ORIGINAL ARTICLE

Anterior Reconstruction Using Titanium Mesh Cage in Dorso-Lumbar Tuberculosis Spine

ABDUL HAMEED, NAVEED ASHRAF, MUHAMMAD AKMAL

ABSTRACT

Tuberculosis of the spine is one of the oldest diseases afflicting humans. Evidences of spinal tuberculosis have been found in Egyptian mummies dating back to 3400 BC1. The descriptions in Rigveda, Atharvaveda and Charak Samhita are the oldest known texts in the world literature relating to this disease. Tuberculosis was a leading cause of mortality in the beginning of the twentieth century. Improvement in the socio-economic status led to a major decline in the prevalence even before the introduction of antituberculous drugs. However, it continues to be a major public health problem in developing countries. Malnutrition, poor sanitation, and exanthematous fever are the factors contributing to the spread of the disease. surgical treatment of the caries spine is very controversial . 25 cases of thoraco-lumbar and lumbar carries spine were included in our study. Males were less than the females. Dorsal spine was affected the most .All the patients were given anti tuberculous drugs for 18 months and anterior fixation of the spine achieved by titanium mesh cage filled with bone and fixed with titanium DC plate over it. All the patients recovered well. Titanium mesh cage fixation after proper decompression and fixation proved very beneficial to the patient in relieving pain and getting early mobilization.

Key words: TMC titanium mesh cage, TB tuberculosis

INTRODUCTION

Spinal tuberculosis was first described by Percival Pott in 1799 [1]. Neolithic skeleton found in Arene Candide cave (Liguria, Italy) represent one of the earliest cases of this disease lesion localized to the lower thoracic and upper lumbar vertebral bodies[2].

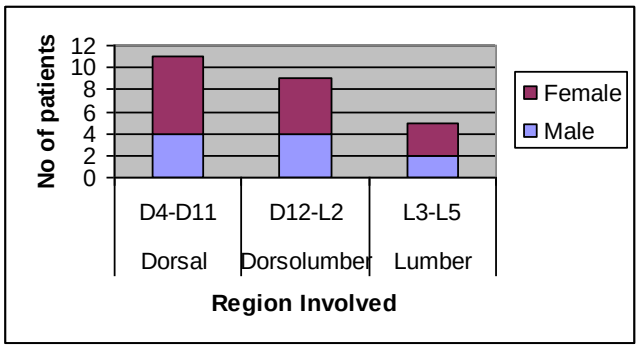
There is rebirth of T.B in both developing and developed countries and that of resistant type because of non adherence and invasion by HIV. An estimated 2 million or more patients have active spinal T.B. and the global incidence of disease is increasing. Majority of the T.B population is still in developing countries with almost 50% having spinal lesions[3]. Neurological deficits are reported in 10% to 60% of cases with spinal T.B and change in bowl and bladder functions.

Pharmacological treatment of T.B has favorable results if started early. Surgical approach is required in cases of an epidural abscess, neurological deficit and instability due to structural destruction [4, 5]. Surgical prerequisites are debridement with extensive resection of the infected vertebrae and stabilization requiring reconstruction of anterior columns as compressing element is usually lies anteriorly with or without implants[4,5,6,7]. The efficacy and safety of the implant in infectious spinal disease is not known. There are many reports which inhibit the use of metal implants in spinal infections because infectious agent colonize on the metal surface and form biofilms. These biofilms increase the chance of infection recurrence and prolong infection control[8,9,10].

Various autogeneous bone grafts have been used for anterior reconstruction and found safe.[11, 12, 13, 14, 16] Recently Titanium Mesh Cages have been used for anterior column reconstruction.[11, 16] In this study we are reporting our experience with Titanium Mesh Cages when used for anterior column reconstruction in Tuberculosis Spondylitis.

MATERIAL AND METHODS

Study design: Retrospective study
Sample size: 25 Patients
Gender distribution: 11 male and 14 females
Sampling technique: Purposive sampling



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Region of spine involved	Region involved	Male	Female
Dorsal	D4 – D11	4	7
Dorsolumbar	D12 - L2	4	5
Lumbar	L3 - L5	2	3

Indications of Surgical Intervention

- Epidural Abscess.
- Neurological Deficit due to neural element compression.
- Structural destruction resulting in instability.

Outcome Assessment: Outcome was assessed by following parameters

- Neurological status improvement by Motor Index
- Pain subsidence by Huskisson`s VAS (Visual Analog Scale)
- Osseous Reunion was identified by clinical and radiological outcome at 1 year follow up.

