Case - Acute lumbosacral fracture following radical cystoprostatectomy in a patient with DISH and osteopenia

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Cite as: Gadot R, Rachlin J. Case - Acute lumbosacral fracture following radical cystoprostatectomy in a patient with DISH and osteopenia. *Can Urol Assoc J* 2026 September 25; Epub ahead of print. http://dx.doi.org/10.5489/cuaj.9866

Published online September 25, 2026

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INTRODUCTION

Radical cystoprostatectomy (RC) is the standard surgical treatment for muscle-invasive bladder cancer and requires prolonged dorsal lithotomy positioning, often for many hours.[1] Recognized positional complications include lower extremity compartment syndrome, common peroneal or femoral nerve palsies, and rhabdomyolysis.[2]

Acute lumbosacral fracture following lithotomy positioning is exceedingly rare and has not been well-described in the urological literature. Diffuse idiopathic skeletal hyperostosis (DISH), a condition characterized by flowing ossification of the anterior longitudinal ligament across multiple vertebral levels, rigidifies the spine and creates biomechanical vulnerability at transitional segments.[3-6]

KEY MESSAGES

- Radical cystoprostatectomy requiring prolonged lithotomy positioning can cause acute lumbosacral fracture in patients with underlying bone disease, even in the absence of direct trauma.
- Diffuse idiopathic skeletal hyperostosis (DISH) renders the spine a rigid lever arm, concentrating biomechanical stress at transitional segments, such as the lumbosacral junction during prolonged surgical positioning.
- Postoperative neurologic symptoms following cystoprostatectomy should prompt consideration of spinal fracture, particularly in patients with pre-existing DISH or osteopenia, as pain may be masked by surgical recovery.
- Conservative management with a lumbosacral orthosis brace and serial imaging is a viable approach for neurologically intact patients with manageable to no pain with ambulation who incur this injury when recent major surgery precludes elective operative intervention.
- Urologists should consider preoperative bone quality assessment and spine surgery consultation for positioning optimization in patients with known DISH or reduced bone mineral density undergoing radical cystoprostatectomy.

We present a case of acute sacral superior endplate and anterior vertebral body fracture extending to the L5-S1 disc space following RC in a patient with concurrent DISH and osteopenia. This case underscores the importance of recognizing this complication and considering implementation of appropriate perioperative precautions in at-risk patients.

CASE REPORT

A 77-year-old male with a history of muscle-invasive bladder adenocarcinoma, peripheral neuropathy, osteopenia, and DISH underwent radical cystoprostatectomy, bilateral pelvic lymph node dissection and right cutaneous ureterostomy. An epidural injection for perioperative anesthetic was attempted without success secondary to extensive posterior osteophytes. The patient was positioned in standard dorsal lithotomy with hips and legs flexed. Total operative time was 8 hours. EBL was 1200 cc's requiring transfusion of 2 units of packed red blood cells and 1 unit of fresh frozen plasma and a transient need for vasopressor to maintain systolic blood pressure perioperatively. No intraoperative complications were noted.

In the immediate perioperative period and extending into postoperative day 1, the patient reported numbness around bilateral knees with pain in both hip joints and subjective difficulty moving his legs in the plane of the bed. Symptoms were noted to worsen when the patient sat upright. Neurology was consulted given the new-onset neurologic symptoms. Examination demonstrated a pain-limited decrease in hip flexion (2/5) and knee extension (4/5) strength, as well as symmetric reduction in pain, light touch, and vibratory sensation below the knees. Distal lower extremity strength and proximal lower extremity sensation was preserved. An MRI T/L spine with and without contrast was recommended.

MRI demonstrated an acute fracture of the S1 superior endplate and anterior vertebral body extending to the L5-S1 disc space, with associated marrow and presacral edema. CT of the lumbosacral spine confirmed cortical disruption at the superior sacral endplate with anterior vertebral body involvement, and demonstrated background changes consistent with DISH, including continuous ossification of the anterior longitudinal ligament across multiple thoracolumbar levels. Generalized osteopenia was noted throughout. [See Figures 1 and 2.] No evidence of acute neural element stenosis was evident. The patient denied a prior recent history of trauma pre-operatively. The patient's pain and mobility continued to improve over the several remaining days of his hospitalization.

Given the patient's reassuring and rapidly improving neurological status, subsequent ability to ambulate without pain, and the clinical complexity introduced by his recent major urological cancer surgery, operative intervention was deferred following multidisciplinary discussion. Flexion-extension x-rays of the lumbar spine did not demonstrate dynamic motion concerning for gross instability. He was fitted with a soft lumbosacral orthotic (LSO) brace for use when out of bed. Follow-up imaging was arranged at a 2–4-week interval to trend fracture healing.

[Figure 1. MRI lumbosacral spine — STIR hyperintense (left), T1 hypointense (right) signal within the anterior-superior S1 vertebral body and endplate with extension of edematous signal within the L5-S1 disc space and presacral compartment.]

