Techniques - Single keyhole puncture microsurgical vasovasostomy

Sarah M. Brink[1,2], Kiera Libik[3], Justin Gillespie[4], Luke Witherspoon[4], Ryan K. Flannigan[1,2]
[1]Department of Urologic Sciences, University of British Columbia, Vancouver, BC, Canada; [2]Reproductive & Sexual Medicine Centre, M.H. Mohseni Institute of Urologic Sciences, Vancouver, BC, Canada; [3]University of British Columbia, Vancouver, BC, Canada; [4]Division of Urology, Ottawa Hospital, Ottawa, ON, Canada

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Corresponding author: Dr. Sarah Brink, Department of Urologic Sciences, University of British Columbia, Vancouver, BC, Canada; sarahbrinkmd@gmail.com

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ABSTRACT

Microsurgical vasectomy reversal has progressed from bilateral scrotal incisions, through which the testes were delivered, to incisions delivering the vasa, and now to techniques using mini-incisions. We present our technique for microsurgical vasovasostomy via a single keyhole puncture using the no-scalpel vasectomy techniques.

KEY MESSAGES

- The single keyhole puncture microsurgical vasovasostomy results in minimal tissue violation, improved cosmesis, and theoretically decreases operative time by eliminating multiple sutures during closure.
- The vas is isolated and mobilized to the median raphe with the three-finger technique learned from no-scalpel vasectomy; the vasectomy forceps are used to make a keyhole puncture at the marked spot on the median raphe, and the vas is grasped at the site of vasectomy with the vasectomy ring forceps through the keyhole site, to avoid crush injury to the healthy vas.
- If the delivered vas is not suitable for anastomosis, the ring forceps can be used in "leapfrog" succession to work either proximally or distally until a suitable segment of vas is encountered.
- After each cut of the testicular or abdominal end, it is important to precisely but thoroughly cauterize the excluded vasal segment and surrounding tissues for hemostatic control using bipolar electrocautery on a micro setting.

INTRODUCTION

Over 55,000 vasectomies are performed annually in Canada; however, approximately 6% of vasectomies are reversed.[1,2] Vasectomy reversal (VR) is a viable option for paternity with published patency rates of 78.7-92% in bilateral vasoepididymostomy (VE) to 88-99% in bilateral vasovasostomy (VV).[3-6]

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Quinby first described macrosurgical VV in 1919, which continued in many variations, with or without stenting and with or without loupe magnification, into the 1970s.[3] Microsurgical techniques were first described independently by Silber and Owen in 1977.[7,8] The traditional approach consisted of 3-4cm bilateral vertical incisions. In 2008, Jarvi *et al.* described bilateral mini-incisions utilizing techniques learned from no-scalpel vasectomy.[9] We describe a single site "keyhole" puncture incorporating no-scalpel vasectomy techniques. The keyhole puncture is appropriate as bilateral VVs are performed in 74.3% of our VRs, and is easily extended into an incision if VE is required.[4]

SURGICAL TECHNIQUE

Following anesthesia induction, patients are positioned, shaved, prepped, then draped. A diamond configuration of blue towels is used to isolate the scrotum and exclude the phallus. The surgical steps (Fig. 1), begin with palpation to determine the location of the vasal defects and mobility of the vasa to ensure adequate vasectomy site mobilization to midline. The median raphe is marked approximately one fingerbreadth inferior to the penoscrotal junction. The right vas is isolated and mobilized to the median raphe with the three-finger technique learned from no-scalpel vasectomy. The vasectomy forceps make a keyhole puncture at the marked site and tissues overlying the vas are dissected. Through the keyhole site, vasectomy ring forceps grasp the vas at the vasectomy site, avoiding crush injury to healthy vas. The vas is isolated from the adventitia and delivered onto the field. Careful spot electrocautery is utilized to the dartos, and bipolar to perivasal vessels. In our experience, both the abdominal and testicular ends can be delivered to the keyhole site in one movement. The abdominal and testicular ends are isolated with vessel loops then each is marked with a 5-0 prolene through the superficial muscularis. The testicular end is cut sharply and fluid analyzed under a standard microscope. If fluid analysis is favorable, microsurgical VV is performed. The testicular end is secured in the Goldstein microspike approximator.[10] The abdominal end is cut sharply then flushed with saline using a 24-gauge angiocath cannula to ensure patency. The abdominal end is secured in the microspike. The operating microscope is docked and microsurgical VV is performed in the modified two-layer technique.[4]

