

Microdenervation of the Spermatic Cord for Chronic Scrotal Content Pain: Single Institution Review Analyzing Success Rate After Prior Attempts at Surgical Correction

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Abbreviations and Acronyms

CT = computerized tomography
MDSC = microdenervation of the spermatic cord
MRI = magnetic resonance imaging
VAS = visual analog scale

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Purpose: Microdenervation of the spermatic cord is an effective treatment for men with intractable scrotal content pain. We evaluated a single center experience, analyzing patients in whom prior surgical attempts had failed to correct pain who subsequently underwent microdenervation of the spermatic cord.

Materials and Methods: A retrospective chart review of 68 patients who underwent microdenervation of the spermatic cord from 2006 to 2010 was performed. Prior ipsilateral surgical procedures with the intent to correct scrotal content pain were selected, identifying 31 testicular units.

Results: Chart review was performed on 68 men with mean age of 42 years at presentation and a mean followup of 10 months. Patients in whom prior surgical correction had failed and who subsequently had microdenervation of the spermatic cord had a mean postoperative pain score of 3 (range 0 to 10) with an average decrease in pain of 67%. Those who had not undergone a prior attempt at surgical correction had a mean post-microdenervation of the spermatic cord pain score of 2 (range 0 to 10) and an average pain decrease of 79% which did not differ statistically from those in whom prior surgery failed. In addition, 50% of men who had undergone surgery before microdenervation of the spermatic cord had complete relief of pain after microdenervation of the spermatic cord vs 64% of those who had not undergone previous surgery.

Conclusions: Men with chronic scrotal content pain in whom prior attempts to correct pain have failed have similar, albeit lower, success rates as those without prior surgical intervention. Therefore, men with chronic scrotal content pain in whom prior surgical management has failed and who have a positive spermatic cord block should be considered candidates for microdenervation of the spermatic cord.

Key Words: spermatic cord, testis, pain, denervation

CHRONIC orchialgia is a well described urological manifestation of a chronic pain syndrome defined as unilateral or bilateral testicular pain that is constant or intermittent and has lasted for more than 3 months.¹ Chronic scrotal content pain may be a more accurate description of this condition as it does not exclude pain in the scrotum that

is not derived solely from the testicle, but also the epididymis and/or spermatic cord. Chronic scrotal content pain is a debilitating condition which can inhibit one's ability to perform activities of daily living including work, and physical and sexual activity. For the practicing urologist it can pose a significant challenge to manage and treat.

Chronic pain is a complex process which is poorly understood, and thought to be secondary to an inciting noxious stimulus which leads to the process of sensitization and plasticity of the peripheral and central nervous systems, allowing for up-regulation of pain pathways.^{2,3} This up-regulation ultimately can lead to a spontaneous firing of nerves such that no noxious stimuli are necessary to generate the pain impulse.⁴ Chronic scrotal content pain is believed to develop from numerous direct sources, including previous trauma; pelvic, inguinal or scrotal surgery; after infection; after torsion; referred pain from the hip or spine; diabetic neuropathy; and after vasectomy, and it is most commonly idiopathic.^{5,6} In fact, up to 43% of patients with chronic scrotal content pain have been reported to have no identifiable cause for their symptoms.^{1,7} Conservative treatment is recommended before more invasive therapeutic modalities such as surgical correction.

Before presenting to a urologist, patients may have already sought out and experienced failure of multiple previous conservative treatments⁸ including analgesics, anti-inflammatory agents, antidepressants, anticonvulsants, physical therapy, biofeedback and acupuncture. In addition, many patients are referred to a pain clinic where medical therapy and local and regional blocks are administered, and psychotherapy is offered to help cope with the pain. In some cases chronic scrotal content pain may be attributed to an easily identifiable abnormal physical finding such as varicocele, hydrocele, spermatocele, hernia or obstruction after previous vasectomy. In these circumstances surgical correction for chronic scrotal content pain typically aims at correcting these findings via varicocelectomy, hydrocelectomy, spermatocelectomy, herniorrhaphy, open ended vasectomy or vasovasostomy, respectively. In the absence of a reversible cause, microdenervation of the spermatic cord has been reported as an effective durable testis sparing surgery, emerging as a clear alternative to orchiectomy for the treatment of chronic orchialgia refractory to medical management.^{7,9-11} It has not yet been reported whether MDSC is an effective treatment for patients in whom previous attempts at surgical correction of chronic scrotal content pain have failed. We reviewed our results from 2006 to 2010 for patients who underwent MDSC at our institution, and compared the efficacy of MDSC in patients who have had prior attempts at surgical correction for pain vs those who have not.

