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Case Report

The Use of Lumbar Sympathetic Blockade at L4 for Management of Malignancy-Related Bladder Spasms

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Background: Cancer-related bladder spasms may be a rare but severe symptom of bladder or metastatic cancer or its related treatments. Various treatments described in the literature include systemic medications, intravesical or epidural medications, or even sacral neurolectomies.

Objective: We present 3 patients who have suffered from bladder spasm either from invasion of the bladder wall by tumor (2 patients) or from intravesical chemotherapeutic treatment.

Design: Case Report.

Setting: Cancer pain management hospital.

Methods: For each patient, we describe the use of lumbar sympathetic block to successfully treat the bladder spasms. Sympathetic blockade was performed at the left anterolateral border of lumbar vertebra L4. We used 10 mL of local anesthetic (0.25% bupivacaine) delivered in 2 mL aliquots, each given after negative aspiration for heme. Each procedure was performed with fluoroscopic guidance (both AP and lateral views) with the use of iodine contrast (Omnipaque-180) to confirm the location of the medication and its resulting spread.

Results: All 3 patients had a reduction in the frequency and intensity of spasms, with 2 out of 3 patients not having a recurrence of the spasms for up to 2 months post procedure and follow up.

Limitations: Case Report.

Conclusion: Lumbar sympathetic blockade could be a useful treatment for recurrent bladder spasm in the oncologic population. Based on these findings, we feel that the branches of the sympathetic nerve set at L4 may be a good target for neurolytic procedures, such as radiofrequency ablation, for long term treatment of bladder spasms. Further research is necessary to determine the efficacy of this technique for the treatment of bladder spasms in the oncologic population.

Key words: Bladder spasm, cancer pain, splanchnic nerve, lumbar sympathetic block

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Recurrent bladder spasms can be caused by invasive bladder cancer or associated treatments in the cancer population. While opioids and adjuvant medications, such as oxybutynin, have been the mainstay for treatment, persistent spasms may be resistant to many forms of treatment (1). Epidural opioids, intravesicular opioids and local anesthetics, and sacral nerve root rhizotomies have been described as treatment alternatives (2-6).

Sympathetic blockade and blockade of superior hypogastric plexus have been described as treatment options for chronic pelvic pain (7). In cancer patients, the superior hypogastric plexus block has been described to treat cancer-related pelvic pain (8-10). Studies in rats and human cadavers have shown the sympathetic innervation of the bladder stemming from the low thoracic and lumbar spinal cord, exiting as bilateral sympathetic chains and branching into splanchnic nerves (11-13). The splanchnic nerves typically lie at the anterolateral aspect of the upper lumbar vertebrae (medial to the sympathetic chains), and become more posterior at the lower lumbar vertebrae (Fig. 1).

The lumbar sympathetic chain generally consists of 2 to 6 interconnected ganglia, mainly located on the L2 and L3 vertebrae (12). Branching from the ganglia, 4 preganglionic splanchnic nerves innervate various abdominal structures (12). The third and fourth splanchnic nerves contribute to the superior hypogastric plexus and are an ideal target for blockade and neurolysis (12). We feel that L3 or L4 is an ideal location to target the splanchnic nerves or sympathetic chain for malignancy-related bladder spasm (13). We describe the successful treatment of 3 patients using this technique.

Methods

Institutional review board approval was obtained for a retrospective review of the collected data.Three patients suffering from severe, constant bladder spasms were offered a lumbar sympathetic blockade for diagnosis and potential treatment.

Each patient was seen as an outpatient, evaluated, and given the risks and benefits of an injection at the lumbar spine. Once patients gave written consent, they were taken to our fluoroscopy unit and placed in the prone position. Each patient's vital signs were monitored during the entire procedure. Under sterile precautions a 10 cm, 22-gauge spinal needle was guided to the anterolateral border of L4 (Fig. 2). All injections were performed on the left side of the patient after lidocaine injection for local anesthesia. The patient's pelvic CT scan was used to determine optimal placement of the needle at the anterolateral border of L4 (Fig. 3). Anteroposterior, oblique, and lateral fluoroscopic images were used to guide the needle to the correct position.

