

MINIMALLY INVASIVE STABILIZATION OF AN UNSTABLE MULTI-LEVEL THORACIC GIBBUS IN MULTI-LEVEL CONTIGUOUS SPINAL TUBERCULOSIS: A CASE REPORT

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ABSTRACT

Tuberculosis (TB) is a disease of poverty with a global concentration in sub Saharan Africa. While 10% of extra-pulmonary tuberculosis is skeletal, 50% of this occurs in the spinal column. Multi-level spinal TB is however a rarity, especially in the HIV negative population. Besides the medical management of this condition which decades ago revolutionized the treatment of these patients, spinal surgeons must today still decide on the best way to manage the challenges of instability, deformity and the often large cold abscesses that accompany this condition. We present an immunocompetent male patient who presented to our unit complaining of mild chronic mid-thoracic axial backache. Despite these minor symptoms our investigations revealed extensive tuberculous destruction of his entire thoracic spine with unstable pathological compression fractures of the T5 and T6 vertebral bodies, and a large pre-vertebral tubercular abscess. To definitively address each problem, we performed minimally invasive transthoracic thoracoscopic drainage of the pre-vertebral tubercular abscess and transthoracic thoracoscopic T5 and T6 corpectomies and cage reconstruction in the same surgery. At a second surgery 3 days later a T2-T8 posterior instrumented surgery was performed to afford a 360-degree stabilization and fusion. Post operatively the patient was braced to assist healing. The patient had immediate improvement in his symptoms and was discharged in a brace, fully ambulant, on anti-tuberculosis treatment, for out-patient follow-up. At his 2-year follow-up he was doing well and follow-up thoracic spine X-rays revealed no progression of his deformity. In conclusion patients with unstable spinal tuberculosis can gain more benefit from a minimally invasive anterior approach which avoids the morbidity of thoracotomy rather than an open surgical approach.

Key words: Minimally invasive surgery, Spinal tuberculosis, Transthoracic thoracoscopic surgery

INTRODUCTION

Tuberculosis (TB) is a disease of poverty with a global concentration in sub Saharan Africa. While 10% of extra-pulmonary tuberculosis is skeletal, 50% of this occurs in the spinal column. Multi-level spinal TB is however a rarity, especially in the HIV negative population (1,2). Besides the medical management of this condition which decades ago revolutionized the treatment of these patients, spinal surgeons must today still decide on the best way to manage the challenges of myelopathy, instability, deformity and the often-large cold abscesses that accompany this condition. The large conventional open procedures for this condition which include thoracotomy and its trans pleural or extra pleural corridors, lateral extra cavitary and the

costotransversectomy are all extensive and carry with them inherent morbidity. In contrast significant benefit is being seen in minimally invasive approaches to this condition (3). We present an immunocompetent male patient who presented to our unit with tuberculous involvement of almost his entire thoracic spine. We successfully managed him minimally invasively saving him the morbidity of the more extensive approaches.

CASE REPORT

A 30-year-old male presented to our unit complaining of progressive mid-thoracic axial backache of more than six months duration. He also complained of intermittent paresthesias in both his legs of two months duration with no associated weakness. On further

questioning he confirmed that he had been losing weight and suffering from night sweats for several months. He denied having had TB before and had no TB exposure. Clinical examination revealed a healthy young male with no stigmata of immunosuppression. He had a mid-thoracic gibbus deformity at the T5/T6 level with slight midline tenderness but no defect palpable (Figure 1).

