Minimally Invasive Approach for Drainage of Spondylodiscitis with Iliopsoas Abscess

Tameem Elkhateeb, Abdelrady Mahmoud

Lecturers of Orthopedic Surgery, Faculty of Medicine, Ain-Shams University

ABSTRACT

AIM: To evaluate outcomes in patients with spondylodiscitis accompanied by iliopsoas abscess who were treated by minimally invasive paraspinal surgical approach.

INTRODUCTION: Several authors have described minimally invasive techniques that address spondylodiscitis as the primary focus for the treatment of this condition. Although the clinical results have been satisfactory in these studies, the techniques are technically demanding and sometimes time-consuming, which may present obstacles to these techniques becoming accepted as standard procedures. Simpler and easier treatment for this condition is still needed.

MATERIAL and METHODS: Twenty patients (13 men, 7 women; mean age, 49.0 years; range, 25-85 years) were treated using minimally invasive paraspinal surgical approach in addition to common conservative therapy. Mean follow-up duration was 27.7 months (range, 12-48 months). Clinical outcomes were graded.

RESULTS: Symptoms such as low back pain, radicular pain, and hip pain resolved in all patients immediately after treatment. Mean time from the start of treatment to the return of C-reactive protein levels to normal or baseline values recorded before the onset of spondylodiscitis was 28.3 days (range, 8-56 days). In the final set of follow-up radiographic studies, all patients were free from progressive destructive changes. Follow-up magnetic resonance images or computed tomography with contrast enhancement confirmed the disappearance or near-total resolution of the iliopsoas abscess cavity with healing of the spondylodiscitis in all 20 patients. No recurrences were observed during follow-up.

CONCLUSIONS: Minimally invasive paraspinal surgical approach to drain iliopsoas abscess provides advantages in terms of rapid recovery, minimally invasiveness, absence of radiation, and shorter hospital stay.

KEY WORDS: Drainage, iliopsoas abscess, minimally invasive, spondylodiscitis

INTRODUCTION

The rate of occurrence of spondylodiscitis has been increasing among patients who are immunocompromised due to severe underlying diseases such as diabetes mellitus and malignant tumor as well as among patients undergoing chronic hemodialysis. Iliopsoas abscesses sometimes develop in patients with spondylodiscitis. Although small iliopsoas abscesses usually respond to ordinary conservative treatment, cases of spondylodiscitis accompanied by larger abscesses are, in general, difficult to cure using conservative methods. Because most of these cases occur in immunocompromised patients who are in poor general condition, a less invasive operative procedure is desirable. Although percutaneous drainage has been reported to be effective in iliopsoas abscesses secondary to spondylodiscitis (10), valid long-term results of this technique are not yet available. Drainage alone for a secondary psoas abscess may result in significant recurrence rates, and percutaneous drainage alone is not always sufficient for the treatment of secondary iliopsoas abscesses due to spondylodiscitis (1, 2, 11, 16). In addition, some authors have emphasized the role of the spine as the primary source of infection for secondary iliopsoas abscess and have suggested that it is essential to combine abscess...
Several authors have described minimally invasive techniques that address spondylodiscitis as the primary focus for the treatment of this condition (4, 5, 7, 12). Although the clinical results have been satisfactory in these studies, the techniques are technically demanding and sometimes time-consuming, which may present obstacles to these techniques becoming accepted as standard procedures. Simpler and easier treatment for this condition is still needed. To the best of our knowledge, there have been no previous reports of the use of a minimally invasive paraspinal surgical approach, and the purpose of this article is to evaluate the outcomes in patients who have undergone this approach.

**MATERIALS AND METHODS**

Twenty patients with spondylodiscitis accompanied by iliopectus abscess were treated using a minimally invasive paraspinal surgical approach in addition to common conservative therapy, including bed rest and pharmacotherapy with antibiotics and/or immunoglobulin preparations, in our hospital between May 2010 and January 2014. There were 13 men and 7 women (mean age, 49.0 years; range, 12-85 years). The mean duration of follow-up was 27.7 months (range, 12-48 months). The indications for the use of this method to treat spondylodiscitis with iliopsoas abscess were as follows: 1) involved vertebra located in the lumbar spine; 2) absence of major neurological deficits; 3) absence of radiographically remarkable bone destruction of the affected vertebral body (we included cases with signal intensity change in the vertebral body on magnetic resonance imaging (MRI) and/or endplate collapse and excluded cases with vertebral body collapse) (Figure 1); and 4) abscess measuring ≥30 mm on the axial view of the MRI (Figure 2). Of the 20 patients, all experienced low back pain. Four patients exhibited mild or moderate radicular pain, and 1 patient had left hip pain. No patient had bowel or bladder dysfunction. The affected intervertebral discs were L1-2 in 3 patients, L2-3 in 6 patients, L3-4 in 4 patients, L4-5 in 6 patients, and L5-S1 in 1 patient. The abscesses were measured at their largest dimensions on the MRI axial view. The mean size of the abscesses was 48.1 mm (range, 30.0-79.1 mm). Mean C-reactive protein (CRP) level at admission was 12.83 mg/dL (range, 1.78-23.76 mg/dL). Comorbidity included diabetes mellitus in 7 patients, renal failure in 3 patients, carcinoma in 2 patients, urinary tract infection in 2 patients, pneumonia in 1 patient, and bronchial asthma in 1 patient.

