ORIGINAL ARTICLE

Neurological outcome after anterior decompression and stabilization with cage in thoracolumbar caries spine

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Abstract

Background: Tuberculous spondylitis being endemic in developing countries including Pakistan has considerable socio-economic and orthopaedic concern. In spite of all the advances regarding diagnosis, treatment and total control of many diseases, this slow but grave disease still affects considerable number of cases and makes them disabled and even paralyzed. The objective of the study was to determine the neurological outcome in terms of Frankel Scale after anterior decompression and stabilization with titanium mesh cage in thoracolumbar caries spine.

Methodology: The case series (descriptive) study was conducted in Orthopaedic ward of Ghurki Trust Teaching Hospital/Lahore Medical & Dental College, Lahore from 1st Jan. 2015 to 31st Dec. to 2015. In this randomized controlled trial of 150 patients who were admitted either through OPD or through emergency. Data was collected by using non-probability consective sampling technique. Patient was prepared for surgery. A locally made fixed interbody Titanium Mesh Cage, with packed bone graft, was placed. A Boston brace was applied for at least 6 months to provide external support to spine. The neurological outcome was assessed in terms of Frankel Scale post-operatively at the end of one month, 6 months and 12 months.

Results: In our study, out of 150 cases, 42% (n=63) were between 15-30 years of age while 58% (n=87) were between 31-60 years of age, mean+sd was calculated as 32.85±8.35 years, 45.33% (n=68) were male and 54.67% (n=82) were females. Frequency of neurological outcome regarding improvement was recorded as 52% (n=78).

Conclusion: We concluded that the neurological outcome in terms of Frankel Scale after anterior decompression and stabilization with titanium mesh cage in thoracolumbar caries spine is good and this technique may be used in future in our population.

Key words: Tuberculous spondylitis, caries spine, anterior decompression, titanium mesh cage, neurological outcome, boston brace, Frankel Scale, neurological outcome

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Introduction

Tuberculosis is the world's leading cause of death. Globally, Pakistan is ranked 8th amongst the most burdened countries with an incidence of 181 per 100,000 population. It is an endemic, chronic infection, commonly caused by Mycobacterium Tuberculosis. Despite the adequate control of pulmonary tuberculosis, the incidence of musculoskeletal tuberculosis is increasing.[1]

Vertebral tuberculosis is the most common form of skeletal tuberculosis, and constitutes about 50% of all cases of skeletal tuberculosis.[2] According to World Health Organization, tuberculosis has become the world's most dreadful infectious disease, killing nearly three million people per year.[3,4] Each year there are eight million new cases of tuberculosis and 50% of them are infectious.[5] Loss of sagittal balance resulting from vertebral infection and appearance of the kyphotic deformity is a major reason which has led surgeons to restore or prevent kyphosis with surgical treatment alternatives.

Treatment of tuberculous infection of spine is essentially medical and operative intervention is indicated for complications. Surgical decom-

pression and stabilization is contemplated in few patients to prevent/treat complications such as kyphosis, neurological deterioration, epidural abscess arising as a result of the disease or where conservative treatment fails.[5] Approach for surgical treatment of thoracolumbar tuberculosis is always controversial. The goals of surgery in Pott's spine are adequate decompression, adequate debridement, maintenance and reinforcement of stability and correction and prevention of deformity. Traditionally, the anterior approach has been preferred through all segment of spine to achieve these goals because the pathology of tuberculosis mainly affects the vertebral bodies and disc spaces, and the anterior approach allows direct access to the infected focus and is convenient for debriding infection and reconstructing the defect.[6] The use of a titanium mesh cage is more secure, accurate, and dependable deformity correction. The cage provides a more rigid fixation construct and minimizes the risk of graft failure.[7,8]

Garg B, et al while studying neurological outcome using anterior and posterior approach for treatment of tuberculosis in terms of Frankel Scale found that out of 18 Frankel C patients in anterior approach group, 10 patients improved to Frankel E.[8-10]

The outcomes of this modern approach of anterior debridement and stabilization with Cage has been studied in other parts of world but data in Pakistan is scarce. Moreover, our population has different demographics, nutritional and living status and the burden of disease is much more than expected so, if the results of my study are good, use of anterior approach may be recommended with its consequent advantages.

