Minimizing Pain During Vasectomy: The Mini-Needle Anesthetic Technique

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Purpose: We describe pain scores for a modified anesthesia technique for no-scalpel vasectomy using a 1-inch 30 gauge mini-needle.

Materials and Methods: A prospective study was performed in 277 patients who received anesthesia using a 3 cc syringe filled with approximately 2 cc 2% lidocaine without epinephrine and a 1-inch 30 gauge needle. Local anesthesia was given directly to the vas at the expected surgical site on each side.

Results: Mean ± SD pain intensity score on the 10 cm visual analog scale was 1.5 ± 1.6 (95% CI 1.3–1.7) during the anesthesia and 0.6 ± 1.0 (95% CI 0.5–0.7) during the procedure. Patients experienced less pain during anesthesia and the procedure than they expected before vasectomy (average 3.1 ± 1.8, 95% CI 2.8–3.3).

Conclusions: The mini-needle technique provides excellent anesthesia for no-scalpel vasectomy. It compares favorably to the standard vasal block and other anesthetic alternatives with the additional benefit of minimal equipment and less anesthesia.

Key Words: testis; vasectomy; anesthesia, local; pain; pain measurement

Abbreviations and Acronyms

EMLA = eutectic mixture of local anesthetics

NSV = no-scalpel vasectomy

SCB = spermatic cord block

VAS = visual analog scale

VDS = visual descriptive scale

Submitted for publication September 6, 2009.

Study received hospital medical director approval.

Supplementary material for this article can be obtained at www.vasectomie.net/table_anesthesia.doc.

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VASECTOMY is a minor surgical procedure done with local anesthesia.[1] NSV has become the standard approach to vasectomy.[2,3] The NSV technique decreases bleeding, hematoma formation, infection and pain, and allows a shorter procedure time.[3–6] Still, despite the no-scalpel technique many men may forego vasectomy due to fear of pain during the procedure.[7,8]

Currently standard anesthesia for NSV is a vasal block with 10 cc lidocaine without epinephrine given with a 25 or 27 gauge 1 ½-inch needle.[9] Suggested improvements to this technique to minimize pain during vasectomy include using EMLA cream alone or as an adjunct to infiltration anesthesia, buffering anesthesia, spermatic cord block and the no-needle jet injector technique.[10–17]

Overall few groups have examined the impact of needle gauges on pain perception. Since needles smaller than 27 gauge are primarily used in dental procedures, most groups have focused on dental pain control. These studies show mixed results with no difference or modest improvements in pain control with smaller needle gauges.[18–20] Limited studies of intradermal injection exist but some suggest that smaller gauge needles may cause less pain during a specific procedure.[21,22] To our knowledge no group to date has investigated the use of smaller gauge needles for pain control during vasectomy. We determined pain scores for a modified anesthesia technique for NSV using a 30 gauge

0022-5347/10/1835-1959/0
THE JOURNAL OF UROLOGY®

Vol. 183, 1959-1963, May 2010
Printed in U.S.A.
DOI:10.1016/j.juro.2010.01.006

1-inch needle. The mini-needle technique should be an acceptable alternative to the standard vasal block. It uses commonly available materials and requires a smaller quantity of anesthesia to provide adequate pain control.

MATERIALS AND METHODS

Participants

Patients were recruited between January and February 2007, and May and June 2009 at 2 primary care private clinics and 1 family planning clinic in a tertiary care teaching hospital. Patients scheduled to undergo the first vasectomy entered the study after verbally agreeing to answer a preoperative and postoperative pain questionnaire. Patients were recruited in consecutive fashion and none refused study participation. The study was reviewed and accepted as an evaluation of the quality of care by the hospital medical director.

Clinical Procedures

The mini-needle technique was introduced in late 2006 at all 3 participating clinics. This technique replaced the vasal block technique[9] that had been in use since NSV was introduced in 1992.

