Intraspinal schwannoma and neurogenic bladder

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ABSTRACT

Most lumbar intradural schwannomas present initially as radiculopathies with sensory disturbances. However, neurogenic bladder dysfunction may be one of the earliest manifestations and can cause long-term disability. We present the case of a patient with a L3–4 schwannoma (newly diagnosed owing to recurrent urinary retention and urinary tract infection) who finally underwent surgical resection. Improvement of bladder sensation was documented by urodynamic study and the patient was subsequently weaned off her Foley catheter with satisfactory outcome.

KEYWORDS

Lumbar intradural schwannoma – Neurogenic bladder – Urodynamic study

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Schwannomas are one of the most common intradural extramedullary spinal tumours. The initial presentation of such tumours depends on their location. Jinnai and Koyama studied 176 spinal schwannomas and found that most arose from the dorsal sensory root.¹ Only six (3.6%) originated from the ventral motor root. The most common initial

presentation is sensory disturbance, especially night pain. Reasons for night pain may be related to the tumour moving along with cerebrospinal fluid pulsation when reclining, causing the tumour to stimulate the sensory root. Weakness may not be apparent until a later stage and can be mostly due to lumbar stenosis.¹ Neurogenic bladder can be the first

Figure 1 Preoperative urodynamic study including cystometry with no urinary sensation on bladder filling and detrusor areflexia after the first episode of urinary retention

symptom of such intraspinal tumours, causing upper or lower motor neuron dysfunction depending on the location of the tumour.

To our knowledge, improvement in urinary tract symptoms has rarely been reported as a postoperative outcome measure. For patients with neurogenic bladder and intraspinal neoplasms, a microscopic approach should be used and the surgeon needs to take meticulous care when handling the nerves. In addition, postoperative rehabilitation programmes can be extremely valuable.

Case history

An 81-year-old woman had been treated at our urology clinic for a 3-year history of recurrent urinary retention and urinary tract infection. The urologist had inserted a

Foley catheter, and attempted unsuccessfully to remove this when the infection was cured and the treatment course was completed. Over the following two weeks, the patient experienced lower back pain with persistent pain radiating to the right lower extremity and gait difficulty. She presented to our neurosurgical clinic, where physical examination revealed intractable paraesthesia in the right L4 dermatome. Urodynamic study (UDS) indicated that she had no urinary sensation on bladder filling and cystometrography (CMG) showed detrusor areflexia (Fig 1). Lumbar spine gadolinium enhanced magnetic resonance imaging showed a 23.0mm × 12.7mm × 10.7mm intradural extramedullary tumour at the L3–4 level with intermediate

Figure 2 Gadolinium enhanced T1 weighted magnetic resonance imaging of the lumbar spine: axial imaging demonstrating an intradural tumour (arrow) displacing the cauda equina peripherally (A) and sagittal imaging revealing a tumour at the L3–4 level (arrow) (B)

Figure 3 Intraoperative photograph showing the intradural extramedullary tumour (white arrow) located centrally at the L3–4 level, displacing the cauda equina (black arrows) peripherally

Figure 4 Haematoxylin and eosin stain showing abundantly proliferated, interlacing bundles of wavy neurogenic fibres consistent with schwannoma (A, 100x magnification) and Verocay bodies with nuclear palisading (arrows) (B, 200x magnification). The Antoni A area had compact, spindle shaped cells. The Antoni B area contained a myxoid component with a low density of tumour cells.

Figure 5 Postoperative anteroposterior and lateral radiography showing good dynamic stabilisation of lumbar segments achieved by pedicle-based instrumentation

signal intensity on both T1 and T2 weighted imaging, and avid enhancement (Fig 2).

Surgical resection of the tumour was undertaken. A wide laminectomy at the L3–5 level with facet joint resection was performed for better exposure and visualisation of the spinal canal. After opening the dura, the well encapsulated tumour was mobilised and removed meticulously *en bloc* using microdissection. Excessive nerve root traction was avoided to decrease the risk of catastrophic neurological deficits.