Surgical Procedure: Anterior Corpectomy followed by reconstruction with Titanium Mesh Cage was done. Thoracotomy was done for thoracic lesions and retroperitoneal approach was done for lumbar region lesions. Infected bone and discs were extensively removed till the normal bone exposed. Decompression of the neural element was the primary goal along with structural reconstructions for correcting deformity and providing stability. In cases with Paravertebral pus pockets, pus was drained and irrigation was done with copious amount of saline. After the affected vertebral body resection and pus drainage, Titanium Mesh Cage with morselized bone graft from iliac crest was inserted. ATT was given for 18 months. ATT regimen was as follows

Isoniazid: 5mg/kg/day; max 300mg/day
Rifampin: 10mg/kg/day; max 600mg/day
Ethambutol: 25mg/kg/day; max 2.5g/day
Pyrazinamide: 25mg/kg/day; max2g/day

RESULTS

There were 25 patients including 11 males (44%) and 14 females (56%).11 patients (44%) had lesion in the dorsal region, 9 patients (36%) at thoracolumbar junction, 5 patients (20%) in lumbar region.

Preoperative status was as follows; 11 patients (44%) were neurologically intact preoperatively, 4 patients (16%) with motor power 4/5 , 7 patients (28%) with motor power 3/5, 2 patients (8%)with motor power 2/5and there was 1 patient (4%) with motor power 1/5.

There was no intraoperative complication with the use of Titanium Mesh cage. Postoperatively Motor power index improved from 4/5 to 5/5 in 4 patients (16%), from 3/5 to 5/5 in 5 patients (20%), from 3/5 to 4/5 in 2 patients (8%), from 2/5 to 4/5 in 2 patients (8%) and from 1/5 to 3/5 in 1 patient (4%). Pain was subsided in all cases from VAS average 83 to 11.

Postoperative complications included wound infection in 3 Patients (12%) and bed sores in 4 patients (16%) which were treated with extended regimen Antibiotics without any serious consequences. All patients showed definite improvement in their symptoms. Osseous union on a clinical and imaginary basis was achieved in all 15 cases available at final follow up of 18 months. ESR remained high until four weeks after surgery then dropped slowly over long time.

DISCUSSION

Although patients with spinal Tuberculosis constitute a major bulk of both Neurosurgery and Orthopedic department but it is just the tip of the iceberg. The actual number of patients affected is much more. Patients seek medical care after some neurological deficit or some structural deformity, leaving surgical management as the only choice. Prerequisites of spinal surgery are for carries spine are the removal of pus as well as necrotic bone and tissue debridement, neural decompression , deformity correction and stabilization of the affected spinal segments[4,5,6,7]. Stabilization can be done with the help of bone graft [11, 12, 13, 14, 16] or with instrumentation using metal implants[11,15]. Although instrumentation is required for deformity correction and stabilization, many arguments have been disputed regarding the use of instrumentation. In patients requiring surgical intervention, use of instrumentation should be justified against the structural stability and deformity correction provided by the instrumentation and the increased chance of infection by the presence of foreign material in the area which may diminish the effects of infection eradication. In other words instrumentation offers the theoretical advantage of deformity correction and stability but has also been closely related with an increased of infection, although this notion has been challenged by some results[12,13,17].

Titanium Mesh cage with bone grafts is better than structural bone graft alone as it provides more secure and accurate stability and deformity correction. It is more dependable as compared to bone graft alone.[11, 13, 15, 19] Cage provides a fixation which is more rigid and there is also less risk of graft subsidence or dislodgement, that are well-documented complications when structural bone graft only is used.[1, 5, 18] Cages with bone also provide stability to enable earlier and safer mobilization[13].

In our study, all the patients showed definite improvement of kyphosis without infection recurrence.

Oga et al[20] studied the risk of persistence and recurrence of infection in posterior spinal instrumentation surgery for spinal tuberculosis in eleven patients. They operated the patients with debridement, anterior fusion, and combined posterior instrumentation. There was no case of persistence or recurrence of infection after surgery, and they found that instrumentation provided immediate stability and protected against development of kyphotic deformity. The adherence property of Mycobacterium tuberculosis to stainless steel was evaluated experimentally also. They found that little Mycobacterium tuberculosis adhered to stainless steel while Staphylococcus heavily colonized stainless steel. They concluded that posterior instrumentation surgery was not a hazard to a spinal TB when it is combined with radical debridement and intensive anti-tuberculosis chemotherapy.

