

Original article:

Study of clinical presentation of empyema in different age groups

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Abstract:

Introduction: The clinical presentation of a paediatric patient with empyema depends upon several factors, including the causative micro-organism. Most cases present themselves in the setting of a pneumonia, although up to one third of patients do not have clinical signs of pneumonia.³ Typical symptoms include cough, chest pain, shortness of breath and fever.

Materials and methods It was prospective study carried out at DR DY PATIL MEDICAL COLLEGE HOSPITAL AND RESEARCH CENTRE, PIMPRI, PUNE. At a significance level of 5% and power of 80%, the minimum sample size works out to be 20. To cater for nonresponse or loss to follow up, I will include 30.

Results and Conclusion: The most common symptoms amongst the cases were fever (96.7%), cough (80%) and breathlessness (36.7%). The most common signs of empyema in children were decreased vocal fremitus, decreased vocal resonance and decreased air entry (96.7%). This was followed by tachycardia (76.7%), and tachypnoea (73.3%).

Introduction:

The clinical presentation of a paediatric patient with empyema depends upon several factors, including the causative micro-organism. Most cases present themselves in the setting of a pneumonia, although up to one third of patients do not have clinical signs of pneumonia.^{1,23} Typical symptoms include cough, chest pain, shortness of breath and fever. Empyema is an intrapleural infection distinguished from simple parapneumonic effusions based on positive cultures. The most likely infectious agents are Tuberculosis (TB) or Staphylococcus, although many others have been identified.⁴ The other common isolated organisms of empyema are Streptococcus pneumoniae and anaerobes for community-acquired pleural infection and S. aureus (including methicillin-resistant S. aureus (MRSA)) for hospital-acquired cases.⁵ Exudative simple parapneumonic effusions can occur in as many as 40% of patients with pneumonia⁶, and may frequently resolve with appropriate antibiotic treatment of the pneumonia, without the need for drainage.

Materials and methods

It was prospective study carried out at DR DY PATIL MEDICAL COLLEGE HOSPITAL AND RESEARCH CENTRE, PIMPRI, PUNE.

At a significance level of 5% and power of 80%, the minimum sample size works out to be 20. To cater for nonresponse or loss to follow up, I will include 30.

Inclusion criteria:

- Parents willing to give consent
- Child with x-ray findings suggestive of empyema
- Child with symptoms of empyema : cough, fever, and other comorbidities such as nutritional deficiencies

Exclusion criteria:

- Parents not willing
- Child who presents after primary management (as course of antibiotics or thoracocentesis)

Methodology:

1. Authors took consent of the ethical committee before starting my study.
2. Written informed consent and assent(in children less than 7 years of age) from each patient was taken.
3. Detailed history was recorded.
4. General and systemic examination was conducted.

Results:

It was observed that 19 cases (63.3%) were between 3-6 years, 6 cases (20%) were between 6-9 years and 5 cases (16.7%) were between 9-12 years. Mean age of study subjects was 5.5years.

The present study comprises of 30 cases. Incidence was more in males (66.7%) than in females (33.3%).

Table 1: Nutritional status wise distribution of cases in study group

Nutritional status	No of cases	Percentage
No PEM (>80%)	6	20
Grade I (70 - 80%)	13	43.3
Grade II (60 - 70%)	8	26.7
Grade III (50 - 60%)	3	10
Grade IV (<50%)	0	0
Total	30	100

The above table shows nutrition wise distribution of cases in the study, depicting 6 cases (20%) not showing any signs of malnutrition. Maximum number of cases, 13 cases (43.3%) showed grade I protein energy malnutrition. 8 cases (26.7%) showed grade II malnutrition. 3 cases (10%) showed grade III malnutrition. No case showed severe grade IV malnutrition.

