

Osteomyelitis of the ribs in Ibadan

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ABSTRACT Sixteen patients with pyogenic osteomyelitis of the ribs are reported; ages ranged from 3 months to 42 years and 10 were female. Right sided ribs were affected in 10 cases and single ribs in 12. Antecedent causes included empyema thoracis (56%) and blunt chest trauma (19%). Fourteen out of 16 patients presented with discharging chest wall sinuses and five patients had associated swellings on the chest wall. The duration of symptoms ranged from two to 36 months. The most common microorganism isolated was *Staphylococcus aureus* (50%). Rib excision (with drainage of the empyema in two cases) was curative in all 16 cases in this study.

Osteomyelitis of the ribs appears to be a rare disease in both the tropical and the temperate areas of the world.¹⁻³ Adeyokunnu and Hendrickse,⁴ in a review of 63 cases of salmonella osteomyelitis seen in Nigerian children, found no case of rib osteomyelitis. Similarly, Dich *et al*¹ reviewed 163 cases of osteomyelitis in infants and children over 15 years and found only one case (0.6%) affecting the ribs.

Osteomyelitis of the ribs has been found in association with childhood empyema,⁵⁻⁷ *Staphylococcus aureus* infection,¹ sickle cell anaemia, and infection due to *Salmonella* and *Klebsiella* species and *Proteus rettgeri*.³ Osteomyelitis arising in ribs adjacent to sites of intubation in the chest in children with empyema has been documented by Osinowo *et al*.⁷

The present report reviews 16 cases of rib osteomyelitis treated by our cardiothoracic unit over seven and a half years. From this experience and a review of the published reports we consider the aetiology, pathogenesis, clinical presentation, and results of treatment of the disease.

Methods

The records of all patients with rib osteomyelitis admitted to the unit from January 1975 to May 1983 formed the basis of this prospective study.

The data extracted from each patient's record included the age, sex, clinical presentation, radiological findings, mode and results of treatment, and the results of bacteriological and routine haem

atological investigations and haemoglobin electrophoresis.

Rib resection was carried out in all the patients under general anaesthesia.

Results

The clinical features of the 16 patients are shown in the table. The ages of the patients ranged from 3 months to 42 years (mean 9.32 (SD 11.38) years). Ten were female and six male (M:F = 1:1.7). All six patients in whom the haemoglobin genotype was known were AA. The packed cell volume ranged from 26% to 52% (mean 34.7 (7.0), n = 10) and the white blood cell count from 3700 to 14500 10⁹/l (mean 9006 (4051), n = 9).

Ribs on the right side were affected in 10 cases and on the left side in six. A single rib was affected in 12 cases (75%) while two ribs were affected simultaneously in three cases (19%). In the remaining case three ribs were affected. Empyema thoracis and blunt chest trauma were the commonest causes of the osteomyelitis. Five of the 16 patients (31%) presented with chest wall swellings. Discharging sinuses were seen in 14 of the patients (87.5%) and were multiple in three. Two patients (12.5%) had no sinuses on presentation. The duration of symptoms was known in 12 patients and ranged from 2 to 36 months (mean 7.8 (SD 8.9)).

The most common microorganism isolated was *Staphylococcus aureus*, which was present in half the cases. In one case each *Pseudomonas aeruginosa* and *Klebsiella* sp were isolated in addition to *S aureus*. Radiologically bone destruction and patchy necrosis were seen in all the affected ribs. Three patients presented with expansion of the affected rib (fig 1)

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Clinical data on 16 patients with rib osteomyelitis

