

Lumbosacral radiculopathic pain presenting as groin and scrotal pain: pain management with twitch-obtaining intramuscular stimulation. A Case Report and Review of Literature

B. Gozon, J. Chu¹, I. Schwartz

Abstract

Background: Chronic groin and scrotal pain is a common entity plaguing a significant population of young athletic individuals. Aside from urologic and visceral etiologies, there is a vast array of underlying musculoskeletal and spinal abnormalities that may be found in these individuals.

Findings: Presented is a patient found to have chronic, spine-related groin and scrotal pain diagnosed with lower lumbar discogenic disease by physical examination findings, imaging studies and multi-level chronic radiculopathy by electrodiagnostic studies who was treated with twitch-obtaining intramuscular stimulation (TOIMS). Symptoms of groin and scrotal pain abated with therapy.

Conclusion: Twitch-obtaining intramuscular stimulation has a promising role in the treatment of groin and scrotal pain of radiculopathic origin.

Keywords: Groin – Scrotum – Pain – Radiculopathy – Intramuscular stimulation.

Introduction

Chronic groin and scrotal pain is a complex problem implicating pathology of the urogenital, musculoskeletal, neuro-vascular and gastrointestinal systems.

Because of the variety of conditions that can cause groin and scrotal pain, adequate diagnosis is key in the management of the patient with this problem with effective treatments ranging from conservative management including nerve blocks to surgery.

Presented is a case report of a patient with radiculopathy induced groin and scrotal pain who improved with a new conservative method consisting of twitch-obtaining intramuscular stimulation (TOIMS).

Case report

A 20 y.o. Caucasian, male patient was referred to the Urology Division of our Institution in 5/96 with a 2-year history of left-sided intermittent scrotal pain radiating to the groin. There was an exacerbation of pain for 6 weeks prior to presentation. He had already been evaluated at the Urology Department at another university hospital. On physical examination there, the testes were noted to be bilaterally descended without swelling and were nontender. The right epididymis was unremarkable. The left epididymal head was tender, without palpable abnormality. Urinalysis was normal. A left scrotal varicocele, diagnosed by scrotal ultrasound, was possibly thought to be the etiology of the pain on urologic evaluation. A question of intermittent torsion of the scrotal appendices was also entertained as a possible etiology of the pain. Conservative therapy was unsuccessful with persistence of “disabling pain”.

¹ Department of Rehabilitation Medicine, Hospital of the University of PA, Philadelphia, U.S.A.

Due to this disabling scrotal and groin pain, he had a "left low inguinal exploration of scrotal contents, varicocelelectomy, excision of appendix epididymis and appendix testis, left" at the same university hospital. Although there was pain relief for one week post-surgery, recurrence of scrotal and groin pain prompted a second urologic evaluation, 3 weeks post-surgery at our institution.

On examination at our institution, the left epididymal tail was tender without other palpable abnormality. The left vas deferens and spermatic cord contents, along with the floor of the inguinal canal were palpably normal. There was no palpable pulsation from an inguinal hernia during increase in intra-abdominal pressure and the left testis was unremarkable. Negative urologic work-up post-operatively included urinalysis, semen analysis, digital rectal examination of prostate, transrectal ultrasound of prostate, and intravenous pyelogram. With the negative urologic work-up, and with a key finding of worsening of left hemiscrotal pain on forward flexion of the lumbosacral spine, the urologist sought electrodiagnostic medicine consultation.

On presentation at the Electrodiagnostic Laboratory of the Rehabilitation Medicine Department, we obtained a history of intermittent left-sided lower back pain secondary to a football injury 4 years ago. He also gave a concurrent history of lower back pain but scrotal pain symptoms were more significant. The scrotal pain radiated to the groin and was rated 8/10 on a visual analog scale. Physical examination confirmed increased scrotal and groin pain on forward flexion. We termed this sign as a positive "Schwartz-Chu sign" to indicate presence of a pathology of the lumbosacral spine as a cause and source of this type of pain. Provocative maneuvers such as supine straight leg raising test, sitting root sign and Patrick's test were negative. No weakness was appreciated on the motor examination and the rest of the neurological examination was within normal limits. Tenderness was appreciated on deep manual palpation of the bilateral lumbosacral paraspinal muscles and the motor points on the bilateral sartorius muscles. No tenderness was appreciated over the corresponding points on the adductor muscles, and ischial tuberosity. There was also no tenderness over the insertions of the rectus abdominis and inguinal ligament.