Once the needle was in the correct position, 1 mL of omnipaque-180 dye (iodine based) was injected showing good anterolateral spread of the solution. A total of 10 mL of 0.25% bupivacaine was injected in 2 mL aliquots with negative aspiration for heme. After each aliquot was given, a fluoroscopic image was obtained to determine the spread of the anesthetic. Thus, we were able to confirm anterolateral spread of the medication post injection (Fig. 2).

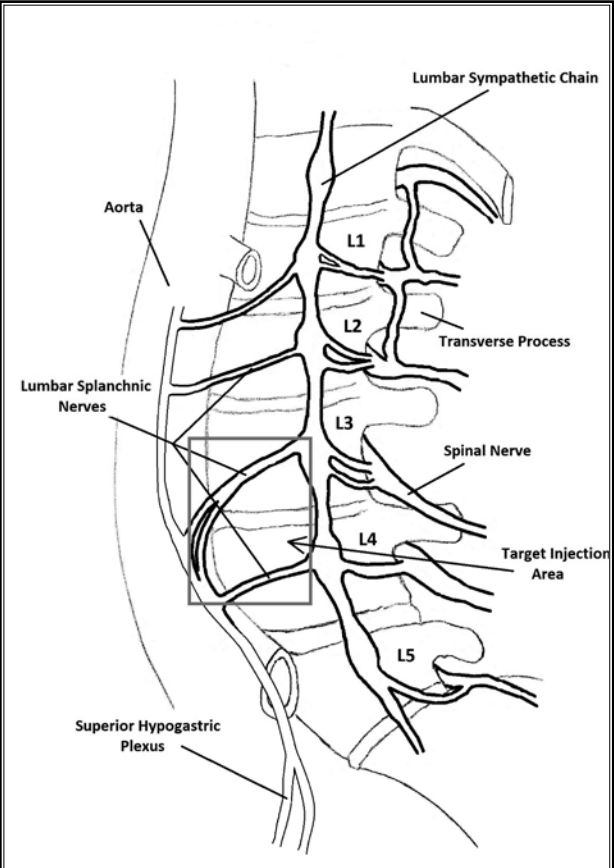

Fig. 1. *Anatomical representation of the sympathetic chain at the lumbar spine branching into the splanchnic nerve chain, which will later become part of the superior hypogastric plexus.*

Results

Three case presentations are reported below. In each case, there were no complications. Each patient had improvement in the frequency and intensity of spasms. The patients in cases 1 and 2 had entered hospice care within 3 months post treatment because of advancing disease, but the spasms improved during this period. In the third case, the spasms returned after 4 weeks; however, the patient did not desire a repeat procedure because the severity of the spasms had overall improvement.

Case 1

A 68-year-old female with a history of metastatic leimyosarcoma, with a mass in the bladder wall, complained of bladder spasms (20/d) with radiation of the pain to the right groin. She was seen after not responding to oxybutynin, darifenacin, pyridium, opioids, or nortriptyline. Her opioid regimen consisted of morphine sulfate (MS-Contin) 210 mg every 8 hours, later changed to methadone 20 mg every 8 hours. A sympathetic blockade was offered and performed without complication. The patient had no spasms for one month, and her methadone was reduced to 10 mg every 8 hours. Subsequently, she was transferred to hospice care, for advancing disease and comfort care, where she had no spasms for 2 additional months and was managed with morphine IV PCA with a basal rate of 20 mg/h. Her Numerical Rating Measurement (NRM) score was 10/10 during the bladder spasms; it was variable 7-10/10 post procedure because of other pain generators.

Case 2

A 67-year-old male with transitional cell cancer of the bladder who had bladder spasms after intravesical chemotherapy treatments was unable to tolerate continued treatments because of severe pain. The patient was given oxybutynin, pyridium, anticonvulsants (pregabalin at 50 mg 3 times a day), and opioids (tramadol 50 mg every 6 hours) for treatment, but received minimal relief. He was offered a sympathetic blockade, and after the procedure was performed, the bladder spasms ceased and subsequently his intravesical treatment was changed to mitomycin. He was able to stop both pregabalin and tramadol for 3 months post procedure. His NRM score was 7/10 during the bladder spasms, but post procedure he had no pain complaints.