Case No	Sex	Age (y)	Side	Ribs affected	Aetiological factors	Microorganisms	Radiological findings in rib	Resection and other treatment	
								Side	Ribs
1	F	7	L	3	Empyema	<i>Staphylococcus aureus</i>	Destruction, sequestrum	L	3
2	F	12	L	11,12	Blunt chest trauma	<i>Staphylococcus aureus</i> <i>Pseudomonas aeruginosa</i>	Destruction, sequestrum	L	11,12
3	M	10	L	12	Blunt chest trauma	<i>Pseudomonas aeruginosa</i>	Destruction, expansion	L	12
4	M	4	R	5	Empyema	<i>S aureus</i>	Destruction, expansion	R	5
5	M	2	R	6	Empyema	<i>S aureus</i>	Destruction	R	6
6	F	3	L	8	Chest wall abscess	<i>S aureus</i>	Destruction	L	8
7	M	30	R	6, 7	# ribs, empyema	<i>S aureus</i>	Destruction	R	6,7
8	F	1	R	9	Septicaemia, chest wall abscess	<i>S aureus</i>	Destruction, expansion	R	9
9	F	42	R	7	Right upper lobectomy, empyema	NCR	Destruction	R	7
10	M	4 m	R	7	Empyema	<i>S aureus</i>	Destruction, osteitis	R	7
11	F	1½	R	9	Empyema, foreign body (swab)	NCR	Destruction	R	9, with drainage of empyema
12	M	6	R	5,6,7	—	<i>Proteus rettgeri</i> <i>Klebsiella sp</i>	Destruction	R	5,6,7
13	F	3 m	L	6,7	Septicaemia, chronic empyema	<i>Klebsiella sp</i> <i>S aureus</i>	Destruction	R	6,7, with open drainage
14	F	19	R	8 and sternum	—	<i>S aureus</i>	Destruction (also of sternum)	R	8, with curettage of sternum
15	F	3	R	6	—	NCR	Destruction	R	6
16	F	8	L	10	Blunt chest trauma	NCR	Destruction	L	10

NCR—no culture report.

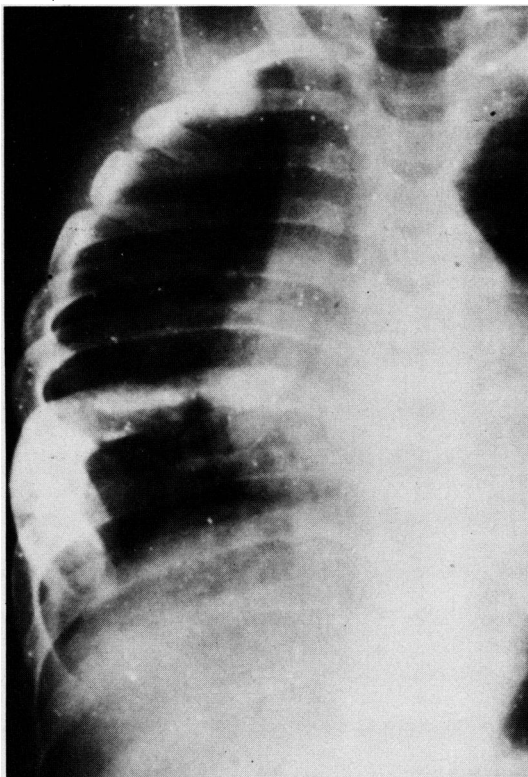


Fig 1 Radiograph showing osteomyelitis of the right 7th rib in 4 month old boy after chest tube drainage for empyema.

