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Spinal Epidural Abscess and Psoas Abscess Combined with Pyogenic Spondylodiscitis Following Vertebroplasty - A Case Report -

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Study Design: Case report.

Objective: To report a case of extensive spinal epidural abscess and bilateral psoas abscesses combined with pyogenic spondylodiscitis after a L3 vertebroplasty.

Summary of Literature Review: Infection after vertebroplasty or kyphoplasty is a rare medical complication. Few reports on spinal epidural abscess and bilateral psoas abscesses, coupled with pyogenic spondylodiscitis after vertebroplasty, are available in the English medical literature.

Materials and Methods: The authors performed a clinical and radiographic case review.

Results: A 74-year-old woman, without any existing medical illness, presented with a history of three weeks of lower back pain, fever, and neurologic deficits of both legs after vertebroplasty performed in another hospital. Magnetic resonance imaging demonstrated an extensive spinal epidural abscess from T10 to S1 and huge bilateral psoas abscesses combined with spondylodiscitis at L3-4. Urgent limited laminectomies and abscess drainage were performed from L1 to S1. The day after the operation, ultrasound-guided percutaneous drainage was performed to manage bilateral psoas abscesses. Methicillin-resistant *Staphylococcus aureus* was identified by intraoperative culture. Antibiotic therapy during hospitalization was maintained for six weeks with vancomycin and rifampicin. The infection was successfully treated without any neurologic deficit and spinal deformity.

Conclusions: Vertebroplasty is relative safe and simple procedure; however, the procedure also may cause severe spinal infection. Aseptic techniques under sterile environment was required during surgery. It is important that early diagnosis and prompt surgical decompression in spinal epidural abscess with neurologic deficit. Limited surgery and antibiotic therapy could be a good treatment option in spinal epidural abscess combined with pyogenic spondylodiscitis.

Key Words: spinal epidural abscess, psoas abscess, pyogenic spondylodiscitis, vertebroplasty, complication

Major complications after vertebroplasty or kyphoplasty include extravertebral cement leakage, permanent nerve entrapment, pulmonary embolism. Infection after vertebroplasty or kyphoplasty is rare, but has increased during the last ten years.^{1,2)} Infection after vertebroplasty is associated with preexisting infection, compromised immunity including diabetes, liver cirrhosis and immunosuppressive therapy.^{1,2)} Various microorganisms have been reported as causative agents.²⁾ Whatever causative agents may be cultured, treatment requires proper long-term antibiotic therapy and surgery to eradicate infection and gain decompression or spinal stability.

We experienced a case of severe infection following vertebroplasty of L3. An extensive spinal epidural abscess from

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*The manuscript submitted does not contain information about medical device(s)/drug(s).