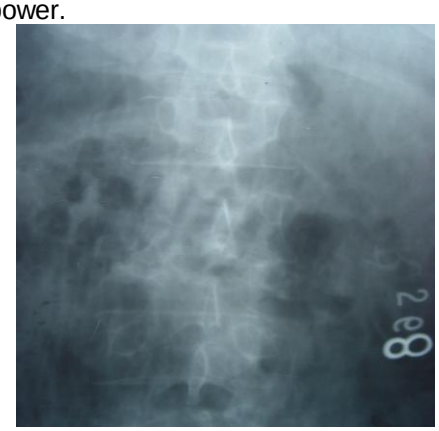
He et al[21] evaluated the differences in adherence and biofilms formation between Staphylococcus epidermidis and Mycobacterium Tuberculosis on various spinal implant surfaces. They found that Staphylococcus epidermidis heavily colonized on the metal rod and form thick biofilms, while Mycobacterium tuberculosis ,rarely adhered to metal surfaces and showed scanty biofilms formation. Many experimental studies suggest Mycobacterium tuberculosis, unlike bacteria, has low adherence to stainless steel and forms less polysaccharide biofilms.[20] Therefore the use of implants is theoretically safe in the presence of spinal TB.

There were few studies about Titanium alloys and Mycobacterium tuberculosis. Solutions et al[22] reported that titanium alloys, in general, showed relatively friendly toward the host bone and had lower infection risk. On the other hand, Mycobacterium tuberculosis has low adherence properties to stainless steel, but its behavior towards Titanium has not been studied yet. Our study suggested Mycobacterium tuberculosis may behave towards titanium implants in a similar fashion as towards stainless steel implants.

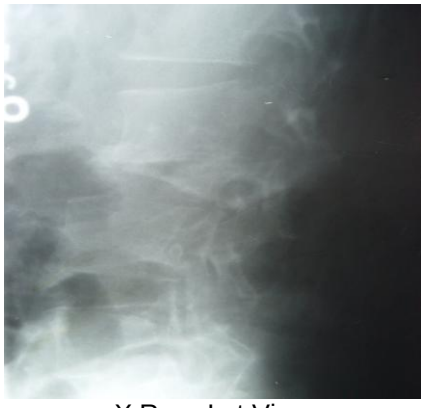
In regard to the Neurological status improvement all the patients showed an improved status.11 patients were neurologically intact who remained same, while 9 patients out of the rest 14 become ambulatory post operatively. Sphincter function and sensations improved. So we assume that anterior fixation provides increased stability and lead to favorable environment for infection control, and solid fusion.

CONCLUSION

Titanium Mesh Cage is an effective device for anterior column reconstruction in spinal T.B.[11, 13, 15, 19] It helps in restoring and maintaining sagital plane alignment after wider resection of infected bone without the fear of instability.[11, 15] Furthermore use of TMC has proved to be not associated with increased chance of infection recurrence.[20, 21, 22] In our study the decompression and stabilization provided by TMC has helped immensely in reducing pain and providing early mobilization with improvement in motor power.



