413. Airway infections in children: from risk factors to treatment

P4110
Quality of life after acute bronchiolitis in infancy
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Acute bronchiolitis, parental allergic disease, atopic eczema, male gender and parental stress are risk factors for asthma development. Quality of life (QoL) may be reduced in children with allergic disease, but prospective studies on risk factors for reduced QoL in infants are lacking.

Aim: Are asthma risk factors, apart from acute bronchiolitis associated with QoL nine months after hospitalization for bronchiolitis?

Methods: The Infant Toddler Quality of Life Questionnaire (ITQOL(TM)) was sent to parents of 405 hospitalised infants included in a randomized clinical trial testing the efficacy of racemic adrenaline, the Bronchiolitis All SE-study. The 13 domains were analyzed by multiple linear regression including age at hospitalization, gender, atopic eczema, parental asthma and parental allergic rhinitis (risk factors).

Results: Risk factors were similar for the 209 infants (mean age 13.2 months) who did and the 196 who did not return the questionnaire. Reduced QoL was found for atopic eczema (Table 1), parental asthma and female gender (four, two and one domain, respectively), but increased in children with parental allergic rhinitis (one domain).

Effect on atopic eczema on QoL adjusted for asthma risk factors

<table>
<thead>
<tr>
<th>Atopic eczema associated with</th>
<th>Change in QoL (95% CI)</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall health</td>
<td>-9.8 (-16.4, -3.1)</td>
<td>0.004</td>
</tr>
<tr>
<td>Growth and development</td>
<td>-4.5 (-8.1, -1.0)</td>
<td>0.01</td>
</tr>
<tr>
<td>Discomfort</td>
<td>-14.5 (-25.7, -3.2)</td>
<td>0.01</td>
</tr>
<tr>
<td>Getting along</td>
<td>-12.5 (-18.7, -6.2)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Multiple regression of the risk factors, results of atopic eczema.
Age of hospitalization did not influence any scores.

Conclusion: QoL nine months after hospitalization for acute bronchiolitis was negatively associated with atopic eczema, parental asthma and female gender.

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Respiratory complication in children with dengue
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Dengue, emerging infectious disease, has been presenting more severe in the last years. In children the diagnosis is difficult. The morbimortality is related to the early recognition and appropriate management. The goal is to know the clinical and laboratory features of children with dengue, hospitalized in the pediatric emergency of the Antonio Pedro University Hospital. Were analyzed from 2006 to 2010 the records of 63 children. 25 (39.7%) of them with respiratory complication. All had pleural effusion: 17 (68%) to the right and 8 (32%) bilateral. The age ranged between 2 and 12 years (mean = 8.2), the most was female 16 (64%). The symptoms were: fever, abdominal pain, vomiting and headache. All had leukopenia and 23 (92%) thrombocytopenia. Ascite was found in 19 (76%) and thickening of the gallbladder in 5 (20%). Hypoalbuminemia in 15 (60%) and enzyme liver abnormalities in 21 (84%). The analysis was similar to that reported in the literature differing only in sex.

P4114

Association between rhinovirus C infection and respiratory symptom severity in an unselected pediatric population, the EUROPA-study
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Rationale: In a paediatric population hospitalized for bronchiolitis rhinovirus (RV) types are associated with more severe respiratory symptoms as compared to RV-C. We therefore aimed at early prediction of asthma (N=1207;0-3 years). Nose and throat swabs were collected in a cross-sectional study from the prospective EUROPA birth cohort, aimed at early prediction of asthma and chronic obstructive pulmonary disease. An epidemiological study suggested that interactions between sulfur dioxide and viral infections exacerbate respiratory disease. However, little is known about the mechanism underlying these interactions.

Objective: We investigated the effects of sulfur dioxide on the production of RV-induced chemokines such as IL-8, RANTES and IFN-gamma inducible protein-10 (IP-10) in airway epithelial cells.

