



Management of Unstable Pathological Spinal Fractures Secondary to Lymphoma

John F. Hamilton MD PhD; James Boddu; Joy A. Rostron PA-C



1. Department of Neurosciences, Division of Neurosurgery, Inova Fairfax Hospital, Northern Virginia Campus of Virginia Commonwealth University School of Medicine.
2. The George Washington University School of Medicine and Health Sciences

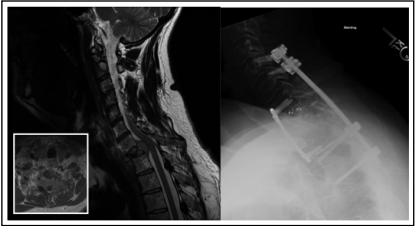
INTRODUCTION: Lymphoma is a systemic disease that has widespread impact on the body’s baseline homeostasis. Standard treatments for the disease – i.e. chemotherapy, radiation therapy, high-dose steroids, and bone marrow transplantation, drastically decrease fusion rates in those patients with unstable pathologic spinal fractures requiring surgical management. This potential for decreased fusion can lead to an increased risk of hardware failure, and the need for additional surgeries. Herein, the authors present a unique case series highlighting the management of 4 patients with unstable pathologic fractures secondary to lymphoma in the cervico-thoracic spine that required surgical management.

METHODS: All patients underwent an anterior corpectomy followed by either 1) posterior fusion with postoperative external orthosis, or 2) only postoperative external orthosis.

CASE #1: HISTORY: 47yo RT hand dominant male with an extensive PMHx presents with severe neck and RT scapular pain with associated radiation of pain and numbness into their RUE down to the level of the RT elbow. He notes associated decreased ROM in RUE and swallowing difficulty due to chin-on-chest deformity. **PAST MEDICAL HISTORY:** Lymphoma (2011) with C7-T1 pathologic fracture, sepsis, organ failure, endocarditis resulting in aortic valve replacement, and stem cell transplantation. The pathologic fracture was initially managed nonoperatively. During recuperation from cardiac surgery, patient deteriorated from C7-T1 involvement. Therefore, C6-T2 anterior partial corpectomy was done at another institution. Subsequently, the patient had worsening pain over several months. PET scan showed involvement of the C5 vertebral body, with a pathological fracture and kyphosis. In addition it was noted that the patient had subsidence of the PEEK cage into the C6 vertebral body with the instrumentation eccentric to the right. **PHYSICAL EXAM: Chin-on-Chest deformity,** Short bulky neck. Breathly quality voice, consistent with prior recurrent laryngeal nerve injury. **Motor:** 5/5 BUE and BLE, **EXCEPT** for RT hand with thenar and

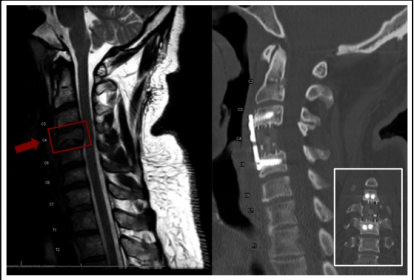
OUTCOME: Patient developed an enterocutaneous fistula at anterior surgical site ~1 week after surgery. The wound was l&d and a JP Drain was placed at the site. Patient also had a GJ tube placed at that time. **4 months Post Op Visit – 5/5 strength and sensation in BUE and BLE. No pain/weakness/numbness.** Mild dysphagia. Still using CTO brace and bone stimulator. **6 month Post op imaging showed solid fusion with stable hardware placement and resolved fistula.**

CASE #2
HISTORY: 44yo M h/o progressive neck pain with radiation down his RUE with associated weakness. **PHYSICAL EXAM: Motor:** 5/5 BLE & LUE, 5/5 RUE except 4/5 grip. **Sensory:** Sensation intact except RUE ulnar distribution. **Reflexes:** 1+ brachioradialis B/L, 1+ patellar BL. No midline TTP of spine **RADIOLOGY:** Metastatic disease with pathological fracture at T1 resulting in complete collapse of the vertebral body with kyphotic deformity, subluxation, and compression on the spinal cord secondary to disk bone fragments and metastatic tumor. Also with tumor encroaching upwardly into the inferior aspect of the C7 vertebral body. **PLAN:** Two-Stage surgical approach over 2 days. **Stage 1:** Anterior T1, T2 corpectomy, with tumor resection. Placement of an expandable intervertebral PEEK cage C7 –T3 arthrodesis with correction of subluxation. **Stage 2:** Posterior segmental fixation with lateral mass screws at C5, C6, and pedicle screw fixation at T3 and T4. Posterolateral arthrodesis at C5-T4.



