Clinical Manifestation of Tuberculous and Pyogenic Spine Infection

BOONSIN BURANAPANITKIT, M.D.*,
APIRADEE LIM, B.Sc.**,
THEERASAN KIRIRATNIKOM, M.D.*

Abstract

The authors compared clinical and baseline parameters between patients with tuberculous spondylitis (67 patients) and pyogenic vertebral osteomyelitis (34 patients). The average age was 50.8 (range, 1 to 82 years). Males were slightly more predominant in both pyogenic and tuberculous infections. Seventy per cent of patients with pyogenic infection had had symptoms for less than 3 months, while this was the case for only 44 per cent of the tuberculous patients. Lumbar spine was the most common site of involvement. Associated infections were more commonly found in tuberculous infection. Thirty per cent of tuberculous spondylitic patients were initially misdiagnosed, while 44 per cent of patients with pyogenic vertebral osteomyelitis had delayed diagnosis. Only 20 per cent and 30 per cent of tuberculous and pyogenic patients had fever, respectively. Neurological deficit occurred more frequently in pyogenic than in tuberculous infection (79% *vs* 59%), while bowel bladder involvement was more commonly found in tuberculous spondylitis. Kyphosis was significantly more common in tuberculosis than in pyogenic infection (50.8% *vs* 26.5%, respectively). Sinus tract formation, subcutaneous abscess formation and positive for SLRT (straight-leg-raising test) were found in only a small percentage of the patients. Duration of symptoms, site, associated infection, kyphosis and neurological deficit could be used for differentiation of spinal infection.

Key word : Clinical Manifestation, Tuberculous and Pyogenic, Spinal Infection

**BURANAPANITKIT B,
LIM A, KIRIRATNIKOM T
J Med Assoc Thai 2001; 84: 1522-1526**

* Department of Orthopaedic Surgery,
** Epidemiology Unit, Faculty of Medicine, Prince of Songkla University, Songkhla 90110, Thailand.

Spinal infection is an uncommon condition compared to other causes of back pain, but it can cause significant morbidity and mortality[1-3]. The causative organisms can be tuberculous, bacterial, viral, fungal or parasitic[4,5]. Tuberculous spondylitis is more common than other causes of spinal infection in our country, however, the incidence of pyogenic vertebral osteomyelitis has been increasingly reported[2,5-9]. Diagnosis of spinal infection is based on both clinical and investigational studies. Clinical presentations are dependent on the causative agent, site, type and severity of the disease [4,10]. Treatment involves antimicrobial drugs and/or surgery. Identification of the organism by either open or closed technique sometimes cannot be done or yields an unsuccessful result. Clinical and baseline data should be used to predict the causes of the disease. To our knowledge, there are no previous reports comparing the demographic and clinical data of tuberculosis spondylitis and pyogenic vertebral osteomyelitis. This study aimed to find the clinical parameters that help to differentiate between tuberculous and pyogenic infection of the spine.

MATERIAL AND METHOD

One hundred and one records of patients diagnosed as tuberculous spondylitis and pyogenic vertebral osteomyelitis in the Department of Orthopaedic Surgery, Prince of Songkla University during the study period 1989 to 1999 were included for analyses. The diagnosis of each disease was basically based on a combination of factors including clinical data, laboratory data, result of culture, pathologic finding and response to treatment. Demographic data regarding duration of symptoms, age, sex, underlying disease, site of involvement, number of vertebral segments and misdiagnosis were reviewed. Clinical parameters including fever, back pain, associated symptoms, tenderness along the spine, neurological deficit, kyphosis, sinus tract formation, positive root tension sign and subcutaneous abscess formation were compared. Baseline laboratory data included for the study were complete blood count and erythrocyte sedimentation rate (ESR). Radiographic study was not included due to the inadequate number of available radiographs.

Statistical Analysis

Descriptive statistics were used. Demographic and clinical data of pyogenic and tuberculosis spondylitis were compared using either Chi-square or Fisher's-exact test.

