infants within 24 hours of birth was first retrospectively reported in this study. The clinical evaluation's most surprising finding was the absence of overlap in CHD spectrums between

auscultation and POX detection. This observation was distinct from earlier studies. Tertiary referral hospitals have stronger prenatal screening and management systems and more medical resources. Pregnant women registered at these hospitals frequently underwent additional prenatal ultrasound screening, increasing the possibility of a significant CHD being detected before birth, which is typically followed by pregnancy termination. This investigation was conducted at a single, tertiary referral hospital that had stronger prenatal management systems, prenatal screenings, and sufficiently qualified medical staffs, in contrast to previous multicenter studies that collected information from a wide range of institutions.

	Pulse oximetry alone	Auscultation alone	Auscultation or pulse oximetry
True positives	20	438	458
False negatives	438	20	0
False positives	7	33	40
True negatives	43,682	43,656	43,649
Sensitivity	4.37%	95.63%	100.00%
Specificity	99.98%	99.92%	99.91%
Positive Predict Value	74.07%	92.99%	91.97%
Negative Predict Value	99.01%	99.95%	100%

Screening accuracy for CHD newborns (*n* = 44,147)

Conclusion:

This study reveals that auscultation and POX combination in CHD screening during the first 24 hours after delivery can produce speedy and accurate results in an affordable manner, which can benefit facilities in low-income areas and hospitals deficient in ward resources.

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3. An 11-year experience from a tertiary referral hospital on the long-term effects of lymphatic malformations in children

Introduction

With an estimated incidence of 1 in 2000 live births, lymphatic malformations (LM) are congenital developmental defects of the lymphatic system . Macrocystic (> 1 cm), microcystic (1 cm), and mixed lesions are the three categories of LM based on the size of the cysts. While larger LM can also be identified during pregnancy and some LM present later in life, LM are typically diagnosed at birth or in the first two years of life.[1]

simple (cystic) lymphatic malformations demonstrate wide heterogeneity in terms of size, location, and clinical course.

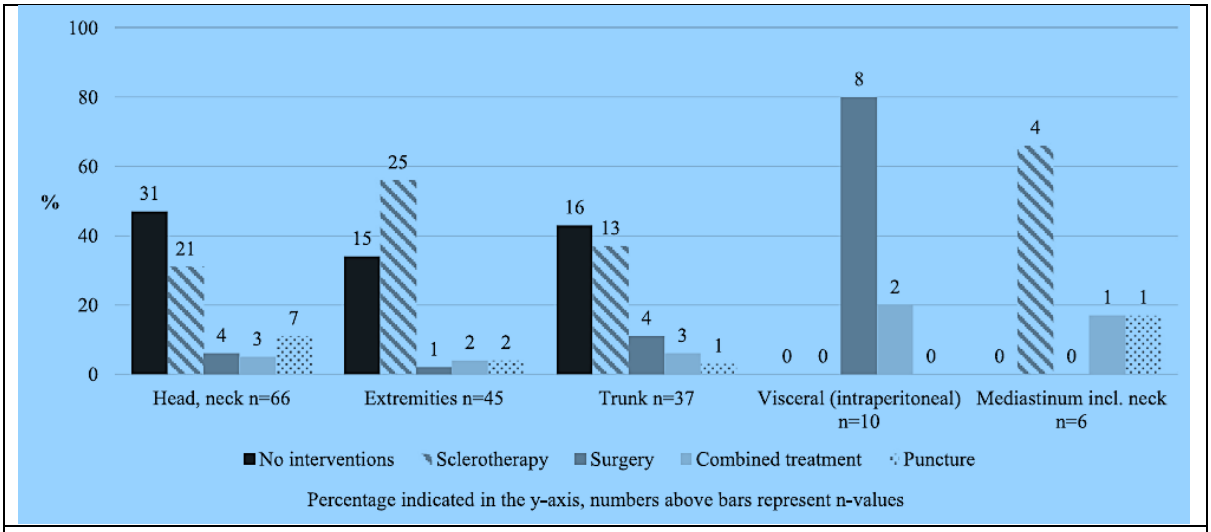
Cysts that are bleeding or infected can expand painfully, alter their appearance or function, and occasionally pressure important structures like the airway.[2] The purpose of this study was to evaluate the characteristics, the course of care, and the results for our paediatric patient population receiving LMs at a single facility throughout an 11-year follow-up.