Methods: A549 airway epithelial cells were pretreated with 2.500 μg/mL sodium sulfite for 6 h at 37°C and infected with RV-7 at 1 x 10^6 TCID50/mL for 2 h at 33°C. The medium was replaced with a virus-free medium, and the cells were incubated for 24 h at 33°C. Cell culture supernatants and mRNA expression were harvested at 24, 48, and 72 h after sodium sulfite treatment. Production and mRNA expression of IL-8, IL-6, and IP-10 in these harvests were assessed by ELISA and real-time PCR.

Conclusion: Rhinovirus-C infection occurred in 24% of the infants and is associated with similar symptom severity as other RV-genotypes. Since RV-C appears to be commonly involved in wheezy episodes not requiring hospitalization, it’s association with future development of asthma needs to be examined.

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Neutrophil count trends in BAL samples from children being investigated for chronic cough
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Introduction: Investigating probable persistent bacterial bronchitis (PPB) with a bronchoscopy allows the identification of infectious agents and quantification of cellular responses in the paediatric population who rarely expectorate sputum under these conditions.

Methods: Bronchoscopies in children carried out 2010-11 were identified and a retrospective case notes analysis done to identify those performed because of chronic cough or proven/probable PPB. Bronchovascular lavage (BAL) samples were analysed for standard bacterial culture, viral PCR and neutrophil count (%).

Results: 70 bronchoscopy BALs were analysed: 18.6% positive for bacteria and viral culture (B pos/V pos); 35.7% positive for bacteria but negative for viruses (B pos/V neg); 21.4% negative for bacteria but positive for viruses (B neg/V pos); 24.3% negative for both (B neg/V neg). Analysis of the BAL neutrophil count (%) was performed with one-way ANOVA and Cuzick’s test for trend. For the reasons of analysis the 4 groups were ordered as follows: group 1: B pos/V pos; group 2: B neg/V pos; group 3: B neg/V neg; group 4: B neg/Vneg. The 4 groups differ significantly (means±sd:45.7±30.7, 18.6±21.4, 20.4±22.9, 11.6±15.2, for groups 1, 2, 3, and 4, respectively, p=0.001). Furthermore, a significant trend was found across the 4 ordered groups (p=0.003).

Conclusion: The presence of bacteria and viruses is associated with a significantly more neutrophils and thus a greater degree of inflammation than that induced by bacteria alone and could explain why recurrent viral infections are a feature of PPB.
Conclusion: Our results suggest that sodium sulfite may potentiate the activity of RV-induced diseases by increasing the production of IL-8, RANTES, and IP-10.

P4116 Differential responses of monolayer and differentiated airway epithelial cell cultures to NTHi infection
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The innate defence functions of the lung require a patent airway epithelium and infections are often associated with epithelial defects and phenotype alterations. Non-typeable Haemophilus influenzae (NTHi) one of the first bacterial species to infect children, reduces innate defences, allowing further colonisation with other pathogens, including RSV. We have established NTHi infections of lung derived epithelial cell lines and primary airway epithelial cells in differentiated cultures prior to the establish- ment of secondary infections with RSV as a model for paediatric RSV infection. A549, H292 and primary airway epithelial cells were grown in monolayer cultures in transwell inserts. Differentiated cultures of tracheobronchial epithelial (TBE) cells were grown at the ALI using established methods. The apical compartments of established cultures were infected with increasing doses of GFP tagged NTHi and followed for up to 7 days. Infection and cell viability was determined using confocal microscopy and bacterial counts at each time point. A549 and H292 cells, and undifferentiated primary cells became heavily infected and by day 7 almost complete loss of cells was associated with a loss of viable bacteria. Cytokine array studies showed that these cultures mounted limited cytokine responses. The ALI TBE cell cultures had an enhanced ability to overcome the same bacterial infections and this was associated with a marked cytokine response. This data suggests that differentiated epithelial cell cultures have an enhanced ability to overcome bacterial infection compared to monoculture of epithelial cells. This is like this to the innate defensive shield secreted from these complex cultures.