MATERIALS AND METHODS

A retrospective chart review identified 68 patients (70 surgical testicular units) treated with MDSC from 2006

to 2010. Patients who underwent prior ipsilateral surgical procedures with the intent to correct chronic scrotal content pain were selected and 31 testicular units were identified. Long-term followup was conducted by office visit or chart review and telephone interview.

Perceived etiology of pain was recorded, and included previous surgery (vasectomy, inguinal hernia repair, varicocelectomy) and acute trauma. Conservative therapy had failed in all men. Many patients in this study were referred to our institution after evaluation and treatment at a specialized pain clinic. A standard evaluation protocol was performed on all patients including a detailed medical history with a focus on previous genital infection, spinal surgery, local trauma, analgesic use, history of sexual abuse, psychiatric disorders and other chronic pain conditions (eg fibromyalgia, chronic pelvic pain, chronic prostatitis, interstitial cystitis) which may suggest a more global pain syndrome. A focused physical examination was performed to identify the precise location of the pain (ie testicle, spermatic cord structures and/or epididymis). Urinalysis and semen culture were performed when there were signs of infection. Duplex scrotal ultrasound was performed at least once in all patients to exclude structural abnormality including tumor, torsion, varicocele, hydrocele, spermatocele, inguinal hernia and epididymo-orchitis. CT or MRI of the spine or hip was performed when a history of back pain or trauma was reported. Figure 1 provides a detailed depiction of our algorithm for the evaluation of chronic scrotal content pain.

Conservative therapies had been tried and had failed in all patients by the time they were evaluated at our clinic, and in 31 men prior surgical treatment of their pain had failed. Figure 2 depicts the treatment algorithm used at our institution. When no reversible cause was identified, spermatic cord block was performed at the pubic tubercle area with 20 ml 0.25% bupivacaine. Pain scores were recorded before and after the administration of local anesthetic, and were quantified using the short form McGill pain score VAS.¹² Patients who demonstrated a positive response, defined as greater than 50% temporary reduction of pain following cord block, were considered candidates for MDSC.

The microdenervation procedure was performed in an outpatient setting with the patient under general anesthesia with the assistance of an operating microscope. The spermatic cord is exposed at the external inguinal ring through an inguinal incision and the ilioinguinal nerve is divided as it emerges from the ring. The cord is isolated and supported by a Penrose drain, and the operating microscope at 8× power is brought to the field. The anterior cremasteric fascia is then incised and the cord structures are identified during careful dissection. Arteries are isolated with the assistance of intraoperative micro-Doppler and carefully stripped of all fibroareolar tissue for 1 to 2 cm. All cord structures are divided with cautery or between 4-zero silk ties except several lymphatics and all identified arteries (testicular, cremasteric, deferential).^{7,13} In the patients who have not undergone vasectomy, the vas deferens is spared but stripped of all perivascular fascia for approximately 2 cm as it is richly innervated.¹⁴

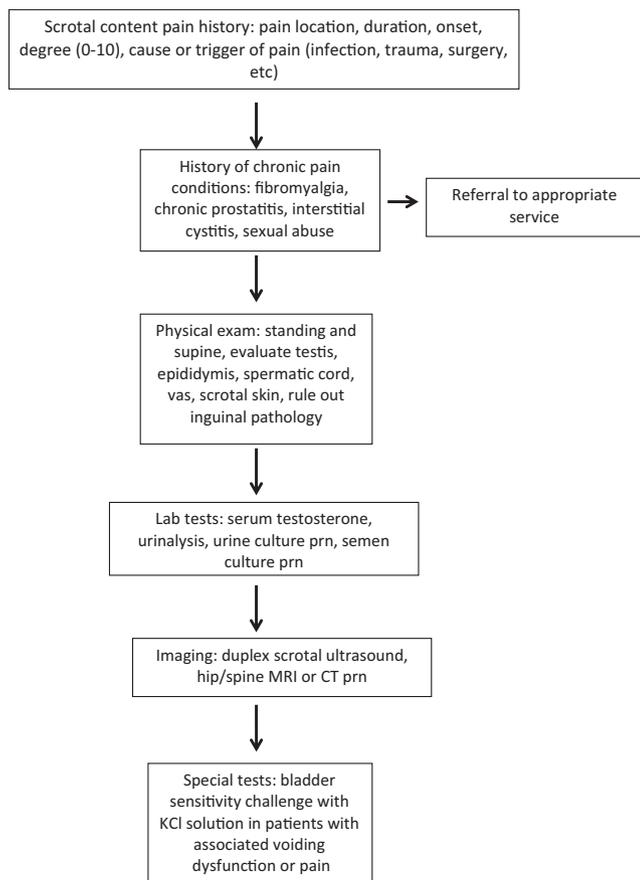


Figure 1. Evaluation algorithm for patient with scrotal content pain. *prn*, as needed.

