

Clinical Study

Tuberculosis of ultralong segmental thoracic and lumbar vertebrae treated by posterior fixation and cleaning of the infection center through a cross-window

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Abstract

BACKGROUND CONTEXT: Surgical treatment of thoracolumbar tuberculosis (TB) aims at spinal cord decompression, focus debridement, spine stability, and deformity correction. However, several problems exist in treating multiple segmental thoracolumbar TB, including reducing surgical trauma with effective incision exposure; ensuring the effective long-armed fixation, and maintaining the possibility for revisionary surgery in cases of treatment failure.

PURPOSE: To investigate the clinical efficacy and surgical technique of the single posterior midline approach for screw-rod fixation and debridement through the sacrospinalis muscle outer cross-window to treat multiple segmental thoracolumbar spinal TB.

STUDY DESIGN: A retrospective cohort study.

PATIENT SAMPLE: A group of 17 patients with spinal TB after surgical treatment, with a mean follow-up of 27.9 months (range, 18–48 months).

OUTCOME MEASURES: Neurologic recovery, Cobb angle, and graft union assessed by the Moon standard.

METHODS: This study was approved by the local ethical committee and recruited patients from January, 2005 to January, 2011. We used a posterior midline incision for internal fixation of a pedicle screw system in the gap of the longissimus and spinal multifidus. Anterior lesion debridement and interbody fusions were performed through bilateral cross-windows in the outer edge of the sacrospinalis muscle. Using this technique, we treated 17 patients (10 men; aged 19 to 68 years; mean 39.8 years) with spinal TB involving more than four vertebrae. Nerve damage was classified by the Frankel classification. All patients were treated with regular anti-TB chemotherapy and were followed for 18 to 48 (mean: 27.9 months) months.

RESULTS: The mean (range) for operative time was 4.7 (3.6–6.3) hours, for blood loss during surgery was 1,100 (850–2,300) mL, and for time of interbody fusion was 6.3 (4 to 11) months. The Cobb angle correction rate is 67.1%. Nine of 11 patients' neurologic function returned to normal, which was statistically significant ($p=.004$). There was no TB recurrence or internal fixation failure.

CONCLUSIONS: Combined with anti-TB chemotherapy, the discussed surgical technique can show improved lesion clearance, decompression of the anterior aspect of the spine, bone graft fusion, internal fixation of outside lesions, drainage and lead to positive treatment outcomes. © 2015 Elsevier Inc. All rights reserved.

Keywords: Thoracic vertebrae; Lumbar vertebrae; Tuberculosis; Focal debridement; Spinal fusion; Surgical procedures; Operative

FDA device/drug status: Not applicable.

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Conflicts of interest: None declared.

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EVIDENCE & METHODS

Context

The surgical treatment of spinal tuberculosis remains challenging, particularly when multiple contiguous vertebral segments are involved. The authors review their experience treating such cases using an all-posterior approach.

Contribution

The authors report satisfactory outcomes among the 17 cases presented in this series. No instances of tuberculosis recurrence or instrumentation failure were reported.

Implications

Although it is necessary to appreciate the clinical and academic context in which these cases were collected, the fact remains that the present study is a retrospective review of a small series of patients. Selection and indication biases, among others, potentially impair the generalization of this study's results to others treated in different clinical settings. At a minimum, this investigation demonstrates the feasibility of an all-posterior approach in effectively managing tuberculous spondylitis at multiple spinal segments.

—The Editors

usually exist and are seriously damaged, producing obvious partial deformities. Other vertebrae may become eroded lesions or subcenter lesions caused by gravitation abscess. Fourth, simple X-ray films seldom define the involved scope of ultralong segmental spinal TB. In contrast, three-dimensional computed tomography (CT) scans and magnetic resonance imaging (MRI) clearly show the involved vertebrae and attachments [6]. They can also show the degree of destruction of the intervertebral discs, the scope of center and satellite lesions, the locations and number of cavities and abscesses, and the scope and degree of spinal cord compression. Thus, sound preoperative imaging can be used to guide the surgical plan by defining the lesion characteristics and assessing the degree of destruction of the intervertebral discs of the marginal vertebral TB, which is usually formed by gravitation abscess. This planning component is critical for establishing the protocol for the surgical segment fusion.

Surgical treatment of thoracolumbar TB aims at spinal cord decompression, focus debridement, spine stability, and deformity correction. However, surgical and fixation techniques for thoracolumbar TB treatment are still controversial [7,8] (Table). There are several problems in treating multiple segmental thoracolumbar TB, including reducing surgical trauma while maintaining effective incision exposure; ensuring the effectiveness of fixation in the long arm; and maintaining the possibility for revisionary surgery in cases of treatment failure.

To address the disadvantages of these surgical techniques, we sought to improve the traditional posterior fixation and focus debridement surgery using chemotherapy. We separated the posterior fixation and focus debridement steps into different muscle windows. This approach ensured that the three columns stayed firmly fixed, while preventing direct contact between the internal fixations and lesions. This strategy allowed us to perform focus debridement in several windows on both sides that contained less than two segments of spinal overlap, while still meeting the operative needs for multiple segmental thoracolumbar spinal TB.

We reviewed 17 cases of posterior fixation and lesion clearance through a cross-window treatment strategy for long-segment thoracolumbar TB. Our goals were to introduce the indications and operation approaches of this method; assess the effects and safety of this method; and discuss

Introduction

Despite increased treatment concepts and surgical methods, the medical management of spinal tuberculosis (TB), which is increasing in prevalence, remains challenging [1,2]. Ultralong segmental spinal TB may result from the onset of disease because of the doctors' incomplete understanding or delayed surgical treatment during the patient's first visit [3–5]. The wide scope of the lesions and the number of vertebrae involved make it difficult to cure these patients.

Ultralong segmental spinal TB has four features. First, it has a long course and is energy-consuming for patients and also leads to hypoproteinemia and anemia. Second, the scope of lesions reaches multiple vertebrae and intervertebral discs, either contiguously or separately, potentially with a large paravertebral abscess. Third, central lesions

Table
Comparisons between three approaches

Approach	Advantages	Disadvantages
Anterior transthoracic approach [9]	One incision; easy to manipulate; sufficiently secure to internal fixation	Not stronger than three-column fixation; internal fixation and lesions contact; postoperative drainage is difficult;
Posterior approach [10]	Less damaging than other methods; sufficient deformity correction	Difficult lesion debridement
Anterior and posterior joint approach [11]	Prevents contact between internal fixation and lesions; internal fixation after bone graft fusion can be removed later	Two incisions; more surgical trauma

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