

AN EXPERIENCE WITH TUBERCULOUS OSTEOMYELITIS IN TEACHING HOSPITALS OF LAHORE

FARIA MALIK

*Departments of Microbiology and Pathology
Fatima Jinnah Medical College, Lahore - Pakistan*

The conclusive diagnosis of tuberculous osteomyelitis requires isolation of Mycobacterium tuberculosis in aspirate from bone lesion and bone debridement. The present study was undertaken to find mycobacterial aetiology in osteomyelitis cases reported to four hospitals in Lahore. One hundred and fifty patients were selected from outpatient departments and Orthopaedic wards of Lahore General Hospital, Sir Ganga Ram Hospital, Services Hospital and Mayo Hospital, Lahore. Specimens of pus from bones and bone debridement were collected. All samples were decontaminated and inoculated on two Lowenstein Jensen slopes. Smears were made and stained by the Ziehl Neelsen method for acid fast bacilli. The Lowenstein Jensen slopes were examined biweekly for eight weeks and any growth obtained was stained by the Ziehl Neelsen method. Cultures for pyogenic bacteria were also put up both for aerobes and anaerobes. Thirteen cases were positive for Mycobacterium tuberculosis: five cases had mycobacterium isolated as a single pathogen, whereas in seven cases there was concurrent infection with Staphylococcus aureus, enterobacteriaceae or both. One case presented with a mixed infection with mycobacterium, Staphylococcus and an anaerobe. These patients were clinically suggestive of tuberculosis on the basis of history, symptoms and signs general and/or pulmonary, typical involvement of spine, chronicity or refractoriness to surgical and antibiotic therapy. The present study highlights the importance of tuberculosis in chronic cases of osteomyelitis. All cases should be cultured for Mycobacterium tuberculosis as it can occur alone or with concomitant pyogenic infection masking its presence leading to failure of therapy.

Keywords: *Mycobacterium tuberculosis, concomitant pyogenic infection, osteomyelitis.*

INTRODUCTION

Tuberculosis (TB), is the global epidemic which is killing 2 million people each year. Over all one third of the world's population is infected with TB with 8 million (1%) being newly infected each year. It has been estimated that between 2002 and 2020 approximately 1000 million people will be newly infected, 150 million will get sick and 36 million will die. Presently the biggest number is borne by South Asia¹. According to the latest estimates, Pakistan with a population of 153,577,900, ranks seven globally by a prevalence of 359 cases per 100,000 population and a mortality of 43 per 100,000 population². In other 1.5 million suffer³ and 210,000 newly acquire the disease⁴.

Mycobacterium tuberculosis primarily affects lungs but may cause lesions anywhere in the body⁵. In recent years there has been a sharp increase in the incidence of non pulmonary tuberculosis⁶. Extrapulmonary disease (pleura, lymph nodes, gastrointestinal tract or urinary

tract) is present in 15% of non-HIV patients and upto 70% of HIV positive patients with tuberculosis⁷. Skeletal TB occurs in 1% of patients of tuberculosis⁸ and account for 10% of all cases of extra pulmonary TB. Two percent of all new cases of TB involve bone or joint⁹. Any bone can be involved but the commonest site is spine^{10,11} followed by joints^{12,13}. Long bones are involved less commonly¹⁴.

In Pakistan a few workers have studied bacteriological isolates involved in bone infection including tubercle bacilli reports from Lahore^{15,16}, show 19% incidence of osteomyelitis amongst 262 extrapulmonary cases in 1976 and 4.7% positive yield from 233 cases of non pulmonary tuberculosis in 1988-studies from Rawalpindi did not report TB in 96 cases of osteomyelitis¹⁷. Studies from other cities give data on Afghan refugees^{18,19}.

The study was undertaken to find out osseous tuberculosis in cases of osteomyelitis in Lahore.

MATERIALS AND METHODS

The study was conducted at the Department of Microbiology, Post Graduate Medical Institute, Lahore. One hundred and fifty patients were selected from out patient departments and Orthopaedic wards of Lahore General Hospital, Sir Ganga Ram Hospital, Services Hospital and Mayo Hospital, Lahore.

The patients included were from both sexes and all age groups. One hundred and forty four specimens of pus from bone and four specimens of bone debridement were taken. Two samples from infants were not processed for tuberculosis.

Pus, swabs and homogenized bone curettings were decontaminated with 4% NaOH at 37°C for thirty minutes. Then it was centrifuged for fifteen minutes at 1500g revolutions per minute. The supernatant was discarded and the sediment neutralized by 8% hydrochloric acid. One hundred ul to two hundred ul of deposit was inoculated on two Lowenstein- Jensen slopes, one with glycerol and other with pyruvate. These slopes were incubated aerobically at 37°C, aeriated and checked twice a week. Negative cultures were incubated for eight weeks and then discarded²⁰.

