SURGEON'S WORKSHOP

EXTERNAL SPERMATIC SHEATH INJECTION FOR VASAL NERVE BLOCK

PHILIP SHIHUA LI, M.D.
SHUNQIANG LI, M.D.
PETER N. SCHLEGEL, M.D.
MARC GOLDSTEIN, M.D.

From the Division of Urology, Department of Surgery, The James Buchanan Brady Foundation, The New York Hospital-Cornell Medical Center, New York, and Center for Biomedical Research, The Population Council, New York, New York; and Chongqing Family Planning Scientific Research Institute, Chongqing, China

Vasectomy is a safe and effective method of permanent male contraception that has been gaining popularity throughout the world. Each year up to 500,000 American men undergo vasectomy and between 10,000 to 35,000 physicians in the United States perform this procedure.[1] Although vasectomy can be performed under local anesthesia as an outpatient procedure, a substantial number of vasectomies are performed under general anesthesia because of the fear of pain and inadequacies of local anesthetic technique.[2] Good local anesthetic technique is essential for a pain-free procedure and to prevent local hematoma and injury to the testicular vessels that can result from multiple blind injections.[3] We describe an atraumatic technique of external spermatic sheath injection for vasal nerve block for vasectomy that was developed in China. This method results in a pain-free vasectomy. Widespread use of this technique should enhance the popularity of vasectomy.

Material and Methods

Anatomic basis of external spermatic fascia block

Familiarity with the anatomic distribution of nerves and blood vessels in the scrotum is essential for the effective administration of a local anesthetic for vasectomy. The ilioinguinal nerve provides motor innervation to the cremasteric muscle and conveys sensory input from the vas deferens, epididymis, testis, and tunics. However, the innervation of scrotal skin is separate from that of the testis and epididymis. The scrotal skin is innervated by fibers of the pudendal, inguinal, and ilioinguinal nerves.[4] Therefore, the area of scrotal skin entry for vasectomy must be anesthetized as well as the block required for vasal manipulation.

The internal spermatic (testicular) artery and veins (pampiniform plexus) are located within the internal spermatic fascia. The vas deferens lies between the internal and external spermatic fascias. The deferential artery and vein, with accompanying nerves, are closely related to the vas. The technique of external spermatic fascia block involves administration of local anesthetic within the external spermatic fascia but outside of the internal spermatic fascia, thereby minimizing the risk of hematoma and injury to the blood supply of the testis (Fig. 1).

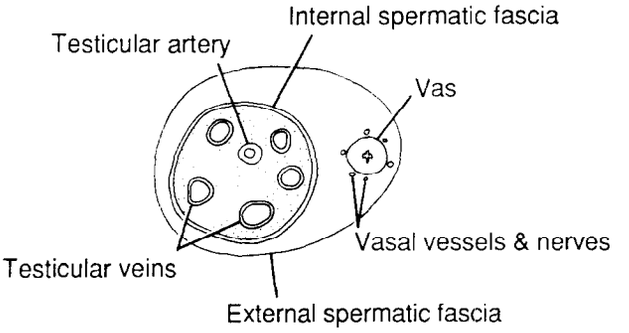

FIGURE 1. *Schematic coronal view of spermatic cord and internal structures. Note location of vas deferens and its innervation within external spermatic fascia but outside of internal spermatic fascia. Testicular artery and veins are located within internal spermatic fascia.*