**Figure 1:** Signal intensity change in the L3 vertebral body on MRI.
SURGICAL PROCEDURE

The patients were placed in the prone position; We start this exposure by incising the skin two to three finger breadths off the midline. Paraspinous incisions are then made through the fascia, creating a gentle medial curve at the cranial and caudal extremes of the incision. The fascial incision will lie over the muscular interval between the multifidus and longissimus, which is bluntly developed to expose the facet joints and transverse processes below. Once the facet joint has been identified, a deep Williams or Gelpi retractor may be placed and the Cobb elevator used to strip the soft tissues from the transverse process laterally and from the facet and lamina medially. The transverse process may be osteotomized at its base and retracted laterally along with the posterior attachment of the psoas muscle. A bipolar cautery is used to obtain hemostasis around the transverse process and facet by identifying and coagulating the communicating and intraarticular branches of the segmental artery.

When the psoas muscle and abscess become visible, a 2-cm incision was made in the fascia overlying the muscle (Figure 3), and pus was removed by suction and abscess cavity was irrigated with saline solution, after collecting 10 mL for microbial culture. A large silastic drain was placed into the abscess cavity and removed on second or third day, postoperatively.

This approach also provides access to the spinal nerve root as it exits the lateral boundary of the intervertebral foramen, permitting decompression of far lateral disc herniations or lateral margin osteophytes. Access is also available to the lateral aspect of the pedicle and vertebral body.

After the procedure, all patients underwent routine clinical, laboratory, and imaging examinations. Radiographs were checked for signs of bone destruction such as vertebral collapse and spinal deformities such as kyphosis and scoliosis. Contrast-enhanced MRI or CT was used to investigate the abscess size (Figure 4). The following parameters were evaluated: 1) alleviation of symptoms; 2) changes in inflammatory markers on laboratory tests; 3) changes in the findings of radiographic imaging, including bone destruction, spinal deformity, and instability; 4) change in the abscess size; 5) recurrence rate; and 6) clinical outcome at the final follow-up. The clinical outcome was graded as excellent when there was no pain and no limitation in activities of daily living (ADLs); good if there was no limitation in ADLs but mild occasional pain; fair in the cases.
with slight limitations in ADLs and continuing pain that was not as great as that before the procedure; and poor in cases with limitations in ADLs and persistent, marked pain or no response to the procedure.

RESULTS

All 20 patients were treated using a minimally invasive paraspinal surgical approach in addition to common conservative therapy including bed rest and pharmacotherapy with antibiotics and/or immunoglobulin preparations. The pathogens were identified from collected samples in 12 of the 20 patients. Low back pain in 20 patients, radicular pain in 4 patients, and hip pain in 1 patient resolved immediately after treatment. The mean time required from the start of treatment for CRP to decrease to normal levels or to reach the level before the onset of spondylodiscitis was 28.3 days (range, 8-56 days). Progressive destructive changes were absent in the final follow-up radiographic studies in all patients. No patient displayed progression of spinal deformity or instability. Follow-up MRI or CT with enhancement confirmed the disappearance or near-total resolution of the iliopsoas abscess cavity and healing of the spondylodiscitis in all 20 patients (Figure 5). No recurrence was observed in any patient at follow-up. At the final follow-up, the clinical outcomes were rated as excellent in 10 patients, good in 8 patients, and fair in 2 patients. There were no patients with poor outcomes according to the classification described.

DISCUSSION

Conservative therapy with antibiotics is generally the initial treatment of choice for spondylodiscitis. However, because of the increased number of patients who are immunosuppressed due to the effects of certain medications or underlying diseases, it is becoming more difficult to treat patients with spondylodiscitis using only common conservative therapy. Open surgery is required in cases of spondylodiscitis in which conservative treatment is ineffective or in which advanced bone destruction or severe neurological deficits are present. There have been a number of reports regarding surgical options for spondylodiscitis. Some authors have suggested that favorable results are best achieved using anterior curettage and autologous bone grafting (3-9) and Wisneski (15) has also included increased paraspinal abscess formation among the indications for open surgery. In addition, Malawski and Lukawski (16) have reported that although small paraspinal abscesses usually respond to conservative treatment, larger paraspinal abscesses can be treated surgically with successful results. However, in 147 surgically treated patients, 4 cases of mortality due to cardiac or renal disease and secondary pneumonia were encountered. Because patients with spondylodiscitis who require surgery are often immunocompromised and in poor general condition, less invasive operative procedures are desirable.