We obtained an MRI of the lumbar spine that showed L4-5 degenerative disc with loss of disc

height with a small central protrusion superimposed on a concentric bulge associated with bony remodeling at the endplates. At L5-S1 there is loss of disc height and decrease signal within the disc on T2 weighted images. There was a right paracentral protrusion which abuts the right L5 nerve root.

EMG of the lower extremities showed chronic changes over the bilateral L5 and S1 innervated myotomes with mildly depressed H reflexes bilaterally on nerve conduction studies.

The patient underwent twitch-obtaining intramuscular stimulation (TOIMS) therapy (4,5) using manual oscillation of a monopolar pin into motor points over the L4-S1 myotomes and the C7-S1 paraspinal muscles. Many motor points were treated in the bilateral gluteus maximus (L5,S1), gluteus medius (L5,S1), tensor fascia latae (L5,S1), vastus medialis (L3,L4), vastus lateralis (L3,L4), rectus femoris (L2,L3), adductor longus (L2,L3), and adductor magnus (L2-S1) muscles in order to elicit muscle twitches. TOIMS treatments were applied at 2-5 day intervals for the first 3 treatments. By the third treatment, the testicular pain was significantly better and was rated at 2-3/10. The patient came back after 3 weeks to continue his series of treatments at 2-5 day intervals between treatments to complete 32 treatments. Scrotal pain was rated 0/10 by the 13th treatment with a gradual decrease in low back pain. There was complete resolution of back and groin symptoms by treatment number 28. On one year follow-up the patient remained symptom-free with an Oswestry score of 100%.

Discussion

Chronic groin and scrotal pain arising from the urogenital system are most often due to testicular tumors, varicoceles, hydrocoeles, inguinal hernias, latent inflammatory conditions of the prostate, testis, epididymis and vas deferens, cremasteric spasm, intermittent recurrent torsion of testes or the appendages of the testis and epididymis, and post-vasectomy syndrome. On rare occasions, systemic conditions such as polyarteritis nodosa and Henoch-Schonlein purpura and other conditions such as thrombosis of the testicular arteries, gluteal fibrosis, retro-peritoneal lesions such as tumors, hematomas and fibrosis can cause this pain (14). Chronic referred

groin and scrotal pain of visceral origin occurs from ureteral colic, abdominal aortic aneurysm, or appendicitis (11). Groin and scrotal pain may occur also from entrapment neuropathies of the ilioinguinal and iliohypogastric nerves. This type of entrapment neuropathy may occur after surgical damage or from post-surgical cicatricial adhesions, such as from hernia repair, a low McBurney's incision post-appendectomy, pelvic laparotomy with a transverse incision, incision for lumbar sympathectomy, or a low renal incision. Other causes of groin and scrotal pain include injuries to the genitofemoral nerve from surgery in the groin region, a psoas abscess or a compressive abdominal mass. The obturator nerve may also be involved either with an obturator hernia, osteitis pubis, after childbirth, hip joint arthropathy or local entrapment within the obturator tunnel or by thickened fascia overlying the short adductor muscles (3,8,14). Among musculoskeletal sources of chronic groin and scrotal pain are sacro-iliac joint dysfunction (6); enthesopathy over the pubic attachment of the inguinal ligament (2), strain injury of the muscles of the groin region including the adductor longus, rectus abdominus, iliopsoas, rectus femoris and hamstrings (13); osteitis pubis, and on rare occasion osteomyelitis of the pubic symphysis (9). It may also occur as a manifestation of femoral and acetabular component loosening after total hip replacement surgery (10). Spinal nerve root involvement from arachnoiditis, intervertebral disc prolapse, facet joint arthropathy, or spinal stenosis can also give rise to chronic groin and scrotal pain (15). In such instances, there may associated back symptoms or sciatica (14).