Smears

Smears were made from the sediments of the decontaminated specimens of pus, swabs and

curettings. The slides were stained by the Ziehl-Neelsen method²¹ and examined under oil immersion lens for acid fast bacilli. The acid fast bacilli were seen as red, straight or slightly curved rods. The rest of the structures were seen as blue.

RESULTS

The ages of the 150 patients ranged from 2 to 90 years with the mean age \pm SD 28.73 \pm 16.64 years. There were 105 males and 45 females. Thirteen patients suffered from tuberculous osteomyelitis included 6 males and 7 females (ratio 1:1.1). There were four specimens of bone curettings and 144 of pus. The distribution of tuberculous osteomyelitis cases according to age and bone involved is shown in Table 1. Table 2 shows the hospitals from where these patients were taken. Table 3 gives detail of associated diseases and trauma. The breakup of cases according to monomicrobial and polymicrobial infection is given in Table 4.

The Hb ranged from 6-13.4gms/dl. The ESR was from 30-105 mm fall in 1st hour. The duration of illness ranged from 3 weeks to 25 years. Four patients with backache and paraplegia had the duration of illness of 5 months, 1.5 years, 3 years and 25 years. All the 13 patients were culture positive but none was positive for the Ziehl-Neelsen stained smear.

Table 1: Distribution of tuberculous osteomyelitis cases according to age, sex and bone involved.

Age (Year)	Total	Male	Female	Bones involved			
				Spine	Long Bone	Hand	Feet
<15	4	1	3	2	1	0	1
16-30	5	2	3	1	1	1	2
31-45	4	3	1	0	4	0	0

Table 2: Distribution of tuberculous osteomyelitis cases presenting to the different hospitals.

Hospital	Patient No.	In Patient	OPD
Mayo	5	4	1
SGRH	4	2	2
LGH	2	1	1
Services	2	2	0
Total	13	9	4

Table 3: Associated pathology in patients with tuberculous osteomyelitis.

Disease	Trauma	Foreign Body
Cough \ hemoptysis	4	3
Backache Paraparesis	4	Nil
Nil	7	1
		Bullet
		2
		Nil
		1

DISCUSSION

In the present study osseous tuberculosis was seen in thirteen patients (8.6%) out of 150 cases of

Table 4: *Distribution of tuberculous osteomyelitis cases with concomitant pyogenic infection.*

Male	Female	Total No. of Patients	Mycobacterium Tuberculosis	Staphylococcus Aureus	Enterobacteriaceae.	Anaerobes
2	3	5	+	-	-	-
	1	1	+	+		
3	2	5	+		+	
1		1	+	+	+	
	1	1	+	+		+
6	7					

osteomyelitis. In Pakistan, tuberculous bone infection has been reported amongst tuberculosis of other sites^{15,16,18,22}. Bone involvement was 19% in 262 extrapulmonary sites¹⁵, 4.7% cases in 233 nonpulmonary cases¹⁶ and 50% amongst 48 extrapulmonary sites²². However, studies exclusively on skeletal tuberculosis have been reported at home¹⁹ and abroad^{23,24}.

As shown in Table 1, the age of patients was from 10 months to 45 years compared to 18 months-47 years (mean 26 years) in India²⁴. In the present study four cases belonged to the paediatric group. Studies from Pakistan on tuberculosis reported bone involvement in 6.3% cases in Afghan refugee children¹⁸ whereas 8% paediatric cases were implicated in a London based study²⁵.

There were 6 males and 7 females affected in the present study. Other studies, report 20 males and 5 females in India²⁴ and 34 males versus 46 females in Afghan based Pakistani study¹⁹. An England based study²³ shows a male predominance in the white population but female preponderance in the Indian subcontinent based ethnic group. The duration of illness was 1 month to 25 years in the present study whereas 2-39 months²⁴ and 1 week-3 months²⁶ in other studies.

Any bone may be involved in tuberculous osteomyelitis^{24,27}. Vertebral column is a common site to get tuberculosis^{19,23} but isolation rate from long bones, like the present study, are on the increase²⁸. The metaphysis, epiphysis, or diaphysis can be involved²⁷. In the present study long bones were involved in six (40%) cases. However, any bone²⁴, even flat bones as mandible²⁹, scapula³⁰ may also be infected as isolated lesions. Foot³¹ and hand³² involvement has also been reported. This digital involvement is similar to a case in the study of a young barber in whom the local lesion followed injury incurred by scissors. This teenaged patient was very ill with pulmonary symptoms.