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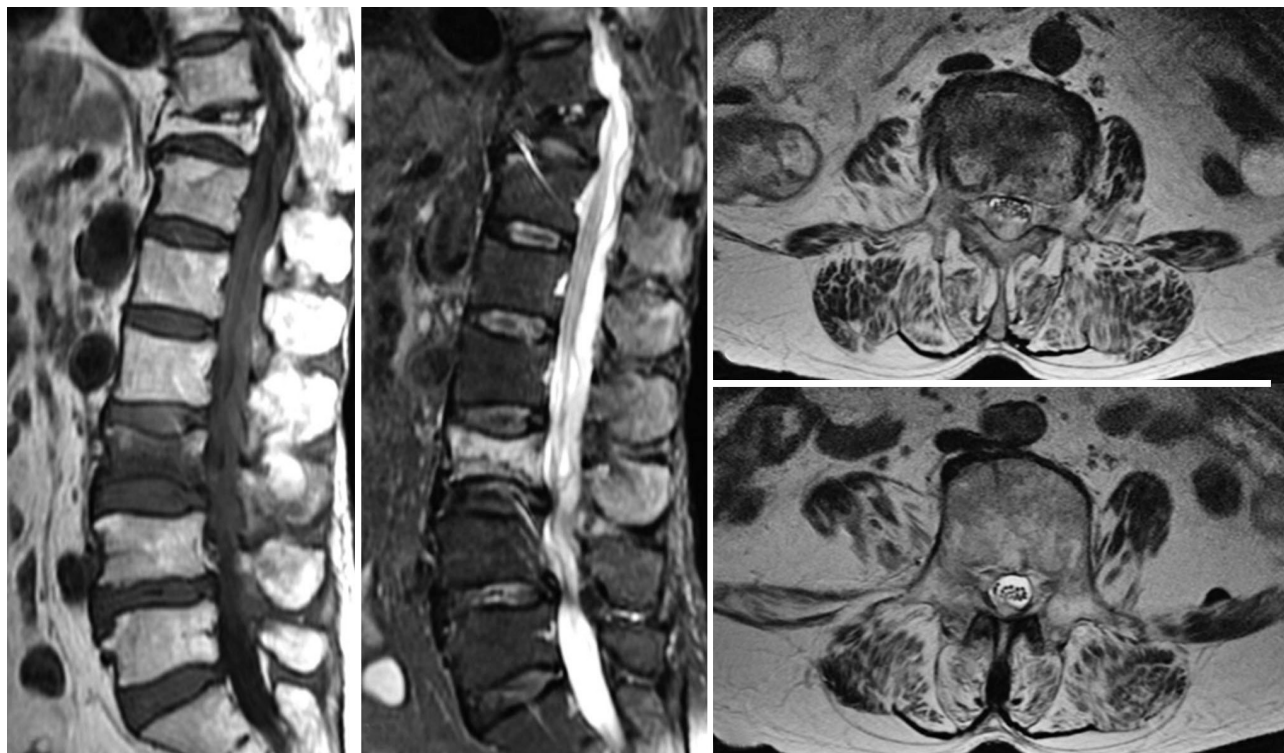


Fig. 1. MRI before vertebroplasty demonstrated compression fracture of L3 body with epidural hematoma and old compression fracture of T11 body. There was no evidence of infection.

the T10 to the S1 and bilateral psoas abscesses are originated from pyogenic spondylodiscitis L3–4.

Case Report

A 74-year-old woman presented to emergency room of our hospital, complaining of lower back pain, fever and radiating pain in the lower extremity. 1 month before her visit, she had presented to the local hospital, complaining low back pain after fall and been diagnosed with an osteoporotic compression fracture of L3. Magnetic resonance imaging (MRI) sent from a local hospital revealed a new compression fracture at L3 with epidural hematoma and collapsed T11 body by an old compression fracture (Fig. 1). She underwent vertebroplasty at L3 using polymethylmethacrylate (PMMA) cement. Physical examination indicating fever or local heating sensation were not found. Before the procedure, blood test showed normal ranges of white blood cell (WBC), erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP). According to the medical records of the hospital, antibiotic prophylaxis was administered with cephalosporin, and there was no event during

the procedure. Her back pain has been relieved immediately after vertebroplasty. About a week after vertebroplasty, however, the patient complained of aggravated back pain and fever. She received empirical antibiotic treatment for a week. However, her symptoms did not improve, but worsened. Blood test taken at a local hospital on aggravation of fever and back pain showed WBC count of 20,000 cells/mm³ (normal: 4000~10000 cells/mm³) with 85.7% segmented neutrophils. She was transferred to our hospital for further care.