After anastomosis, the tails of the marking prolene sutures are tied together as our anastomotic tension-relieving hitch stitch.[4] After confirming hemostasis, the vas is replaced into the scrotum. The left vas is isolated and mobilized with the same three-finger technique and grasped with ring forceps through the same keyhole site, then the same process is repeated. After replacing this vas, the site is inspected and hemostasis is achieved with spot electrocautery as needed. Most commonly, a buried single interrupted 3-0 Monocryl reapproximates the dartos. Bupivacaine plain is injected at the site and bilateral cord blocks are performed. The keyhole site can generally be cauterized and left sutureless. A bandage is placed over the site and the scrotum is wrapped in 4-inch kling gauze.

Our single site VV evolved from 3-4cm bilateral scrotal incisions, to a single midline scrotal incision, to a single midline mini-incision, and finally to this single keyhole puncture

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utilizing the no-scalpel vasectomy set (Fig. 2). Throughout this evolution, exposure has been sufficient to facilitate our previously published microsurgical technique and outcomes, while significantly limiting dissection within the scrotum minimizing anatomical plane violation.[4] We have not yet encountered any cases not amenable to this approach. Here are a few key points for success. First, if both the abdominal and testicular ends cannot be delivered in one movement due to lack of space, the second end can be delivered with the same three-finger technique and ring forceps after the first end is isolated, marked, cut, and secured in the microspike. Likewise, the cut testicular end should be secured in the microspike prior to cutting the abdominal end preventing retraction of the testicular end. Second, if the delivered vas is unsuited for anastomosis, the ring forceps can be used in "leapfrog" succession to work either proximally or distally until a suitable segment is encountered. Third, after each cut of the vas, it is important to precisely but thoroughly cauterize the excluded segment and surrounding tissues for hemostatic control using micro bipolar electrocautery. Fourth, using a vessel loop to better position the microspike helps to facilitate both the first and second halves of the anastomosis (Fig. 1E). These considerations facilitate fast and efficient isolation of the vasal ends, leading to clean and clear exposure for microsurgical suturing.

CONCULSIONS

Bilateral microsurgical VV can be accomplished via a single midline keyhole puncture. The single keyhole puncture results in minimal tissue violation, improved cosmesis, and theoretically decreases operative time by eliminating multiple sutures during closure.

