Original Research Paper

Volume - 14 | Issue - 01 | January - 2024 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Orthopaedics

SPINOUS PROCESS SPLITTING IN LUMBAR INTRADURAL SCHWANNOMA WITH INTRA-OSSEOUS EXTENSION - A RARE CASE REPORT

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KEYWORDS : Spinous process splitting (SPS), spinal nerve sheath tumors (SNST), intradural schwannoma, intra-osseous schwannoma, paravertebral muscles (PVM),

INTRODUCTION

Spinal schwannomas are most common benign nerve sheath tumours within spinal canal and typically arising from spinal nerve roots. cervical spinal cord is most common site of origin followed by thoracic and lumbosacral spinal cord . They are more common in adults and mostly intradural and extramedullary massses. Lumbar intradural schwannomas usually present with neurological deficits including radicular symptoms associated with sensory disturbance and weakness in lower extremities and in some cases with bladder dysfunction. MRI is best diagnostic modality for schwannomas.

Surgical excision of schwannomas have proven favourable outcomes, however based on the location and size of the spinal tumor, formal multi-level laminectomy is the standard procedure performed in order to excise intradural extramedullary schwannomas and thereby needing stabilization of the operated segment in view of impending instability.

Conventional exposure for laminectomy causes extensive detachment of the multifidus muscle from the spinous process bilaterally and denervation of the paravertebral muscles. In view of poor spinal biomechanics due to loss of posterior tensile strength post laminectomy at multiple levels, stabilization with pedicle screws is needed. Since multifidus in the main stabilizer of the lumbar spine, sparing it with spinous process-splitting technique can be of greater advantage to main stability thereby avoiding hardware for stabilization.

SPS allows to preserve multifidus muscle attachment and at the same time provides conventional exposure of the lumbar spine to carry out adequate laminectomy for intradural extramedullary tumor excision.

Aims

1. Preserve the strength of paraspinal muscles
2. Prevent instability
3. Decrease post operative low back pain

Case Report

We present a case of 73 year old female presenting with severe low backache since many months and aggravated in the last few weeks with rapidly progressive weakness in both lower limbs associated with radiculopathy. Patient was finding it difficult to sit, unable to stand, walk and bed-ridden status for the past ten days. Patient also complained of severe pain on movement in bed. Patient had urinary incontinence since 2 days however normal bowel control. There is no history of trauma. Patient is a known case of diabetes mellitus for the past 20 years and on regular treatment for the same. The patient is hailing from low socio-economic background as she is a vegetable seller by occupation.

Clinically Patient Had The Following

No active straight leg raise (SLR) , Passive SLR 60 degrees bilaterally associated with backache and radicular-shooting type pain over thigh and leg area ,Visual analogue score 9/10 , proximal girdle power 0/5 , Quadriceps 2/5 bilaterally , Ankle dorsiflexion 4/5 bilaterally , EHL 4/5 Left> Right , Knee jerk and Ankle jerk Absent bilaterally , Plantars were mute , Sensation was altered along L2, L3, L4, L5 dermatomes

Patient's routine blood investigations were within normal limits and glycosylated haemoglobin (HbA1c) was 7.4. Patients X-ray of the lumbar spine suggestive of degenerative changes and grossly osteoporotic (Figure 1-A). Her MRI showed intradural tumor at L2-3 disc space level along with L3 vertebral body lesion involving 2/3rd of its posterior aspect and appeared to be osteolytic (Figures 1-B). Ideally prior surgery, additional special investigations such as CT scan and bone densitometry should be performed but due to patients's poor financial condition, these could not be done. However, in view of patient's rapidly progressive neurological deterioration it was decided to go ahead with surgery with available merits.