When she was presented to our hospital, physical examination revealed a body temperature of 38.1°C and tenderness in lumbar area. Neurologic examination showed no significant motor weakness and sphincter disturbance. Decreased sensory function was found in both lower extremities. The laboratory findings showed a WBC of 10,760 cells/mm³ with 84.2% segmented neutrophils, an ESR of 80 mm/h (normal: 0~20 mm/h), and a CRP level of 97 mg/L (normal: <5 mg/L). She had not have any significant medical illness. Radiographs showed vertebroplasty of L3 with mild decreased body height (Fig. 2). MRI demonstrated high signal intensity of L3–4 body and subcutaneous fat tissue in T2-weighted images. On T1-weighted images with gadolinium

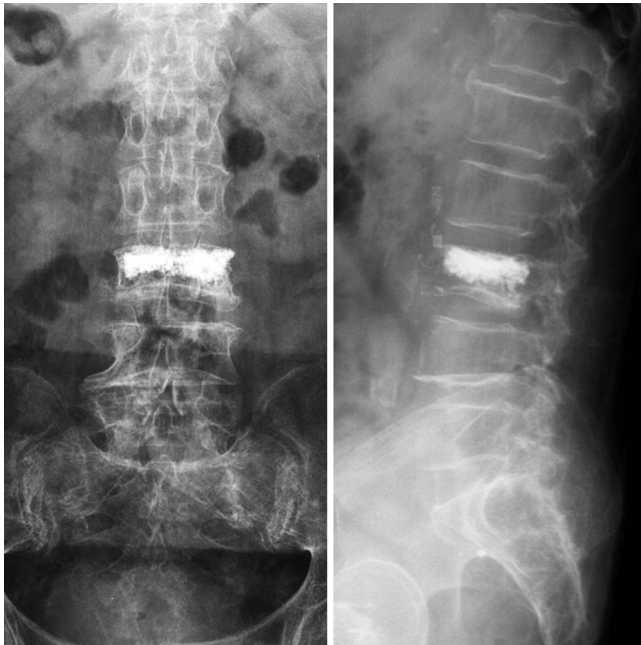


Fig. 2. Initial anteroposterior and lateral radiographs of the lumbar spine demonstrate L3 vertebroplasty without definite bony lesion.

enhancement, an extensive spinal epidural abscess from T10 to S1 and huge bilateral psoas abscesses (right: $4.8 \times 3.6 \times 2.7$ cm, left: $6.7 \times 5.7 \times 3.8$ cm) was demonstrated with peripheral rim enhancement (Fig. 3, 4).

After admission, we started empirical antibiotic therapy was started with cephalosporin and aminoglycoside. On the first hospital day, neurological deterioration was aggravated significantly. Neurologically, she had 3 or 4 grade muscle weakness and aggravated radiating pain on both lower extremities. However, anal tone and urinary function were intact. The patient was immediately taken to the operating room. Through a midline posterior approach, limited unilateral laminectomy of L1–2, and limited bilateral laminectomies from L3 to S1 were performed selectively. Large amount of yellow-colored pus were encountered, and significant granulation tissues were observed in the epidural space. After a pus culture and biopsy were performed, the dural sac was decompressed through copious saline irrigation and the evacuation of granulation

