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Introduction Drainage of infected pleural fluid is a key component in the management of paediatric empyema. There is significant controversy regarding management policy resulting in substantial variation in treatment between tertiary centres in the UK. We have compared different primary pleural drainage strategies using a multicentre cohort design.

Methods Demographic and clinical data on cases of paediatric empyema undergoing pleural drainage were obtained from 19 centres from September 2006 until March 2011. Primary management strategy was defined as that used in the first 48 h of pleural drainage. Robust multivariate survival models were used to analyse length of stay (LOS) and incorporated a frailty term to account for institutional differences. All models were adjusted for age, sex, length of pre-hospital illness, comorbidity and intensive care admission. Fisher's exact test was used to compare readmission and pneumothorax rates.

Results Four pleural drainage strategies were recorded in 637 cases (56% male, median age 4.3 years)—Thoracocentesis without fibrinolysis (TC alone, n=35), Thoracocentesis with fibrinolysis (TC-Fib, n=286), Video assisted thoracoscopic surgery (VATS, n=18) and open Thoracotomy (Tho, n=295). Median tertiary LOS was 8 days (range 3–33) and median total hospital stay (THS) 11 days (range 5–43). Results of LOS analysis are shown in Abstract P173 table 1. In comparison to TC-Fib there were no significant differences in either LOS measure for VATS or Tho. TC alone was associated with a 44% increase in LOS at the tertiary centre and a 36% increase in THS, although the THS effect was of borderline statistical significance. There were significant differences in the rates of pneumothoraces between treatment groups (TC alone 11.4%, TC-Fib 4.2%, VATS 0% and Tho 1.69%, p=0.023) but no differences in readmission rates.

Abstract P173 Table 1

Primary pleural drainage strategy	Hazard	Estimated change in LOS (%)	95% CI	p Value
Length of stay at tertiary centre				
Chest drain and fibrinolysis	Reference			
Chest drain alone	0.56	+44%	0.36 to 0.87	0.011
VATS	0.81	+19%	0.46 to 1.45	0.49
Thoracotomy	1.28	−28%	0.88 to 1.85	0.20
Total hospital stay				
Chest drain and fibrinolysis	Reference			
Chest drain alone	0.64	+36%	0.41 to 1.01	0.053
VATS	0.82	+18%	0.45 to 1.47	0.48
Thoracotomy	1.40	−40%	0.95 to 2.08	0.093

Conclusions Thoracocentesis alone is associated with substantially increased length of hospital stay and increased risk of pneumothorax. There were no significant differences in length of stay or readmission rates between drainage with fibrinolysis, VATS and thoracotomy. Both thoracotomy and VATS were associated with lower risk of pneumothorax but given the overall small number of pneumothoraces this finding should be interpreted with caution.

P174 EMERGENCE OF PNEUMOCOCCAL SEROTYPE 19A AS A CAUSE OF SEVERE COMPLICATED PNEUMONIA WITH EMPYEMA IN CHILDREN IN ENGLAND

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Introduction The severity of pneumococcal empyema varies according to serotype. Invasive disease due to serotype 19A has become a major concern, particularly in the USA and Asia with an increasing incidence of virulent often antibiotic resistant variants. This has not been a significant problem in the UK until now. We describe changes in the incidence of this problem in England and the characteristics of serotype 19A disease.

Methods Data on paediatric empyema patients requiring pleural drainage between September 2006 and March 2011 were collected from 19 collaborating UK-ESPE centres. Pneumococcal serotypes were identified by non-culture multiplex polysaccharide antigen detection assay on culture negative pleural fluid. Kruskal–Wallis and Fisher's exact test were used for continuous and categorical variables. Multivariate models were used for length of stay data.

Results The incidence of empyema due to *S pneumoniae* serotype 19A more than quadrupled from 0.48 in 2006/2007 to 2.41 cases per million children in 2010/2011 (p=0.03). Of cases where full clinical details were available (n=12), 25% had a positive blood culture but all had culture negative pleural fluid. No evidence of antibiotic resistance was reported. Cases of 19A were significantly younger compared to other pneumococcal cases (median 2.0 years vs 4.3 (p=0.004)), had more reported complications (33% vs 11% (p=0.047)), were more likely to have been admitted to intensive care (50% vs 12% (p=0.008)) and to have required assisted ventilation (50% vs 9% (p=0.003)). Duration of hospital admission at the centre managing the empyema was increased by >50% in patients with 19A disease compared to all other serotypes (adjusting for age/sex—HR: 0.47, 95 % CI 0.24 to 0.91, p=0.024). One 19A case died, no further deaths were reported.

