One-stage posterior approach for the treatment of tuberculous spondylitis with kyphosis

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Background
Patients with Pott's disease who are candidates for surgical intervention can be approached posteriorly, anteriorly, or combined. Each of these approaches has advantages and disadvantages. In this study we evaluated the results of one-stage posterior approach by using anterolateral rachotomy with radical excision of the lesion, correction of kyphotic deformity, and fixation with trans pedicular screw fixation (TPSF) in 22 patients with thoracic tuberculous spondylitis with kyphosis.

Patients and methods
A total of 22 patients with thoracic tuberculous spondylitis with kyphosis were treated by using the one-stage posterior approach. Preoperatively all patients were suffering from pain, and had neurological deficit (20 Frankle B and two Frankle C). The maximum kyphotic angle was 45°, whereas the minimum was 25°. All cases underwent radical excision of the lesion, strut iliac graft, and TPSF through posterior approach.

Results
Immediately postoperatively all patients showed improvement in pain severity; all patients with neurological deficits improved within 2 months after surgery; hematological parameters demonstrated a significant clinical improvement in all patients. Radiological follow-up showed solid fusion within 6 months in 20 patients. The mean kyphotic angle was corrected from 30 to 15° after surgery.

Conclusion
Anterolateral rachotomy of thoracic Pott's lesion by using radical excision of the lesion, strut iliac bone graft, and TPSF under the umbrella of antituberculous preoperative and postoperative give satisfactory results without the need for the more morbid and technically demanding anterior or combined procedures in patients with mild kyphosis (<45°).

Keywords:
Pott's disease, tuberculous spondylitis, spinal kyphosis

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Introduction

Spinal tuberculosis has deformed, paralyzed, and killed many for the past 7000 years. Antituberculous chemotherapy revolutionized its treatment in the 1950s, but could not improve nor satisfactorily arrest the associated kyphotic spinal deformity (medical research council 1976) [1]. It was considered to be eradicated in the West [2,3]. In their study, Magid and Fishman [4] reported that tuberculosis should be considered in any patient with AIDS. Tuberculosis involves mostly (nearly 50%) the spinal column in the musculoskeletal system [5]. Diagnosis sometimes may be difficult because atypical manifestations may mimic other disorders. Surgery for tuberculous spondylitis is recommended in the presence of spinal deformity, and failure of nonoperative management, persistent severe pain, and neurological dysfunction that does not resolve or that develops when patients with tuberculous spondylitis undergo antituberculous medication [6]. In addition, older patients with Pott's disease-related paraplegia require decompressive surgery to avoid the hazards of prolonged immobilization [7]. A study by Nussbaum *et al.* [8] even recommended surgical treatment for patients with mild neurological deficits because both epidural infection and bone destruction typically progress for a variable period after the initiation of antituberculosis chemotherapy.

This study aimed at assessing the results of posterior one-stage approach for the treatment of thoracic Pott's disease with mild kyphosis (<45°) in our locality through radical excision, strut iliac bone graft, and TPSF.

Patients and methods

From June 2006 to June 2009, 22 patients with thoracic tuberculous spondylitis were treated at South Valley

University Hospital by radical excision of the lesion by using anterolateral rachotomy and TPSF. In total, 12 patients were women and 10 were men (Table 1). The mean age of the patients at the time of surgery was 50 years (range = 30–70 years) and the mean follow-up period was 34 months (range = 24–48 months). In total, 22 patients suffered neurological deficits (20 Frankel B and two Frankel C). Six cases had combined pulmonary tuberculosis.

All patients were examined preoperatively for the evaluation of the pain severity (by visual analogue score), neurological status (using Frankle classification), and the presence of kyphotic deformity (using Cobb's method), which was evident in all patients. Hematological examination was also carried out. Radiography was used to measure the kyphotic angle – the maximum kyphotic angle was 45° and the minimum was 25° – which was graded according to Kaplan's method. Paravertebral abscesses' shadows were evident in 10 patients. MRI was carried out for the detection of the compression site.

Operative technique

The patient was positioned on the spinal frame. Sterilization and draping of the operating room was carried out. The affected level determined radiologically using mobile C-arm, midline approach centered over the determined level. Two levels of transpedicular screws were inserted on each side of the affected level. Unilateral fixation was carried out with one rod to avoid collapse of the spine during debridement of the lesion through anterolateral rachotomy on the left side, with an excision of 5 cm from two to three ribs; the lesion was excised and the spinal cord decompressed, after which the correction of the kyphotic angle was carried out either by using manual pressure over the gibbus or by using a vertebral distractor. Evacuation of the caseous material was also carried out. After ensuring the complete removal of the two endplates and when the cancellous bony bed was evident, two or three blocks of corticocancellous strut iliac bone graft were inserted with the cancellous surfaces facing up and down. Insertion of the graft may be facilitated by some distraction of the prefixed screws. Next, tightening of the screws over contoured rods in corrected position was done. Final evaluation of the corrected position using the C-arm fluoroscopy was carried out, and then closure in layers over suction.

