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Anterior approach arthrodesis - ALIF with use of a titanium cage for treatment of postoperative spondylodiscitis after lumbar microdiscectomy

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Keywords
arthrodesis, discitis, discectomy, postoperative period

ABSTRACT

Introduction. Infectious spondylodiscitis has an incidence of 0.21-3.6%. The best intervention should be individualized, using antibiotics only or combining them with stabilizing surgeries.

Case presentation. A 38-year-old man presented with lumbosciatalgia, severe pain and inability to ambulate. Magnetic resonance imaging (MRI) of the lumbar spine showed L5-S1 extruded disc herniation and the patient underwent endoscopic microdiscectomy with complete remission of symptoms. After two weeks, he reported severe low back pain and a return of difficulty to walk. Laboratory tests showed an increase in CRP and ESR. MRI showed signs of lumbar spondylodiscitis. The patient started on broad-spectrum intravenous antibiotic therapy. He evolved with improvement in laboratory parameters and maintenance of low back pain. Due to the failure of conservative treatment, anterior approach arthrodesis (ALIF) was chosen, with the complete improvement of the low back pain and the return of the ability to walk.

Discussion. Postoperative spondylodiscitis' frequency depends on the invasiveness of the operation and the type of surgery performed. The most likely source of infection is direct inoculation by virulent pathogens during surgery. A diagnosis delay of more than two months is considered a risk factor for generating adverse results. A Conservative approach is indicated for the patient who is neurologically intact and with minimal bone destruction. Surgical indications are the presence of neurological deficits, intraspinal abscesses, extensive bone destruction, and failure of conservative management. ALIF is supported in the literature because it allows wide exposure of the entire disc space through efficient access to the spine with the complete evacuation of the disc, avoiding dissection of perineural scar tissue and preserving the articular facets.

Conclusion. Early diagnosis and treatment are crucial, although there is still no consensus about the best treatment approach. The use of a titanium cage with a bioglass graft had a good response in pain and infection control in our case.

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Introduction

Infectious spondylodiscitis is an infection of the intervertebral disc and adjacent vertebral bodies, with an postoperative incidence of 0.21-3.6%[1]. The most recommended diagnostic method is Magnetic Resonance Imaging (MRI), due to the early identification of the disease made by this exam[2,3]. The appropriate intervention should be individualized, using either conservative methods alone, such as antibiotic therapy, or combined with stabilizing surgery [2,4]. The purpose of this paper is to report and discuss the case of a patient who underwent an anterior approach arthrodesis (ALIF) using a titanium cage after presenting postoperative spondylodiscitis from a lumbar microdiscectomy.

Case presentation

Male patient, 38 years old, attended the first medical appointment with lumbosciatalgia on the right side. He reported severe pain with progressive worsening and inability to ambulate. Neurological examination revealed distal paresis of the right lower limb with achilles hyporeflexia and pain in S1 root territory. Magnetic resonance imaging (MRI) of the lumbar spine showed L5-S1 extruded disc herniation with radicular compression on the right side. Patient underwent endoscopic microdiscectomy with complete remission of symptoms.

After two weeks, the patient reported severe mechanical low back pain, unresponsive to the use of opioids. Moreover, there was a return of difficulty in walking and the need for intravenous analgesia for pain control. Laboratory tests showed an increase in C-reactive protein (CRP) and erythrocyte sedimentation rate. Control MRI showed signs of contrast-enhanced L5-S1 lumbar spondylodiscitis, such as diffuse hyposignal on T1 between the L5 and S1 vertebral bodies, with irregularity and loss of definition of the terminal plateaus and compression of the ventral surface of the dural sac and nerve roots (Figure 1).

In view of the diagnosis, the patient was hospitalized and started on broad-spectrum intravenous antibiotic therapy with Vancomycin Hydrochloride and Meropenem for eight weeks. He evolved with improvement in laboratory parameters, but there was maintenance of intense low back pain. Due to the failure of conservative treatment, anterior approach arthrodesis (ALIF) using a titanium cage and bioglass graft was chosen (Figure 2).

Figure 1. MRI with contrast uptake exposing spondylodiscitis of the L5 and S1 vertebral bodies.

Figure 2. Postoperative X-ray presence of the titanium cage and graft.

Three months after the procedure, the patient presented complete improvement of the low back pain, return of the ability to walk, and undergoing rehabilitation for muscle strengthening.