To perform the mini-needle technique a 3 cc syringe is filled with approximately 2 cc 2% lidocaine without epinephrine. A 1-inch 30 gauge needle is attached before injection. With the surgeon on the right side of the patient the left vas deferens is secured using the traditional 3 finger technique of NSV. As in the standard vas block technique,[9] the needle entry site is over the vas deferens, midway between the top of the testes and the base of the penis over the median raphe. Using the needle tip a superficial skin wheal is raised with approximately 0.5 cc. The surgeon then redirects the needle directly to the vas at the expected surgical site and infiltrates 0.5 to 0.75 cc anesthesia as close as possible to and even into the vas deferens. The procedure is repeated for the right vas deferens except the superficial skin wheal is not repeated since the needle reenters through the previously used site. Vasectomy is started immediately on the left side after finishing anesthesia on the right side.

In all cases the NSV technique was used to secure and extract the vas from the scrotum.[2,3] Vasal occlusion was achieved using thermal cautery of the prostatic end of the vas, fascial interposition with a medium Hemoclip® over the prostatic end and excision of approximately 5 mm of the testicular end, which remained open ended.[23] In 17 consecutive patients average total operative time from anesthetic injection to skin dressing was 5.0 ± 1.1 minutes (range 3.4 to 6.9).

A verbal announcement was made at the beginning and end of anesthesia, and at the start of vasectomy to delineate these time points for the patient. Anesthesia and vasectomy were done by a single surgeon (ML), who performs more than 1,000 cases per year. No mention or discussion about pain was done during or after the procedure.

Data Collection

Patients were asked to complete a preoperative questionnaire in the waiting room while waiting for surgery. The questionnaire included a 10 cm VAS on expected pain intensity (score 0—no pain to 10—worst possible pain) and a 5-item VDS of overall pain expected (score 0—no, 1—mild, 2—discomforting, 3—distressing, 4—intense and 5—excruciating pain) during vasectomy. The questionnaire was given to a nurse after completion.

Immediately after vasectomy patients were asked to complete a postoperative questionnaire. They had no access to the preoperative questionnaire. The postoperative questionnaire included assessment of actual pain related to anesthesia and actual pain related to vasectomy. Pain assessment of anesthesia and vasectomy included 3 questions, including a 10 cm VAS of pain intensity, a 10 cm VAS of unpleasantness and a 5 item VDS of pain. VDS descriptors were identical to those described. Preoperative and postoperative questionnaires were matched based on patient initials and birth date.

Analysis

The same ruler was used to measure VAS results in all patients. All measurements and data entry were done by an independent research assistant. The mean is with the SD and 95% CI. The Student t test was used to evaluate differences between surgical sites (private clinics vs hospital clinic) and years (2007 vs 2009). The Pearson correlation coefficient was calculated to evaluate the correlation between scores reported on different pain scales.

RESULTS

A total of 277 patients were recruited to participate in the study, including 84 in 2007 and 193 in 2009. Average patient age was 38 ± 6 years (range 26 to 58). Of the 277 patients 50 (18%) were recruited at the tertiary care hospital family planning clinic and 227 (82%) were recruited at private clinics. Three patients left at least 1 item of the questionnaire unanswered. Six of the total of 2,216 items (0.3%) were unanswered, including 1 on VAS expected pain, 2 on VDS expected pain, 1 on VAS vasectomy pain intensity, 1 on VAS vasectomy unpleasantness and 1 on VDS vasectomy pain. These missing items were excluded from analysis.

