Management of Skip-Lesions in Dialysis-Related Cervical Spondyloarthropathy

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Citation

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Abstract

Dialysis-related spondyloarthropathy is a rare cause of spinal deformity and cervical myelopathy. The optimal management of cervical spine destructive spondyloarthropathy often requires circumferential reconstructive surgery, as affected patients typically have compromise of both the anterior columns and the facet joints. The presence of non-contiguous or "skip lesions" add an additional level of complexity in the surgical management; decompression and fusion of a focus of neural compression can lead to worsening deformity if it applies stress upon a nearby spinal level where there is already severe bone loss. We report the case of a patient presenting with cervical myelopathy in whom non-contiguous cervical vertebral disease was treated with cervical corpectomies and circumferential fusion and in whom halo-vest placement was instituted at 5 weeks after surgery to arrest construct subsidence.

INTRODUCTION

Since first described by Kuntz in 1984, dialysis-related spondyloarthropathy has been recognized as a rare cause of cervical myelopathy and deformity.[1] A key factor in the development of the complications of hemodialysis appears to be the deposition of 2 Microglobulin amyloid, seen in nearly all dialysis patients at post-mortem.[2] Amyloid deposition in cartilage surfaces, tendons, and ligaments lead to destruction of joints and surrounding bone. Frequently encountered clinical manifestations of long-term hemodialysis related to amyloid deposition include carpal tunnel syndrome and chronic arthropathy affecting the appendicular skeleton. Spinal disease results from amyloid deposition thickening the posterior longitudinal ligament that may cause spinal cord compression and destructive spondyloarthropathy (DSA).

Destructive spondyloarthropathy most frequently comes to clinical attention in the cervical spine.[3,4,5] Routine evaluation of cervical radiographs in dialysis patients demonstrate that the disease is frequently asymptomatic, presumably when it has not resulted in deformity or neural compression.[6] The length of dialysis treatment appears to be a predictive factor in the development of the disease.[6] Destruction of adjacent endplates can make differentiation from discitis and vertebral osteomyelitis difficult on imaging grounds alone.[7]

Skip lesions can rarely occur, and present very difficult management problems because these patients have very poor bone quality and are at high risk for construct failure.[4] We report the case of a patient in whom non-contiguous cervical vertebral disease was treated with cervical corpectomies and circumferential fusion and in whom halo-vest placement was instituted at 5 weeks after surgery to arrest construct subsidence.

CASE REPORT

A 42-year-old female patient with a history of dialysis-dependence for 17 years presented with a three-month history of progressively worsening symptoms of neck pain and hand numbness. Neurologic examination was normal with the exception of a bilateral decrease in pin sensation affecting the hands in a non-dermatomal distribution and bilateral, positive Hoffman's reflexes. Laboratory evaluation with a complete blood count, serum electrolytes, erythrocyte sedimentation rate, and C-reactive protein were within normal ranges except for elevaton in the renal function tests consistent with the history of renal failure.

A lateral cervical radiograph and computerized tomography showed destruction of the C4 and C6 vertebral bodies (figure 1 and 2). MRI of the cervical spine demonstrated spinal cord impingement at the C4 level (figure 3). Corpectomies of C4 and C6 were performed with fusion using femoral head allograft and anterior fixation with a dynamic, non-slotted

plate. The anterior construct was supplemented with lateral mass instrumentation from C3-7 and posterior fusion using local autograft.(figure 4)

Figure 1

Figure 1: A lateral cervical radiograph in a 42 year-old patient with a history of dialysis dependence presenting with hand numbness and neck pain. Note non-contiguous vertebral lesions in C4 and C6.

Figure 2

Figure 2: A sagittal reconstructed CT scan shows destruction of the vertebral bodies with some developing kyphosis at the upper level and retropulsion of bone into the spinal canal.