Minimally invasive paraspinal surgical approach to drain iliopsoas abscess may be a recognized alternative to major surgery, but in patients with secondary iliopsoas abscess without radical treatment of the primary focus of infection (i.e., spondylodiscitis), drainage of the iliopsoas abscess alone is sometimes not enough. For patients in whom spondylodiscitis is the primary focus of infection, prolonged infection of a vertebral body or intervertebral disc usually leads to spinal deformity or instability, resulting in the need for surgical intervention. Without intervention for the primary focus, a prolonged period of therapy may be required, and there can be recurrence even if the infection is initially cured. Tofuku et al reported that the mean time
required for normalization of CRP is 30.2 days for treatment consisting of drainage tube in the secondary iliopsoas abscess (12). The mean time required for normalization of CRP was 28.3 days in the present study, which is comparable to the data of Tofuku et al study; thus, there was no prolonged period of therapy in this study. Several authors have previously reported recurrence of iliopsoas abscesses without curative treatment of the primary focus of infection. Dinc et al. (2) reported that 6 (29%) of 21 patients had recurrences within 1 to 3 months after catheter removal in their study of percutaneous drainage of iliopsoas and spondylodiscitic abscesses measuring >3 cm. Yacoub et al. (16) reported a recurrence rate of 15% (4 of 26 patients) after percutaneous drainage of psoas abscess. Tabrizian et al. (11) reported that the failure rate of percutaneous drainage alone was as high as 60% (29 of 48 patients) and that 44% (21 of 48) of patients ultimately required operative management. Cronin et al. (1) reported that 10 (10%) of 99 patients had recurrent abscesses after catheter removal. Therefore, percutaneous drainage of iliopsoas abscesses alone might not be an established treatment for spondylodiscitis accompanied by iliopsoas abscesses. Some investigators consider it essential to combine abscess drainage with curative treatment of the primary focus of infection (8) and we believe that a more effective means of preventing a prolonged period of therapy and recurrence is a crucial factor in successful and less invasive treatment.

Several minimally invasive techniques for the treatment of spondylodiscitis have recently been described. This paraspinal surgical approach has been popularized by Wiltse and colleagues (13, 14) it requires less retraction of the medial paraspinous musculature and may reduce operative blood loss by taking advantage of the anatomic plane between the multifidus and the longissimus. Stripping of the facet capsule and lamina can still be carried out from this approach, and medial foraminotomies, medial facetectomies and foraminotomies, or complete foraminal
decompression can be carried out through this approach. The primary advantage of the approach, however, remains the excellent access to the transverse processes and facets.

The articular surfaces of the facet joint are also accessible for débridement and decortication. If the spinal nerve root requires decompression, the dissection is carried down to the extraforaminal region by carefully incising and removing the intertransverse ligament. The nerve root lies just below this layer, in line with the fibers of the ligament. Care must be taken to distinguish the fibrous bands of the intertransverse ligament from the nerve root itself during dissection to avoid injury to the nerve. The nerve root is then mobilized to allow examination of the lateral aspect of the intervertebral disc. An infected disc is also accessible for débridement and may be excised directly, and any posterolateral osteophytes may be removed to decompress the nerve. A ball-tipped probe is then passed retrograde through the foramen to insure an adequate decompression. If exposure of the lateral pedicle or vertebral body is required (e.g., for biopsy or drainage of a vertebral body lesion), the transverse process may be osteotomized at its base and retracted laterally along with the posterior attachment of the psoas muscle (Figure 6). The nerve roots exiting above and below the pedicle will be exposed and must be protected, but a limited, direct portal may be gained into the posterolateral aspect of the vertebral body at the base of the pedicle.

CONCLUSION

The minimally invasive paraspinal surgical approach to drain an iliopsoas abscess is advantageous in terms of rapid recovery, minimal invasiveness, absence of radiation, and shorter hospital stay. We think that the minimally invasive paraspinal surgical approach to drain an iliopsoas abscess is a safe method in patients with lumber spondylodiscitis. In addition, we think that the minimally invasive paraspinal surgical approach procedure can be used not only for cold abscesses, but also for other pathologies of the lumbar vertebral area.

REFERENCES


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Address correspondence to: Tameem Elkhateeb, Lecturers of Orthopedic Surgery, Faculty of Medicine, Ain-Shams University
Phone: +202 238 545 55
email: tameem_77@hotmail.com; Tameem_elkhateeb@med.asu.edu.eg