The table lists pain outcome results. An average of almost no pain was perceived during vasectomy, mild pain was perceived during anesthesia and discomforting pain was expected before surgery. The 10 cm VAS and the 5-item VDS results for expected pain correlated highly ($r = 0.72$, $p < 0.0001$), as did the 3 scales to measure pain during anesthesia ($r = 0.71$ to 0.82, each $p < 0.0001$) and during vasectomy ($r = 0.67$ to 0.91, each $p < 0.0001$). Pain scores during anesthesia and during vasectomy correlated moderately ($r = 0.44$ to 0.55, each $p < 0.0001$). However, although they were statistically significant, correlations of expected pain scores with pain scores

Pain outcome with mini needle anesthesia during vasectomy in 277 men

	Mean ± SD (95% CI)	Median (range)
Preop expected:		
10 cm VAS pain	3.1 ± 1.8 (2.8–3.3)	2.8 (0–10)
5-Item VDS pain	1.9 ± 0.8 (1.8–2.0)	2 (0–5)
Related to anesthesia:		
10 cm VAS pain intensity	1.5 ± 1.6 (1.3–1.7)	1 (0–7.1)
10 cm VAS unpleasantness	1.5 ± 1.6 (1.3–1.7)	1 (0–7.3)
5-Item VDS pain	1.2 ± 0.8 (1.1–1.3)	1 (0–3)
Related to vasectomy:		
10 cm VAS pain intensity	0.6 ± 1.0 (0.5–0.7)	0.1 (0–7.2)
10 cm VAS unpleasantness	0.6 ± 1.0 (0.5–0.7)	0.1 (0–6.8)
5-Item VDS pain	0.4 ± 0.6 (0.3–0.5)	0 (0–3)

during anesthesia or during vasectomy were low (0.12 to 0.26, $p < 0.04$).

We compared pain intensity, unpleasantness and overall pain scores by surgical site and by year. There were no statistically significant differences among the sites in any pain measure. When analyzing pain scores by year, we found a statistical difference only in expected pain scores. Patients in 2007 had a higher average expected VAS score than those in 2009 (3.4 ± 1.8 vs 2.9 ± 1.8, $p = 0.02$). There were no statistically significant differences between the 2 periods in all other pain measures. No adverse events were noted except occasional perivasal ecchymosis, which did not interfere with vas occlusion.

DISCUSSION

Given the efficacy, cost-effectiveness and safety of vasectomy, we must make advancements in technique so that vasectomy is more used by couples who have completed childbearing or do not want children. The development of the no-scalpel technique shows that improvements in technique and social marketing can dramatically increase the selection of male sterilization over female sterilization.[24] We propose a method that may make vasectomy a more acceptable option by using a smaller gauge needle while minimizing the equipment needed to perform the procedure.

Overall our patients reported mild pain during anesthesia and virtually no pain during vasectomy. Since this is a descriptive study without an inherent comparison group, we performed a literature search using the key words vasectomy and anesthesia in MEDLINE® in July 2009 to provide some comparison for our results. From 197 titles and abstracts we identified 10 articles providing pain scores associated with local anesthesia during vasectomy.[8,10–12,14–17,25–27] An additional article was found in the personal database of one of us.[27]

When comparing the mini-needle technique with the traditional vasal block, our pain scores are lower. Using the mini-needle technique the average VAS pain score for vasectomy was 0.6. In studies using a traditional vasal block that measured pain on a 10 cm VAS scale the mean pain score was 1.9 to 3.3. There are limitations to these comparisons. These studies done at various sites and in various clinical contexts used different anesthetic preparations and needle gauges, and surgeons with varying skill levels. In our study all procedures were done by 1 experienced surgeon, which may have contributed to our low pain scores. Also, given the different backgrounds of the patients in these studies, cultural or other differences in pain perception may not make the VAS scale universally comparable. Due to the several variables that may influence pain perceived and reported by patients comparisons across studies must be made while considering these limitations.

Our technique also compares favorably with variations of the traditional vasal block. Recently SCB was suggested as an alternative vasectomy anesthesia.[26] A 30 gauge 0.5-inch needle was used for SCB, which is similar to our mini-needle but shorter (0.5 vs 1 inch). SCB uses an equal mixture of 1% lidocaine with epinephrine and 0.5% bupivacaine. Approximately 4 cc anesthesia were infiltrated in each spermatic cord. An additional 1 to 2 cc were used for local anesthesia on the scrotal skin for a total of 10 cc compared to 2 cc for our technique. The average pain scores of 1.7 and 0.6 on a 10 cm VAS for SCB with local anesthesia during anesthesia and vasectomy, respectively, were similar to those of our technique.