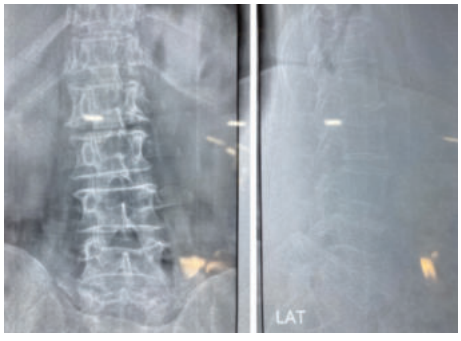

Image 1 -A

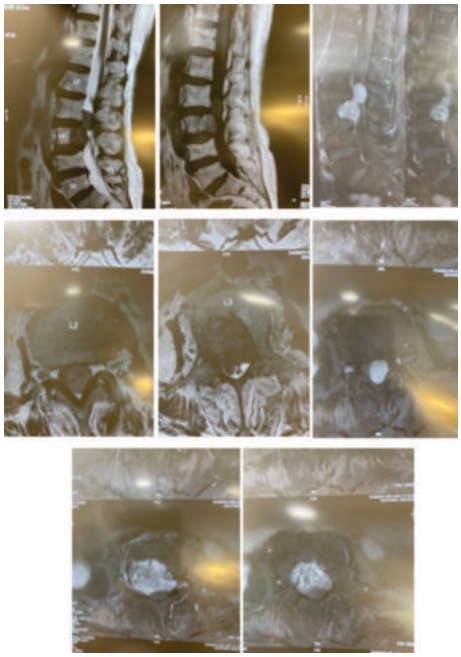

Image 1- B

Surgical Technique

Patient was position in prone and skin surface-marking under c-arm intensifier from L2 to L4. Midline longitudinal incision from L2 to L4. L2,L3,L4 spinous processes splitted using high-speed 2mm burr till base of spino-laminar junction (Image 2-a). Laminectomy performed for adequate thecal sac exposure. Facet joint-capsules were preserved. Thecal sac after exposure was digitally palpated. Durotomy was perform and carefully released the adhered neural structures to intradural tumor-mass. tumour mass felt hard in consistency was removed completely (Image 2-b). Dural closure with 4-0 vicryl was done. Valsalva test by the anaesthetist was done showed no leakage from the closed dura. L3 vertebral body was approached after L3 partial pediclectomy. L3 vertebral body was filled with material appeared to be like blood clots/ hemorrhagic appearance, which were sent for histopatholgy study. L3 vertebral body cavity was currated and almost 2/3 body was involved. Patient's autogenous bone graft (laminar bone) was used to fill the L3 vertebral body cavity using funnel (Image 2-d). Spinous-process recontruction and musculo-fascial closure with ethibond suture was performed (Image 2-e). Standard closure and skin with ethilon. A romovac gravity drain was kept . Immediately post surgery after extubation patient was moving both lower limbs. Neuromonitoring was not used during the surgery. Immediately post-surgery after extubation patient moved her both lower limbs. Post-operative findings after 24 hrs, patient was moving both lower limbs with bilateral active Straight leg raising upto 20 degrees, knee and hip flexion recovery. Patient stopped experiencing radicular-shooting pain. Patient was advised complete rest in bed for 48 hours, after which patient was mobilized out of bed with high-frame type Lumbo-sacral belt. Post-operative well recovered neurologically showing near complete recovery, with no urinary incontinence and mobilized well. Her histopathology report suggested Schwannoma .