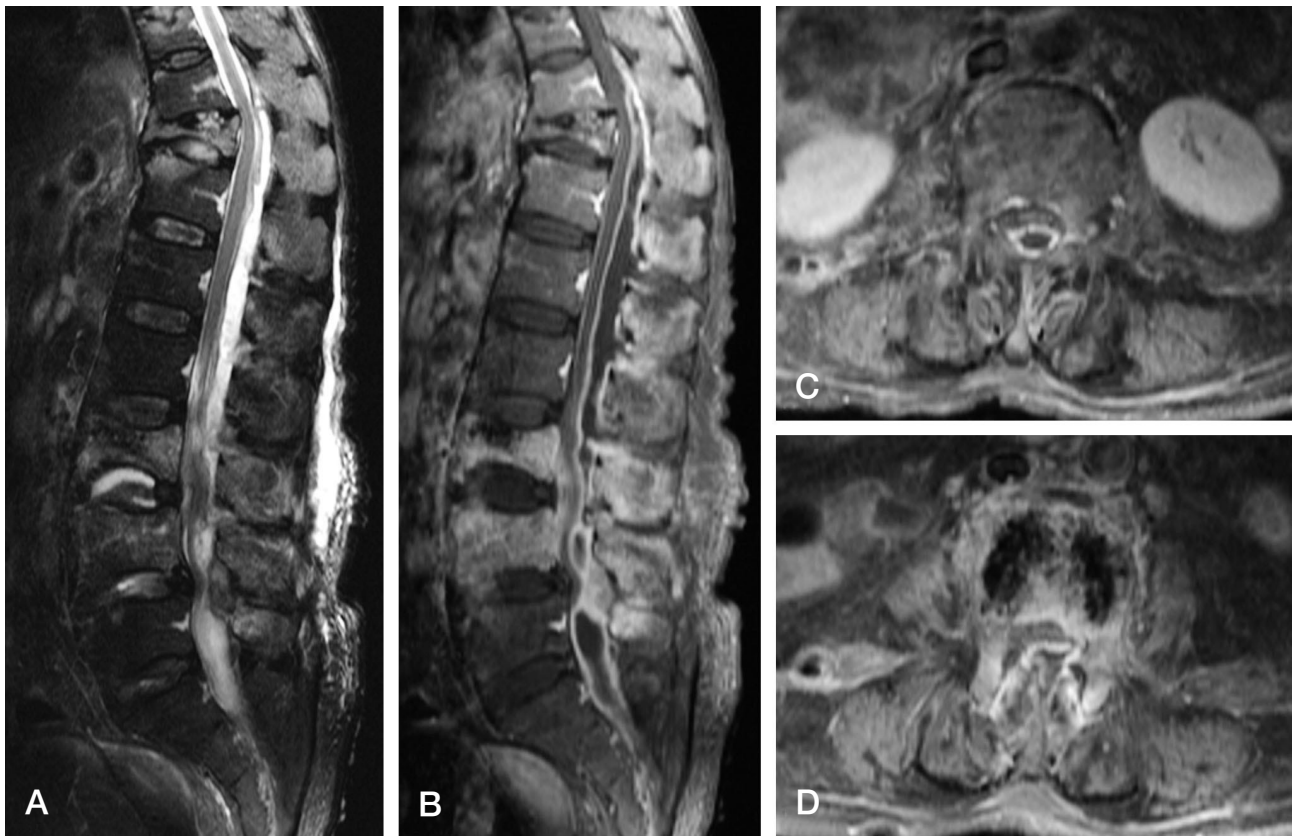


Fig. 3. T2 weighted sagittal MR image demonstrates high signal intensity of L3-4 body and epidural space and subcutaneous space (A). Enhanced T1 weighted MR images demonstrate low signal intensity with ring-like peripheral rim enhancement of epidural lesion, suggestive of spinal epidural abscess from T10 to S1 (B). An axial image of L2 level demonstrates compression of spinal cord by a huge spinal epidural abscess (C). An axial image of L3 body level (D).