Methods:

This series was cross-sectional and focused on a single tertiary institution. the case histories of all individuals with uncomplicated (cystic) LMs at tertiary institutions who are under the age of sixteen Age at presentation, presenting symptoms and indications, location of the LM, imaging scans, therapy, laboratory findings, and specifics of outcomes over follow-up were all clinical information that was recorded. Using records, symptoms were ranked in order of severity: Asymptomatic, mild/occasional symptoms (such as skin pigmentation or light discomfort that comes and goes), moderate/severe symptoms that interfere with daily activities or surround vital organs (e.g. airway).

Results:

Sixty-six percent of the 164 patients (60 percent men) had diagnoses before the age of two. After diagnosis, the median follow-up lasted 5 (0.3–16) years. LMs were seen in the head and neck (40%) as well as the extremities (27%) and trunk (23%) and the mediastinum (4%). 47% of cases were macrocystic, 21% were microcystic, and 32% were mixed. The most often used intervention (38%) was sclerotherapy. In 12% of cases, primary surgery had been done. Following therapies, 82/102 (80%) of LMs showed symptomatic improvement, size reduction, or complete regression; problems from treatment were rare (Clavien-Dindo grade I–II: 6%; grade III–IIId: 1%). Sixty-two patients (38%) did not need any therapies up to this point, and 16 (26%) of these expectantly followed-up cases experienced spontaneous regression of the LM.



Treatment approach according to the location of the LM.

Discussion:

Since LMs are benign lesions, they usually don't need to be treated right away unless important structures are affected. As the infant ages, these lesions may enlarge, and LMs appear to be more likely to progress, especially during adolescence. [2]Surgery was used in the current cohort in a few cases, primarily for the macroscopic resection of symptomatic intraabdominal LMs or as a secondary debulking measure for large, mixed-type peripheral or head/neck LMs that affected multiple tissue layers when sclerotherapy had not been sufficiently effective. These findings imply that surgery was successful in symptom relief and lesion reduction. On the other hand, Lee et al. reported that the majority of patients with intra-abdominal LMs can be cured with a complete resection of clearly delineated macrocysts.[3] In this series, surgery was associated with more Clavien-Dino complications grade III than sclerotherapy was ($p = 0.002$). These results can be a result of the complexity of surgically treated cases and patient selection for various therapy categories. The highest rates of clinical resolution or improvement after therapy, by lesion type, were seen in individuals with macrocystic LMs, which is also supported by the literature.[3]

Conclusion:

Simple (cystic) LMs exhibit significant variation in terms of size, location, and clinical course, notwithstanding the terminology used for their classification. The majority of earlier papers have concentrated on results by location, while the new study encompasses the whole patient group that was seen at a single tertiary care facility over the course of an 11-year period. The development of management plans, which include conservative follow-up, is aided by careful, multidisciplinary assessment. It also highlights that, in symptomatic instances, several and occasionally multimodal treatments may be necessary.

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4. Rare Presentation of Bilateral Large Pulmonary Hydatid Cyst in a Young Child.

Introduction:

The parasite Echinococcus granulosus, which is endemic to many regions of the world, is the cause of the disease hydatidosis.[1] Although other organs may sometimes be affected, the lungs and liver are the most frequently impacted organs in paediatric cystic lesions. A rare clinical occurrence in young infants is a bilateral gigantic pulmonary hydatid cyst, which is primarily associated with greater lung tissue elasticity.[2] A 3-year-old male youngster with bilateral pulmonary hydatid cysts is the subject of the following report.

Hydatid disease remains to be of public health importance with worldwide distribution and preventive measures should be taken.