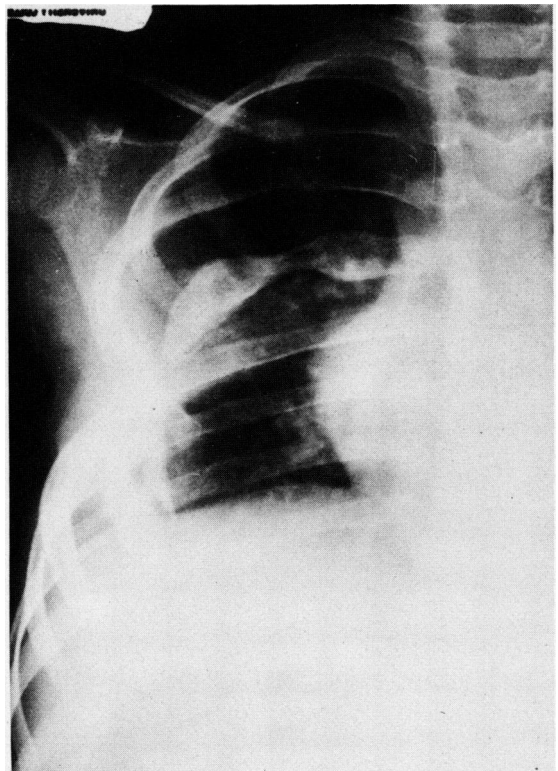


Fig 2 Radiograph of 4 year old boy with discharging chest wall sinus and osteomyelitis destruction of the right 5th rib. There is a sequestrum in the anterior portion of the affected rib.

while in two cases sequestra were visible radiologically (fig 2).

All the patients responded well to rib resection, combined with drainage of the empyema in two cases.

Discussion

Osteomyelitis of the ribs appears to be more common in children than in adults and in our series was related mainly to empyema thoracis and blunt chest trauma. It may also occur at the site of chest intubation, as a result of pressure necrosis caused by large or stiff chest tubes.⁷ In a study of 178 children with empyema Osinowo *et al*⁷ reported a 1.1% incidence of rib osteomyelitis. Antecedent blunt chest trauma may cause fracture of the rib and compromise its blood supply, which in the presence of subsequent infection may lead to the development of osteomyelitis. The importance of septicaemia and haemoglobinopathies as causative factors in rib osteomyelitis has been emphasised⁴ but these are rarely encountered.

Patients with osteomyelitis of the rib commonly present with a chronic discharging sinus^{1,3} and sometimes swelling³ in the chest wall, as has been confirmed in our study.

We cannot readily explain the frequency of rib osteomyelitis on the right side in this study (10/16), but disease of the right 6th and 7th ribs may be due to the frequent use of the 6th intercostal space for chest intubation for empyema. Although Komolafe³ reported one case of bilateral rib osteomyelitis out of the five they studied, we encountered no such cases—even the cases in which more than one rib was affected were all ipsilateral.

The diagnosis of rib osteomyelitis is readily confirmed radiologically by the presence of expansion and destruction of the rib, patchy necrosis, and extra-

pleural swelling of soft tissue. Occasionally a sequestrum may be present.

Despite reports that salmonella species are the major causative organisms of osteomyelitis in those with haemoglobinopathies,⁴ *Staphylococcus aureus* remains the commonest cause of osteomyelitis in general.¹⁻³

Resection of the rib offers the best treatment for pyogenic rib osteomyelitis,^{3,8} as the complete cure of all of our 16 patients has shown.

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References

- 1 Dich VQ, Nelson JD, Haltalin KC, *et al*. Osteomyelitis in infants and children. A review of 163 cases. *Am J Dis Child* 1975;129:1273-8.
- 2 Mollan RAB, Piggot J. Acute osteomyelitis in children. *J Bone Joint Surg* 1977;59:2-7.
- 3 Komolafe F. Pyogenic osteomyelitis of the rib in children. *Pediatr Radiol* 1982;12:245-8.
- 4 Adeyokunnu AA, Hendrickse RG. Salmonella osteomyelitis in childhood. A report of 63 cases seen in Nigerian children of whom 57 had sickle cell anaemia. *Arch Dis Child* 1980;55:175-84.
- 5 Aderele WI, Stevenson CE, Antia AU. Empyema in childhood: a review of 116 cases. *Nigerian Journal of Paediatrics* 1974;1:20-5.
- 6 Adebajo SA, Osinowo O, Oyemade OA. Surgical management of empyema in children. *Nigerian Medical Journal* 1970:469-74.
- 7 Osinowo O, Adebajo SA, Adebo OA, *et al*. Childhood empyema in Ibadan, Nigeria. *Nigerian Medical Journal* 1982;12:337-47.
- 8 Guest JL, Anderson JN. Osteomyelitis involving adjacent ribs. *JAMA* 1978;239:133.