Korean J Thorac Cardiovasc Surg 2015;48:443-446 □ Case Report □
ISSN: 2233-601X (Print) ISSN: 2093-6516 (Online) http://dx.doi.org/10.5090/kjtcs.2015.48.6.443

Mycotic Abdominal Pseudoaneurysm due to Psoas Abscess after Spinal Fusion

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A 36-year-old man, who had undergone thoracoscopic anterior spinal fusion using the plate system and posterior screw fusion three months previously, presented to our hospital with left flank pain and fever. Computed tomography indicated the presence of a psoas muscle abscess. However, after two days of percutaneous catheter drainage, a mycotic abdominal aortic pseudoaneurysm was detected via computed tomography. We performed *in situ* revascularization using a prosthetic graft with omental wrapping. Methicillin-resistant *Staphylococcus aureus* was identified on blood and pus culture, and systemic vancomycin was administered for one month. Although the abscess recurred, it was successfully treated with percutaneous catheter drainage and systemic vancomycin administration for three months, without the need for instrumentation removal. The patient remained asymptomatic throughout two years of follow-up.

Key words: 1. Aneurysm, infected
2. Psoas abscess
3. Methicillin-resistant *Staphylococcus aureus*
4. Spinal fusion

CASE REPORT

Mycotic aortic pseudoaneurysm is a rare condition, but it is life-threatening due to its rapid progression. It has been associated with a range of infectious conditions, including psoas abscesses, from which *Salmonella*, *Staphylococcus*, and *Escherichia coli* are commonly isolated. However, cases of psoas abscess caused by methicillin-resistant *Staphylococcus aureus* (MRSA) following spinal fusion are extremely rare.

In the present report, we describe a case of mycotic abdominal aortic pseudoaneurysm due to a psoas abscess caused by MRSA after spinal fusion. To our knowledge, this is the first such case to be reported in the literature.

A 36-year-old man presented to Wonkwang University Hospital with a one-month history of left flank pain and a one-week history of fever. He had undergone thoracoscopic anterior spinal fusion with the plate system and posterior screw fusion of T12 to L1 for the treatment of a T12 burst fracture three months previously. Computed tomography (CT) indicated the presence of a psoas muscle abscess (Fig. 1A). Laboratory test results showed an elevated erythrocyte sedimentation rate (56 mm/hr) and C-reactive protein level (118 mg/L). The remaining laboratory values were within normal limits. After the empirical systemic administration of first-generation cephalosporin, CT-guided percutaneous catheter drainage (PCD) and biopsy were performed. MRSA was identified in blood and pus culture, and the treatment was changed to vancomycin. After two days of PCD, the patient complained of gradually wor-

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Received: October 1, 2014, Revised: December 1, 2014, Accepted: December 3, 2014, Published online: December 5, 2015
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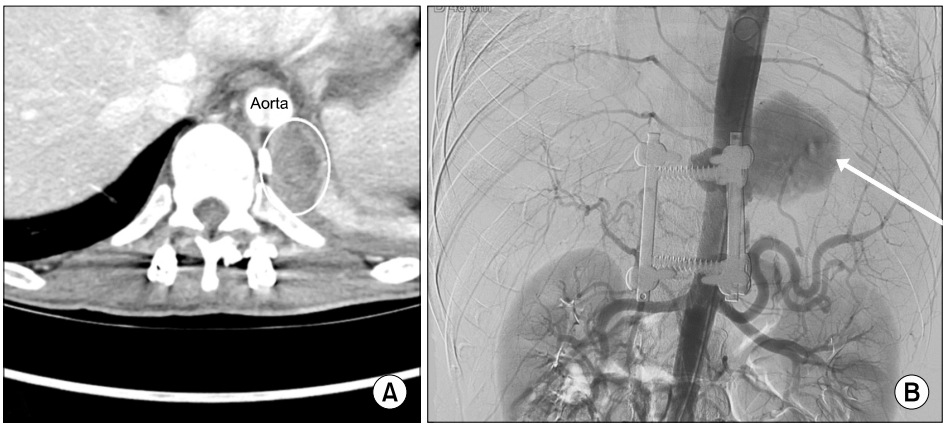

Fig. 1. (A) Contrast-enhanced computed tomography showing a psoas muscle abscess (circle) (B) Aortogram performed 2 days after percutaneous catheter drainage showing a large aortic pseudoaneurysm (arrow).