RESULTS

There were 101 patients included in the study; 67 were tuberculous spondylitis and 34, pyogenic vertebral osteomyelitis. A predilection for the male gender of 1.5:1, was shown for both types of infections. The average age of the patients was 50.8 years (range, 1 to 82 years). Underlying diseases that predisposed to infection were found in 18.5 per cent of tuberculosis and 26.4 per cent of pyogenic infection. The associated infection accompanying tuberculosis occurred in 35.4 per cent while it was only 9 per cent for pyogenic spondylitis. Lumbar spine was the most common site of involvement of both infections. About one-fifth of the patients of both tuberculous and pyogenic spondylitis involved more than one motion segment. The average duration of symptoms was 5.5 months (range, 1 week to 3 years). More patients with duration of symptoms less than 3 months was observed in pyogenic than in tuberculous infection ($p = 0.011$). Misdiagnosis was encountered in 28 per cent of tuberculosis and 44 per cent of pyogenic spondylitis (Table 1).

Of the clinical features, fever was found in only 21 per cent of tuberculous and 38 per cent of pyogenic infection. Associated symptoms such as malaise, nausea, vomiting and weight loss occurred in 23 per cent of the patients. On physical examination, tenderness along the involved spine was the most consistent finding. Kyphosis was more common in tuberculosis than in pyogenic infection. Neurological compromise was encompassed in a high proportion of patients. Bowel-bladder dysfunction was more commonly found in tuberculosis (29% *vs* 12%). There were 2 patients with sinus tract formation. Subcutaneous abscess formation was found in only a small percentage of the patients. Positive root tension sign (SLRT) was demonstrated in 18 per cent of pyogenic infection, in contrast to 5 per cent of tuberculous infection. Leucocytosis was shown in a small number of the patients, while the majority had an increased erythrocyte sedimentation rate (ESR) (Table 2).

DISCUSSION

We found that patients with tuberculosis had a longer duration of symptoms and involvement of the thoracic spine was more common than those

Table 1. Demographic data.

Characteristics	Tuberculosis, number	%	Pyogenic vertebral osteomyelitis, number	%	P-value
Duration					0.011*
≤ 3 mo	29	43.9	24	70.6	
> 3 mo	37	56.1	10	29.4	
Age					0.639
≤ 40 yr	19	30.0	8	24.3	
41-60 yr	21	32.8	14	42.4	
> 60 yr	24	37.2	11	33.3	
Sex					0.693
Male	39	60.0	19	55.9	
Female	26	40.0	15	44.1	
Underlying disease	12	18.5	9	26.5	0.355
Site of involvement					0.001*
Lumber	36	58.1	27	81.8	
Thoracic	26	41.9	4	12.1	
Other	0	0.0	2	6.1	
Number of involvement (motion segment)					0.617
≤ 1	48	77.4	27	81.8	
> 1	14	22.6	6	18.2	
Associated infection	23	35.4	3	8.8	0.004*
Misdiagnosis	19	28.8	15	44.1	0.125

* = Statistically significant.

Table 2. Clinical and laboratory data.

Characteristics	Tuberculosis, number	%	Pyogenic vertebral osteomyelitis, number	%	P-value
Fever	14	21.2	13	38.2	0.069
Associated symptoms	15	23.1	7	20.6	0.777
Tenderness of spine	50	75.8	27	79.4	0.681
Neurological deficit	39	59.1	27	79.4	0.042*
Kyphotic deformity	33	50.8	9	26.5	0.020*
Sinus tract formation	1	1.5	1	2.9	1.000
Positive straight-leg-raising test	3	4.6	6	17.6	0.039
Abscess formation	4	6.1	2	5.9	1.000
Bowel-bladder involvement	19	28.8	4	11.8	0.044
Leucocytosis	14	21.9	10	29.4	0.409
Erythrocyte sedimentation rate > 30 mm/h	44	93.6	28	87.5	0.695

* = Statistically significant.

with pyogenic infection. Kyphosis deformity and bowel-bladder dysfunction were more common in tuberculosis, while positive root tension sign was more commonly found in pyogenic vertebral osteomyelitis. Neither leucocytosis nor the erythrocyte sedimentation rate could be used to differentiate between the two conditions.