Discussion

Spinal infections are relatively uncommon, but the incidence is significantly increasing due to the growing number of spinal interventions, which often require long operation times and deployment of significant amounts of instrumentation [3,5]. Postoperative spondylodiscitis is a rare primary infection of the nucleus pulposus, with secondary involvement of the cartilaginous endplate and vertebral bone, mainly affecting single segments in the lumbar region [1,6]. The frequency depends on the invasiveness of the operation and is between 0.1% and 0.6% for microsurgical operations, as in the reported case, and between 1.4% and 3% for macrosurgical operations [7]. The incidence also varies with the type of surgery performed, and usually occurs after minimally invasive spinal procedures, including laminectomy, discectomy, discography, myelography, paravertebral injection, lumbar puncture, and spinal fusion, with or without instrumentation [1, 6, 8]. In the presented case, the patient had spondylodiscitis after a microdiscectomy to treat a herniated disc. The most likely source of infection for postoperative spondylodiscitis is direct inoculation by virulent pathogens during surgery, the most common being Staphylococcus aureus and Streptococcus epidermidis bacteria, but hematogenous contamination, although uncommon, is also a possible cause [6].

Among the risk factors, malnutrition, neoplasms, obesity, alcoholism, smoking, chemotherapy, immunosuppression, advanced age, diabetes mellitus, and spinal trauma have been reported in the literature to predispose patients to postsurgical discitis [1, 6]. In addition, several studies report a bimodal age distribution among patients with spondylodiscitis, with peaks in the under 20 age group and the 50 to 70-year-old group, although all ages can be affected [9]. Spondylodiscitis also has a male preponderance, with a female/male ratio of 1.5-2:1.9 [9].

The main symptom is low back pain [2, 10, 11]. The pain is not always severe, but tends to be persistent, often preceded by a febrile episode [10, 11]. In the patient, the febrile episode was not reported, but there was intense low back pain. Among the diagnostic procedures described in the literature, MRI, in particular, is able to show the expansion of inflammatory processes into the spinal canal and soft tissues. ESR, CRP and the white blood cell count are key parameters for monitoring disease activity and the suspicion of associated infection [2, 11, 12]. Early diagnosis including assessment of the extent of infection is crucial [2, 3]. A delay of more than two months is considered a risk factor for generating adverse results [9].

The treatment possibilities consist of conservative or surgical management. A conservative approach is indicated for the patient who is neurologically intact and with minimal bone destruction. Therapeutic options are based on the culture and use of antibiotics, immobilization, analgesics and orthoses [3]. Despite having a good outcome in most cases, the prolonged period of immobilization and the long duration of antibiotic regimens in the conservative approach can lead to medical - such as renal failure and allergic reactions - and psychosocial consequences [2].

Surgical indications are the presence of neurological deficits, intraspinal abscesses, extensive bone destruction, and failure of conservative management [3, 9, 13, 14]. The objectives of surgical treatment are root decompression, debridement, eradication of the focus of infection, identification of pathogens, correction of deformity, and restoration of the physiologic profile of the spine [3, 14]. Based on the treatment of 75 Postoperative Discitis, Ahsan et al. reported that the success rate of surgical treatment was 90% and, compared to conservative treatment, required a shorter hospital stay, shorter immobilization period and administration of antibiotics and greater symptom relief with lower complication rates, similar to other studies [2]. However, there is still no consensus about the decision between proceeding conservatively or surgically and, like the procedure of choice, these are topics still under discussion [3].

The technique chosen in this case was anterior lumbar (interbody) fusion (ALIF), which is supported in the literature because it allows wide exposure of the entire disc space through efficient access to the spine with complete evacuation of the disc, avoiding dissection of perineural scar tissue and preserving the articular facets. This facilitates the insertion of the cage -correcting the overload of the structure and relieving pain - and the restoration of the disc height, which increases the foraminal volume, indirectly decompressing the nerve roots and relieving radicular symptoms [9, 15, 16, 17]. However, the longer surgery time and the

consequent increased risk of infection were also exposed as negative points of ALIF [17]. Jägersberg et al. reported, in a German retrospective study in which 83 patients with post-discectomy lumbar complications between 2005 and 2011 were analyzed, that from 2008, due to the previously mentioned advantages, the ALIF technique was applied in preference to the others - except in patients with risk factors that complicated the previous approach, such as extreme overweight and men who spoke out against this approach due to the risk, although low, of retrograde ejaculation [17].

The recorded mortality of spondylodiscitis is less than 5% [11]. Although uncommon, postoperative spondylodiscitis can be associated with severe long-term sequelae, such as neurological deficit and severe pain resulting in disability, which occurs in about 30% of cases [1, 5, 9]. In addition, it has complex diagnosis and treatment, usually resulting in prolonged hospital stays and recovery time [14]. However, most cases reported in the literature, especially those undergoing surgical treatment and without delay in diagnosis, had good outcomes with significant - but partial - reduction of symptoms, especially low back pain. The studies by Chang et al., Ahsan et al. and Jägersberg et. al. reported positive results in 80%, 90% and 76% of patients, respectively [2, 8, 17]. For conservative treatments, on the other hand, the overall prognosis is successful in about 70-83% of cases [2].