Material and Methods:

The study was conducted in Orthopaedic ward of Ghurki Trust Teaching Hospital / Lahore Medical & Dental College, Lahore from 1st Jan 2015 to 31st Dec. 2015. A total of 150 cases is calculated as non probability consecutive sampling with 80% power of test and 8% significance level. Improvement in neurological status from Frankel C to Frankel E to be 55.5%.13 All patients between 15 – 60 years of age of both sexes with no previous spinal surgery having single level of thoracolumbar spinal tuberculosis from D7-L5 vertebrae clinically and radiologically proven were included, having neurological status of Frankel C in Frankel Scale and in whom the conservative treatment failed to respond for 3 months. The patients with clinical and radiological proven caries of cervical and upper segments of thoracic spine, congenital spine deformity, multiple level disease and different types of myopathies were excluded from the study. All patients who sought consultation at Ghurki Trust Teaching Hospital OPD, who qualify the inclusion criteria were included in the study. Written informed consent was taken. Patient was prepared for surgery. After induction of general anesthesia, patient was placed in left lateral position, anterolateral approach was used then vertebral resection & pus drainage was done. A locally made fixed interbody Titanium Mesh Cage, with packed bone graft, was placed. The surgically removed tissue was sent for biopsy, culture sensitivity and for Acid Fast Bacilli. Post operative radiograph anteropostrerior and lateral views were taken to check and record the position of the cage. Patients stayed in the hospital for pain control and rehabilitation. A Boston brace was applied for at least 6 months to provide external support to spine. All procedures were carried out by the senior consultant and followed by researcher. The neurological outcome was assessed in terms of Frankel Scale(table 1) post-operatively at the end of 1,6 and 12th month.

The collected data was entered in SPSS 17.0 version and analyzed accordingly. The variables analyzed included age, gender, and improvement in neurological outcome by Frankel Impairment Scale. The quantitative variables like age were calculated using mean and standard deviations. Frequency and percentage was used for qualitative data like sex and improvement in neurological outcome. Data was stratified for age, gender, duration of disease, BMI and economic status. Chi-square test was applied post-stratification with P-value < 0.05 considered as significant.

Table 1: Franken's Criteria

	Classification	Characteristics
a	Complete	Complete neurological injury - no motor or sensory function
b	Incomplete	Preserved sensation only - no motor function clinically
c	Incomplete	Preserved motor non-functional
d	Incomplete	Preserved motor function
e	Normal	Normal motor -

Table 2: Demographics characteristics of patients

	Frequency (%)
Age in years	
15-30	63(42%)
31-60	87(58%)
Sex	
Male	68(45.33%)
Female	82(54.67%)
BMI	
≤30kg/m2	121(80.67%)
>30kg/m2	29(19.33%)
Socio-Econimic status	
Low	47(31.33%)
Middle	71(47.33%)
High	32(21.34%)
Duration of disease	
<6 months	137(91.33%)
>6 months	13(8.67%)

Table 3: Frequency of Neurological outcome with regards to age

	Improvement		P-value
	Yes	No	
Age in Years			
15-30	30	33	0.35
31-60	48	39	
Gender			
Male	31	37	0.15
Female	47	35	
Duration of disease			
<6 months	69	68	0.19
>6 months	9	4	

Results:

A total of 150 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the neurological outcome in terms of Frankel Scale after anterior decompression and stabilization with titanium mesh cage in thoracolumbar caries spine. Age distribution of the patients was done showing that 42% (n=63) were between 15-30 years of age while 58% (n=87) were between 31-60 years of age, mean±sd was calculated as 32.85±8.35 years. Patients were distributed according to gender showing that 45.33% (n=68) were male and 54.67% (n=82) were females. Frequency of neurological outcome regarding improvement was recorded as 52% (n=78) while 48% (n=72) had no findings of improvement(according to operational definition of our study). Body mass index of the patients showing that 80.67% (n=121) had ≤30 kg/m2 while 19.33% (n=29) had >30 kg/m2.