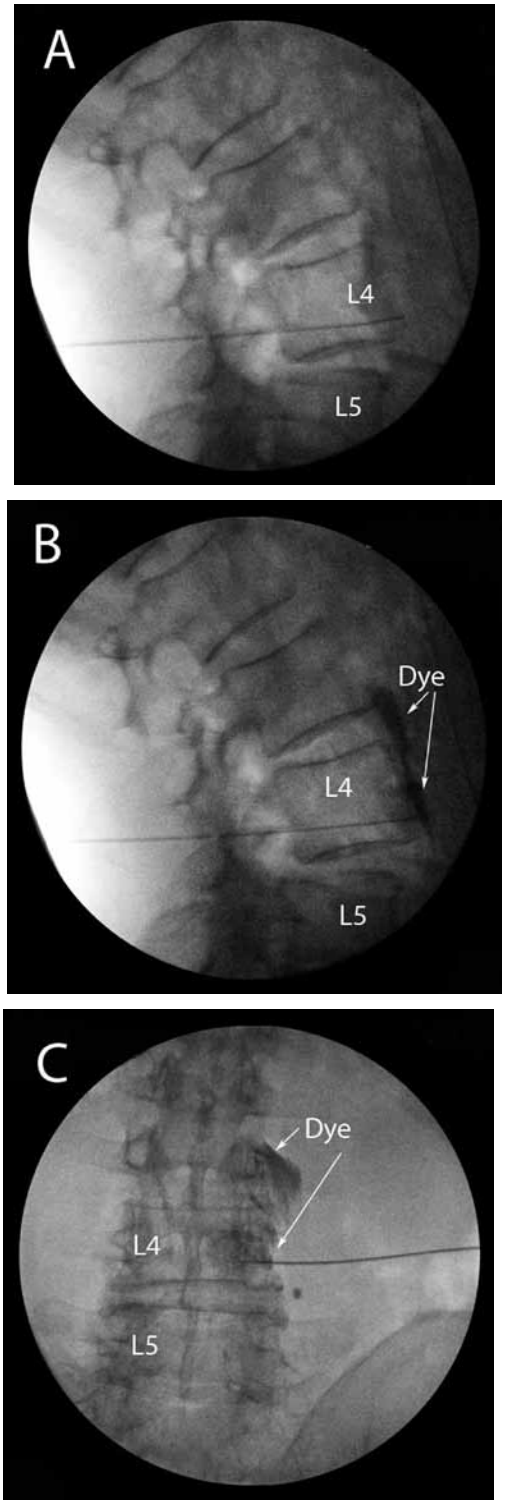

Fig. 2. *Fluoroscopic images of needle placement for patient 3. (A) Lateral view of L4 with needle placement. (B) Lateral view of needle placement with contrast dye. (C) AP view of needle placement and dye spread after local anesthetic was delivered.*

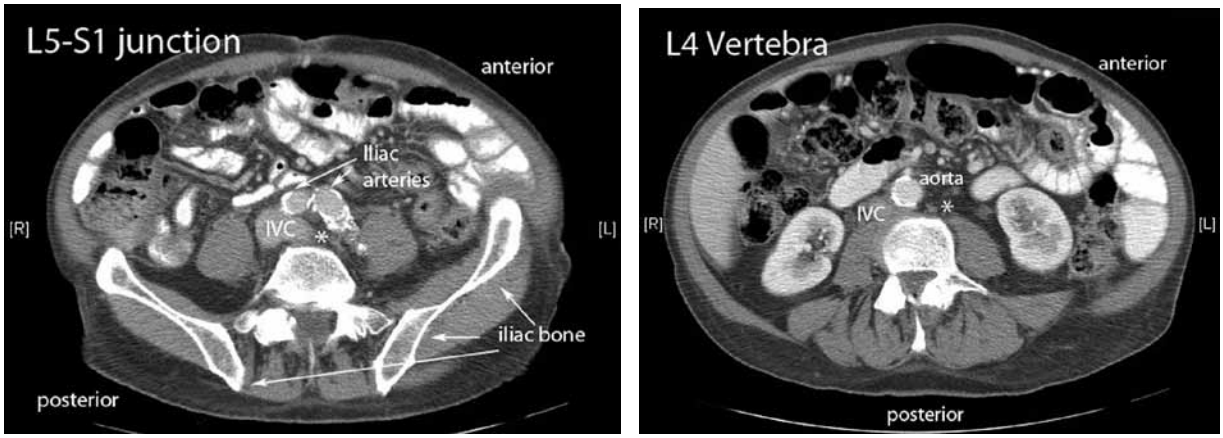

Fig. 3. *CT Scan images of patient 3. Both L5-S1 and L4 slices are shown. The asterisk (*) represents location of needle placement and deposit of local anesthetic (and neurolytic). Notice the ease of placement of a needle at L4 vs. L5-S1 junction.*