POSTOP CARE: Bone Stimulator and External Orthosis (Aspen & CTO). Steroids and intensive chemotherapy. Plan for stem cell therapy. **OUTCOME:** At 4.5 months Post Op Visit –

PLAN: C4 Corpectomy via anterior approach. Placement of intervertebral body biomechanical cage extending from C3 to C5 filled with allograft. Placement of anterior cervical plate with vertebral body screws at C3 and C5.



POSTOP CARE: External Orthosis (Aspen). Steroids, radiation, intensive chemotherapy. **OUTCOME:** At 10 months Post Op Visit – **5/5 strength and sensation in BUE and BLE. No radicular symptoms. No weakness or numbness. No dysphagia. No Pain.** They did have posterior neck stiffness, but had not followed up with physical therapy. **Post op imaging showed solid fusion with stable hardware placement.**

CASE #4
HISTORY: 47yo M h/o anemia c/o progressively worsening mid-to-low back pain with associated BLE pain/paresthesias over 7-8 months with worsening BLE weakness over 1 month prior to admission. He reported difficulty ambulating and getting out of bed due to the back pain. No bowel or bladder incontinence. No upper extremity symptoms. He had tried conservative outpatient measures (ie physical therapy and chiropractic manipulations) but these did not work.

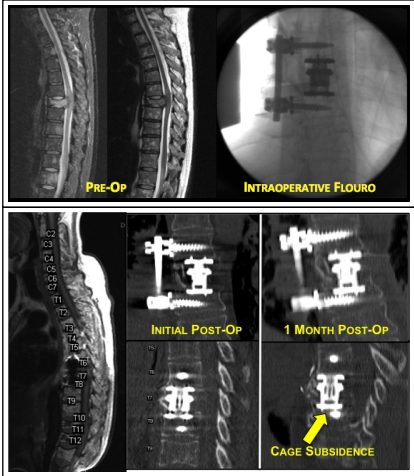
PHYSICAL EXAM: Motor: 5/5 strength in all extremities EXCEPT RLE - iliopsoas of 4+/5 strength, quadriceps 4+/5 strength, hamstring 4-/5 strength foot dorsal and plantar flexion 4+/5 strength, and great toe flexion and extension 4+/5 strength. **Sensory:** Diminished to light touch in BLE, but still present. Decreased sensation below the level of approximately T8 bilaterally. **Reflexes:** 2+ and symmetric in the biceps, 3+ and symmetric on the quadriceps, 2+ and symmetric in the

RADIOLOGY: Multiple lytic lesions throughout T & L spine. T7 is hyperintense throughout. It has approximately 40% height loss of the vertebral body anteriorly and posteriorly with retropulsion. There is growth of the lesion along the pedicles bilaterally causing a focal narrowing of the spinal canal at that level with posterior displacement of the spinal cord.

CLINICAL COURSE & SURGICAL PLAN: Patient initially had improvement of back pain and BLE weakness/numbness with steroids and radiation treatment. However, they did not continue to improve but rather worsened therefore prompting surgical intervention. – **RT Anterolateral Thoracotomy:** T7 Corpectomy. Placement of intervertebral biomechanical cage. Lateral rod and vertebral body screws in T6 & T8, reinforced with additional bone from harvested T6 rib.

POSTOP CARE: TLSO brace, steroids, chemotherapy, & physical therapy

OUTCOME: 1 Month postoperatively, patient was readmitted to the hospital for back pain. At that time, he was noted to have multiple compression fractures throughout the T & L spine. **Imaging also shows that the T7 cage construct had subsided into the superior endplate of T8.** The lateral plate and screws did not have any change in position, and there was no retropulsion. **SURGICAL LESSON: This patient would've benefitted from posterior fusion to further stabilize anterior construct.** After ~10 months in the TLSO brace, patient was noted to have **5/5 strength and sensation in all extremities. He was ambulating with a walker. Follow up imaging showed no interval change in compression fractures or amount of cage subsidence.**



RESULTS

From this study, the authors determined that patients requiring more than a one-level corpectomy, also required posterior fusion with postoperative external orthosis in order to obtain solid fusion. However, in patients where only a one-level corpectomy was needed, a postoperative external orthosis was sufficient to help facilitate solid fusion. Furthermore stimulators were utilized in all of the patients who underwent posterior fusion. The authors also propose that an anterior followed by a posterior fusion is indicated for any pathologic fracture involving the thoracic spine, irrespective of the number of levels involved. From our experience this seems to promote a more robust fusion. Postoperatively, all patients showed improvement of preoperative neurological symptoms. Average follow up was 9.5 months, with demonstrated solid fusion, substantial improvement in pain, as well as improvement in functional ability.

CONCLUSION

This case series demonstrates that though difficult, solid fusion is possible in lymphoma patients with unstable pathologic spinal fractures despite standard adjuvant treatment for the disease.