Patients can present with multiple lesions affecting many bony sites simultaneously³³.

Although isolated tuberculous bone lesions have been described but superadded pyogenic infection has rarely been reported^{34,35}. In the present study 5 cases presented with an isolated tuberculous lesion whereas 8 cases had concomitant infection with Enterobacteriaceae, Staphylococcus aureus and anaerobes. An unusual presentation was that of a 40 year old female with 25 years history of backache at the lumbosacral region. This acute pain radiated to the left foot and was accompanied by numbness in the legs and feet. On examination a small sinus at the back of her thigh was seen. It was discharging thick green pus for the past 25 years. Her haemoglobin was 8.6 gm/dl and erythrocyte sedimentation rate 50mm in 1st hour, x-ray left femur revealed changes consistent with chronic osteomyelitis. Myelography revealed a filling defect and a collapsed disc at L5-S1. On aerobic and anaerobic cultures of pus, staphylococcus aureus, peptococcus and acid fast bacilli were isolated.

Six patients had associated local trauma to the bone and eight patients presented with concomitant infection at the same site. Bacteraemias are known to preferably seed the vascular bony tissue and trauma, aids the localization³⁶. Once the pathology of one type of organism is established, the decreased local resistance would enable other type of organisms to set their infective process too. Four patients with the longest duration of illness had vertebral involvement-a favoured common site for TB in absence of trauma, which is more common in limb bone. Three patients (age 15-17 years) underwent repeated curretage of foot without a culture or biopsy being sent to the attached laboratories of the teaching hospitals. Similarly a young girl of the same age group was operated four times but without relief. Ultimately she was sent for bacteriological investigations.

All these patients were strongly suspected of TB on either history, physical signs, laboratory findings, clinical refractoriness to medical therapy and surgical curettage, yet they were mismanaged. None were diagnosed or treated as tuberculosis despite presenting to the four teaching hospitals (Table 2).

In **conclusion** the present study highlights the importance of skeletal tuberculosis in our country. The isolation of *Mycobacterium tuberculosis* alone or with a pyogenic aerobe and/or anaerobe makes it essential to put up a culture on Lowenstein-Jensen slope in all cases of osteomyelitis whether positive or negative for aerobic and anaerobic pyogenic organisms for curative therapy.