P4117 Video-assisted thoracoscopic surgery (VATS) and percutaneous drain insertion (PDI) in childhood empyema
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Introduction: Pediatric parapneumonic effusion (PPE) incidence increases. Aims: To compare different treatment options in children with PPE. Methods: Retrospective analysis of children with PPE, admitted from 01/01/2007-30/11/2011. PPE definition: ≥1 cm fluid on US or CT, and/or an opacity on chest X-ray of ≥50% of the hemithorax. Exclusion criteria: age <6m, trauma, thoracotomy. PDI and VATS were performed on clinical indication. VATS was reserved for patients (pts) with insufficient clinical improvement. Pts were treated as follows: Group A: no PDI/VATS. Group B: PDI. Group C: VATS. Group D: PDI followed by VATS. Results: 49 pts were included, F/M=23/26, median age 3.3y (range 0.8-14.8y); 15, 12, 11, and in group A, B, C, and D, resp. Age, sex ratio and inflammatory parameters were similar in all groups. Total length of stay (LOS) was similar for groups B, C and D, but shorter for group A (22 vs 18d, p=0.03) Oxygen need was also shorter in group A compared to the others (4 vs 12d, p=0.001). PDI was performed earlier than VATS (4 vs 9d, ps=0.011). Oxygen need and fever resolved earlier after intervention in group C than in group B (3 vs 8d, p=0.009 and 1 vs 6d, ps=0.04, resp). Time to drain removal, LOS and duration of antibiotic treatment after intervention (3 vs 6d, p=0.011; 11 vs 18d, ps=0.004; and 10 vs 16d, ps=0.001) were shorter in group C than in group B. ICU stay after intervention was similar in the 3 groups. Conclusions: VATS is a good treatment option for PDI in children with PPE. Clinical improvement was faster with VATS than with PDI, indicating that early performed VATS might shorten LOS and duration of antibiotic treatment.

P4118 Cyst hydatid patients in a pediatric pulmonology department in Turkey
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Human hydatid disease due to Echinococcus granulosus is of worldwide impor- tance in Turkey. The aim of this study is to review our experience in pediatric pulmonary hydatid cysts focusing on clinical symptoms, location of the cyst, type of the intervention, postoperative complications and long-term results. Between January 2007: December 2011 there were 26 patients with Cyst Hydatid Disease (CH) at Gazi University Pediatric Pulmonology Department. There were 26 patients with a mean age of 12.8 (8-18) years. Hydatid cysts were localized in the lungs in 18 patients, in the liver in 14 patients. Nine patients have lung and liver CH together. Two patients have vertebral, one patient has splenic and one patient has splanchnic involvement. The most common symptoms were cough and chest pain. Cysts were found in right lung in 6 patients, in left lung in 7 patients and bilateral in 4 patients. The cysts were perforated into the bronchia in 3 patients. Surgical treatment was performed in 15 patients. Cystotomy plus capitonage was the most frequent administered surgical technique. The mean hospitalization time was 14 days. There was no complication related to surgery such as pneumothorax and infection. Nine patients had PAIR. All of the patients received albendazole therapy and 6 patients received praziquan- tel therapy. Mean follow-up time was 17.6 (1.5-22) months. Six patients left the follow-up. There were two recurrence, one patient was with pulmonary CH and the other was with vertebral CH. 18 patients continue to follow-up of without recurrence.

Cyst hydatid is an important public health problem especially in countries where it is common in agriculture and animal husbandry.

P4119 Adjunct treatment of pneumonia in children 6-18 years old using a hand held sputum induction device
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Pneumonia is consistently a leading cause of mortality and morbidity in the Philip- pines; treatment is mainly antimicrobial. Lung Flute is a safe, hand held device that helps effective induction of sputum. The objective of this study is to evaluate the effectiveness of Lung Flute in sputum induction for relief of cough in children 6-18 years old admitted for Pediatric Community Acquired Pneumonia (PCAP) PCAP B and PCAP C. Children ages 6-18 years old admitted with a diagnosis of PCAP B or PCAP C were included. Patients diagnosed with PCAP A, PCAP D and hyperreactive airway were excluded. Each subject was enrolled to Lung Flute group or Control group by systematic randomization. Patients in the Lung Flute group used Lung Flute 3x a day in addition to the treatment provided by the physician. Pretested questionnaire on cough was answered by both groups. McNemar test was used. Of the 35 subjects (CI 80%, alpha error 0.05), 9 were more males than females. The mean age was 9 years old. Majority admitted were diagnosed with PCAP B in Lung Flute group (73.4%) and Control group (85%). There was significant decrease in the frequency of cough on Day 2 (p value 0.049954) and significant improvement on the quality of cough on Day 2 (p value 0.002627) and Day 3 (p value 0.02961). Significant improvement on the quality of life on Day 1 and Day 2 was seen (p value 0.0004883, p value 0.002, p value 0.0000023284). Effective sputum induction was noted in both groups but earlier improvement was seen in the Lung Flute group. Lung Flute is an effective device in sputum induction and may someday be used as adjunct treatment of pneumonia.