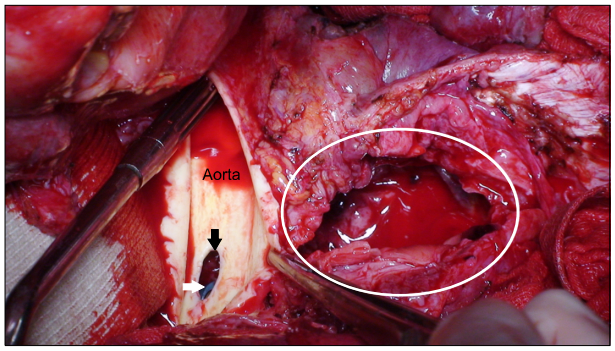

Fig. 2. Perforated abdominal aorta (black arrow), aneurismal sac (circle) and metal instrumentation (white arrow).

sening back pain. We therefore performed repeat CT and identified a pseudoaneurysm in the abdominal aorta around the abscess. We confirmed the presence of a large abdominal aortic pseudoaneurysm immediately below the diaphragm on aortography (Fig. 1B).

We performed an operation under partial extracorporeal circulation using the femoral vessels. After a thoracoabdominal incision was made and laparotomy was performed, we approached the pseudoaneurysm via the retroperitoneum. We cross-clamped the aorta above the diaphragm and above the celiac axis. The aneurysmal sac and psoas abscess were opened and debrided (Fig. 2). *In situ* reconstruction of the aorta was performed with a prosthetic vascular graft (18-mm Vascutek, Gelseal; Terumo, Ann Arbor, MI, USA). The remaining metal instrumentation and vascular graft were covered with omentum.

After surgery, tissue culture confirmed the presence of MRSA. Vancomycin was therefore administered, with the serum drug level maintained at >10 μg/mL. The patient gradually recovered, but fever reoccurred 33 days postoperatively. A repeat CT indicated recurrence of the abscess, and PCD was performed promptly. Moreover, the vancomycin dose was increased, with the serum drug level maintained at 15 μg/mL. After 11 weeks of systemic vancomycin administration, the patient was discharged and has undergone two years of follow-up; at present, he remains asymptomatic.

DISCUSSION

Due to its rich blood supply, the psoas muscle is believed to be predisposed to primary abscess formation by hematogenous spread, primarily among children and young individuals. Secondary psoas abscess is generally observed in industrialized countries and primarily affects patients aged 10–50 years [1,2]

Primary psoas abscess with *S. aureus* as the primary pathogen only accounts for 20% of all cases of psoas abscess; the remaining 80% of cases of psoas abscess have been reported to be secondary psoas abscesses from adjacent infectious sources. A previous study found that skeletal infections (48%, 29/61), such as vertebral osteomyelitis (33%), pelvic osteomyelitis (8%), and septic arthritis (7%), were the most frequent source of secondary infections, followed by intra-abdominal infections (23%) [3]. Although rare, several cases of psoas abscess after spinal fusion have been reported in the literature.

Alonso et al. [3] reported that MRSA has recently become

the predominant pathogen involved in cases of psoas abscess, accounting for 32.5% (13/40) of all cases of psoas abscess with a definitive pathologic diagnosis. Secondary infections of skeletal origin comprised 69% of these cases (9/13). Therefore, although only one case of psoas abscess due to MRSA after spinal surgery has been reported in the English-language literature [1], an increase in the incidence of psoas abscesses with MRSA after spinal surgery is expected in the future.

Such infectious conditions may cause bacteremia and the embolization of infectious agents that are implanted in diseased or atherosclerotic arterial walls or mural thrombi. Alternatively, as observed in the present case, the infectious agent may directly penetrate an adjacent vascular structure, resulting in necrosis and mycotic pseudoaneurysm formation [4].