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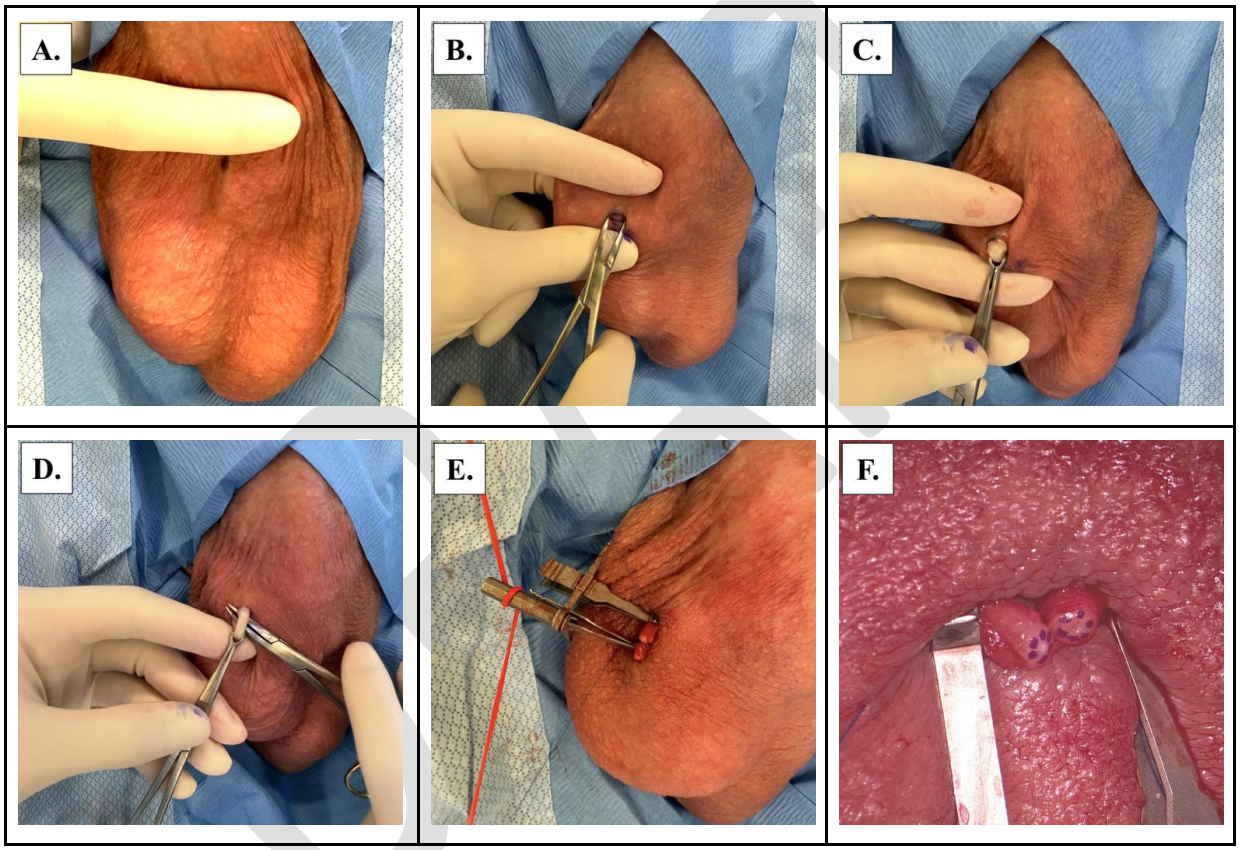
FIGURES AND TABLES

Figure 1. Step-by-step illustration of the surgical technique for our single keyhole puncture microsurgical vasovasostomy. (A) Puncture site marking one finger breadth inferior to penoscrotal junction. (B). Three-finger technique to isolate vas with no-scalpel skin puncture. (C) Ring clamp on the vas deferens. (D) Isolating the vas with no-scalpel vasectomy forceps. (E) Vas in Goldstein microspike approximator. (F) Microdot placement on the faces of the transected vas deferens. (G) 10-0 Ethicon suture placement for vasal mucosa. (H) 9-0 Ethicon suture placement for vasal muscularis. (I) Final skin puncture site at the conclusion of the case.