Despite a relatively rare incidence of spinal infection, it can cause significant morbidity. In the study, we found that about 60 per cent of tuberculosis and 79 per cent of pyogenic vertebral osteomyelitis had neurological compromise at the initial visit. The relatively high incidence of neurologic deficit compared to other studies might result from the severity of disease or delayed diagnosis. The misdiagnosis of pyogenic vertebral osteomyelitis was more frequent than in tuberculous spondylitis and this might be due to the shorter duration of symptoms and the relatively rare incidence of pyogenic infection.

The site of involvement of the spine was similar to that of most other studies[6,8,11-13]. Most pyogenic vertebral osteomyelitis involved the lumbar area. The infection might be associated with urinary tract infection; however, in our study, the proportion of patients having associated infection was lower than previously reported[6,8]. Thoracic spine involvement is a predilection site for tuberculosis, possibly associated with accompanying pulmonary tuberculosis. Thoracic spine involvement is more commonly found in tuberculosis resulting in an increased proportion of the patients having kyphotic deformity compared to pyogenic vertebral osteomyelitis.

Eighty per cent of the patients in the study had infection in only one motion segment, however, one-fifth of the patients had involvement of more than one motion segment, especially in immunocompromised hosts. This group of patients can be easily misdiagnosed as other conditions such as metastases to the spine. Accompanying pulmonary or renal tuberculosis was found in 35 per cent of the patients with tuberculous spondylitis, which was lower than previously reported[4,10,14]. Associated infection in pyogenic vertebral osteomyelitis such as urinary tract infection was also lower than previously reported[6,9].

Fever was found in only 21 per cent of the patients with tuberculosis and 38 per cent of pyogenic vertebral osteomyelitis. Other symptoms such as weight loss, nausea and vomiting were of little value for differentiation between the two conditions.

Tenderness along the involved spine was a consistent finding in most cases, but other conditions such as metastasis or fracture also need to be differentiated. Kyphotic deformity usually represents the late finding of the disease. Sinus tract formation and subcutaneous abscess formation were rarely found, similar to the results of previous study[14]. Positive root tension sign was noted in 17 per cent of pyogenic vertebral infection.

Baseline laboratory investigation showed that leucocytosis was noted in only a small proportion of the patients, while elevated erythrocyte sedimentation rate (ESR) was found in about 90 per cent of cases, which was similar to most other studies[6,8,9,12,14]. ESR can be used for screening patients suspected of having spinal infection but cannot be used to differentiate between pyogenic and tuberculous infection of the spine.

The clinical implications from the study are that factors such as duration of symptoms, site of involvement, associated infection, kyphotic deformity and positive root tension sign could be used as predictors of pyogenic and tuberculous infection of the spine. However, clinical response and laboratory follow-up are needed.

In conclusion, we have shown that clinical parameters such as duration of symptoms, site of involvement, associated infection, kyphotic deformity and positive root tension might be useful to differentiate between tuberculous spondylitis and pyogenic spinal infection.

(Received for publication on January 29, 2001)

REFERENCES

1. Waldvogel FA, Medoff G, Swartz MN. Osteomyelitis: A review of clinical features, therapeutic considerations and unusual aspects. N Engl J Med 1970; 282: 316-22.
2. Liebergall M, Chaimisky G, Lowe J, Robin GC, Floman Y. Pyogenic vertebral osteomyelitis with paralysis: Prognosis and treatment. Clin Orthop 1991; 269: 142-50.
3. Martin NS. Pott's paraplegia. J Bone Joint Surg 1971; 53B: 596-608.
4. Leong JCY. Pyogenic and tuberculosis infections. In: Weinstein JN, Weisel SW (eds). The Lumbar Spine. Philadelphia: WB Saunder, 1996: 874-98.
5. Calderone RR, Larsen JM. Overview and classification of spinal infections. Orthop Clin North Am 1996; 27: 1-8.
6. Hadjipavlou AG, Mader JT, Necessary JT, Muffoletto AJ. Hematogenous pyogenic spinal infections and their surgical treatment. Spine 2000; 20: 1668-79.
7. Stauffer RN. Pyogenic vertebral osteomyelitis. Orthop Clin North Am 1975; 6: 1015-27.
8. Carragee EJ. Pyogenic vertebral osteomyelitis. J