[Figure 2. Post-and pre-operative CT lumbosacral spine — (left) postoperative CT demonstrates acute displaced fracture of the S1 superior endplate with intradiscal gas and evidence of DISH changes (anterior longitudinal ligament ossification across vertebral levels) at multiple lumbosacral levels. Osteopenic bone quality apparent. CT abdomen from 1.5 months prior to surgery redemonstrates osteopenia (middle) and DISH (right) without the L5-S1 fracture.]

DISCUSSION

To our knowledge, this represents one of the first reported cases of acute sacral fracture attributable to lithotomy positioning during radical cystoprostatectomy. The mechanism is multifactorial, with three key contributors: prolonged lithotomy positioning, DISH-related spinal rigidity, and osteopenia.

Prolonged lithotomy positioning redistributes forces along the lumbosacral junction, reducing lumbar lordosis and generating axial and shear loads concentrated at the L5-S1 level. The duration of this load appears critical; operative times exceeding four hours have been associated with increased rates of positional morbidity in large RC series.[2]

DISH transforms the thoracolumbar spine into a rigid lever arm with diminished capacity to distribute biomechanical stress, concentrating forces at transitional, non-fused segments. This mechanism parallels the well-described fracture predisposition seen in ankylosing spondylitis, where low-energy mechanisms produce clinically significant spinal injuries at transitional zones.[7,8]

Concomitant osteopenia reduces vertebral endplate resistance to compressive and shear loads, further lowering the fracture threshold. Bladder cancer disproportionately affects older males, a demographic with high rates of both DISH and reduced bone mineral density, making this a clinically relevant at-risk population for urologists.[9-11]

An important practical consideration is diagnostic delay. Postoperative pain and functional limitations following RC may mask or defer recognition of a concurrent spinal fracture. In this patient, the presenting symptom of bilateral lower extremity numbness and subjective weakness prompted spinal imaging; however, in the absence of neurological symptoms, this fracture could have gone undetected. It remains likely that his presenting neurologic symptoms resulted from an acute-on-chronic exacerbation of his chronic peripheral neuropathy compounded by acute peripheral nerve stretch from prolonged flexion in lithotomy, a commonly appreciated phenomenon in urological surgery. Still, urologists should maintain a low threshold for lumbosacral imaging in patients with new neurological symptoms following RC, particularly those with known DISH or osteoporosis.

Conservative management with an LSO brace and serial imaging was selected in this case given neurological stability, preserved ambulation, and the clinical risk of reoperation in the

immediate postoperative period. This approach is consistent with management strategies employed for low-energy sacral insufficiency and transitional zone fractures in patients with DISH and ankylosing spondylitis.[12]

Based on this case, we suggest the following perioperative considerations for patients with DISH and/or reduced bone mineral density undergoing RC: (1) preoperative DEXA scan for at-risk patients; (2) anesthesia or spine surgery consultation for intraoperative positioning optimization; (3) minimizing lithotomy duration where surgically feasible; (4) low threshold for postoperative lumbosacral imaging when neurological symptoms arise; and (5) early multidisciplinary involvement when a fracture is identified.

CONCLUSIONS

Acute lumbosacral fracture is a rare but clinically significant positional complication of radical cystoprostatectomy in patients with DISH and osteopenia. Urologists should be aware of this entity, maintain vigilance for postoperative neurological symptoms that may indicate spinal injury, and consider preoperative bone quality assessment and positioning optimization in patients with known skeletal disease.

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FIGURES AND TABLES

Figure 1.

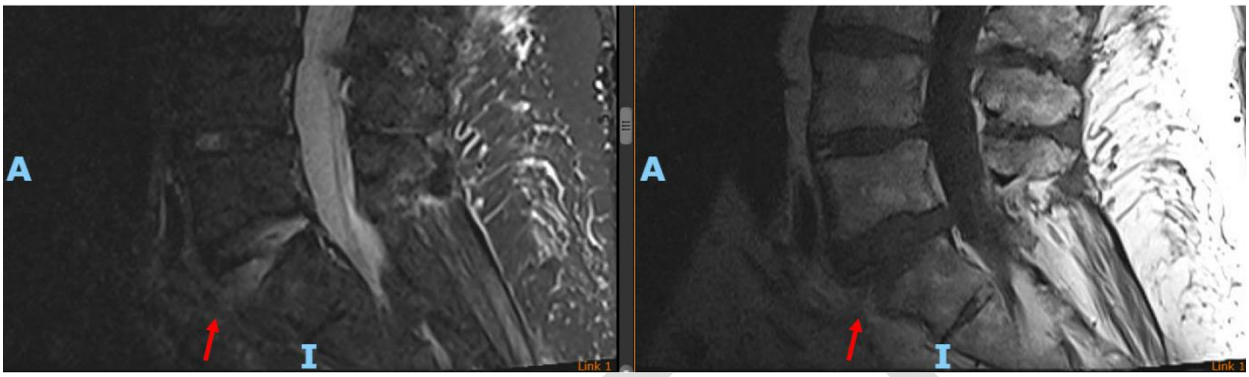

Figure 2.