Conclusions Empyema due to *S pneumoniae* serotype 19A infection is a particularly serious disease. The incidence of this problem has increased dramatically. Prevenar 7©, the first version of the conjugate pneumococcal vaccine introduced into the UK vaccination programme did not offer protection against this serotype, the second generation vaccine Prevenar 13© introduced in 2010 contains antigen for 19A, but continued surveillance will be required to determine whether this is effective in our population.

P175 MANTOUX OR GAMMA INTERFERON (IGRA)—WHICH TEST IS BEST IN CHILDREN?

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Introduction NICE guidelines recommend a Mantoux threshold of 15 mm induration to trigger investigation for tuberculosis (TB), with IGRA tests used as second line in selected groups. Little data are available about the role of the two tests in the diagnosis of active TB. Emerging evidence suggests IGRA tests may be more sensitive in identifying TB infection in children.

Aim To explore the relationship between Mantoux and IGRA in children attending a paediatric TB clinic in Manchester.

Hypothesis A Mantoux threshold of ≥15 mm induration underestimates TB infection in children.

Method All children aged 0–17 years referred to the TB service at Central Manchester Foundation Trust between Jan 2009 and May 2011 were included. Initial screening included symptom review and Mantoux testing. Based on induration at 48–72 h, Mantoux tests were defined as negative <6 mm or positive ≥6 mm for those with no prior BCG, and negative <10 mm, borderline 10 to ≥15 mm or

positive ≥15 mm for those with prior BCG. Children with borderline or positive Mantoux test results, or in whom there was clinical concern, were referred for consultant assessment and/or IGRA (Quantiferon Gold). Data were collected retrospectively from case notes.

Results 976 children were referred. 756 completed initial assessment (388 (51%) male, mean age 6.2±4.6 years, range 0.16–16.36 years). BCG history was known in 754 (99.7%; 516 BCG). 403 patients were discharged without intervention, 63 were offered BCG vaccination, two were referred elsewhere and 288 were referred for consultant assessment. Of these 288, 108 were notified with TB, 46 received chemoprophylaxis, 117 received no treatment, 5 received BCG and 12 failed to attend. 252 children had paired Mantoux and IGRA. Of these, 18/44 (41%) of those with a borderline Mantoux had a positive IGRA. 126/252 had TB infection (91 active and 35 latent TB)—see Abstract P175 table 1. A Mantoux threshold of ≥15 mm identified 77 (61%) children with TB infection, IGRA identified 92 (73%) and the two tests combined identified 100 (79%) children.

Abstract P175 Table 1 Mantoux and IGRA in children with TB infection

	GIFN negative	GIFN indeterminate	GIFN positive	Total
Mantoux neg	18	1	5	24
Mantoux borderline	6	1	18	25
Mantoux positive	5	3	69	77
Total	29	5	92	126

Conclusion Using a Mantoux threshold of ≥15 mm induration significantly underestimates the number of children with TB infection compared with using Mantoux and IGRA together.

P176 DOES BCG PROTECT AGAINST ATOPIC DISEASES ONLY FOR A LIMITED TIME PERIOD?

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Allergic diseases such as atopic asthma are believed to have their origins in early life[1] but the precise mechanisms and timings of the relevant immunoregulation continue to be a focus of research. One area of investigation has been the role of vaccinations in Th cytokine regulation.[1] Epidemiological studies investigating the potential of BCG, a potent immunomodulator, to reduce the risk of atopic diseases report conflicting results.[2] A Manchester study (MANCAS), using a cohort of children all born in the same hospital in the mid 1990s identified a lower risk of wheeze for children given neonatal BCG.[3] Data analysis for a follow-up study 6 years later when the cohort was aged 13–17 yrs has just been completed. Using the same definitions for wheeze and asthma as the first study there was no difference in prevalence of wheeze or asthma between BCG vaccinated and non-vaccinated adolescents (Abstract P176 table 1). Significance tests between the studies were not performed because some participants responded only to one of the two studies. A Medical Research Council study[4] in the 1950s investigating the effectiveness of a vaccination programme to prevent tuberculosis identified a progressive decrease in the efficacy of BCG in successive 5 year periods with 80% efficacy 5 years post vaccination reducing to 59% 10–15 yrs after vaccination. If the decrease in efficacy of BCG modifies its ability to protect against atopy it may be that the conflicting results in studies investigating BCG and atopy have occurred because the protection afforded by BCG is limited to within a timeframe after vaccination.