Finally, in the literature, the only factor found to prevent infection was pre- and intraoperative antibiotic prophylaxis. Brown et al. recommend first or second generation cephalosporin. Vancomycin associated with Gentamicin is advised in patients allergic to cephalosporins or colonized by methicillin-resistant Staphylococcus aureus and in long operative procedures, and for this last group, the use of frequent saline irrigation, with or without povidone-iodine to reduce wound contamination, is also recommended [1].

Conclusion

In our report, a patient who underwent an arthrodesis for the treatment of postoperative spondylodiscitis was presented. Early diagnosis and treatment are crucial, although there is still no consensus about the best treatment approach. The use of titanium cage with bioglass graft had a good response in pain and infection control in our case.

References

1. Gerometta A, Bittan F, Rodriguez Olaverri JC. Postoperative spondilodiscitis. International Orthopaedics. 2012;36(2):433-438. doi:10.1007/s00264-011-1442-0
2. Ahsan MK, Hasan MS, Khan MSI, Sakeb N. Management of post-operative discitis following discectomy in a tertiary-level hospital. Journal of Orthopaedic Surgery. 2021;29(1). doi:10.1177/2309499020988213
3. Weckbach S, Lutz B, Wölfle-Roos J v., Reichel H. Infections of the spine: Therapeutic strategies. Chirurg. 2016;87(10):839-846. doi:10.1007/s00104-016-0247-5
4. Akgul T, Bayram S, Korkmaz M, Karalar S, Dikici F, Sar C. Surgical Approach Algorithm in the Treatment of Lumbar and Thoracolumbar Pyogenic Spondylodiscitis. Turkish Neurosurgery. 2022;32(1):83-90. doi:10.5137/1019-5149.JTN.33784-21.2
5. Fang A, Hu SS, Endres N, Bradford DS. Risk Factors for Infection After Spinal Surgery. SPINE. 2005;30(12):1460-1465.
6. Zou MX, Peng AB, Dai ZH, et al. Postoperative initial single fungal discitis progressively spreading to adjacent multiple segments after lumbar discectomy. Clinical Neurology and Neurosurgery. 2015;128:101-106. doi:10.1016/j.clineuro.2014.11.012
7. Dulani R, Shrivastava S, Singh P. A rare case report: Tubercular spondylodiscitis following lumbar disc surgery. Asian Pacific Journal of Tropical Medicine. 2010;3(6):496-498. doi:10.1016/S1995-7645(10)60120-4
8. Chang CW, Tsai TT, Niu CC, et al. Transforaminal Interbody Debridement and Fusion to Manage Postdiscectomy Discitis in Lumbar Spine. World Neurosurgery. 2019;121:e755-e760. doi:10.1016/j.wneu.2018.09.211
9. Gouliouris T, Aliyu SH, Brown NM. Spondylodiscitis: Update on diagnosis and management. Journal of Antimicrobial Chemotherapy. 2010;65(SUPPL. 3). doi:10.1093/jac/dkq303
10. Digby J, Kersley J. Pyogenic Non-tuberculous Spinal Infection: An Analysis of Thirty Case. The Journal of Bone and Joint Surgery. 1979;61(1):47-55. doi:10.1302/0301-620x.61b1.370121
11. McDermott H, Bolger C, Humphreys H. Postprocedural discitis of the vertebral spine: challenges in diagnosis, treatment and prevention. Journal of Hospital Infection. 2012;82(3):152-157. doi:10.1016/j.jhin.2012.07.009
12. Haaker RG, Senkal M, Kielich I", Kr J, Kielich T, Kr~imer • J. Percutaneous lumbar discectomy in the treatment of lumbar discitis. Eur Spine J. 1997;6:98-99.
13. Korinth MC. Treatment of cervical degenerative disc disease - Current status and trends. Zentralblatt fur Neurochirurgie. 2008;69(3):113-124. doi:10.1055/s-2008-1081201
14. Gasbarrini A, BORlANI L, Zamparinp E, et al. Spinal infection multidisciplinary management project (simp): from diagnosis to treatment guideline. International

journal of immunopathology and pharmacology. 2011;24(I):95-100.

15. Linhardt O, Matussek J, Refior HJ, Krödel A. Long-term results of ventro-dorsal versus ventral instrumentation fusion in the treatment of spondylitis. International Orthopaedics. 2007;31(1):113-119. doi:10.1007/s00264-006-0140-9
16. Teng I, Han J, Phan K, Mobbs R. A meta-analysis comparing ALIF, PLIF, TLIF and LLIF. Journal of Clinical Neuroscience. 2017;44:11-17. doi:10.1016/j.jocn.2017.06.013
17. Jägersberg M, Schneider K, Schaller C, Richter M. ALIF versus TLIF for post-discectomy syndrome. Journal of Neurological Surgery, Part A: Central European Neurosurgery. 2014;75(5):329-335. doi:10.1055/s-0034-1372432