Macroscopically, there appeared to be a deeply seated, soft, yellowish mass displacing the cauda equina peripherally inside the dura mater (Fig 3). On histopathological examination, there were numerous palisading spindle cells with Verocay bodies arranged in a dense Antoni A area and a

loose, paucicellular Antoni B area, consistent with a benign schwannoma (Fig 4).

An Isobar[®] TTL semirigid device (Alphatec Spine, Carlsbad, CA, US) was implanted for the decompressed segments under anteroposterior and lateral fluoroscopy guidance to provide dynamic stability and motion preservation for our patient (Fig 5).

Postoperative UDS including CMG showed delayed first sensation (396ml) on bladder filling with positive detrusor activity (Fig 6). The patient's leg pain and gait were greatly improved. The Foley catheter was removed successfully. The patient was doing well at the two-year outpatient follow-up visit.

Discussion

The majority of spinal intradural nerve sheath tumours comprise schwannomas, followed by neurofibromas.¹ Schwannomas are generally composed of a proliferation of Schwann cells. Common symptoms may mimic cauda equina syndrome, and include lower extremity muscle weakness and numbness, urinary retention and bowel dysfunction.² They cause urinary bladder dysfunction, including abnormal storage and emptying of urine. In our patient, there was prolonged urinary retention with overflow incontinence, which can result from direct mechanical compression of nerve roots and/or venous congestion or ischaemia.²

Some authors have reported a urinary incontinence rate of 17.4% in patients with a primary tumour of the cauda equina³ and others have reported a rate of 5% for bladder or bowel incontinence in those with a spinal nerve sheath tumour.⁴ There are few studies documenting the surgical outcome for bladder dysfunction. Yu *et al* reviewed 14 patients with a giant invasive spinal schwannoma.⁵ Three

Figure 6 Postoperative urodynamic study including cystometry with delayed first sensation on bladder filling and positive detrusor activity

had dysfunctional voiding or urinary incontinence, which improved after tumour resection in two cases. Urological evaluation is recommended for patients with the associated symptoms (including urinary retention, incontinence or recurrent urinary tract infection). UDS provides objective information on voiding function as information on urethral pressure, urethral/anal sphincter electromyography and voiding flow rate can all be recorded.

The main goal of neurogenic bladder management is to prevent complications such as infection, vesicoureteral reflux and urolithiasis. Individuals with a weak detrusor muscle may require bladder training and/or medication. Although there is no effective way to enhance bladder contractions, there are operations (including autoaugmentation cystoplasty) to improve the bladder compliance. If the bladder cannot be emptied adequately, intermittent catheterisation should be considered.

Schwannomas are very amenable to resection. Complete removal of the tumour is imperative to avoid recurrence. Rare neurological complications after tumour excision may be accounted for by functional compensation of the adjacent non-affected nerves and chronic compression due to the slow growing nature of the tumour. Decompression with tumour excision is the main treatment strategy and spinal fixation is sometimes required. In our patient, a wide laminectomy, total tumour resection and Isobar[®] dynamic stabilisation were performed to control motion in the iatrogenically destabilised spine after facet joint resection. Postoperatively, most patients enjoy the immediate and long-term relief from the discomfort they experienced prior

to resection surgery. Recurrence is rare following complete resection. Our patient was satisfied with the functional recovery and subsequent removal of the Foley catheter.

Conclusions

It is worth bearing in mind that lumbar intradural schwannomas can cause neurogenic bladder dysfunction. Early UDS and surgical intervention should lead to a good outcome. Additionally, documentation of the functional changes of neurogenic bladder (by UDS) may be beneficial as a postoperative outcome measurement for comparison. Further research regarding surgical technique, rehabilitation protocol and postoperative assessment is important for improving the prognosis of the disease.

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