Mycotic aortic pseudoaneurysm is a life-threatening condition that exhibits relatively rapid progression in comparison with noninfectious aortic aneurysms. Most mycotic aneurysm patients are symptomatic and complain of back, abdominal, or thoracic pain depending on the location of the aneurysm [4].

Fever, back pain, leukocytosis, and elevated inflammatory marker levels are common symptoms and signs of psoas abscess and mycotic pseudoaneurysm. Although the psoas sign is helpful in the diagnosis of psoas abscess, it is difficult to distinguish between psoas abscess and mycotic pseudoaneurysm due to their similar symptoms and signs.

The optimal surgical management of mycotic aneurysm and graft selection (antibiotic-bondage grafts, silver-coated Dacron grafts, or cryopreserved arterial homografts, among others) remain controversial. However, for infrarenal lesions, extra-anatomic bypass grafts are the standard treatment used to avoid graft contamination [4]. In contrast, for suprarenal lesions, *in situ* prosthetic graft reconstruction following mycotic aneurysm resection is the preferred method of revascularization [4,5].

Overall, the removal of the instrumentation combined with extensive debridement, irrigation, administration of long-term antibiotics, and *in situ* revascularization using a prosthetic graft is considered the treatment of choice [4-6]. In cases involving infection after spinal surgery, as occurred in our patient, instrumentation removal is often necessary to eradicate the infection [2]. However, if the infection develops before the maturation of the fusion, the implant can be left in place and irrigation and debridement can be performed successfully [6].

In the present case, the abscess recurred despite debridement, irrigation, and wrapping of the prosthetic graft with omentum. However, the abscess was successfully treated with PCD and long-term antibiotic administration, and instrumentation removal was not necessary. We believe that insufficient debridement, the presence of MRSA, and the remaining metal instrumentation influenced the recurrence in the present case. However, graft wrapping prevented contamination and facilitated successful treatment with PCD and long-term (three-month) antibiotic administration.

Thus, intensive antibiotic therapy may be crucial for the successful treatment of such cases. The initial use of broad-spectrum antibiotics and the parenteral administration of culture-specific antibiotics for more than six weeks is recommended. Muller et al. [4] suggested that postoperative antibiotics should be administered for at least three months and should be discontinued only when the patient does not exhibit any further signs of infection.

In conclusion, complete resection of the infected tissue and removal of instrumentation prior to *in situ* graft reconstruction is necessary. However, in patients who cannot undergo complete removal of the infected tissue and the metal instrumentation, omental wrapping may provide a suitable barrier to prevent the propagation of contamination, facilitating successful treatment.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

ACKNOWLEDGMENTS

This paper was supported by a grant from Wonkwang University in 2014.

REFERENCES

1. Berti AF, Santillan A, Berti AF Jr. *Bilateral psoas abscesses caused by methicillin-resistant Staphylococcus aureus (MRSA) after posterolateral fusion of the lumbar spine*. J Clin Neurosci 2010;17:1465-7.
2. Muckley T, Schutz T, Kirschner M, Potulski M, Hofmann

G, Buhren V. *Psoas abscess: the spine as a primary source of infection*. Spine (Phila Pa 1976) 2003;28:E106-13.
3. Alonso CD, Barclay S, Tao X, Auwaerter PG. *Increasing incidence of iliopsoas abscesses with MRSA as a predominant pathogen*. J Infect 2011;63:1-7.
4. Muller BT, Wegener OR, Grabitz K, Pillny M, Thomas L, Sandmann W. *Mycotic aneurysms of the thoracic and abdominal aorta and iliac arteries: experience with anatomic and extra-anatomic repair in 33 cases*. J Vasc Surg 2001;33:106-13.
5. Chen IM, Chang HH, Hsu CP, Lai ST, Shih CC. *Ten-year experience with surgical repair of mycotic aortic aneurysms*. J Chin Med Assoc 2005;68:265-71.
6. Bose B. *Delayed infection after instrumented spine surgery: case reports and review of the literature*. Spine J 2003;3:394-9.