Clinical Neurology and Neurosurgery 153 (2017) 67–72

Contents lists available at ScienceDirect

Clinical Neurology and Neurosurgery

journal homepage: www.elsevier.com/locate/clineuro

One-stage posterior surgical management of lumbosacral spinal tuberculosis with nonstructural autograft

Jia-Ming Liu[a], Yang Zhou[a], Ai-Fen Peng[b], Xuan-Yin Chen[a], Wen-Zhao Chen[a], Xin-Hua Long[a], Shan-Hu Huang[a], Zhi-Li Liu[a,*]

[a] Department of Orthopedic Surgery, The First Affiliated Hospital of Nanchang University, Nanchang, 330006, PR China
[b] School of Humanities, Jiangxi University of Traditional Chinese Medicine, Nanchang, 330004, PR China

ARTICLE INFO

Article history:
Received 27 October 2016
Received in revised form
23 December 2016
Accepted 25 December 2016
Available online 28 December 2016

Keywords:
Lumbosacral tuberculosis
Bone graft
Posterior
Fusion

ABSTRACT

Objective: Lumbosacral spinal tuberculosis is rare in current population. Previous studies have reported effective outcomes about anterior, antero-posterior and posterior surgery for treating tuberculosis of lumbosacral region. However, the bone grafts used in these studies are mainly structural bone and mesh cage. The purpose of this study is to evaluate the efficacy and safety of nonstructural autograft in the surgical treatment of lumbosacral tuberculosis by one-stage posterior procedure.

Patients and methods: A total of 21 patients with lumbosacral tuberculosis were retrospectively reviewed between January 2012 and December 2014. All the patients underwent one-stage posterior debridement, interbody fusion with nonstructural autograft and posterior instrumentation. The preoperative and postoperative erythrocyte sedimentation rates (ESR), C-reactive protein (CRP) and visual analogue scale (VAS) were recorded. Preoperative and postoperative lumbosacral angle and intervertebral space height were measured on the plain films. American Spinal Injury Association (ASIA) Impairment Scale was used to evaluate the neurological outcomes of the patients.

Results: The average follow up period was 22.9 ± 6.7 months (range 12–36 months). The preoperative ESR and CRP were 33.4 ± 10.5 mm/h and 30.3 ± 20.3 mg/l, respectively, which decreased to 15.2 ± 7.1 mm/h and 10.6 ± 5.8 mg/l postoperatively with significant differences ($P < 0.05$). The lumbosacral angles and intervertebral space height were increased from preoperative 20.4° ± 4.5° and 9.7 ± 1.9 mm to postoperative 25.6° ± 4.6° and 12.3 ± 2.1 mm, respectively ($P < 0.001$ and $P < 0.001$). At the final follow up, a loss of 2.1° of lumbosacral angles and 1.6 mm of intervertebral space height was observed. The VAS scores were decreased from 4.73 to 2.71. Bony fusion was achieved in all patients at 6 months after surgery. Neurological outcomes were improved with 1–2 grades in most of the patients. One patient got wound infection and was cured by daily dressing. Complications related to instrumentation or neurological deficit weren't observed.

Conclusion: Combined with one-stage posterior debridement and instrumentation, interbody fusion with nonstructural autograft is an effective option for lumbosacral tuberculosis.

1. Introduction

Spinal tuberculosis is the most common form of the extrapulmonary tuberculosis. It accounts for nearly half of the musculoskeletal tuberculosis cases [1]. However, tuberculosis locating at the lumbosacral junction is rare. Only 2–3% of all spinal tuberculosis occurred in this region [2,3]. Although antituberculous chemotherapy remains the dominant treatment for spinal tuberculosis, surgical management is an important strategy for it when patients present with kyphosis, progressive neurological deficit, massive cold abscesses and don't have positive responses to chemotherapy [4].

Previous studies have reported satisfactory outcomes in anterior, antero-posterior and one-stage posterior surgery for lumbosacral tuberculosis [5–8]. However, the interbody bone grafts used in these studies were mainly structural bone harvested from the iliac crest [5,6], rib [7] and fibular [9], structural allograft [5,6] and mesh cage [8]. Few studies reported the using of non-

* Corresponding author at: Department of Orthopedic Surgery, The First Affiliated Hospital of Nanchang University, No.17 Yong Wai Zheng Street, Donghu District, Nanchang, Jiangxi Province, 330006, PR China.
E-mail address: liuzhiliyfy@163.com (Z.-L. Liu).

http://dx.doi.org/10.1016/j.clineuro.2016.12.013
0303-8467/

structural autograft in one-stage posterior surgical management of lumbosacral tuberculosis.

The purpose of this study is to investigate the efficacy and safety of autogenous nonstructural bone graft in the surgical treatment of lumbosacral spinal tuberculosis via one-stage posterior procedure.

2. Materials and methods

This study was approved by the ethics board committee of our hospital. And informed consents were obtained from all the participants. A total of 21 patients with lumbosacral tuberculosis were included in this study between January 2012 and December 2014. All the patients underwent one-stage posterior debridement, interbody fusion with nonstructural autograft and posterior instrumentation in our hospital. The clinical data of the patients were retrospective reviewed. Of these patients, 13 were males and 8 were females, with an average age of 39.5 years (range, 19–68 years) at the time of admission.