Figure 1

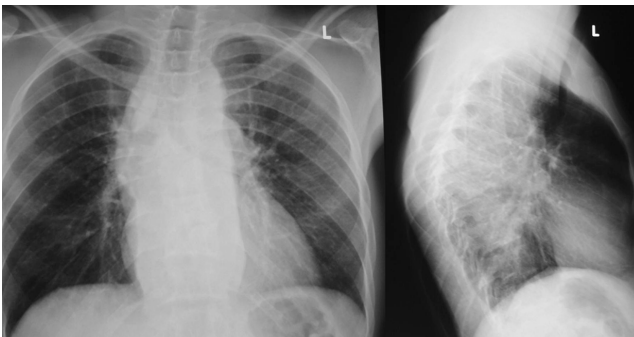
Pre-operative photo of the patient: Showing him comfortably standing without assistance and on the lateral photograph the mid-thoracic gibbus is appreciated. The subtle swelling of a subcutaneous collection is visible on the left-hand side at the mid-thoracic level



The motor and sensory examinations of his lower limbs were normal. His gait was also normal. He was tested and found to be HIV negative and had no other medical problem. A chest X-ray was performed which excluded obvious pulmonary TB although a large central mediastinal mass was clearly evident (Figure 2).

Figure 2

Antero-posterior chest X-ray and lateral chest X-ray: Showed no obvious evidence of apical changes associated with pulmonary tuberculosis. The large mediastinal shadow of a cold abscess is clearly visible. On the lateral CXR the T5 gibbus is visible



A CT of his spine was performed which confirmed the mediastinal mass to be a large pre-vertebral abscess and furthermore showed extensive osteolysis of almost his entire thoracic spine with severe compression fractures of the T5 and T6 vertebral bodies and an acute kyphotic deformity at this level (Figures 3, 4).

Figure 3

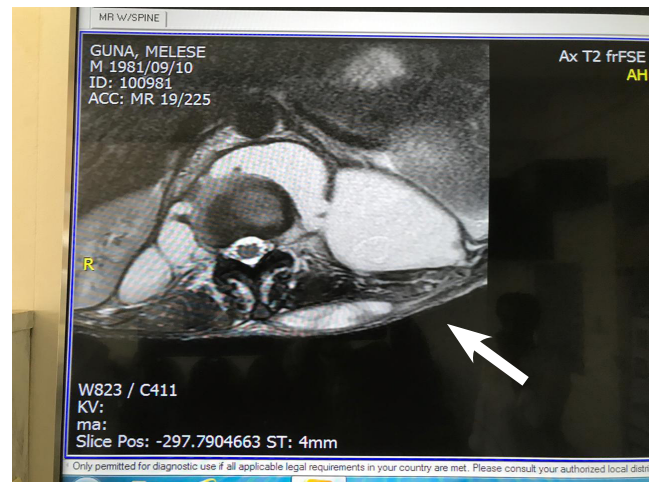
Sagittal CT thoracic spine: Showing multi-level contiguous spinal tuberculosis with involvement of the entire thoracic spine and an 80 degree collapse of the T5 and T6 vertebral bodies



An MRI was performed which excluded cord compression and revealed the extent of the paravertebral abscess which had insinuated posteriorly between the muscles of the back (Figure 4).

Figure 4

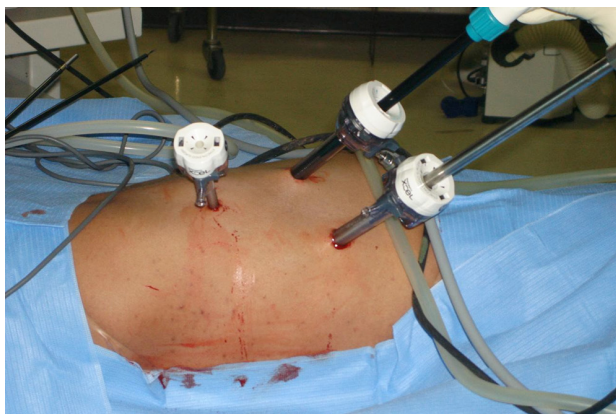
Axial MRI T2W excluded cord compression and showed the extent of tubercular abscess which had insinuated between the muscles of the back



The patient was taken for a transthoracic thoracoscopic drainage of the large pre-vertebral abscess and transthoracic thoracoscopic T5 and T6 corpectomies and cage reconstruction. A double lumen endotracheal tube was placed by anaesthesiology whereby the right lung could be deflated intra-operatively. The patient was placed in the left lateral position and cardiothoracic surgery placed the portals facilitating thoracoscopic access to the T5 and T6 vertebral bodies (Figure 5).

