Late Complications of Displaced Thoracolumbar Fusion Instrumentation Presenting as New Pain in Individuals With Spinal Cord Injury

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Abstract

Background: Harrington rods and more modern thoracolumbar posterior fusion with segmental instrumentation have been used successfully for decades in individuals with scoliosis or spinal cord injury (SCI). However, late complications of these instrumentations specifically presenting as new, localized pain in individuals with SCI have not been previously reported. Displacement of the hooks and the rods can cause significant back pain that may require hardware removal.

Methods: Two case reports illustrate thoracolumbar fusion rod removal because of displaced hooks with protruding rods and associated pain.

Results: Both of the individuals experienced back pain caused by proximal hook displacement. There was no neurologic deterioration. The proximal portions of the rods were sawed off and the displaced hooks and the rods were removed.

Conclusions: These cases illustrate the importance of clarifying different types of pain experienced by individuals with SCI and the importance of diagnosing the cause of pain accurately.

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Key Words: Spinal cord injuries; Harrington rods; Spinal fixation; Low back pain; Complications

INTRODUCTION

Harrington rod instrumentation and more modern posterior fusion with segmental instrumentation with hooks, screws, and rods have both been used to stabilize fractures in the thoracic and lumbar spine with the goals of fracture reduction, early mobilization, and rehabilitation. There are many reports on the use of Harrington rods with respect to immediate treatment complications, neurological outcomes, and hospitalization times (1–3). There are also reports of both early and late complications in individuals with scoliosis treated with Harrington instrumentation; some of the complications result from hook migration and broken rods (4–6). However, to our knowledge, there are no reports of late complications in individuals with spinal cord injury (SCI) progressing to the removal of the thoracolumbar spinal fusion with modern segmental instrumentation (7). We report 2

cases of individuals with SCI who required removal of proximal portions of the fixation rods because of hook displacement causing significant back pain.

CASE 1

R.G. is a 48-year-old white man who sustained a thoracic level 11 (T11) SCI caused by a motor vehicle crash in spring 1990 and had Harrington rods placed from T11 to L2 for spinal stabilization. The patient is neurologically T11 American Spinal Injury Association (ASIA) grade D and can ambulate short distances with bilateral ankle-foot orthoses (AFO) and Lofstrand crutches. The patient reported a varying degree of pain since the injury. He initially described his pain as “burning” pain in his bilateral extremities, radiating from behind his knees towards his feet. This pain was thought to be “neuropathic.” However, over time his pain worsened and changed in character, with a shift to a more muscular type of low back pain. He started to require a long-acting opioid medication for pain control. There was tenderness to palpation of his lower back, and a palpable mass at the lower thoracic/high lumbar area. The following radiologic studies were obtained:

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Figure 1. Case 1: MRI of lumbar spine showing flexion-compression deformity of T12 vertebral body with retropulsed fragment.

- Magnetic resonance imaging (MRI) of the thoracic spine 4 months after initial injury showed a disk bulge at T8-T9 and T9-T10 and a wedge fracture of T12. However, metallic artifacts prevented adequate visualization of the rods.
- MRI of the lumbar spine approximately 6 weeks later showed a disk bulge at L4-L5 and compression deformity of T12 with retropulsed fragments (Figure 1).
- Thoracolumbar spine radiograph approximately 1 month later showed Harrington rods extending from T11 to L4 (Figure 2).
- Computerized tomography (CT) scan of thoracolumbar spine 2 weeks later showed superior portions of the hooks not attached to the lamina at the T10 level (Figure 3).
- CT myelogram 2 months later demonstrated narrowing of the subarachnoid space at the level of L1 and L2 (Figure 4).
- Nuclear whole body bone scan approximately 10 days later showed large osteophytes on the T9 and L3 vertebral bodies and sclerosis of the lamina of the L5 vertebral body. No significant pseudoarthrosis was noted.

Figure 2. Case 1: Thoracolumbar spine radiograph.

Figure 3. Case 1: CT scan of thoracolumbar spine showing superior portion of the hooks not attached to the lamina at the T10 level.

Figure 4. Case 1: CT myelogram showing narrowing of the subarachnoid space at the level of L1 and L2.

Approximately 7 months after the first radiology study, the patient underwent removal of the upper two thirds of the Harrington rods by an orthopedic surgeon (Figure 5). An incidental durotomy was created during the surgery, which was repaired primarily. He had no other complications postoperatively. Although he continues to have significant neuropathic pain requiring continuation of long-acting opioid medication, his muscular-type low back discomfort resolved after the surgery. There has not been any progression of spine deformity after the hardware removal.

CASE 2

S.W. is a 22 year-old woman who sustained a T12-L1 fracture-dislocation caused by a motor vehicle crash 6 years ago, which resulted in a T12 level complete paraplegia. The patient had a thoracolumbar spine stabilization from T8 to L2 with laminar hooks proximally and pedicle screw fixation in T11, L1, and L2. After her rehabilitation, she continued to have significant neuropathic pain over the T12-L1 region. Approximately 15 months after SCI, she reported a different type of pain over the mid-to-upper thoracic levels. On examination, a protruding mass was palpable around the area.