Frequency of economic status of the patients showing 31.33% (n=47) had low economic status, 47.33% (n=71) were middle class and 21.34% (n=32) were of high class. Duration of disease of the patients was recorded as 91.33% (n=137) between 1-6 months while 8.67% (n=13) had >6 months of duration of disease. (Table No.2). Stratification for frequency of neurological outcome with regards to age, gender, duration of disease, body mass index and economic status are recorded and presented in (Table 3)

Discussion:

Controversy exists regarding approach for the management of thoraco-lumbar tuberculosis. Adequate decompression is considered as the main goal in Pott's spine. Conventionally, anterior approach is likely to be preferred throughout the spine for achieving the goals due to the fact that vertebral bodies and disc spaces are affected by pathology of tuberculosis while this approach allows direct access to infected area and easy for debriding infection.

We planned this study with the view that the outcome of modern approach of anterior debridement and stabilization with Cage has been studied in other parts of world but data in Pakistan is scarce. Moreover, our population has different demographics, nutritional and living status and the burden of disease is much more than expected so, the results of the study may be helpful for recommending this approach, if it was found with better outcome.

In our study, out of 150 cases, 42% (n=63) were between 15-30 years of age while 58% (n=87) were between 31-60 years of age, mean±sd was calculated as 32.85±8.35 years, 45.33% (n=68) were male and 54.67% (n=82) were females. Frequency of neurological outcome regarding improvement was recorded as 52% (n=78).

The findings of our study are in agreement with a previous study by Garg B, et al who studied neurological outcome using anterior and posterior approach for treatment of tuberculosis in terms of Frankel Scale found that out of 18 Frankel C patients in anterior approach group, 10 patients improved to Frankel E and recorded improvement in neurological status from Frankel C to Frankel E to be 55.5%.[10]

Various studies[11-16] have demonstrated that treatment of active tuberculosis spondylitis with anterior instrumentation along with anterior debridement and fusion provides a high and effective rate of deformity correction and maintenance. However, there may be associated lung scarring secondary to old/active pulmonary tuberculosis, which may preclude the anterior approach. Anterior instrumentation is usually appropriate to prevent deterioration of the kyphus during treatment.

Korovessis P and others[17] evaluated the outcome in-patients with pyogenic spondylitis of the thoracolumbar spine following combined anterior and posterior approach. They concluded that patients with thoracolumbar osteomyelitis can successfully undergo anterior approach surgery with insertion of titanium mesh cage and posterior instrumented fusion performed sequentially on the same day under one anesthesia. The presence of the mesh cage anteriorly at the site of spondylitis had no negative influence on the course of infection healing, and additionally it stabilized the affected segment maintaining sufficient sagittal profile.

Regarding the use of mesh cage, a study[18] assessed the efficacy of titanium mesh cages in the treatment of active vertebral osteomyelitis and concluded that the use of titanium mesh cages in the treatment of vertebral osteomyelitis effectively reconstructs the anterior column, while adding stability and restoring the sagittal profile. There is no increase in the rate of recurrence or persistence of infection related to the implantation of titanium mesh cages.

In our study, we stratified our data for age, gender, body mass index and economic status and recorded that these effect modifiers had no effect on the results of the study regarding neurological outcome which shows that this procedure can be performed in any group of age, gender, body mass index and economic status.

Though, our population has different demographics, nutritional and living status and the burden of disease is much more than expected, however, the results of our study are good and the use of anterior approach is recommended with its consequent advantages.

Conclusion:
We concluded that the neurological outcome in terms of Frankel Scale after anterior decompression and stabilization with titanium mesh cage in thoracolumbar caries spine is good and this technique may be used in future in our population.

Conflict of Interest: None

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Role and contribution of authors:
Dr Ejaz Ahmad, MBBS, FCPS(1), Resident Orthopaedic Surgeon collected the data and helped in introduction writing

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Prof Dr Shahzad Javed, MBBS, FCPS, critically review the article and made the final correction of the article.

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