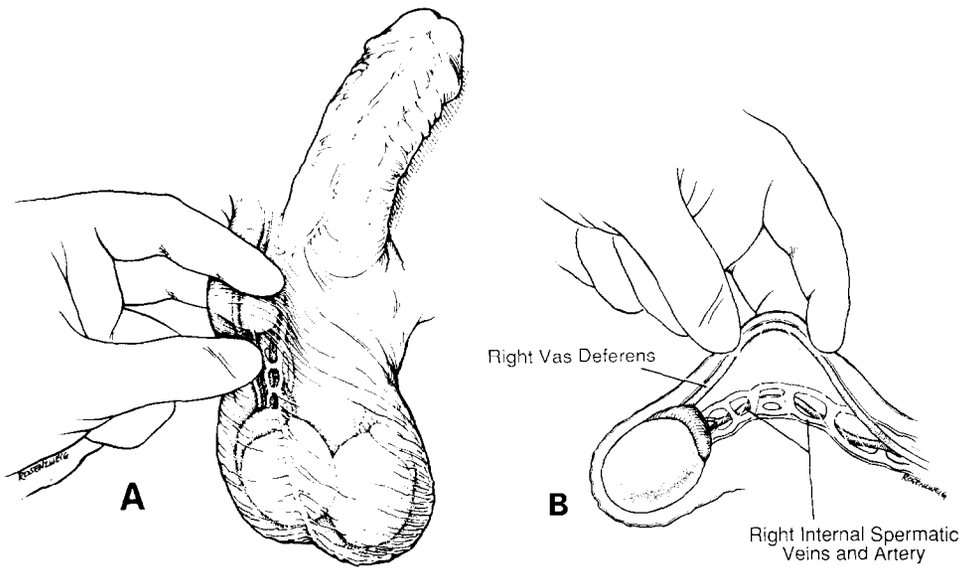

FIGURE 2. *(A) Fixation of right vas deferens using three-finger technique is demonstrated. (B) Close-up view of orientation of right spermatic cord structures after vas fixation with three-finger technique. Note isolation of vas deferens away from testicular blood vessels.*

Technique

We use the "no scalpel vasectomy" method developed in China.[5] Access to the vas is obtained through a single midline puncture wound located at the junction of the middle and upper thirds of the median raphe of the scrotum. There are relatively few superficial blood vessels and thinner skin in this region of the scrotum.

It is important to manually localize and fix the vas deferens under the scrotal skin and separate it from the internal spermatic vessels prior to injection of the anesthetic. We use a three-finger method developed in China that is very effective for holding the vas deferens.[6] With the surgeon standing on the patient's right side, the right vas deferens is manipulated to a superficial position under the median raphe over the middle finger of the left hand and secured above and below with the index finger and thumb in the midline of the scrotum. The needle entry site is located over the vas deferens midway between the thumb and index finger (Fig. 2).

Using 1–2% plain lidocaine, injected through a 25- or 27-gauge, 1½-inch needle, a superficial skin wheal 1 to 1.5 cm in diameter is raised in the dermis and subcutaneous tissues (Fig. 3A). Overzealous administration of subcutaneous lidocaine should be avoided to prevent edema around the vas at the vasectomy site. After making a superficial skin wheal, the needle is then advanced, without injection of anesthetic, the full length of the needle immediately adjacent and parallel to the vas toward the external inguinal ring (Fig. 3B). Before injection, the syringe is gently aspirated to confirm that

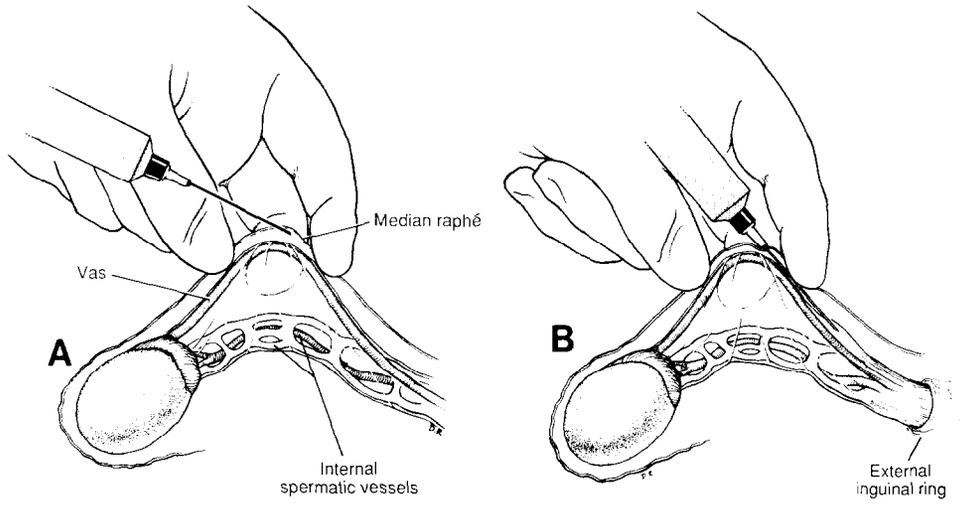

FIGURE 3. *(A) Location of needle entry site for administration of skin anesthetic. (B) Position of needle, relative to right spermatic cord structures, for administration of external spermatic fascia block.*