Postoperative care

Back brace was used in all patients till fusion. In addition to the antituberculous chemotherapy, intravenous antibiotics were prescribed for 5–7 days to all patients after surgery. Serial clinical, hematological, and radiological re-evaluation (Fig. 1) at 2, 6, 12, and 24 months was carried out at follow-up, which ranged from 24 to 48 months, with an average of 34 months.

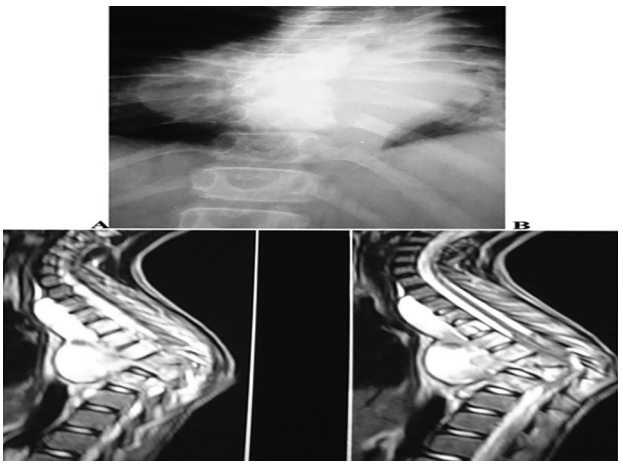
Results

Improvement of back pain severity was evident in all cases immediately postoperatively (the preoperative visual analogue score average was 7.18, which decreased significantly to an average of 1.45). As regards neurological status, after surgery Frankel grade improved in all cases with neurological deficit within 2 months. Hematological parameters demonstrated significant clinical improvement for all patients. Radiologically, follow-up showed solid fusion, stable TPSF, and maintenance of kyphosis correction within 6 months for 20 patients. Mechanical failure in form of pulling out of screws occurred in two cases who showed maximum loss of achieved correction. Both of them, however, showed bone healing and pain relief later on. The mean kyphotic angle was corrected from 30 to 15° after surgery (Table 2).

Table 1 Patients' distribution

Parameters	Group	*n* (%)
Age	≥30	3 (13.63)
	>39	2 (9.09)
	>49	7 (31.81)
	>59	10 (45.45)
Sex	Male	10 (45.45)
	Female	12 (54.54)
Neurological deficit	Frankle B	20 (90.90)
	Frankle C	2 (9.09)

Figure 1



63 Y and #9792; D7-8-9, Frankle B. (a) Preoperative anteroposterior plain radiograph. (b) Preoperative MRI.

Table 2 Results

Parameters	Preoperative	Last follow-up
VAS	7.18	1.45
The mean kyphotic angle	25	15

VAS, visual analogue score.

Discussion

Various surgical methods have been used to treat spinal tuberculosis. Combined anterior radical debridement and internal fixation has several advantages, such as direct excision of the diseased focus, rapid healing, and decreased tendency for progressive collapse of the kyphotic angulation [9]. Although internal fixation for tuberculous spondylitis is safe [10–14], the presence of an implant in the inflammatory tissue with anterior radical debridement can induce bacterial attachment and the formation of a biofilm [10,15]. A study by Jae *et al*. [16] reported that the erythrocyte sedimentation rate and C-reactive protein levels were eventually normalized and that there was no case of persistent infection or failure to control infection despite a metallic implant *in situ* with titanium pedicle screws. In addition, anterior radical debridement and internal fixation by using titanium mesh cage was carried out. Posterior fusion combined with rigid instrumentation has been shown to reduce the required amount of intraoperative anesthetic and surgical demands, and it helps to avoid the possible intraoperative and postoperative complications, which can be associated with the anterior approach [17]. Studies by Guzey *et al*. [18] and Rath *et al*. [19] reported good neurological results after performing posterior debridement and internal fixation for the patients with neurological impairments due to spondylitis. Their results were comparable to the best results obtained after anterior decompression, and this may be explained by the possibility that extended neural decompression was achieved through the posterior approach.

In this study, we carried out debridement, interbody fusion with an autogenous iliac bone graft, and instrumentation with pedicle screws – all through the posterior approach. Through this procedure we removed the infected material, and firmly stabilized and corrected the spinal deformity. The stability provided by posterior transpedicular fixation securely protects the vertebral correction. The results of our work demonstrated that neurological deficits associated with Pott's disease could be successfully treated through the posterior approach alone by performing meticulous debridement of the necrotic bone and the infected disc, followed by a bone graft. Pain relief was achieved immediately postoperatively because of debridement and TPSF, and later on because of fusion.

We used this technique in a patient who had kyphotic deformity less than 45°, and were able to safely correct this deformity without compromising the spinal cord function in one sitting through posterior approach. The final appreciable correction gained in our cases was due to radical excision of the lesion resulting in anterior release and sequential tightening of screws on the contoured rods. The radical excision with thorough cord decompression also resulted in excellent neurological improvement in our series.

Conclusion

Posterior one-stage surgery for thoracic Pott's lesion with thorough debridement, strut iliac bone graft, and TPSF under umbrella of antituberculous drugs can solve the problem without the need for morbid anterior or combined procedures. In addition, the use of TPSF improves the stability, gives immediate relief from pain, eliminates the risk for graft dislodgment, and maintains kyphosis correction until fusion.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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