Case Presentation:

A 3-year-old boy who had been experiencing a growing dry cough, deteriorating shortness of breath, and intermittent low-grade fever for four months was admitted to the hospital. There was no prior history of contact with a patient who had tuberculosis. He had no prior history of weight loss, skin or sclera darkening, abdominal pain, or abdominal bloating. He played with the dog for the most duration of the day. Since the patient was 2 years and 6 months old, various po antibiotics and salbutamol puffs have been used in an attempt to treat pneumonia and hypersensitive airway disease without success. An acutely ill-appearing infant with a breathing rate of 60 breaths per minute, an oxygen saturation of 80% with atmospheric oxygen, and a temperature of 37.4 degrees centigrade was discovered during physical examination during admission. An alae nasi flare, subcostal and intercostal retractions, diffuse bilateral wheezing, and restricted air entry in lower lung fields were all visible on a chest x-ray. Investigations from the abdominal ultrasound, complete blood count, and organ function test were all unrevealing. A posteroanterior chest X-ray was performed during admission and revealed a bilateral lung mass with uniform opacification of the right and left hemithorax. With no septations or debris, a chest ultrasonography gave the appearance that there were cystic lung mass lesions at the site of the mass. Computed tomography of the chest was performed for additional clarification, and the results revealed massive bilateral thick-walled cystic lesions measuring 9 x 7.5 x 7.6 cm on the right side and 8.3 x 7.8 x 5.4 cm on the left, both of which were found in the lower regions of the upper lobe. On the left side, there were bilateral perihilar extension, pressure effects on the diaphragm, atelectatic alterations in the area, and fissural thickening with little interfissural fluid. Left posterolateral thoracotomy and hydatid cystic mass removal (cystectomy) were performed with the parents' permission. An 8 x 7 cm well-defined cystic mass was present intraoperatively, emerging from the left upper lobe interlobar fissure and linked to the left lower lobe surface. Two months later, a right posterolateral thoracotomy and cystectomy were performed for the right lung hydatid cyst. The entire cyst was removed without any spillage. The right hydatid cyst was also completely removed without any spilling, and the child made a full recovery after surgery.

Discussion:

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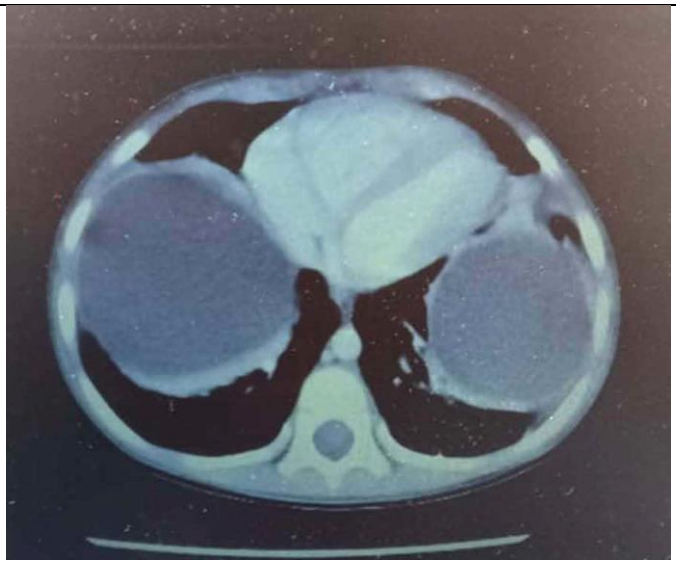
Echinococcus granulosus, a parasite that is endemic to many regions of the world, is the cause of the parasitic disease hydatidosis.[1] The adult tapeworms can live in the small intestine of dogs and other carnivores, and the eggs are expelled in the faeces. Humans become unintentional intermediate hosts when they consume vegetables or water contaminated with echinococcal oocytes.[2] In endemic locations, diagnosis is simple and largely based on history. and radiologic tests, like in this instance, where the CT scan assisted in the discovery of the hydatid cyst. For diagnostic and screening reasons, further procedures include immune electrophoresis and enzyme-linked immunosorbent assay.[3] It is uncommon to see bilateral large pulmonary cysts in a very young infant, as in this case.



Chest CT scan showing large bilateral thick-walled lung cystic lesions located in the lower segments of the upper lobe

Conclusion:

Bilateral pulmonary hydatid cysts are uncommon in clinical practise, despite the fact that hydatidosis is still a serious problem in the world. Histological examination, imaging, and history all contribute to the diagnosis. The mainstay of pulmonary hydatidosis treatment is surgery. The differential diagnosis for cystic lung mass lesions in children should be pulmonary hydatid cyst, as observed in this case. Due to its widespread distribution, hydatid disease continues to be important for public health, and precautions should be taken.

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