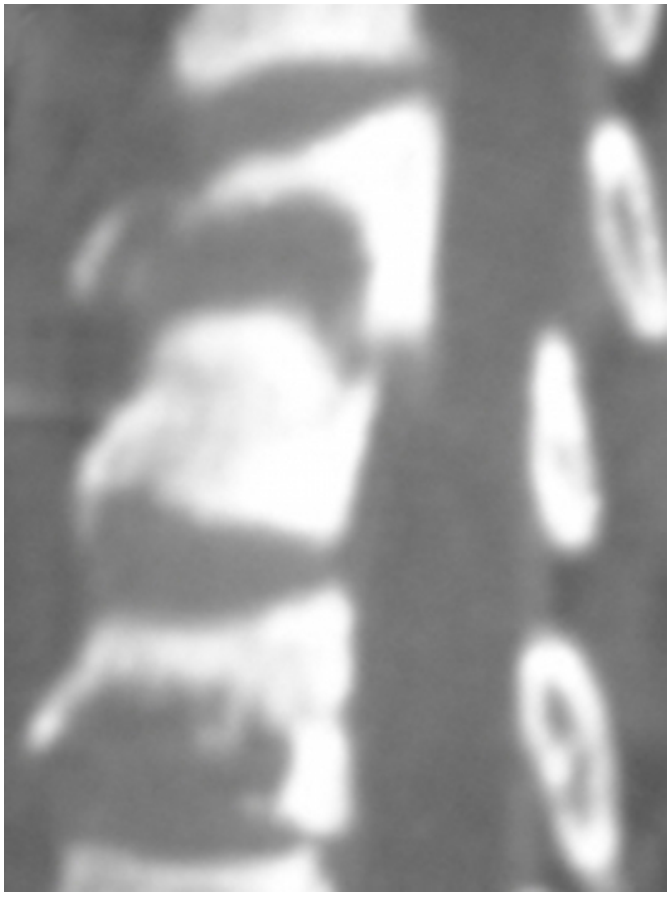


Figure 3

Figure 3: T2-weighted MRI demonstrates spinal cord impingement at the C3/4 level.

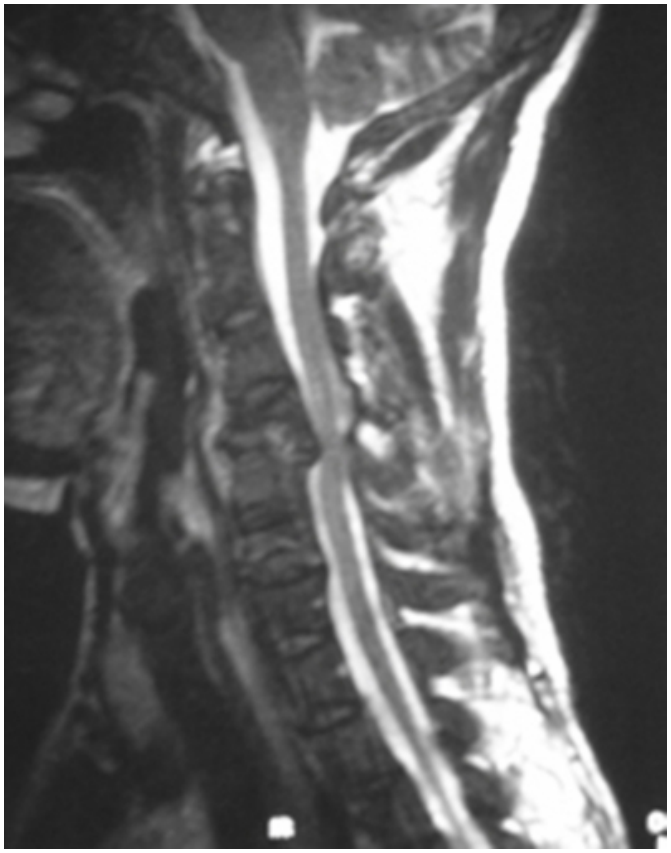
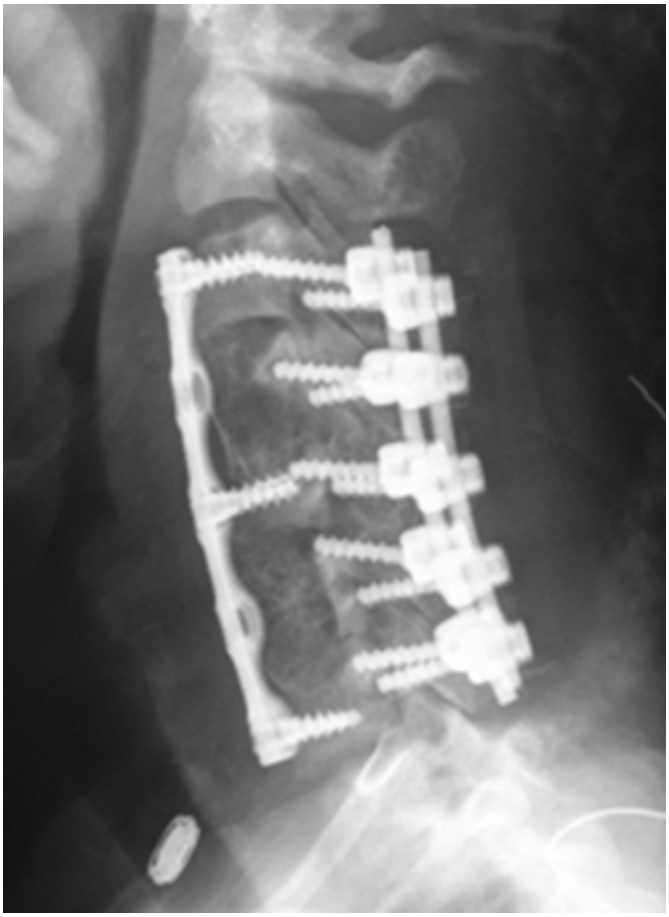