P4120 Clinical characteristics of pediatric patients affected with human Metapneumovirus who needed hospital admittance in the western region of Guatemala
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Introduction: Human Metapneumovirus (hMPV) was described for the first time in 2001 by van den Hoogen et al. as a cause of bronchiolitis in children, although a world spread pathogen, very little is known about its epidemiological behavior in latinamerican countries. Aim: To review the clinical characteristics of children who needed admission to our hospital due to a respiratory infection caused by hMPV. Methods: We included in this review all pediatric patients admitted during 2010 & 2011 suffering from a viral respiratory tract infection, and had a polymerase chain reaction positive to hMPV in a nasopharyngeal aspirate, sent to the CDC in the US, for its accurate classification. Results: We reviewed 102 clinical files. 56 were female, mean age 16 months. Three symptoms were predominant in these patients: fever (n=89), cough (n=86) and respiratory distress (n=57). A atelectic radiological pattern on chest X rays was seen in 57% of the cases. White blood cell counts were normal although a discrete neutrophilia was observed in most cases. C reactive protein mean value was 27 mg/dl. None required mechanical ventilation. Mean time hospitalization was 7.4 days. There was no mortality reported in all cases. During the year 2011, no hMPV infection was recorded, despite an intense epidemiological surveillance. Conclusions: hMPV is still an important cause of respiratory infection in children. Even though, during this time the mortality rate was null. It called our attention the bi annual pattern of appearance of this virus, because we did not record any
Acute lower respiratory tract infection and vitamin D status in children

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Childhood acute lower respiratory infection (ALRI) is one of the most common reason for morbidity and mortality especially in developing countries. Predisposing factors include season, nutrition, suboptimal immunization, lower socioeconomic status, prematurity, underlying disease, tobacco exposure and vitamin D deficiency. Vitamin D deficiency is the 25(OH)D levels below < 20 ng/mL whereas vitamin D insufficiency is defined as 25(OH)D 21-30 ng/mL. In a study in Turkey the incidence of vitamin D deficiency in children was found 8% and insufficiency 25.5%.

In this study we aimed to describe vitamin D status in children with lower respiratory infections. Between November 2010 and February 2011 63 children with acute lower respiratory infection between 0.5-5 years of age and 59 age matched children without respiratory symptoms were enrolled in the study. Both study and control groups received vitamin D prophylaxis for one year and they have no predisposing factors for ALRI. Vitamin D status of children with acute lower infection (mean 34.9 ng/mL) were compared with children without ALRI (mean 37.2 ng/mL). No difference was found between the patient and the control group (p=0.38). In the patient group 17 patients diagnosed to have ALRI again after February 2011 – after one year period. In terms of ALRI recurrence, statistically significant difference was found between vitamin D status normal and insufficient patients (p = 0.003). In conclusion although there was no association between vitamin D status and childhood ALRI, significant association was found between vitamin D status and ALRI recurrence. Larger serial studies are needed for precise results.

Mycoplasma pneumoniae infection affects total eosinophil count, the serum level of ECP, and interleukin-5 in atopic children

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Background: A number of studies have outlined mechanisms by which mycoplasma infection may promote allergic lung inflammation. In addition, there is increasing evidence from human studies suggesting that mycoplasma infection contributes to asthma exacerbations, and severity with the change of cytokines. The present study evaluated the change of serum levels of eosinophil count, eosinophil cationic protein, and interleukin-5 in atopic children with Mycoplasma pneumoniae infection.