Image -2 a. **Image -2 b.** **Image -2 c.**

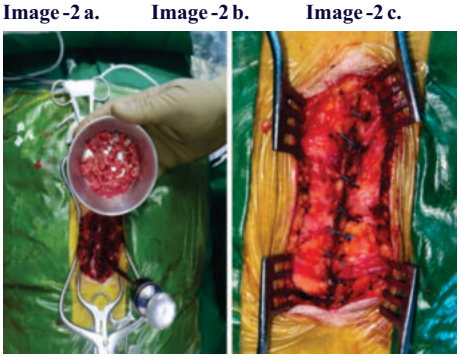

Image 2 -d. **Image 2- e**

DISCUSSION

Schwannomas are well-circumscribed, encapsulated tumors, which are located eccentrically on peripheral nerves or spinal nerves roots . Spinal intraosseous schwannomas are rare with or without spinal canal involvement. Spinal nerve sheath tumors (SNSTs) include Schwannomas (neuromas, neurinoma, neurilemmomas) and neurofibromas. Schwannomas are composed of Schwann cells with fibrous tissue. These tumors may show cystic degeneration and hemorrhage. Most common presenting symptom is pain, which may be local and or radiating to arm and/or leg, depending upon the location of the tumor [1].Schwannoma being a spinal nerve sheath tumor when grows large in size, it may remodel intravertebral foramen or even cause erosion or scalloping of the posterior aspect of the vertebral body [2,3,4] . Surgical approaches are decided upon location of the tumor, size and its extension [5-8]. The primary aim is to achieve adequate exposure for tumor resection, while causing minimal collateral damage to surrounding osseo-ligamentous structures. Removal of ligaments and bony structures in excess lead to spinal instability.Ideally after surgical excision of tumour in our case stabilization is necessary but as our patient is known case of diabetes mellitus and osteopororotic we tried to avoid stbilization and instrumentation.hence we use this approch for tumour resection .

In lumbar spine while performing laminectomies, preservation of facet joint capsules and intertransverse ligaments is of prime importance in order to avoid instability and postoperative kyphosis; or else instrument stabilization becomes mandatory. Although laminectomy is the standard decompressive procedure, it causes intra-operative damage, such as extensive detachment of the multifidus muscle from the spinous process bilaterally, resulting in post-operative back muscle induration associated with fat infiltration in paravertebral muscles and removal of the supporting structures of the lumbar spine, including the spinous process and inter-spinous ligaments [9-13]. In conventional posterior lumbar decompression surgery, even if the posterior ligamentous complex is preserved, exposure of the paravertebral muscles (PVM) is needed [14]. It has been reported that this exposure causes muscle injury and denervation, which may induce failed back syndrome. In 2001, Kota Watanabe et al, developed a new procedure for lumbar laminectomy, the lumbar spinous process splitting laminectomy (LSPSL) [15,16]; wherein, the spinous process is split longitudinally in the middle and then divided at its base from the posterior arch, leaving the bilateral paraspinal muscles attached to the lateral aspects . Ample working space for laminectomy is obtained by retracting the split spinous process laterally together with its attached paraspinal muscles. After successfully decompressing nerve tissues, each half of the split spinous process is re-approximated using a strong suture.Thus, the supraspinous and interspinous ligaments are preserved, as is the spinous process, and damage to the paraspinal muscles is minimal [17] . Cho et al [18] reported on the split-spinous process laminotomy and discectomy, which digs out the spinous process and lamina. They named this the Marmot operation after the marmot, which lives in a hole or a tunnel. However, it is difficult to decompress the lateral part of the spinal canal using the Marmot operation. Kawakami et al, in 2011 made a modification to the marmot operation wherein, they said that the spinal canal can be decompressed easily without exposing the multifidus muscle if the split spinous process is leaned bilaterally [19].

CONCLUSION

We present the case of an elderly patient with intradural tumor at L2-3 level with L3 intraosseous involvement leading to rapid progressive weakness in both lower limbs associated with severe radicular pain. We chose to perform Spinous process-splitting (SPS) technique introduced in 2001 by Dr.Watanabe, Japan for multilevel degenerative lumbar canal stenosis; which we believe is an excellent approach in lumbar spine in avoiding stabilization especially in osteoporotic spine wherein the multifidus muscle is spared and decrease the degree of post operative paraspinal muscular atrophy thereby maintaining spinal stability and decrease the risk of failed back surgery syndrome . Other significant advantages of SPS according to us is, less post-operative pain, early mobilization, it can be performed in osteoporosis where in instrumentation is contraindicated, patient's with multiple co-morbidities, can be performed using loupes and routine instruments. However, long-term results and fusion of the reconstructed spinous process needs attention. Lastly, we would like to emphasize on the use of neuro-monitoring in intradural pathologies for safer outcomes.

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