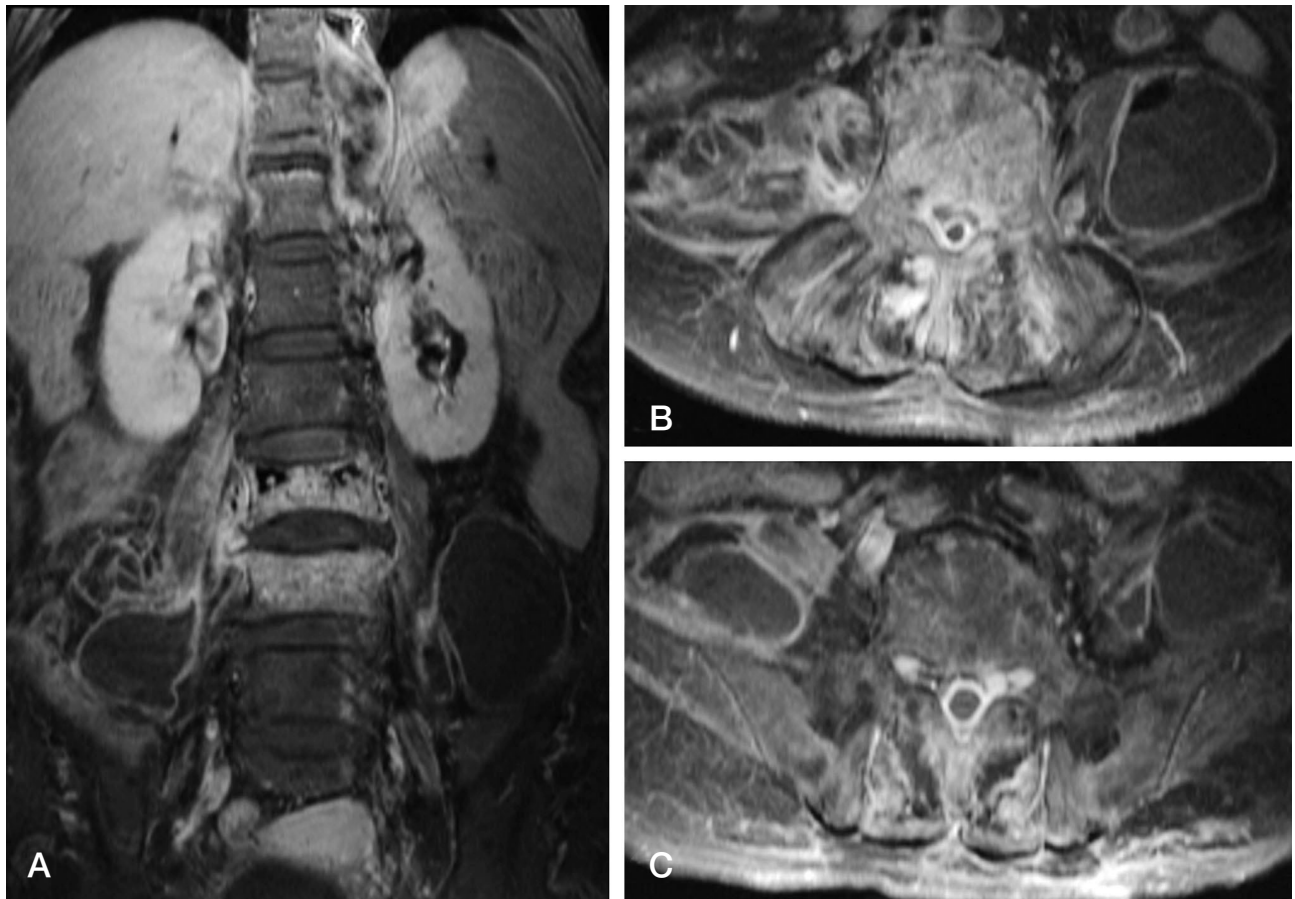


Fig. 4. The enhanced T1 weighted coronal MR image demonstrates huge bilateral psoas abscesses with peripheral rim enhancement (A). Also, spinal epidural abscess and pyogenic spondylodiscitis L3-4 was observed. Axial images of L4 level (B) and L5 level (C).

tissues. We did not perform posterior instrumentation or fusion, because there was no instability of the spinal column.

We drained the bilateral psoas abscesses using ultrasound-guided percutaneous catheter drainage after surgery. Pus and blood clots were drained. The catheters were kept, until pus was drained completely. Cultures of intraoperative swabs revealed methicillin-resistant *Staphylococcus aureus* (MRSA). The antibiotic regimens were changed to intravenous vancomycin and oral rifampicin. Blood test taken 1 week after the surgery showed ESR 46 mm/hr, CRP 44.6 mg/L, after 2 weeks showed ESR 30 mm/hr, CRP 25.5 mg/L, and each index conclusively seemed to decline. As her symptoms and laboratory results improved progressively, she was allowed walker ambulation with brace 1 week after surgery. She underwent 6 weeks of antibiotics therapy after surgery, then she returned home. Blood test taken 6 weeks after the surgery showed ESR 27 mm/hr, CRP 15.4 mg/L. She underwent oral antibiotics treatment for another 6 weeks after discharge. Three months after surgery, she was able to walk



