CONCLUSION

- Pneumothorax is a potentially life threatening complications occurring in PICU and is associated with prolonged length of stay, increased morbidity and mortality.
- The diagnostic categories mostly associated with pneumothorax: respiratory diseases with sepsis and septic shock coming next.
- Iatrogenic pneumothorax is more common than spontaneous pneumothorax. In our study, the most common cause of pneumothorax is barotrauma related to mechanical ventilation with CVC insertion coming next in aetiology of pneumothorax.
- A high incidence of mechanical ventilation among cases of pneumothorax which explains relative high incidence of tension pneumothorax
- Pneumothorax in mechanically ventilated patients is related to underlying lung disease along with high ventilatory settings and longer duration of mechanical ventilation.
- On development of pneumothorax, most cases showed respiratory acidosis, hypercapnia and hypoxemia.
- Pneumothorax was primarily diagnosed with plain radiography, with no role of bedside ultrasonography.
- Most cases were managed with chest tube insertion.

RECOMMENDATIONS

- Close monitoring of all PICU patients especially ventilated cases for detection of early signs of pneumothorax before progression to life threatening tension pneumothorax.
- Strict application of protective lung strategies in order to minimize occurrence of pneumothorax in mechanically ventilated cases.
- Further use of bedside ultrasonography in diagnosis of pneumothorax due to its high sensitivity and specificity.
- Use of bedside ultrasonography guidance during insertion of central lines to minimize pneumothorax and other complications secondary to CVC insertion.

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STUDY OF PNEUMOTHORAX IN ALEXANDRIA UNIVERISTY PEDIATRIC INTENSIVE CARE UNIT: A 5 YEARS RETROSPECTIVE STUDY

دراسة لحالات الاستروا ح الصدرى للأطفال فى وحدة العنايه المركزة بمستشفى الأطفال الجامعى بالأسكندرية : دراسة استعادية على مدار خمس سنوات

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Master of Pediatrics	**الماجستير فى طب الاطفال**
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INTRODUCTION

Pneumothorax refers to the presence of air or gas in the pleural cavity between the visceral and parietal pleura. This condition is uncommon during childhood but can be life threatening.[1]

Pneumothorax can be classified into: i) Primary spontaneous pneumothorax which occurs in children without known lung disease. ii) Secondary spontaneous pneumothorax occurs as a complication of chronic or acute lung disease such as asthma, cystic fibrosis and pneumonia. iii) Traumatic pneumothorax which is caused by blunt or penetrating trauma to the chest. iv) Iatrogenic pneumothorax which occurs as a complication of diagnostic or therapeutic procedures such as central line placement or as a consequence of mechanical ventilation.[1]

In children, pneumothorax is reported as a complication in 1-4 % of central venous catheter insertion and 0.9-13% of mechanically ventilated cases in pediatric intensive care unit (PICU). The mortality rate of mechanically ventilated patients is 34.5-58.3 % versus the mortality rate of all patients in PICU of 12.2-22.6 %.[2-6]

An earlier study in the pediatric population showed that the prevalence of pneumothorax in ventilated patients was significantly higher in the era before protective lung strategies with low tidal volumes were the standard of care.[7] Higher prevalences of pneumothoraces were seen in patients with acute respiratory distress syndrome (ARDS), but not in those treated with prone positioning or different ventilator strategies related to airway pressures alone.[8-10]

There are three mechanisms by which air can enter the pleural space: 1) A communication between the pleura and alveolar space via visceral pleural rupture. 2) A communication between the pleural space and the atmosphere most commonly due to penetrating chest trauma [11] and 3)The presence of gas producing organisms within the pleural space.[12]

The severity of the symptoms depends on the extent of lung collapse, rate of development and underlying clinical status of the patient. Pneumothorax may be either asymptomatic or presents with signs of respiratory distress including tachypnea, nasal flaring, accessory muscle use, anxiety or altered mental status. Breath sounds may be decreased or absent on the affected side. The percussion note may be tympanitic. Pulsus paradoxus (>10 mmHg fall in systolic blood pressure on inspiration) may be noted. Signs of tension pneumothorax may include deviation of trachea away from affected side and if severe, may include cyanosis, jugular vein distension and deterioration of vital signs leading to pulseless electrical activity and death.[13]

Pneumothorax should be considered a medical emergency and requires a high index of suspicion, prompt recognition and intervention. The diagnosis of pneumothorax in critically ill patients can be made by physical examination findings or radiographic studies including chest radiographs, ultrasonography or computerized tomography.[11]

The cause of pneumothorax, as well as the patient's underlying disease greatly influence the treatment course and overall prognosis in critically ill patients.[14] The primary goal during the management of pneumothorax is to evacuate air from pleural space and allow apposition of the lung and chest wall. Although many patients with pneumothorax can be managed conservatively, the majority of patients in the ICU require pleural intervention.[15]

6.