Figure 5

Intra-operative photo: Showing the patient in the lateral decubitus positioned the thoracoscopic ports in place



We then proceeded to do a transthoracic thoracoscopic drainage of the pre-vertebral abscess from which thick caseous material was drained (Figures 6, 7).

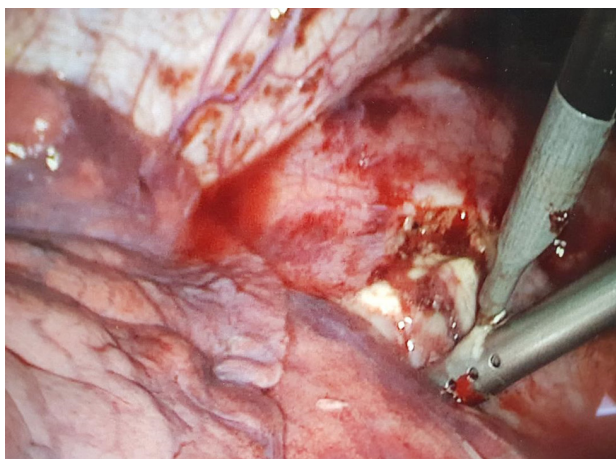
Figure 6

Intra-operative thoracoscopic photo: Showing large pre-vertebral cold abscess distending parietal pleura



Figure 7

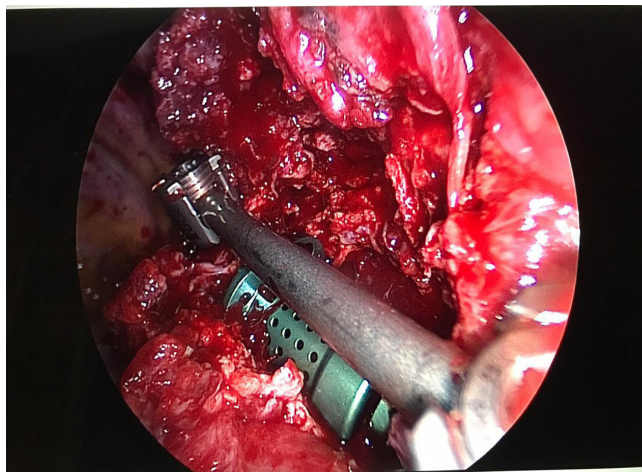
Intra-operative thoracoscopic photo: showing caseous material draining from the cold abscess



We then proceeded to do transthoracic thoracoscopic T5 and T6 corpectomies and cage reconstruction and augmented the construct with a lateral rod (Figure 8).

Figure 8

Intra-operative thoracoscopic photo: Showing thoracoscopic T5 and T6 cage reconstruction augmented with a lateral rod once the T5 and T6 corpectomies had been performed



The soft tissue abscess on the patient's back was also drained and 300ml of pus was removed (Figure 9).

Figure 9

Intra-operative photo: Tubercular pus being drained from the subcutaneous collection on the mid-thoracic area of the patients back



Post operatively there was no worsening of the patient's neurology and in fact he had immediate improvement in his symptoms. At a second surgery 3 days later a T2-T8 posterior instrumented surgery was performed to afford a 360-degree stabilization and fusion. The microbiology Zeels Nielsen staining of a smear of the pus and caseous material failed to demonstrate mycobacterium tuberculosis and only on the tuberculosis culture at six weeks post operatively was tuberculosis confirmed and the sensitivity to standard anti-tuberculosis medication established.