Fig. 5. Two years after surgery, anteroposterior and lateral radiographs of lumbar spine demonstrate spontaneous fusion between L3 body and L4 body with mild collapse of L3 body.

assisted by a cane. There was no evidence of residual infection and neurologic sequelae. After 3 months, laboratory test showed ESR 15 mm/hr, CRP 0.75 mg/L. Two years after surgery, she complained of mild back pain, but this did not prevent her daily activities. Radiographs showed spontaneous fusion at L3–L4 with decreased L3 body height (Fig. 5).

Discussion

There have been reported more than 10 articles of infection after vertebroplasty or kyphoplasty, and the number of cases increases gradually.^{1,2)} Most of them was related with underlying immunocompromised conditions including diabetes mellitus, immunosuppressive therapy, alcoholic liver disease, or preexisting infection, and a few cases was related with intraoperative contamination. Spinal epidural abscess following vertebroplasty has been rarely reported.²⁾ Spinal epidural abscess is clinically very important and requiring prompt cognition and management. Although, there was no definite number of vertebral level, extensive spinal epidural abscess involves more than five levels in reported case.^{2–4)} Advances of imaging technology, aging population, use of spinal instruments, various spinal procedures have doubled the incidence of spinal epidural abscess over the last two decades. Risk factors of spinal epidural abscess are medical illness associated with host immunity (diabetes mellitus, chronic renal failure, alcoholic liver disease, immunosuppression) as well as local or systemic infection. *Staphylococcus aureus* (*S. aureus*) is most common organism in spinal epidural abscess, followed by *Streptococcus* species follows. MRSA infection is relatively uncommon, however, as the increasing use of spinal implants, MRSA infection is increasing steadily. In this case, the patient had been healthy without any risk factor of compromised immunity before compression fracture of L3. The route of infection was presumed to be contamination during the procedure of previous vertebroplasty.

The treatment of spinal epidural abscess often requires an urgent multimodal therapy as spinal emergency. The duration of intravenous antibiotics administration is at least 4–6 weeks depending on size of abscess. In the case of concomitant vertebral osteomyelitis, intravenous antibiotic administration is recommended for 6–8 weeks.⁵⁾ Although medical treatment has been successful, most reports recommend surgical decompression of epidural abscess because it is possible to

effectively decompress spinal canal and progression of infection is unpredictable. There are various surgical options of extensive spinal epidural abscess including multilevel laminectomies, multilevel unilateral fenestrations, minimally invasive multilevel laminotomies, and corpectomy.^{3,4)} In this case, we did not consider aggressive surgical debridement and spinal stabilization to avoid perioperative comorbidity in an elderly patient, and risk of recurrence of infection.

The pyogenic spondylitis and spondylodiscitis are the most common forms of postvertebroplasty infections.¹⁾ Although dominant pathogenic microorganisms of primary pyogenic spondylitis are *S. aureus* and *Streptococcus* species and gram-negative bacilli, various microorganism including tuberculosis also could be causative microorganisms in spondylitis related with vertebroplasty or kyphoplasty.¹⁾ Treatment of pyogenic spondylitis following vertebroplasty is long-term antibiotic therapy or surgical intervention.¹⁾

Incidence of psoas abscess is unknown, but it is thought that it is increasing. Primary psoas abscess is hematogenous origin and secondary is originating from neighbor structures. Most common organism in primary psoas abscess is *S. aureus* and enteric bacteria is the most common organism in secondary psoas abscess.⁶⁾ Treatment modalities of psoas abscess include antibiotic therapy, surgical intervention, and CT or ultrasound guided percutaneous drainage. Advantages of percutaneous catheter drainage are prevention of spread of the contents of an abscess and decrease of inflammation of the surrounding tissues. According to Yacoub, et al, size of abscess that smaller than 3 cm in greatest diameter may be managed with antibiotics alone, and abscess that larger than 3 cm may be managed with percutaneous catheter drainage.⁶⁾ They recommend open drainage is indicated for recurrent secondary psoas abscess. In this case, we successfully treated huge bilateral psoas abscesses with percutaneous catheter drainage at next day after limited laminectomies.