X Rays AP view Carries L2,3



X Rays Lat View

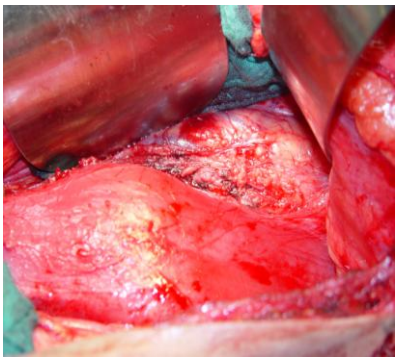
MRI Lumbar Spine T2 Carries L2,3

MRI Lumbar spine T1

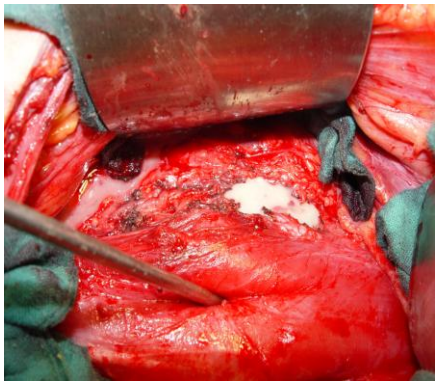
MRI Lumbar spine Axial Sections

Position

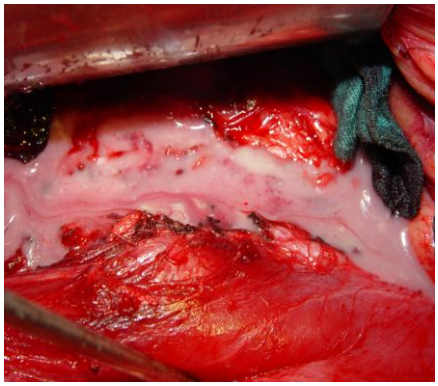
Peroperative



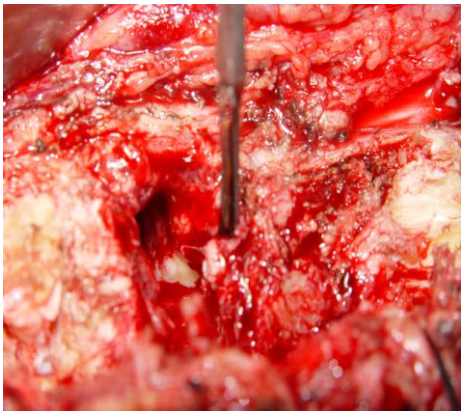
Swollen Psoas Muscle



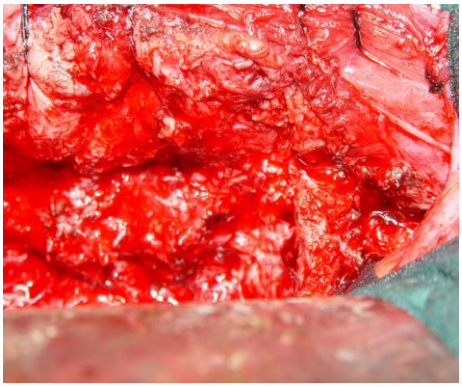
Psoas Abscess



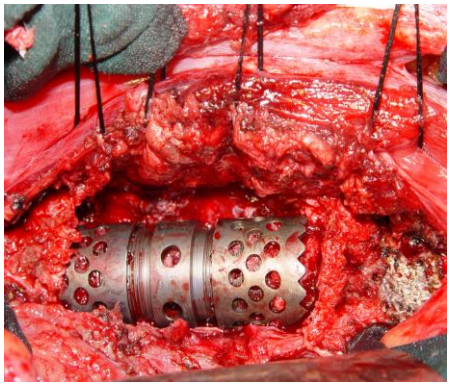
Psoas Abscess



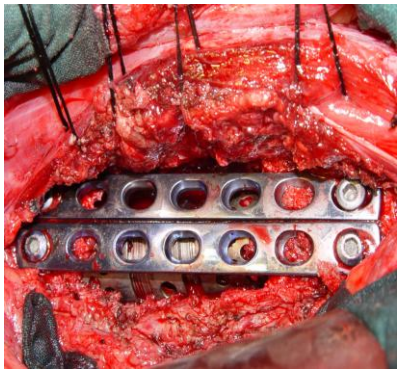
Affected Body of Vertebra



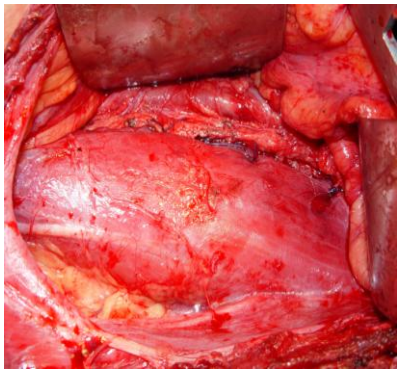
Bed after Corpectomy



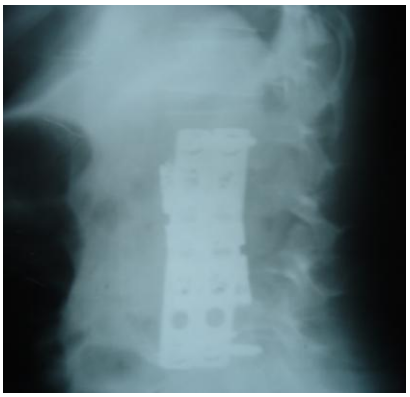
Cage placed at site



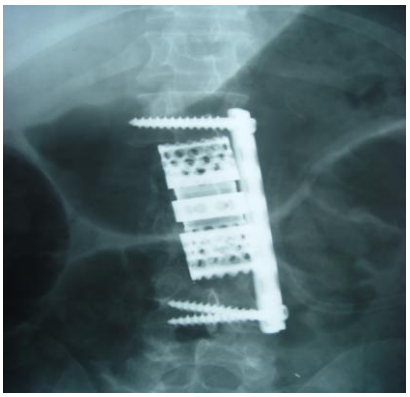
Cage fixed with Titanium Plates



Restitched Psoas



Post Op X Rays



Post Op lateral view

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