AIM OF THE WORK

The aim of this work is to conduct a five year (1st of January 2007-31st December 2011) retrospective study of the cases of pneumothorax among pediatric intensive care unit admissions in Alexandria University Children's Hospital.

MATERIAL

This study will be based on the data retrieved from the files of all children admitted at pediatric intensive care unit of Alexandria University Children's Hospital during five years (1st of January 2007-31st of December 2011) who were diagnosed as having pneumothorax either on admission or during hospital stay.

METHODS

Files of patients with pneumothorax at pediatric intensive care unit of Alexandria University Children's Hospital during the period between (1st January 2007-31st December 2011) will be reviewed regarding:

- History, physical examination, laboratory investigations especially cultures and radiological studies.
- Pediatric index of mortality 2 Score (PIM 2 Score) and Pediatric logistic organ dysfunction score (PELOD Score).
- Admission diagnosis.
- Ventilatory details (if any) including: timing, setting, setting changes and weaning.
- Pneumothorax details: as regards etiology, diagnosis, radiology, management and complications.
- Fate and complications including 28 day mortality.

The study will be done after the approval of Alexandria University Ethical Committee. Informed consents of the parents will be waived as the patients were discharged during the last five years and there will be no application of prospective procedures to the patients. All measures will be taken so as not to spread private data as names of these patients.

9.

ETHICS OF RESEARCH

Research on human or humau products:

☐ Prospective study: informed consent will be taken from patients. In case of incompetent patients the informed consent will be taken from the guardians.

☑ Retrospective study: confidentiality of records will be considered.

☐ DNA/genomic material: informed consent for DNA / genomic test and for research will be taken from patients. No further test will be carried out except with further approval of committee and patients. If the samples will travel outside Egypt the researcher will be responsible for transportation and security approval.

☐ All drugs used in the research are approved by the Egyptian Ministry of Health.

Research on animal:

☐ The animal species are appropriate for the test.

☐ After test, if animal will suffer, it will be euthanized and properly disposed.

☐ After operation, it will have a proper postoperative care.

10.

RESULTS

The results of this study will be tabulated and analyzed using the appropriate statistical methods and SSPS version 20.0.0.

11.

DISCUSSION

The results will be discussed in view of achievement of the aim, and will be compared to those of similar published studies.

12.

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الملخص العربى

الاسترواح الصدرى في المرضى ذوي الحالات الحرجة لا يزال يمثل مشكلة شائعة في وحدات العناية المركزة، وهو ما يمثل حدث يحتمل أن يهدد الحياة، وخاصة إذا كان مرتبط بالتهوية الميكانيكيه.

الاسترواح الصدرى يمكن أن يكون عفويا أو علاجي المنشأ،ويعتبر النوع الاخير هوالاكثر شيوعا في جميع أنحاء العالم.

وينبغي اعتبار حالات الاسترواح الصدرى من الحالات الطبية الطارئه والتى تتطلب مستوى عالى من الشك، والتعرف الفوري والتدخل السريع، ويمكن تشخيص حالات الاسترواح الصدرى فى المرضى ذوى الحالات الحرجه من خلال نتائج الفحص البدنى او الدراسات الاشعاعيه بما فى ذلك الاشعه السينيه للصدر والاشعه المقطعيه.

والهدف من هذا العمل هو تقييم حالات الاسترواح الصدرى فى اطفال العنايه المركزة بمستشفى جامعة الاسكندرية خلال خمس سنوات.

وقد اجريت هذه الدراسة على جميع حالات الدخول فى وحدة العنايه المركزة للاطفال فى الفترة بين ١ يناير ٢٠٠٨ الى ٣١ ديسمبر ٢٠١٢ وعددهم ١٢٩٨ حاله، وقد تم استعراض كافه الملفات للحالات و التى اظهرت ان ١٣٥ حاله عانت من الاسترواح الصدرى ،وتم مقارنه هذه الحالات مع باقي الحالات التى لم تعانى من الاسترواح الصدرى وذلك من اجل دراسه معدل الحدوث والمخاطر والمضاعفات المرتبطه لاسترواح الصدرى.