Method: We recruited 137 children including 44 atopic children with mycoplasma pneumonia (Group 1), 34 non-atopic children with mycoplasma pneumonia (Group 2), 25 children with viral pneumonia (group 3), 34 non-atopic children with viral pneumonia with mycoplasma infection (Group 4). The change of total eosinophil count, serum levels of interleukin (IL)-5, eosinophil cationic protein were measured at admission and at recovery for each group by using commercial ELISA.

Results: The serum level of IL-5 at admission was increased at recovery in group 1 (114±51.1 pg/mL at admission, 143.2±68.4 pg/mL at recovery). However, Buserum eosinophil cationic protein concentrations were increased at clinical recovery compared to the mean serum concentration at admission(49.5 pg/mL at admission, 37.9 pg/mL at recovery in group 1; 38.2 pg/mL at admission, 27.8 pg/mL at recovery).

Conclusion: The outcomes of the present study implied changes of eosinophil and its mediators during Mycoplasma infection may be associated with the mechanism by which the Mycoplasma pneumoniae contribute to the development of airway hypersensitivity.

Is there a delay in diagnosis of post infectious obliterative bronchiolitis (PBO)?

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Background: PBO, an orphan lung disease results following an antecedent severe viral lower respiratory tract infection (LRTI), commonly due to adenovirus. The clinical symptoms of PBO are non-specific. This may result in a significant delay in diagnosis.

Methods: We retrospectively examined the medical records of children with PBO to determine the time from initial illness to diagnosis based on clinical and radiological criteria as follows:
1. History of antecedent viral LRTI
2. Evidence of airway obstruction (clinical or spirometry)
3. Radiological investigations consistent with PBO

Results: Of the nine cases identified over last 17 years, adenovirus (n=7) was the main organism implicated in the initial infection in keeping with description in literature. Common referrals were for difficult or severe wheeze, exercise limitation, recurrent respiratory infections or bronchiectasis. The diagnosis was made earlier in children who had a persistent oxygen requirement or were admitted under the care of respiratory paediatricians.

Conclusions: There is a significant delay in diagnosis of PBO in our experience. Severe LRTI especially with adenovirus and a prolonged oxygen requirement at initial presentation followed by persistent respiratory symptoms should prompt further investigations. Confirmation of the diagnosis leads to better understanding of the disease for the child with the opportunity to network with other children with rare diseases, could lead to potentially disease modifying treatment like Azithromycin and avoid unnecessary treatment for asthma.

Pneumatoceles that required surgery in childhood: Report of 2 cases

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Pneumatoceles are thin-walled filled with air cystic lesions that have been recognized as a potential complication of pneumonia. Although, they are usually asymptomatic, they may enlarge and compress the adjacent lung and mediastinum. The aim of this report is to describe cases of severe pneumonia complicated by pneumatoceles that required surgical intervention.

Case 1
A one year old girl presented with a 2 day history of pyrexia. Radiological investigation revealed a right sided consolidation with pleural effusion. Pleural fluid culture revealed staphylococcus aureus. Antibiotic treatment and drainage failed and a CT scan on day 21 revealed an enlarging pneumatocele on the right causing mediastinal shift. The child developed acute respiratory failure. Successful decompression of the pneumatocele was achieved after initial urgent needle aspiration. Radiologic resolution was complete 2 months post initial presentation.

Case 2
A previously healthy 8 month old boy was admitted to our institution with a tension pneumatocele following a severe necrotic pneumonia. Blood culture was positive for Pneumococcus type 3F. On auscultation they dramatically decreased air entry on the left side. CXR and CT revealed hyperinflation, large air cyst causing mediastinal shift to the right. Conservative management was initially attempted, but when O2 saturation decreased dramatically surgical excision (pneumonectomy) was decided. The patient is now asymptomatic 2 months post discharge.

Conclusion: Tension pneumatoceles, although rare, are a serious complication of pneumonia that may need surgical intervention when the patient is in critical condition.