Figure 4

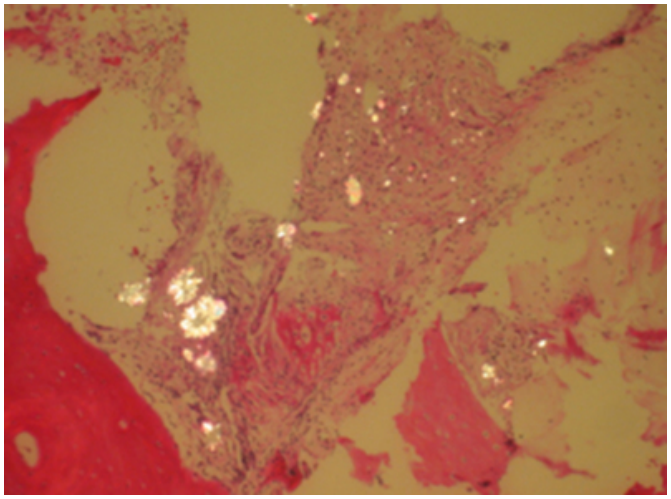
Figure 4: Pathology sections stained with H&E show multiple fragments of hyaline cartilage and cancellous bone with fibrotic marrow and occasional osteoclasts. Refractile crystalline material, some rhomboid and various sizes, and some brown and needle-shaped in clusters, are deposited in the fibrocartilage in a manner typical of destructive spondyloarthropathy.



Pathologic examination of the disc and bone demonstrated retractile crystalline material of various sizes and some brown and needle-shaped material in clusters deposited in the fibrocartilage and soft tissue. These findings were considered consistent with calcium pyrophosphate and calcium hydroxyapatite crystal deposits seen in association with chronic renal disease, dialysis and secondary hyperparathyroidism (figure 5).