و جرى استعراض ملفات جميع المرضى من حيث التاريخ المرضى، والفحص البدنى، والتشخيص، واحتمال الوفيات عند الدخول وتم حسابه باستخدام مؤشر وفيات الاطفال PIM2 score، ودرجه ضعف الاعضاء عند الدخول وعلى اساس يومى وقد تم حسابه باستخدام PELOD score، واالحاجه الى التهويه الميكانيكيه، وضبط جهاز التنفس الصناعى ومصير الحالات (تحسن او متوفى). كما تم استعراض ملفات حالات الاسترواح الصدرى لتوضيح مسببات المرض، شدته، مضاعفاته، الوسيله الاولى المستخدمه فى التشخيص المبدئى و طرق العلاج.

ولقد كشفت النتائج فروقات ذات دلالات احصائية من حيث ارتفاع معدل الوفيات، وطول مده الاقامه وصغر سن المريض ،وانخفاض وزن الجسم وارتفاع احتمال الوفيات ودرجه ضعف الاعضاء عند الدخول فى حالات الاسترواح الصدرى مقارنه للحالات التى لا تعانى من الاسترواح الصدرى.

كما اظهرت الدراسه ان الاسترواح الصدرى علاجى المنشأ اكثر شيوعا من الاسترواح الصدرى العفوى. وكان السبب الاكثر شيوعا للاسترواح الصدرى فى هذه الدراسة هو الاذى الضغطى المتعلق بالتهوية الميكانيكية يليها ادخال القسطرة الوريديه المركزية، وكانت الوسيله الاكثر شيوعا لتشخيص الاسترواح الصدرى هى الاشعه السينيه للصدر يليها الشك الاكلينيكى مع عدم وجود دور للموجات فوق الصوتيه للتشخيص فى هذه الدراسه.

كما اظهرت النتائج وجود فروقات ذات دلاله احصائية فى حالات التهويه الميكانيكيه حيث كانت هناك مدة اطول للتهويه الميكانيكيه، وضبطيه تنفس صناعى عالية فى كلا التنفس الصناعى التقليدى و التهويه التذبذبيه عاليه التردد فى حالات الاسترواح الصدرى مقارنه بالحالات التى لا تعانى من الاسترواح الصدرى.

وكذلك اظهرت النتائج ارتفاع ملحوظ بنسبة ثانى اكسيد الكربون وانخفاض فى نسبه الاوكسجين فى حالات الاسترواح الصدرى مقارنه بباقى الحالات ،بينما لم تظهر نتائج معامل الالتهاب، وعدد كرات الدم البيضاء ودرجه تشبع الدم بالاوكسجين فروقات ملحوظه.

بمقارنه نتائج تحاليل غازات الدم فى حالات الاسترواح الصدرى فى وقت الدخول وعند حدوث الاسترواح الصدرى اظهرت النتائج ارتفاع ملحوظ فى نسبه حموضه الدم و نسبه ثانى اكسيد الكربون و انخفاض فى نسبه الاوكسجين و درجه تشبع الاوكسجين بالدم عند حدوث الاسترواح الصدرى.

وحيث ان السبب الاكثر شيوعا للاسترواح الصدرى فى دراستنا هو الاذى الضغطى المتعلق بالتهويه الميكانيكيه لذلك من المهم جدا تطبيق الاستراتيجيات الوقائيه للرئه بدقه متناهيه من اجل تقليل خطر حدوث الاسترواح الصدرى.

دراسة لحالات الاسترواح الصدرى للأطفال فى وحدة العناية المركزة بمستشفى الأطفال الجامعى بالأسكندرية: دراسة استعادية على مدار خمس سنوات

رسالة مقدمة

لقسم طب الأطفال ـ كلية الطب ـ جامعة الإسكندرية
ضمن متطلبات درجة

الماجستير

فى

طب الأطفال

مـــن

ريم محمد جمال نويجى
بكالوريوس الطب والجراحة ، ٢٠٠٦
كلية الطب، جامعة الإسكندرية

[٢٠١٥]

دراسة لحالات الاسترواح الصدرى للأطفال فى وحدة العناية المركزة بمستشفى الأطفال الجامعى بالأسكندرية: دراسة استعادية على مدار خمس سنوات

رسالة مقدمة من

ريم محمد جمال نويجى

للحصول على درجة

الماجستير

فى

طب الأطفال

لجنة المناقشة والحكم على الرسالة	التوقيع
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