Abstract P176 Table 1 Asthma/wheeze prevalence

	Asthma (3KQ)	Asthma (3KQ1MoS)	Wheeze
MANCAS1 n=2414/5086			
NN BCG	21.6% (201)	13.6% (126)	17.2% (168)
No BCG	26.2% (266)	17.5% (176)	23.2% (250)
	p=0.02	p=0.02	p<0.01
MANCAS2 n=1608/6338			
NN BCG	17.0% (123)	10.7% (77)	15.9% (112)
No BCG	16.3% (120)	11.4% (84)	14.4% (103)
	p=0.69	p=0.66	p=0.44

REFERENCES

1. **Marchant,** *et al*. T cell-mediated immune responses in human newborns: ready to learn? *Clin Exp Immunol* 2005;**141**:10–18.
2. **Arnoldussen,** *et al*. BCG vaccination and allergy: a systematic review and meta-analysis. *JACI* 2011;**127**:246–53.
3. **Linehan,** *et al*. Is the prevalence of wheeze in children altered by neonatal BCG vaccination? *JACI* 2007;**119**:1079–85.
4. **Medical Research Council.** BCG and vole bacillus vaccines in the prevention of tuberculosis in adolescence and early adult life. *Bull WHO* 1972;**46**:371–85.

P177 EVOLUTION OF LUNG FUNCTION IN PRIMARY CILIARY DYSKINESIA: A TWO CENTRE RETROSPECTIVE STUDY

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Background Evolution of spirometry in primary ciliary dyskinesia (PCD) and its determinants are unclear. To assess morbidity and burden of this condition, we investigated the progression of spirometry in patients from two European centres.

Methods Ninety-six patients with =1 spirometry (Naples, Italy, n=21; London, UK, n=75) were enrolled. Sixty-five (Naples, n=15; London, n=50) with 4 years spirometry were analysed longitudinally. Best annual FEV_1, corresponding FVC, both expressed as z-scores, and sputum culture results were recorded.

Results In Naples and London, age at referral to the centre was 9.8 (range, 0.1–20.2) and 6.1 years (range, 0.1–17.3), respectively (p=0.02), while age at first spirometry was 11.6 (range, 8.1–20.2) and 8.4 years (range, 4.2–17.3), respectively (p<0.001). In both centres patients with situs in versus (Naples, n=15; London, n=36) were referred earlier (p<0.001). Despite later diagnosis, Naples children had better baseline FEV_1 and FVC z-scores (−0.53 (1.60) vs −1.66 (1.35), and 0.50 (1.55) vs −1.36 (1.32), p<0.001 respectively) when first seen. Slopes of FEV_1 z-scores over 4 years were −0.05 (95% CI −0.36 to 0.26) and 0.05 (95% CI −0.05 to 1.65) in Naples and London, respectively (p=0.38). No significant correlation was found between slopes of FEV_1 z-scores and age at referral or baseline FEV_1 z-score. *Haemophilus influenzae* was the most frequently isolated pathogen (95% and 79% of subjects in Naples and London, respectively, p=0.1). Naples subjects had higher prevalence of *Pseudomonas aeruginosa* (62% vs 36%, p=0.04). *P aeruginosa* isolation was not associated with worse baseline FEV_1 z-scores or slopes of FEV_1 z-scores.

Conclusions The better lung function despite later diagnosis in Naples is apparently unexplained. However, as spirometry in PCD is stabilised during treatment, its short-term evolution is not related to age at referral or to baseline FEV_1. Spirometry is thus not a useful end-point for randomised controlled trials of treatment. Late diagnosis is common for patients without *situs* anomalies. Although the potential impact of *P aeruginosa* infection on PCD lung function is unclear, its unexpectedly high prevalence merits further study to determine best prevention and management strategies.