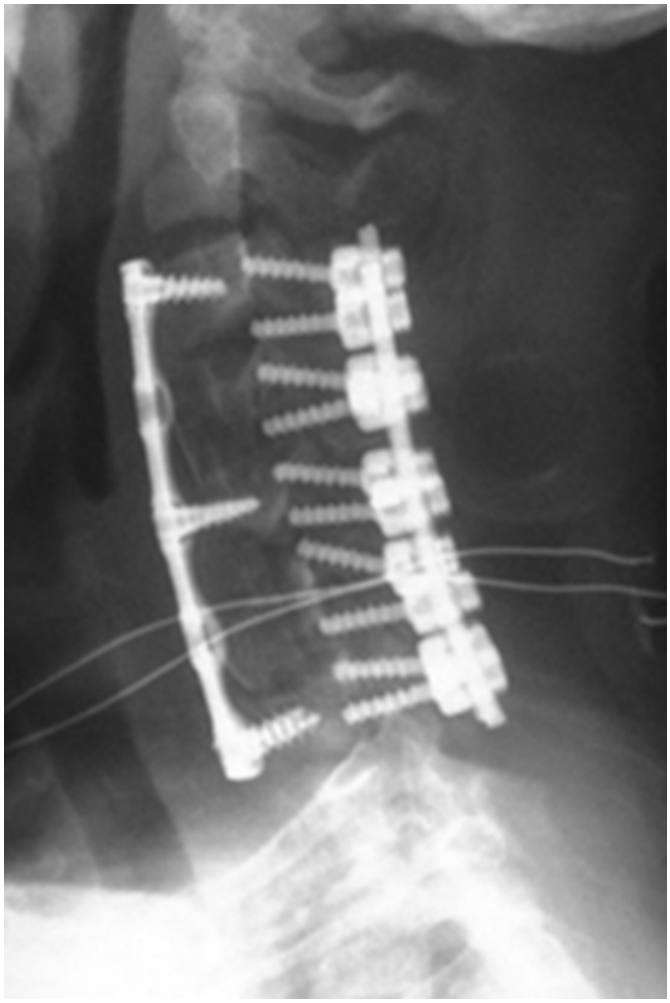
Figure 5

Figure 5: A lateral cervical radiograph six weeks following surgery after placement in a halo-vest. Note subsidence in the grafts with corresponding change in the angulation of the variable-angle screws at either end of the plate. The patient went on to successful fusion without further subsidence.



The patient's symptoms of hand numbness and neck pain resolved; but serial x-rays demonstrated significant subsidence of the anterior grafts, prompting addition of a halo-vest 5 weeks after surgery. (figure 6) The halo was removed at 14 weeks after surgery, and successful fusion documented on a subsequent CT scan (not shown). She has no symptoms at 30-month follow-up.

Figure 6



DISCUSSION

The optimal management of cervical spine destructive spondyloarthropathy often requires circumferential reconstructive surgery, as affected patients typically have compromise of both the anterior columns and the facet joints.[4] Even with circumferential stabilization, there is a high incidence of loss of fixation and construct failure because of poor bone quality and prolonged time needed for bony healing.[3,8] Albumi, et al notes that the pedicle has demonstrated high pullout resistance in biomechanical studies and tends to maintain its integrity even when other spinal fixation points have become diseased, making it a favorable site for fixation in DSA patients.[4] Cervical pedicle screws, however, require precise placement: injury to the spinal cord or vertebral artery may occur from an improper trajectory, and such concerns have led to limited acceptance of the technique.

The presence of non-contiguous or “skip lesions” add an additional level of complexity in the surgical management;

decompression and fusion of a focus of neural compression can lead to deformity if it applies stress upon a nearby spinal level where there is bone loss from renal spondyloarthopathy. In the case presented, we decided to extend a fusion from C3 to C7, though neural compression was only present at the C4 level. In this case, supplemental placement of a halo vest appears to have prevented loss of fixation until the fusion consolidated. Halo placement in this population must be undertaken with caution, however, because soft bone can lead to inadvertent penetration of the skull or loosening of the pins over as little as several days.

CONCLUSIONS

Destructive cervical spondyloarthropathy is a cause of spinal instability or neurologic deficit in long-term dialysis patients, and may present with noncontiguous lesions. Surgical management is challenging because of diffuse osteoporosis and slow bony healing, leading to a high incidence of hardware failure. Patients undergoing extensive stabilization procedures need vigilant postoperative monitoring to detect early evidence of hardware failure, in which case halo-vest placement may be used to maintain fixation.

CORRESPONDENCE TO

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