When vertebral osteomyelitis was involved, anterior surgical decompression in which fresh-frozen structural allograft was used after aggressive debridement, followed by a posterior stabilization procedure.⁷⁾ After the performance of surgical procedure, kyphotic deformity should be considered. Traditional infective spine surgery has a high risk of blood loss and long ICU admission.⁸⁾ Recently, minimal access spine surgery is reporting fine results.^{9,10)} It is considered clinically significant for this patient

to undergo minimal open procedure to control infection.

In conclusion, vertebroplasty is a relative simple, but it may lead to severe spinal infection associated with neurologic deterioration if sterile surgical environment and aseptic technique is not guaranteed. Urgent surgical decompression and long-term antibiotic therapy are important to treat spinal epidural abscess with neurologic deterioration. Additionally, limited surgery and proper antibiotic therapy could be a good treatment option for elderly patients.

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추체 성형술 후 발생한 화농성 척추추간판염과 동반된 광범위 경막외 농양과 요근 농양 - 증례 보고 -

박진성 • 김동희 • 강변중 • 정순택

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연구 계획: 증례보고

목적: 제 3요추 추체 성형술 후 광범위 경막외 농양과 요근 농양이 동반된 화농성 척추추간판염에 대해 증례 보고를 하고자 한다.

선행문헌의 요약: 추체 성형술과 경피적 풍선 척추 성형술 후 감염이 발생하는 경우는 매우 드문 합병증이다. 추체 성형술 후 광범위 경막외 농양과 양측 요근 농양이 동반된 척추추간판염에 대해 적은 증례가 보고되어 있다.

대상 및 방법: 이학적, 임상 및 영상학적 검사를 토대로 증례보고 시행하였다.

결과: 특이 질환없는 74세 여자환자로 내원 3주 전 하부 요통으로 추체 성형술을 타병원에서 시행 후, 양측 하지 신경학적 결손 및 발열로 내원하였다. 자기공명영상에서 제 10흉추에서 제 1천추까지 광범위 경막외 농양과 양측 요근 농양이 동반되어 있는 제 3-4요추 척추추간판염이 관찰되었다. 제 1요추에서 제 1천추까지 제한적 후궁절제술과 배농술을 시행하였다. 양측 요근 농양에 대해서는 수술 이후 초음파 감시 하 경피적 배농술을 시행하였다. 수술장에서 시행한 배양 검사 상 메티실린 내성 황색 포도상구균이 배양되었으며, 6주간 반코마이신(vancomycin) 정맥 주사와 리팜피신(rifampicin)을 경구 투여하였다. 신경학적 결손 및 요추 변형 없이 감염은 성공적으로 치료되었다.

결론: 추체 성형술은 비교적 안전하고 간단한 시술이지만, 종종 심각한 감염을 일으킬 수 있다. 따라서, 반드시 수술은 멸균된 환경에서 무균적 처치가 필요하다. 신경학적 증상이 동반된 경막외 농양은 빠른 진단이 필수적이며, 즉각적인 압박술과 적절한 장기간의 항생제 치료가 필요하다. 또한, 경막외 농양과 동반된 화농성 척추추간판염은 제한적 수술과 적절한 항생제의 투여가 좋은 치료 옵션이 될 수 있다.

색인 단어: 경막외 농양, 요근 농양, 화농성 척추추간판염, 추체 성형술, 합병증

약칭 제목: 감염된 추체 성형술