REFERENCES

- WHO. Tuberculosis. Fact Sheet No 104. Revised. August 2002. Available from: http://www.who.int/mediacentre/factsheets/who_104/en/
- WHO Report. Global TB Control. Tuberculosis Epidemiological Profile: Pakistan. Latest estimates. November 02, 2004. Available from: <http://WWW.STOPTB.ORG/COUNTRIES/GLOBALLREPORT2005/PAKISTAN..PDF>
- WHO Report. Dawn 2001 June 24.
- WHO Report. TB again on the rise in Pakistan. The News 2002 July 17. Karachi.
- Lipscomb MF. The respiratory system. In: Kumar V, Cotran RS, Robins SL. Basic Pathology. 5th Ed. London: WB Saunders Company, 1992: 385-423.
- Shafer RW, Kirn DS, Weiss JP, Quale JM. Extrapulmonary tuberculosis in patients with human immunodeficiency virus infection. *Medicine* 1991; 70 (6): 384-97.
- Kostman JR, Rush P, Reginato AJ. Granulomatous tophaceous gout mimicking tuberculous tenosynovitis: report of two cases. *Clin Infect Dis* 1995; 21: 217-9.
- Davidson PT, Horowitz I. Skeletal tuberculosis: A review with patient presentations and discussion. *Am J Med* 1970; 48: 77-84.
- Kramer N, Rosenstein ED. Rheumatologic manifestations of TB. *Bulletin on the Rheumatic Dis* 1997; 46: 5-7.
- Perronne C, Saba J, Behloul Z, et al. Pyogenic and tuberculous spondylodyskitis (vertebral osteomyelitis) in 80 adult patients. *Clin Infect Dis* 1994; 19: 746-50.
- Hayes AJ, Choksey M, Bames N, Sparrow OCE. Spinal tuberculosis in developed countries; difficulties in diagnosis. *J R Coll Surg Edinb* 1996; 41: 192-6.
- Lee AS, Campbell JAB, Hofman EB. Tuberculosis of the knee in children. *J Bone Joint Surg Br* 1995; 77B (2): 313-8.
- Campbell JAB, Hofman EB. Tuberculosis of the hip in children. *J Bone Joint Surg [Br]* 1995; 77B (2): 319-26.
- Abdelwahab IF, Kenan S, Hermann G, Lewis M, Klein M, Rabinowitz JG. Atypical skeletal tuberculosis mimicking neoplasm. *Br J Radiol* 1991; 64: 551-5.
- Siddiqi SH, Stauffer JC, Ali MA, Middlebrook G. Some bacteriologic aspects of the epidemiology of pulmonary and extrapulmonary tuberculosis. *Am J Epidemiol* 1976; 103: 101-11.
- Raja SM, Bhatti AH, Mirza MN, Iqbal R. Three years study of culture positive / negative pulmonary and extrapulmonary tuberculosis. *Pak J Med Res* 1988; 27 (4): 294-6.
- Karamat KA, Butt T, Abbas G. Osteomyelitis-prevalence and susceptibility pattern of causative micro-organisms in Rawalpindi / Islamabad area. *Pak J Pathol* 1995; 6 (2): 61-6.
- Qazizada A, Safi M. A study of ICD's tuberculosis control programme in Afghan refugee children at Peshawar. *Pak J Med Sci* 1992; 9 (1): 69-74.
- Shah AA, Ahmed S, Shah H, Raziq F. Bone tuberculosis in Abbottabad. *J PMA* 1992; 42: 180.
- Watt B, Raynar A, Harris G. *Mycobacterium*. In: Colle JG, Fraser AG, Marimon BP, Simmons A (eds). Mackie and McCartney Practical Medical Microbiology. 14th Ed. London: Churchill and Livingstone, 1996; 329-41.
- Cheesbrough M (ed). *Medical Laboratory Manual for Tropical countries*. Volume 11: Microbiology. Cambridge: Butterworth - Heinemann Ltd, 1984: 26-39.
- Mirza F, Khalid M, Saleem N, Aziz A. Role of surgeon in children with tuberculosis. *Journal of Surgery Pakistan* 2002; 7 (1): 14-8.
- Davies PDO, Humphries MJ, Byfield SP, et al. Bone and joint tuberculosis: A survey of notifications in England and Wales. *J Bone Joint Surg* 1984; 66 B: 326-31.
- Vohra R, Kang HS, Dogra S, Saggar RR, Sharma R J. Tuberculous osteomyelitis. *Bone Joint Surg [Br]* 1997; 79 B (4): 562-6.
- Goodyear HM, Moore-Gillon JC, Price EH, Larcher VF, Savage MO, Wood CBS. Mycobacterial infection in an inner city children's hospital. *Arch Dis Child* 1993; 69: 229-31.
- Rasool MN, Govender S, Naidoo KS. Cystic tuberculosis of bone in children. *J Bone Joint Surg [Br]* 1994; 76 B (1): 113-7.
- Rasool MN. Osseous manifestations of tuberculosis in children. *J Paediatr Orthop*. 2001; 21 (6): 749-55.
- Eren A, Atay EF, Omeroglu H, Altintas F. Solitary cystic tuberculosis of long tubular bones in children. *J Paediatr Orthop B*. 2003 Jan; 12 (1): 72-5.
- Fukuda J, Shingo Y, Miyako H. Primary tuberculous osteomyelitis of the mandible: A case report. *Oral Surg Oral Med Oral Pathol*. 1992; 73: 278-80.
- Shannon FB, Moores M, Houkoms JA, Waecker NJ. Multifocal cystic tuberculosis of bone: Report of a case. *J Bone Joint Surg* 1990; 72 A (7): 1089-92.
- Kotevoglou N, Tezer M, Kabukcuoglu F. Tuberculous osteitis of the tarsal bones: a case report. *Acta Orthop Traumatol Turc*. 2003; 37 (1): 84-7.
- Ben Brahim E, Abdelmoula S, Ben Salah B, KUani

- F, Chatti Dey S. Digital tuberculosis revealed by trauma. *Rev Orthop Reparatrice Appar Mot.* 2003; 89 (1): 71-4.
33. Kothari PR, Kumar T, Jiwane A, Kulkarni B, Kagutkar A. Tuberculous osteomyelitis; A bizarre presentation. *Indian J Surg* 2003; 65: 515-6.
34. Sinnott JT, Cancio MR, Frankle MA, Gustke K, Spiegel PJ. Tuberculous osteomyelitis masked by concomitant Staphylococcal infection. *Arch Int Med* 1990; 150: 1865-7.
35. Franco-Par edes C, Blumberg HM. Psoas muscle abscess caused by Mycobacterium tuberculosis and Staphylococcus aureus; a case report and review. *Am J Med Sci* 2001; 321 (6): 415-7.
36. Waldvogel FA, Medoff G, Swartz MN. Osteomyelitis: A review of clinical features, therapeutic considerations and unusual aspects. *N Eng J Med* 1970; 282 (4): 198-206.