We now perform MDSC on 2 separate occasions for bilateral pain to minimize the risk of prolonged postoperative scrotal swelling which had been encountered when performing this procedure simultaneously in the past. Postoperative examination and pain score measured on a VAS were compared with preoperative findings. Responses to MDSC were measured on a 0 to 10 VAS and recorded at the latest followup clinic visit.

RESULTS

A total of 68 patients were identified with a complete medical record. Of these men 30 with a total of 31 testicular units were identified as having undergone surgery which failed to correct chronic scrotal content pain. The median preoperative duration of pain was 39 months (range 3 to 366). Mean patient age was 42 years (range 17 to 74). The mean age of those having had prior surgery vs no prior surgery was 39 and 45 years, respectively ($p = 0.8$). Mean duration of pain for those in whom prior surgery failed vs the surgery naïve group was 69 vs 73 months ($p = 0.8$). Mean followup after MDSC for those in whom prior surgery failed was 11 months vs 10 ($p = 0.7$) for those with no history of surgery to correct pain.

The most common operations in our population were epididymectomy, varicocelectomy and orchiopexy, in 10, 8 and 7 cases, respectively. Several of these patients had undergone multiple previous operations before undergoing MDSC, as a total of 38 failed surgeries were performed to relieve pain in those 30 men. After MDSC the mean overall postoperative pain score for both groups taken together was 2 (range 0 to 10), resulting in an average pain decrease of 73% from the baseline presenting pain score. Patients in whom prior surgical correction failed who subsequently underwent MDSC had a mean pain score before and after MDSC of 8 and 3, respectively, with an average decrease in pain of 67%. Patients who had not had prior attempts at corrective surgery had a mean pain score before and after MDSC of 6 and 2, respectively, with an average pain decrease of 79%. The percent improvement in pain between these 2 groups was not statistically significant ($p = 0.123$). There was a complete response to MDSC (ie 0/10 pain on VAS) in 50% of patients in whom prior surgical correction for pain had failed vs a 64% complete response rate in the surgery naïve group, and this difference was not statistically significant ($p = 0.236$). Overall 66% of those in whom prior surgery had failed experienced a more than 50% sustained reduction in pain vs 75% of the surgery naïve group ($p = 0.41$, fig. 3). A sub-

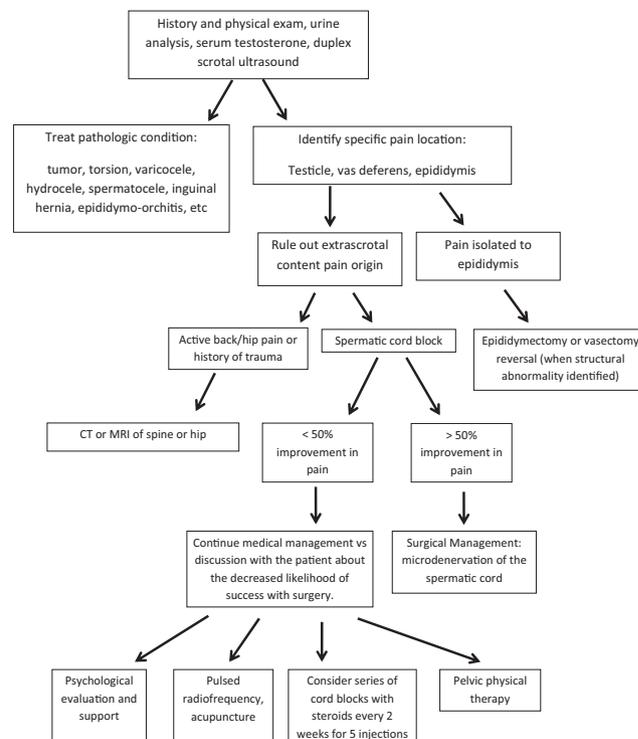


Figure 2. Treatment algorithm for patient with scrotal content pain.