Case 3

A 74-year-old male was suffering with metastatic prostate cancer, which had locally advanced to the bladder causing severe bladder spasm, especially after urination. His pain improved with methadone therapy (10 mg every 8 hours); however, he continued to have 10-20 spasms after urination. Sympathetic blockade was performed, and both the frequency and intensity of the spasms improved for 4 weeks. His methadone was reduced to 5 mg every 8 hours, and he was eventually weaned off. His NRM score went from 10/10 to 7/10, with penile pain being his new significant complaint.

Discussion

We report the successful treatment of bladder spasm in 3 patients with a lumbar sympathetic blockade. In each case the frequency and intensity of spasms was reduced with one or 2 injections performed with local anesthetic. Sympathetic blockade (at L2) has been described both for interstitial cystitis and chronic perineal and pelvic pain, and given our understanding regarding the innervation of the bladder, sympathetic blockade of the splanchnic nerves could help alleviate the pain resulting from bladder spasm (14,15).

The lower splanchnic nerves leave the sympathetic chain around L1 and L2, travelling along the anterolateral border of the lumbar vertebrae medial to the lumbar sympathetic chain, suggesting L3 (and possibly L4) to be a good location to perform the splanchnic nerve block (12). At L4, the aorta is beginning its bifurcation into the iliac vessels (Fig. 3), and the splanchnic nerves are leaving the anterolateral border of the vertebral body to join the superior hypogastric plexus (12). We feel that this location is technically easier than targeting the superior hypogastric plexus at the sacral promontory (Fig. 3).

While there is no consensus on the approach to the superior hypogastic plexus, approaches involving transdiscal, anterior, or CT guidance require either viscera or an intervertebral disk to be pierced (16-19). We feel that if similar results can be achieved by placing the anesthetic at L4 and letting the volume spread around L3 to L5 as visualized under fluoroscopy (Fig. 2), theoretically, this may be safer for the patient. Obviously, this would require further comparison and research for validation. While reported complications have been rare, they could be catastrophic, such as somatic nerve injury (7-10, 18, 20-22).

Should blockade at L4 with local anesthetic not give long lasting relief, bilateral sympathetic blockade or neurolytic procedure may be considered. Unlike chemical neurolysis of the superior hypogastric plexus, chemical neurolysis at the L4 border may also affect the lumbar sympathetic chain, and alcohol neurolysis may lead to somatic nerve injury in either technique (10, 22). However, we have noted that with radiofrequency stimulation, branches of the splanchnic nerves (pelvic sensation) can be differentiated from the lumbar sympathetic chain (lower extremity sensation). Given the anatomy, a specific stimulation and lesion by radiofre-

quency ablation (or pulsed ablation) can alleviate pelvic and bladder pain while possibly sparing the sympathetic chain and hopefully, the surrounding somatic nerves (Fig. 1).

More recently, there is considerable interest in neuromodulation of the sympathetic chains with electrical stimulation devices. In extreme bladder spasticity, sacral nerve rhizotomy with anterior nerve root stimulation has been performed (23, 24). Various centers have published outcomes using sacral neuromodulation techniques, with success rates above 70% in patients that had permanent implants for their bladder ailment (25-27). On the other hand, revision and explantation (from 20 to 50% roughly) was a common occurrence (25-27). Given the similar efficacies described using electrostimulation, implantation of these devices can be considered as part of the treatment for persistent bladder spasms, perhaps if local blockade is unsuccessful.

We recognize that treatment with this technique in 3 patients does not represent proven efficacy for this technique in treating bladder spasm. However, sympathetic blockade at L4 may be an option for recurring spasms of the bladder. Further research is needed to see if this is a viable technique that should be recommended for the treatment of painful cancer-related bladder spasms.

Conclusion

Lumbar sympathetic blockade could be a useful treatment for recurrent bladder spasm in the oncologic population. Based on these findings, we feel that the splanchnic nerve set at L4 may be a good target for neurolytic procedures, such as radiofrequency ablation, for long term treatment of bladder spasms. Further research is necessary to determine the efficacy of this technique for the treatment of bladder spasms in the oncologic population.

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