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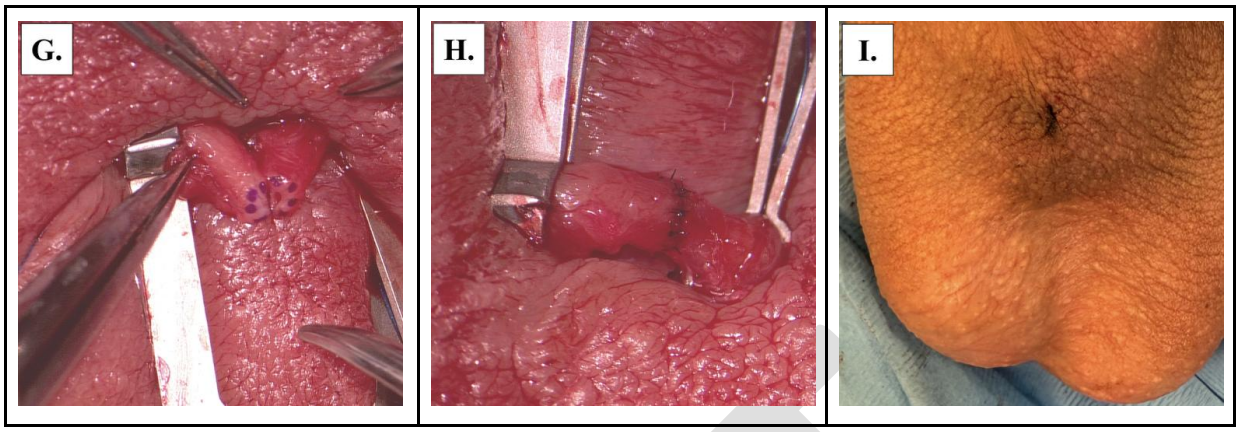
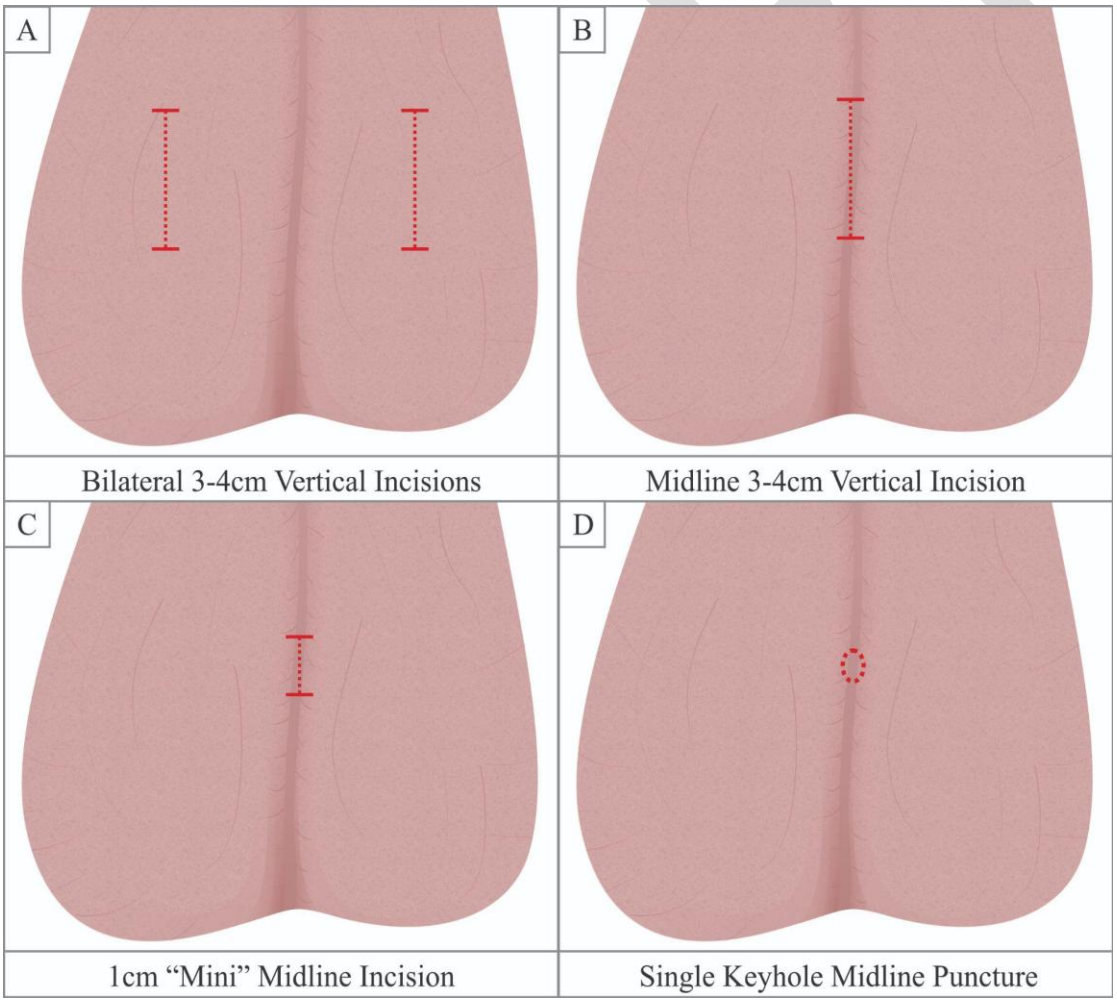


Figure 2. Evolution of surgical skin incisions and access to the vasa deferentia for performing bilateral vasovasostomy. (A) Bilateral 3–4 cm vertical incisions. (B) Midline 3–4 cm vertical incision. (C) 1 cm "mini" midline incision. (D) Single keyhole midline puncture.



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