Figure 5. Case 1: Thoracolumbar spine radiograph after resection of the proximal portion of the rods.

Radiographs of the thoracic spine showed displaced hooks, and the patient was referred to an orthopedic surgeon (Figure 6). No further workup was obtained by the surgeon. Approximately 2 weeks after the first report of newly emergent pain, she underwent removal of the hooks and the proximal portion of the rods without complications. Postoperatively, the patient had resolution of pain at the T1 to T3 levels.

DISCUSSION

Complications of thoracolumbar posterior instrumentation, such as back pain, pseudoarthrosis, hook dislodgment, and broken rods have been previously reported, with hook displacement occurring more frequently than rod breakage (1,5,8). Both of the case reports experienced back pain caused by the hook displacement, and the edge of the rods were palpable under the skin. There was no neurological deterioration. Previous reports in the scoliosis literature recommend that unless there are "symptoms," the rod removal is not indicated (4). The decision to remove the rods needs to be individualized, although some criteria for rod removal in individuals with scoliosis have been recommended (4). The reasons for instrumentation removal in individuals

Figure 6. Case 2: Thoracolumbar spine radiograph showing hook dislodgment.

with traumatic spinal column fracture may include: “rod dislocation,” neurological deterioration, and “residual back pain” (7–9). In our 2 cases, the proximal portions of the protruding rods were sawed off and the proximal hooks were removed (Figure 5), and neither patient required reinstrumentation. The surgeons did not indicate whether the patients’ spines appeared to be fused or not at the time of the surgery. The timing of development of these complications can vary significantly as seen in these 2 cases. The first patient developed a complication 10 years after injury, whereas the second patient experienced her symptoms within 15 months of her injury.

Postoperative management and monitoring of patients with segmental spine stabilization rods is usually done by orthopedic surgeons. However, for individuals with SCI, physiatrists may be the initial health care providers to whom the individuals may report symptoms of pain possibly caused by displaced or broken stabilization rods or hooks. In fact, in both of these case reports, the individuals were no longer being seen by the surgeons who initially placed the instrumentation. In both cases, they initially complained of chronic neuro-

pathic-type pain and then started to complain of a different type of pain, more local to the area of the displaced hooks. Neuropathic pain, which is a common phenomenon in SCI, may make it easier for a clinician to minimize potentially emergent new types of pain, and it may take an experienced clinician, such as a physiatrist, to minimize the different types of pain presentation in individuals with SCI and to initiate appropriate diagnostic evaluation and a referral to a surgeon. It is now well recognized that there are different types of pain in individuals with SCI, and it is critical to perform a detailed history and physical examination to differentiate these types of pain and to diagnose the etiology of pain accurately (10,11).

Although late complications of spinal fusion rods are relatively rare, physiatrists who manage individuals with chronic SCI need to be aware of these possible complications, especially in those who complain of localized symptoms, such as back pain and a protruding mass.

REFERENCES

1. Cotler JM, Vernace JV, Michalski JA. The use of Harrington rods in thoracolumbar fractures. *Orthop Clin North Am.* 1986;17(1):87–103.
2. Gertzbein SD, MacMichael D, Tile M. Harrington instrumentation as a method of fixation in fractures of the spine. *J Bone Joint Surg.* 1982;64B(5):526–529.
3. Willen J, Lindahl S, Nordwall A. Unstable thoracolumbar fractures: a comparative clinical study of conservative treatment and Harrington instrumentation. *Spine.* 1985;10(2):111–122.
4. Erwin WD, Dickson JH, Harrington PR. Clinical review of patients with broken Harrington rods. *J Bone Joint Surg.* 1980;62-A(8):1302–1307.
5. Hales DD, Dawson EG, Delamarter R. Late neurological complications of Harrington-rod instrumentation. *J Bone Joint Surg.* 1989;71-A(7):1053–1057.
6. Paonessa KJ, Enlger GL. Back pain and disability after Harrington rod fusion to the lumbar spine for scoliosis. *Spine.* 1992;17(85):S249–S253.
7. Altioik H, Mekhail A, Vogel LC, Herman JE, Lubicky JP. Issues in surgical treatment of thoracolumbar injuries associated with spinal cord injuries in children and adolescents. *Am J Orthop.* 2002;13(11):647–651.
8. Vaccaro AR, Silber JS. Post-traumatic spinal deformity. *Spine.* 2001;26(24S):S111–S118.
9. Tasmemiroglu E, Tibbs PA. Long-term follow-up results of thoracolumbar fractures after posterior instrumentation. *Spine.* 1995;20(15):1704–1708.
10. Bryce TN, Ragnarsson KT. Pain management in persons with spinal cord disorders. In: Lin VW, eds. *Spinal Cord Medicine: Principles and Practice.* New York: Demos Medical Publishing; 2003:441–460.
11. Bockenek WL, Stewart PJB. Pain in patients with spinal cord injury. In: Kirshblum S, Campagnolo DI, DeLisa JA, eds. *Spinal Cord Medicine.* Lippincott Williams & Wilkins; 2002: 389–408.