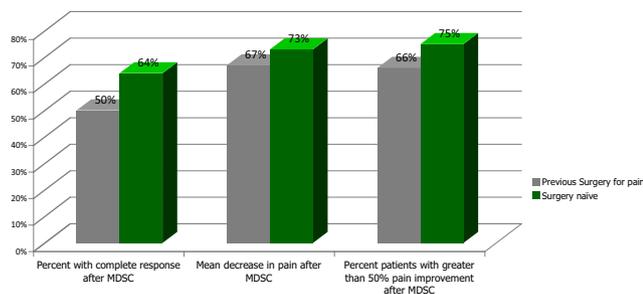


Figure 3. Pain improvement after MDSC

analysis of our population included those with long-term followup greater than 2 years. Of 11 patients with a followup of 24 to 41 months 7 had 100% improvement in pain.

Complications in this cohort included 2 cases of low hanging testicle manifested by greater laxity in the scrotum. Three patients in whom MDSC failed underwent subsequent orchiectomy. There were no reported cases of hydrocele, testicular atrophy or hypogonadism.

DISCUSSION

In this study success rates with MDSC and percent pain reduction did not differ significantly between patients who had prior surgery to correct pain vs those who did not. This suggests that chronic scrotal content pain may develop independently of a known surgically correctable factor. Chronic scrotal content pain can occur as a result of a variety of etiologies, some of which are readily reversed (ie varicocele, spermatocele). However, when the pain is more diffuse and/or there is concern that the pain has become chronic, we believe that the surgery which most appropriately addresses pain is MDSC when there is a positive response to a spermatic cord block. An identifiable physical abnormality may be present but often pain is not due to this identifiable noxious stimulus. In this series 1 patient attributed pain to bicycle riding as he had no history of any other recognized causes for chronic orchialgia. This patient may represent many who attribute their pain to some event which may or may not be the responsible etiology. Nevertheless, it is not until the afferent nerves are interrupted with MDSC that pain has been shown to resolve in up to 71% in men who underwent surgery to eradicate the pain.⁶

Heidenreich et al reported the highest rate of success with a complete response in 96% of patients at a mean followup of 31.5 months.⁹ This high rate of success was attributed to meticulous

diagnostic evaluation with spermatic cord block using saline as placebo and multiple local anesthetic agents as an initial diagnostic tool to predict postoperative outcome. Although it has been suggested that a series of blocks including a placebo is necessary before reliably offering surgery, this approach has not been proven to identify the malingerer. Also, a series of blocks is not always possible due to travel from significant distances, as in this series. In addition, the use of a placebo/saline block increases risk and expense, and may result in local nerve changes which may be perceived as a positive response. We suspect that our complete response rate to surgery would be higher if we offered MDSC only to men with a complete, albeit temporary, relief of pain after cord block. We are currently investigating whether the effectiveness of spermatic cord block is a positive predictor for success of MDSC. There does appear to be a correlation between those who have a more complete response to cord block and success of MDSC. Duration of pain did not seem to affect success rates as we have had men who have had complete response to MDSC despite having more than 20 years of pain.

These findings are important as patients in whom prior treatments have failed, including previous surgical attempts to correct pain, appear to be candidates for MDSC, particularly when they have temporary relief of pain defined as at least a 50% reduction in pain after a spermatic cord block.

The success rates of MDSC for patients who have had prior surgery seem to differ based on the particular surgery performed. Although the numbers are small, this information may help predict rates of success of MDSC in different patient populations which could assist with patient counseling and operative planning (see table).

A major limitation of our study, as in many surgical trials for treating pain, is that there was no control arm. However, we do not believe that a sham surgery would be ethical nor do we believe patients would agree to participate in such a study. Some other weaknesses of this report in-

Previous operations for pain

	Total No.	% Greater Than 50% Reduction in Pain After MDSC
Open-ended vasectomy	4	100
Epididymectomy	10	80
Varicocele	8	75
Hernia	4	75
Orchiopexy	7	57
Hydrocelectomy	4	50
Spermatocele	2	50
Vasovasostomy	2	0

clude the retrospective design and wide variation in followup time. The study strength is that it involves a sizable population of subjects from a center where MDSC has been performed for more than 20 years.

CONCLUSIONS

Men with chronic scrotal content pain in whom conservative medical therapy and surgical approaches have failed still have a significant opportunity to remedy the pain with MDSC.

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