The persistence of groin and scrotal pain despite urologic surgical procedures, presence of thigh and groin muscle tenderness, with the reproduction of groin scrotal and groin pain on spine forward flexion (positive "Schwartz-Chu sign"), was highly suggestive of lumbosacral spine pathology in our patient. The findings of discogenic disease in the lower lumbar levels on MRI and positive chronic changes on electromyography and nerve conduction studies specifically suggest that the source of the chronic groin and testicular pain in this patient is related to nerve root irritation from abnormalities at the L4-L5 and L5-S1 intervertebral disc levels.

There is an association of chronic groin and scrotal pain with postero-central disc herniations at the L4-L5 and L5-S1 levels implicating the sinuvertebral

nerve, a nerve that arises from the ventral ramus and sympathetic trunk and innervates the posterior annulus fibrosus, the posterior longitudinal ligament, and the dura, as the afferent nerve of groin and scrotal pain (15). It is hypothesized that the sinuvertebral nerve carries dichotomizing C-fibers that innervate both the lumbar intervertebral disc and groin skin from the L2 spinal nerve root. In animal studies, capsaicin applied to the anterior portion of the disc stimulates the C-fiber terminals and generates impulses that ascend the muscular branch of the dichotomizing fiber in the psoas major muscle. The impulses then descend along another branch in the genitofemoral nerve which carries somatic fibers from the parietal and visceral layers of the tunica vaginalis and cremaster and finally cause an increase in vascular permeability of the groin skin (12). Potentially this may explain the relationship of the symptoms to the findings in this patient and also explains the increase of groin and scrotal symptoms with spinal flexion movements giving rise to a positive "Schwartz-Chu sign".

The choice of therapy was aimed at conservative management. A nerve block procedure of the genitofemoral nerve may have temporarily relieved the scrotal and groin pain without affecting the associated low back pain. Discography might have further characterized disc pathology. An epidural selective nerve block procedure at the involved disc levels might have been a reasonable therapeutic option. An innovative technique involving modification of intramuscular stimulation and dry needling (7), referred to as twitch-obtaining intramuscular stimulation (TOIMS) was used to treat this condition successfully. The TOIMS procedure induces twitch associated contraction and relaxation of muscle inducing a focused exercise and stretch effect facilitating an increase in circulation to the twitch-exercised area (4,5). If done periodically, the TOIMS treatments have accumulative effects and theoretically induce muscle lengthening, hypertrophy and nerve and muscle repair. Twitch-obtaining intramuscular stimulation has been found to relieve chronic low back pain of radiculopathic origin (5). In chronic radiculopathic conditions, it is postulated that nerve root irritation causes muscle shortening and stiffness through denervation supersensitivity. This causes a traction effect on nerves, blood vessels, tendons, bones and joints that precipitates a

cycle of pain. Ending the traction effect through neuromodulation will break the cycle of pain (4,5,7).

Although epididymectomy, orchiectomy and neurectomy have been advocated in the urologic literature for chronic scrotal and groin pain, the neurologic literature warns of potential enhancement and spreading of pain on damaging or cutting of nerves via deafferentation pain. This occurs by increased neuronal activity in the central cord that receives afferents from the area of nerve injury (1).

Conclusion

In a patient presenting with chronic groin and scrotal pain, a multidisciplinary approach is warranted. The key finding here was a provocative spinal flexion maneuver with reproduction of the patient's groin and scrotal pain (positive "Schwartz-Chu sign"). We suggest that this testing be performed on all such patients. We also suggest attention to palpation of groin, thigh and paraspinal muscles for presence of muscle tenderness especially at motor points. Work-up should include MRI, EMG, and nerve conduction studies if the above physical findings are positive. Based on the evaluation, this patient benefited from a non-surgical, non-chemical conservative therapy with twitch-obtaining intramuscular stimulation. In the interest of avoiding deafferentation pain, we strongly advocate conservative therapy in such patients.

