Anterior Debridement and Fusion Followed by 360° Fixation in Pyogenic Spontaneous Spondylodiscitis of L4-L5: Autologous Iliac Bone Strut, Anterior Titanium Screw-Rod Fixation and Posterior Pedicle Screw Fixation: A Case Report

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Abstract

Objective: To describe a new kind of 360° fixation in pyogenic spontaneous spondylodiscitis of L4-L5 after anterior debridement and fusion.

Summary of Background Data: The adequate surgical treatment modalities for pyogenic spontaneous spondylodiscitis has not been unequivocally defined until present, especially in the use of metal instruments at such a septic focus.

Methods: The 54-year patient, who was in an active period of pyogenic spondylitis, treated with surgical intervention involved aggressive anterior debridement and removal of the infected vertebral body of L4-L5, followed by reconstruction of the anterior column using autologous iliac bone strut and anterior titanium screw-rod fixation (in L4 and L5 residual vertebral body), and posterior pedicle screw fixation in L3 and S1. The patient was given antibiotic treatment with ceftiofur, initially with intravenous administration, which was switched to oral administration after 21 days.

Results: No further relapse of spondylodiscitis have been detected during routine clinical and radiographic check-ups, with ongoing follow-up. The inflammatory parameters have been in the normal range. The patient is well mobilized, using walking feet for long distances, and she has no obvious pain. The radiographs showed the disappearance of extramedullary abscess, no changes in the implant such as loosening of the screws or fracture, iliac bone graft absorption collapse, and partial fusion between vertebral body and bone graft.

Conclusion: This new 360° fixation may be a good surgical treatment alternative, especially in an active period of pyogenic spondylitis, with significant and irregular bone defects.

Keywords: Pyogenic spontaneous spondylodiscitis; Lumbar; Debridement; Fixation

Introduction

There is general agreement that an anterior debridement and fusion is preferable for pyogenic spontaneous spondylodiscitis, due to direct access to the infected tissues, and the use of metal implants in pyogenic spondylodiscitis has traditionally been rigorously avoided since the implants increase bacterial adherence and decrease antibiotic effectiveness [1-4]. More recently, this notion has been challenged by reports in the literature which presented favorable outcomes using titanium implants in the aggressive debridement and spinal stabilization procedures of spondylodiscitis, includes titanium cages, pedicle screw, and so on [5-9]. However, the adequate surgical treatment modalities for the infected spine have not been unequivocally defined until present, especially in the use of anterior metal implants at such a septic focus. In the present paper, we present the good outcome example of a 59-year-old patient with anterior debridement and fusion followed by a new kind of 360° fixation: autologous iliac bone strut, anterior titanium screw-rod fixation(instead of titanium mesh cage), and posterior pedicle screw fixation.

Case Report

On January 10, 2015, a 54-year-old woman was transferred to our department with massive...
lumbar pain, neurological dysfunction, and had raised CRP (107.5 mg/dL) and ESR (121 mm/h). Her medical history showed that she had been presented to another hospital with severe lumbar pain and high fever and undergone conservative treatment by intravenous antibiotics (cefotiam 2.0g i.v. bid) for just 2 weeks at September 2010. However, she continued to have raised inflammatory parameters (C-reactive protein [CRP] 76.0 mg/dL) and severe lumbar pain. In December 2010, she developed progressive spastic paraparesis, radicular numbness of her right lower extremities. Magnetic resonance imaging (MRI) and Computed tomographs (CT) of the spine was carried out, leading to the diagnosis of L4–L5 spondylodiscitis with significant bone destruction, anterior paravertebral abscess and spinal canal compression (Figure 1). Intravenous antibiotic treatment with Cefotiam in accordance with the resistogram was not successful (with persistently lumbar pain, progressive neurological dysfunction, and high CRP values around 45.6 – 122.5 mg/dL). On January 25, 2015, the surgical intervention involved aggressive anterior debridement and removal of the infected vertebral body of L4-L5, followed by reconstruction of the anterior column using autologous iliac bone strut and anterior titanium screw-rod fixation (in L4 and L5 residual vertebral body), and posterior pedicle screw fixation in L3 and S1. (Figure 2). The diagnosed methicillin-sensitive S. aureus was identified in intraoperative biopsies from the spine. The patient was therefore given antibiotic treatment with cefotiam, initially with intravenous administration, which was switched to oral administration after 21 days. CRP values continued to decline to 6mg/dL on February 8, 2015.

Since then, no further relapse of spondylodiscitis has been detected during routine clinical and radiographic check-ups, with ongoing follow-up. Three months later, with a clinical examination, blood testing showed normal CRP (1.2 mg/dL) and no elevation of leukocytes. Three months later, MRI and CT (Figure 3) showed the disappearance of extramedullary abscess, partial fusion between vertebral body and bone graft, and suggested no evidence of iliac bone graft absorption collapse, loosening of the screws or fracture.

**Discussion**

Extensive debridement of the anterior column of the spine, which is known to be predominantly involved in vertebral osteomyelitis, often leads to spinal instability. Structural bone autografts represent the “gold standard” for reconstruction of these anterior column defects, but recent studies have supported the use of titanium mesh cages to bypass the morbidity associated with structural autografts and may provide better anterior column support(maintain their
structural integrity in an infected environment) [5-8]. A study reported the subsidence rate was higher in the strut group than in the cage group (two groups followed by posterior pedicle screw fixation), and the duration until subsidence was also shorter in the strut group than in the cage group [10]. However, there is a high risk of relapse that metal implants are implanted in sites of active infections, because it may decrease antibiotic effectiveness and increase bacterial adherence and glyocalyx formation [2-4]. Tobias et al reported a case of two recurrences after surgical intervention with debridement, and reconstruction of the anterior column with titanium mesh cage [11]. There is currently a lack of consensus in the pertinent literature regarding the appropriate fixation modalities. Various authors advocated combined with additional posterior spinal fixation, and excellent imaging results can be obtained without impairing infection eradication [6,12,13].

In the present case, the 54-year patient was in an active period of pyogenic spondylitis, there would be a high risk of relapse, if titanium mesh cage was implanted in the defect area. Additionally, more vertebral body including no infect bone had to be removed to adapt to the shape of cage. Once relapse of pyogenic spondylitis appeared, extensive debridement should to be done again, and removal the mesh cage means surgical failure. In this case, autologous bone grafts and screw-rod fixation system were used to instead of titanium mesh cage was implanted in the defect area. Furthermore, in case of the infection relapse, reoperation of the anterior column with titanium mesh cage [12].

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