Bone Joint Surg 1997; 79: 874-80.
9. Torda AJ, Gottlieb T, Bradbury R. Pyogenic vertebral osteomyelitis: Analysis of 20 cases and review. Clin Infect Dis 1995; 20: 320-8.
10. Wood II GW. Infection of spine. In: Crenshaw AH (ed). Campbell's Operative Orthopaedic, 8thed. St Louis: Mosby 1992: 3800-5.
11. Hodgson AR, Stock FE. Anterior spinal fusion for the treatment of tuberculosis of the spine. J Bone Joint Surg 1960; 42A: 295-8.
12. Lifeso RM, Weaver P, Harder EH. Tuberculosis spondylitis in adults. J Bone Joint Surg 1985; 67A: 1405-13.
13. Kemp HBS, Jackson JW, Jeremiah JD, Hall AJ. Pyogenic infection occuring primary in intervertebral disc. J Bone Joint Surg 1973; 55B: 698-714.
14. Adjei OB, Squillante RG. Tuberculosis of the spine. Ortho Clin North Am 1996; 27: 95-103.

อาการแสดงทางคลินิกของโรคกระดูกสันหลังติดเชื้อจากวัณโรคและเชื้อหนอง

บุญสิน บูรณะพาณิชย์กิจ, พ.บ.,*
*อภิรดี ลิ่ม, วท.บ.**, ธีรสาส์น คีรีรัฐนิคม, พ.บ.**

คณะผู้ศึกษาได้ศึกษาเปรียบเทียบตัวชี้วัดทางคลินิกระหว่างผู้ป่วยกระดูกสันหลังติดเชื้อวัณโรค (tuberculous spondylitis) 67 ราย และจากเชื้อหนอง (pyogenic vertebral osteomyelitis) 34 ราย ผู้ป่วยอายุเฉลี่ย 50 ปี (1 ถึง 82 ปี) เพศชายพบมากกว่าเพศหญิง ร้อยละ 70 ของผู้ป่วยกระดูกสันหลังติดเชื้อหนองมีอาการทางคลินิกน้อยกว่า 3 เดือน ก่อนพบแพทย์ ขณะที่พบเพียงร้อยละ 44 ในผู้ป่วยวัณโรคกระดูกสันหลัง กระดูกสันหลังส่วนเอวเป็นบริเวณที่พบการติดเชื้อมากที่สุด ผู้ป่วยร้อยละ 30 และ 44 จากการติดเชื้อวัณโรคและเชื้อหนองได้รับการวินิจฉัยผิดพลาด ผู้ป่วยกระดูกสันหลังติดเชื้อตรวจพบมีไข้เพียงร้อยละ 20-30 ร้อยละ 75 และ 59 ของผู้ป่วยติดเชื้อวัณโรคและเชื้อหนองของกระดูกสันหลัง ตรวจพบการกดทับไขสันหลังหรือเส้นประสาท ภาวะกระดูกสันหลังค่อม (kyphosis) พบได้บ่อยในการติดเชื้อจากวัณโรค รูหนอง (sinus tract) หนองบริเวณใต้ผิวหนัง (subcutaneous abscess) การตรวจพบ straight-leg-raising พบได้ไม่บ่อยในการติดเชื้อกระดูกสันหลัง ปัจจัยระยะเวลาอาการแสดงทางคลินิก การติดเชื้อร่วม (associated infection) ภาวะกระดูกสันหลังค่อมและอาการผิดปกติของระบบประสาท (neurological deficit) สามารถช่วยแยกเชื้อก่อโรคระหว่างวัณโรคและเชื้อหนองในการติดเชื้อกระดูกสันหลังได้

คำสำคัญ : อาการทางคลินิก, กระดูกสันหลังติดเชื้อวัณโรคและเชื้อหนอง

บุญสิน บูรณะพาณิชย์กิจ, อภิรดี ลิ่ม, ธีรสาส์น คีรีรัฐนิคม
จดหมายเหตุทางแพทย์ ฯ 2544; 84: 1522-1526

* ภาควิชาศัลยศาสตร์ออร์โธปิดิกส์,
** หน่วยระบาดวิทยา, คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์, สงขลา 90110