Table 2: Symptoms wise distribution of cases in study group

Symptoms	Age (Yrs)			χ^2 Value	P Value
	3 – 6 (n=19)	6 – 9 (n=6)	9 – 12 (n=5)		
Fever	19 (100%)	6 (100%)	4 (80%)	5.17	0.08
Cough	17 (89.5%)	4 (66.7%)	3 (60%)	2.98	0.23
Breathlessness	8 (42.1%)	1 (16.7%)	2 (40%)	1.3	0.52
Chest pain	3 (15.8%)	2 (33.3%)	2 (40%)	1.72	0.42
Cyanosis	1 (5.3%)	0	0	0.60	0.74

The above table shows that the most common symptoms amongst the cases were fever, occurring in 29 out of 30 cases (96.7%), cough (80%) and breathlessness (36.7%). Cyanosis was also observed in 1 case (3.3%).

Table 3: Association between age and symptoms in study group

Symptoms	Age (Yrs)			χ^2 Value	P Value
	3 – 6 (n=19)	6 – 9 (n=6)	9 – 12 (n=5)		
Fever	19 (100%)	6 (100%)	4 (80%)	5.17	0.08
Cough	17 (89.5%)	4 (66.7%)	3 (60%)	2.98	0.23
Breathlessness	8 (42.1%)	1 (16.7%)	2 (40%)	1.3	0.52
Chest pain	3 (15.8%)	2 (33.3%)	2 (40%)	1.72	0.42
Cyanosis	1 (5.3%)	0	0	0.60	0.74

In the present study, the symptoms were divided according to different age groups. Fever being the most common symptom in all age groups. p-value for fever was 0.08 (>0.05) which was non significant.

Table 4: Duration of symptoms wise distribution of cases in study group

Duration (days)	No of cases	Percentage
Up to 3	7	23.3
4 – 7	11	36.7
8 – 14	5	16.7
15 & above	7	23.3
Total	30	100

The above table shows distribution of symptoms according to their duration. Maximum number of cases i.e. 11 (36.7%) came with symptoms persisting for 4-7 days.

Table 5: Signs wise distribution of cases in study group

Signs	No of cases	Percentage (n=30)
Tachycardia	23	76.7
Tachypnea	22	73.3
Retractions	7	23.3
Decreased vocal fremitus	29	96.7
Decreased vocal resonance	29	96.7
Pleural rub	5	16.7
Decreased air entry	29	96.7
Added sound	12	40

The present study showed maximum cases- 29 out of 30 cases presenting with decreased vocal fremitus, decreased vocal resonance and decreased air entry (96.7%). This was followed by tachycardia (76.7%), and tachypnoea (73.3%).

Table 6: Association between age and signs in study group

Signs	Age (Yrs)			χ^2 Value	P Value
	3 – 6 (n=19)	6 – 9 (n=6)	9 – 12 (n=5)		
Tachycardia	17 (89.5%)	2 (33.3%)	4 (80%)	8.07	0.02
Tachypnoea	14 (73.7%)	4 (66.7%)	4 (80%)	0.25	0.88
Retractions	6 (31.6%)	0	1 (20%)	2.58	0.28
Decreased vocal fremitus	18 (94.7%)	6 (100%)	5 (100%)	0.60	0.74
Decreased vocal resonance	18 (94.7%)	6 (100%)	5 (100%)	0.60	0.74
Pleural rub	4 (21.1%)	0	1 (20%)	1.5	0.47
Decreased air entry	18 (94.7%)	6 (100%)	5 (100%)	0.60	0.74
Added sound	11 (57.9%)	0	1 (20%)	7.37	0.03

In age wise distribution of cases, in all age groups- 3-6 years, 6-9 years, and 9-12 years, decreased vocal fremitus, vocal resonance and decreased air entry were the most common signs, occurring in 94.7%,100% and 100% cases respectively. Tachycardia and added sounds such as crepts, rhonchi and wheeze were found to have a significant association with empyema with a p-value of <0.05.

Table 7: Empyema side wise distribution of cases in study group

Empyema side	No of cases	Percentage
Right	17	56.7
Left	13	43.3
Total	30	100

In the present study, right sided predominance is seen, which accounts for 56.7% of cases. Remaining 43.3% cases are left sided. None of the cases were bilateral.

Discussion:

Pleural disease remains common, affecting over 3000 people per million population each year. It originates from a wide range of pathologies and a systematic approach to the investigation and management is therefore required. Empyema thoracis constitutes approximately 5-10% of cases seen by paediatricians in India.^{7,8} 30 children clinically suspected to have empyema were included in this present study. A prospective study was carried out in Dr. D.Y. Patil College, Hospital and Research Centre during the period of September 2018 to August 2020.