References

1. ABDULLA, F.A., SMITH, P.A.: Nerve injury increases an excitatory action of neuropeptide Y and Y2-agonists on dorsal root ganglion neurons. *Neuroscience*, 89(1): 43-60, 1999.
2. ASHBY, E.C.: Chronic obscure groin pain is commonly caused by enthesopathy: 'tennis elbow' of the groin. *Brit. J. Surg.*, 81(11): 1632-4, 1994.
3. BRADSHAW, C., MCCRORY, P.: Obturator nerve entrapment: a cause of groin pain in athletes. *Am. J. Sports Medicine*, 25(3): 402-408, 1997.

4. CHU, J.: Twitch-obtaining intramuscular stimulation therapy in acute partial radial nerve palsy. *Electromyogr. clin. Neurophysiol.*, 39(4): 221-6, 1999 Jun.
5. CHU, J.: Twitch-Obtaining Intramuscular Stimulation: Observations in the management of radiculopathic chronic low back pain. *J. Musculoske. Pain*, 7(4): 131-146, 1999.
6. DAUM, W.J.: The sacroiliac joint: an underappreciated pain generator. *Am. J. Orthop.*, 24(6): 475-478, 1995.
7. GUNN, C.C., MILBRANDT, W.E., LITTLE, A.S., MASON, K.E.: Dry needling of muscle motor points for chronic low back pain: a randomized clinical trial with long-term follow-up. *Spine*, 5(3): 279-91, 1980.
8. HONG, Y., O'GRADY, T., LOPRESTI, D., CARLSSON, C.: Diagnostic obturator nerve block for inguinal and back pain: a recovered opinion. *Pain*, 67(2-3): 507-509, 1996.
9. KARPOS, P.A.G., SPINDLER, K.P., PIERCE, M.A., SHULL, H.J.: Osteomyelitis of the pubic symphysis in athletes: a case report and review of literature. *Med. Science in Sports and Exercise*, 27(4): 473-479, 1995.
10. KHAN, N.Q., WOOLSON, S.T.: Referral patterns of hip pain in patients undergoing total hip replacement. *Orthopedics*, 21(2): 123-6, 1998.
11. MCGEE, S.R.: Referred Scrotal Pain: Case reports and review. *J. Gen. Int. Med.*, 8(12): 694-701, 1993.
12. TAKAHASHI, Y., NAKAJIMA, Y., SAKAMOTO, T., MORIYA, H., TAKAHASHI, K.: Capsaicin applied to rat lumbar intervertebral disc causes extravasation in the groin skin: a possible mechanism of referred pain of the intervertebral disc. *Neuroscience Letters*, 161(1): 1-3, 1993.
13. TAYLOR, D.C., MEYERS, W.C., MOYLAN, J.A., LOHNES, J., BASSETT, F.A., GARRETT, W.E. Jr.: Abdominal musculature abnormalities as a cause of groin pain in athletes. *Am J Sports Med.*, 19(3): 239-242, 1991.
14. UPPINGTON, J., WARFIELD, C.: Chronic pain in the perineum, groin and genitalia. *Hospital Practice*, 23(7): 37-40, 46-52, 1988.
15. YUKAWA, Y., KATO, F., KAJINO, G., NAKAMURA, S., NITTA, H.: Groin pain associated with lower lumbar disc herniation. *Spine*, 22(15): 1736-9, 1997.

Address reprint requests to:

Jennifer Chu, M.D.

Department of Rehabilitation Medicine,
Hospital of the University of PA,
3400 Spruce Street,
Philadelphia 19104
U.S.A.

Tel. (215) 349 5598 (day) – (610) 520 9209 (night)

Fax (215) 662 4848

E-mail: jechu@mail.med.upenn.edu