Other variations of the traditional block include EMLA cream and anesthetic buffering. These techniques showed higher pain scores. EMLA cream combined with local anesthesia had an average VAS pain score during vasectomy of 2.2[11] vs 0.6 for the mini-needle and a VDS score of 0.6[12] vs 0.4 for the mini-needle. Buffered anesthesia had an average anesthetic VAS pain score of 1.7 vs 1.5 for the mini-needle and an average VAS vasectomy pain score of 2.2 vs 0.6 for the mini-needle.[15] In addition to the improved pain scores achieved by the mini-needle technique, no extra preparation is needed. EMLA cream is applied to the scrotal skin 1 hour before the procedure to attain efficacy.

Comparing our technique to the no-needle jet injector anesthesia, our VAS scores were similar to those in the study by Weiss and Li that was done in Canada with similar measurement tools.[16] Average pain score during anesthesia with the 30 gauge needle was 1.5 vs 1.7 for the jet injector anesthetic. Average pain score during vasectomy with the 30 gauge needle was 0.6 vs 0.7 for the jet injector anesthetic. In the single group, randomized trial by White and Maatman the average pain score during anesthesia with the jet injector was 1.6, similar to

our results, but during vasectomy it was higher at 1.7.[17] In the study by Aggarwal et al average pain scores during anesthesia and procedure were higher at 2.2 and 2.1, respectively.[26]

These data show that the jet injector is an appropriate option for vasectomy anesthesia. Known as the no-needle technique, it may have marketing appeal. However, it appears to have varying results depending on provider. It may also not be suitable for all settings. The estimated cost of a jet injector is $562[16] and the device requires regular maintenance and inspection. These factors may restrict its use in low resource settings and at clinics with low vasectomy volume. Based on our study results equivalent or improved pain control could be achieved with the mini-needle technique.

The mini-needle technique uses only 2 cc 2% lidocaine compared to the conventional vasal block, which requires up to 10 cc local anesthesia.[9] At a cost of $0.10 to $0.20/cc lidocaine this has the possibility for significant savings in settings with a large number of vasectomies. The small anesthetic volume infiltrated directly into the surgical site did not alter performance of the standard NSV technique in any way. Minimizing the superficial wheal for the standard vasal block is recommended to facilitate grasping the vas with the ring forceps.[9]

To our knowledge this is the first study to evaluate expected pain before vasectomy. Men expected an average of "discomforting" pain. VAS results were significantly higher in patients operated on in 2007 than in 2009 (3.4 vs 2.9). An explanation may be the inclusion of a description of the mini-needle technique on the practice website (www.vasectomie.net). This website was updated with mini-needle information in the interim between the 2 study recruitment periods. The website describes the mini-needle technique and states that vasectomy will be without pain and most men describe vasectomy as less painful than going to the dentist. This statement did not appear to influence any other pain measurements between 2007 and 2009.

Surprisingly there was only a weak correlation between expected pain and anesthesia pain scores ($r = 0.18$, $p < 0.001$), and between expected pain and vasectomy pain scores ($r = 0.26$, $p = 0.003$). Nevertheless, patients can be reassured that the average pain of the procedure is less than expected.

This is a descriptive study of a modified technique for vasectomy anesthesia that warrants further investigation. The next step includes a randomized, controlled trial comparing pain control with the mini-needle technique vs that of the standard vasal block and/or jet injector technique.

CONCLUSIONS

The 30 gauge mini-needle technique is a promising alternative to the standard vasal block, as evidenced by our low pain scores. This technique may improve pain control during vasectomy and increase patient acceptability, given the smaller needle size. Since the 30 gauge needle technique does not require extra equipment and it is done with a small volume of anesthesia, it may be particularly suitable in low resource settings and may make vasectomy even more attractive and cost-effective.

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