The diagnosis of lumbosacral tuberculosis was based on the clinical symptoms, laboratory findings, such as anemia, hypoproteinemia, erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), and images, including lumbar X-ray films, computed tomography (CT) and magnetic resonance imaging (MRI). All the patients presented with continuous symptoms, such as weakness, night sweat, back pain and stiffness, local tenderness and lower fever with weight loss. Preoperative radiographic examinations showed that tuberculotic destruction was located in the vertebrae of L5, S1 and intervertebral disc of L5/S1. In advance, the patients were confirmed as lumbosacral tuberculosis by histopathologic examination postoperatively.

Patients with continuous low back pain, progressive neurological dysfunction, kyphosis formation and negative responses to chemotherapy were involved in this study. Those patients with two or more segments spinal tuberculosis were excluded.

2.1. Preoperative management

All patients in the study were clinically diagnosed with lumbosacral tuberculosis. They were treated with the HREZ chemotherapy regimen for at least two weeks before surgery, including rifampicin (450 mg/day), isoniazid (300 mg/day), streptomycin (750 mg/day) and pyrazinamide (750 mg/day). The surgery was carried out when ESR and CRP significantly were decreased (ESR less than 40 mm/h) [6] and tuberculosis toxicity symptoms obviously were improved after the chemotherapy.

2.2. Surgical procedure

After administration of general anesthesia, the patient was placed in a prone position and a linear midline skin incision of the back was done. The posterior elements (laminae, facet joints and transverse processes) were exposed, including one vertebra above and below the involved segments. The pedicle screws were inserted into the vertebrae at least one level superior and inferior to the level of decompression. If the upper part of the vertebral body was not destroyed by tuberculosis, the affected vertebrae were often incorporated into the pedicle screws. In terms of the distal fusion level, if the S1 vertebral body was not destroyed by the lesion, and the bilateral pedicles of S1 were intact, it would be just instrumented to S1/ilium. If not, it would be instrumented to S2. Then, a temporary rod was stabilized on the mild side of the focus to avoid nerve root injury caused by instability of the spine during decompression and debridement. If the cold abscess was located on both sides of the vertebra, the PLIF technique [10] was performed. The spinous process, bilateral laminae and facet joints at the level of decompression were resected for debridement. And the cold abscess was completely drained. If the cold abscess and the tuberculotic lesion were presented mainly on one side of the vertebra, the TLIF technique [5] was conducted. After the debridement, the corticocancellous chips harvested from the local bone were implanted into the anterior three-fourth of the interbody space created by debridement (nonstructural autograft). If the bone graft substrate was not enough, posterior iliac cancellous bone chips (nonstructural bone) were obtained. The morselized bone was compressed into the space in order to made the bone graft fully contact with the upper and lower vertebral bodies. Gelatinous sponges were placed in the posterior to prevent the bone chips from dropping into the spinal canal. Correction the lumbosacral kyphosis was accomplished by installing contoured rods with compression maneuvers. During the compression procedure, particular attention to the nerve roots and dural sac should be paid). The lumbosacral spine was a little shortened finally to obtain a better kyphosis correction. The drainage and incision suture were performed and the debridement pathological tissues were sent for culture and histopathologic examination. The surgical duration, estimated blood loss and perioperative complications were recorded.

2.3. Postoperative management

When drainage volume was less than 50 ml/24 h, the drainage tubes were removed. Patients were required to rest on a strict bed for two weeks after the surgery. Then, they were allowed to ambulate with the support of a waist brace which would be used for 10–12 months. All patients were treated with an antituberculous chemotherapy regimen for 9–12 months postoperatively, which was four-drug chemotherapy (rifampicin, isoniazid, ethambutol and pyrazinamide) for two months, then three drugs (rifampicin, isoniazid and ethambutol) during the remaining period.

2.4. Follow ups

The first follow-up visit was done at the first month after surgery and interval three-month at the first year. A subsequent follow-up was at six-month interval. During each follow-up, ESR and CRP were checked. Plain films and CT scans were performed to investigate the bony fusion. The radiologic evidence of bony fusion was defined as the presence of trabecular bone bridging between the bone graft and the vertebrae on CT sagittal plane. The preoperative and postoperative lumbosacral angles were measured on the lateral plain film in neutral position according to Cobb's method. The upper end vertebra was defined as the first normal one above the lesion vertebra, and the lower end vertebra was defined as S1. The intervertebral space height of L5/S1was also measured on the lateral film, which was defined as the length of the line connecting the midpoint of L5 lower endplate with the midpoint of S1 upper endplate. The neurological function and back pain were evaluated by American Spinal Injury Association (ASIA) Impairment Scale and visual analogue scale (VAS) score, respectively.

2.5. Statistic analysis

All analyses were performed by SPSS Version 13.0 (Statistical Soft ware for Social sciences, Chicago, IL, USA). The statistical significance of lumbosacral angles, intervertebral space height, VAS scores before and after surgery, and the last follow-up were assessed by paired-samples t test. Values of $P < 0.05$ were considered to be significant difference.