In the present study, highest incidence of empyema was found in the age group of 3-6 years (63.3%) , with a mean age group of 5.5 years. The oldest patient was 12 years old. In a study conducted in rural India in Government Medical College, Miraj in 2016, empyema was more common in children between 1-5 years of age (52.5%)⁷. Geha et al⁸ observed empyema chest in children more commonly below the age of 10 years. He stated two peaks of the disease, in first year of life and in third year of life. In a study by Mangete⁹, peak incidence of empyema was at 0-3 years.

In this study, 66.7% of affected children were males, and the rest females. In the study by Ghosh et al⁹ the percentage was 65.9% in males. In 2005, the same results were noticed by the British Thoracic Society too.¹⁰ A study conducted in India on 70 children, to evaluate the effectiveness of surgical intervention in managing empyema thoracis in children between 1-14 years of age, 48.6% of patients were males and 51.4% were females. 80% of the children in the present study were undernourished, of which 43.3% were grade 1 malnutrition, with no child being grade IV malnourished with severe wasting or stunting. Whereas in a prospective observational study, conducted in the Department of Paediatrics at Maulana Azad Medical College from February 1, 2008 to 31 January, 2009, 38% were malnourished, and 3% had severe wasting.¹¹

In the present study, fever, cough, breathlessness were the commonest symptoms 96.6%, 80% and 36.66% respectively. In the study in Miraj⁷, patients presented with symptoms of fever, cough- 100% and breathlessness 95%. Goyal et al¹² found cough in 100% cases and breathlessness in 92% cases. Foglia et al¹⁰⁹ had considered fever as a indicator of clinical improvement with other factor such as leucocytosis and CT scan findings. Cause of breathlessness was collapse of underlying lung in the affected side of empyema. Where duration of symptoms were concerned, most of the children came to the hospital with complaints for 4-7 days. (36.7%). Shortest period was 1 day and longest period was 30 days. In the study conducted in Miraj⁷ 46.3% cases presented in first week of their illness. In the study conducted by PK Sharma, in a tertiary care hospital in Delhi in 2012,¹³ all children presented with fever ranging from 2-22 days with a median of 10 days. As per the aim of the present study, the symptoms were then divided based on the different age groups. In the age wise distribution of symptoms done, we noticed that all age groups had fever (100%) except 9-12 years, where fever was seen in 80% of sample size. p- value was 0.08%, which was not significant. Cough being the second most common symptom, was seen in 89.5%, 66.7%, and 60% of the children belonging to 3-6years, 6-9 years, and 9-12 years respectively. Cyanosis was seen only in 1 patient, belonging to 3-6 years of age group, constituting 5.3% for that sample size.

On examination, in the study, the most common signs were decreased vocal resonance and vocal fremitus along with decreased air entry on the affected side, followed by tachycardia and tachypnoea. Least common sign was a pleural rub, seen in only 16.7% children. Distributing it age wise, decreased vocal fremitus, vocal resonance and decreased air entry was seen in 94.7% of children between 3-6years of age, and 100% of children between 6-12 years of age. Added sounds such as crepitations, wheeze, rhonchi were seen in 57.9% of children between 3-6 years of age, and only in 1 child thereafter. Tachycardia was found to have a significant association with empyema with a p-value of 0.02 (<0.05).

Right side was the more commonly affected side, in 56.7% of patients. In the study conducted in Miraj¹⁰¹, right sided empyema was more common(72.5% cases). Similar findings were observed in studies by Stephen et al¹¹¹ and Goyal et al¹⁰⁸ that right sided bronchus is more in line with trachea than that of left side. So lung infections are more common on right side and empyema is also common in right side.

Conclusion:

The most common symptoms amongst the cases were fever (96.7%), cough (80%) and breathlessness (36.7%). The most common signs of empyema in children were decreased vocal fremitus, decreased vocal resonance and decreased air entry (96.7%). This was followed by tachycardia (76.7%), and tachypnoea (73.3%).

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