The patient had been commenced on standard tuberculosis medication from the time of admission receiving rifampicin 600mg daily, isoniazid 300mg daily, pyrazinamide 1600mg daily, and ethambutol 1100mg daily, as well as pyridoxine 20mg daily, for 18 months. In South Africa this standard cocktail of anti-tuberculous medication is administered in the form of the tablet rifafour with the required dose being achieved by the patient taking four tablets daily. Unlike pulmonary tuberculosis which employs an intensive phase of 2 months with all four drugs being given and then a continuation phase of 4 months with only rifampicin and isoniazid, in spinal tuberculosis the intensive phase is continued for a full 18 months.

At day 7 post-operatively the patient was discharged in a thoracolumbar sacral orthosis brace, fully ambulant, on TB treatment, for out-patient follow-up. At his three-month review there was no significant progression of his deformity and the brace was discontinued. He continued on his anti-tubercular medical treatment for a further 15 months. At his two-year review follow-up, he was doing well and thoracic X-rays revealed no significant progression of his deformity (Figure 10).

Figure 10

Follow-up thoracic spine X-rays taken at his 2-year review showed no significant progression of his deformity. Despite the success of the anti-tubercular treatment the accelerated degenerative changes post such an extensive spinal infection are noted



DISCUSSION

Besides the importance of confirming microbial sensitivity requiring a microbiological sample to be obtained in every case, specific challenges for spinal surgeons managing spinal tuberculosis concern the challenges of myelopathy, instability, deformity and the often-large cold abscesses that accompany this condition. Here the spinal surgeon must make important decisions on a patient by patient basis to ensure an optimal outcome.

On the subject of myelopathy there is a general consensus that a significant proportion of these patients improve on anti-TB drugs alone and in fact many studies challenge the benefit of surgery in the absence of obvious compression. The Medical Research Council Working Party on Tuberculosis of the Spine demonstrated that radical operation or even just surgical debridement offers no statistical benefit in this group compared to anti-TB medication alone. The conclusion from this study was that patients with myelopathy with/without functional impairment most often respond to anti-TB drugs once susceptibility is confirmed (4). This statement is supported by various other studies where at least 80% of myelopathic patients experienced a complete resolution or complete functional recovery on medical treatment alone (5, 6).

On the subject of spine tuberculosis and its propensity for progressive deformity it is an established principle that at presentation an acute kyphotic deformity of 40 degrees or more needs to be corrected. Further understanding has also shown that a 10-15 degree increase in kyphosis can be expected with conservative management. Hence as a surgical principle if the presenting kyphotic angle is 40 degrees or more, or is expected to increase to this value, surgical intervention is warranted (7). How this is done is another issue altogether and the pendulum is currently swinging away from the large open anterior procedures with anterior strut grafting towards the minimally invasive posterior procedures involving transcutaneous pedicle screw and rod placement with mini-posterolateral open debridement and fusion (4). In those patients where one needs to go anteriorly to reconstruct the anterior and middle columns video-assisted thoracoscopic surgery is moving more and more into the front as the morbidity of a thoracotomy is increasingly being appreciated (8).

The pre-vertebral tuberculous cold abscess is another surgical concern in its own right and again controversy exists as to the benefit of draining these collections. Proponents for intervention argue that antimicrobial penetration into these collections is poor and hence they should be drained. The benefits of intervention include relief of pain by relieving compression on neural tissue, earlier return to normal activities and a higher percentage and quicker bony fusion (9).

In conclusion, patients with spinal tuberculosis often have profound radiological findings however without progressive neurology or significant deformity they often gain more benefit from a conservative medical rather than a radical surgical approach. In our patient we considered the presenting instability and kyphotic angulation significant enough to warrant correction. Consideration was also given to the probability of progression of the deformity and the paravertebral cold abscess. We successfully managed this patient minimally invasively and he was able to be mobilized and discharged from hospital relatively earlier compared to patients who have underwent the more extensive open approaches.

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DECLARATION OF INTEREST

None of the authors have any financial nor personal relationships with other people, or organizations, that could inappropriately influence (bias) their work, all within 3 years of the beginning the work submitted.

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