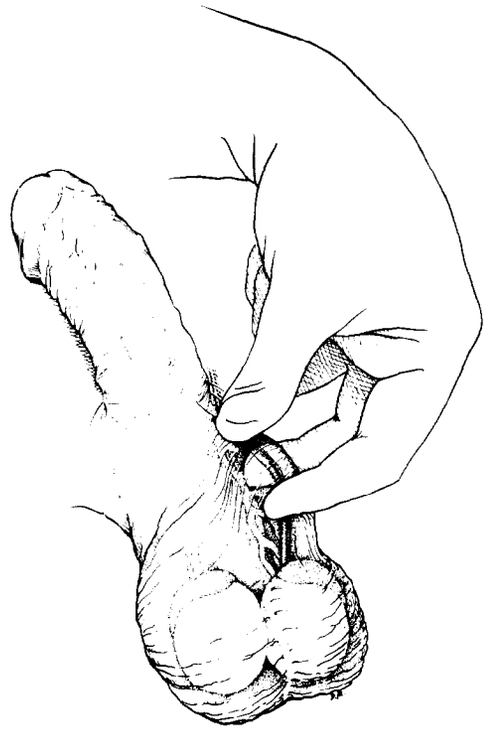

FIGURE 4. *Hand position for fixation of left vas deferens using three-finger technique. Note surgeon's hand is again lateral to scrotum.*

the needle is not located within a blood vessel. Two to 5 mL of lidocaine is then slowly injected within the external spermatic fascial sheath around the right vas deferens. When the needle is in proper position and injection is performed inside the external spermatic fascia, there is no resistance to the injection.

The needle is removed from the right side and the left vas is fixed using a similar three-finger method with the thumb superior and the index finger inferior to the site of injection (Fig. 4). The vas deferens is localized in a superficial position under the median raphe beneath the previously raised skin wheal. The needle is introduced through the same needle hole previously used. The needle is then advanced parallel to the left vas into the external spermatic fascia, and the injection is carried out in an identical fashion as that performed on the right side. After the needle is removed, the site of the skin wheal is pinched for a few seconds to reduce the edema in the skin overlying the planned vasectomy site.

Comment

Good anesthesia prevents pain and minimizes psychologic distress and tissue trauma. Most physicians agree that general anesthesia is not necessary for vasectomy since the procedure can be performed safely and efficiently using local anesthesia. However, a recent study revealed that 22 percent of physicians use general anesthesia for at least some vasectomies, and 4.5 percent use general anesthesia for 50 percent or more of their vasectomies. Two percent of respondents used regional anesthesia for vasectomy.[2] The extensive use of general anesthesia for vasectomy significantly increases the expected morbidity and mortality of the procedure. Furthermore, general anesthesia, requiring more intensive monitoring of the patient, highly trained personnel, and special equipment, is far more costly than local anesthesia. It is possible that general anesthesia is more commonly used by physicians who have been disappointed with conventional techniques of local anesthesia for vasectomy that have resulted in inadequate relief of pain, extensive local edema, and possibly bleeding.

Many vasectomists use multiple blind infiltrations with local anesthetics. This may result in hematoma and injury to the testicular vessels. Animal studies in our laboratory suggest that up to 5 percent of all such blind injections, despite the use of a fine-gauge needle, may result in injury to the testicular artery with subsequent testicular atrophy.[7]

Spermatic cord block at the level of the pubic tubercle has previously been proposed for scrotal surgery.[8,9] However, it is difficult to isolate the vas deferens from the internal spermatic vessels in the region of the pubic tubercle.

The ideal local anesthetic for vasectomy should be rapid in onset and last for the duration of the procedure. Lidocaine has an onset of action of five seconds and lasts for up to one hour. It is safer than other commonly used agents,[10] such as bupivacaine and procaine, both of which have a longer duration of action. The total administered dose of 2% lidocaine should not exceed 15 cc, although the toxic dose for a 70-kg man is 500 mg (50 cc of 1% solution).[11] We recommend the use of 1–2% lidocaine without epinephrine as the local anesthetic of choice for this block. Epinephrine has been reported to cause prolonged postoperative pain and can potentially cause testicular ischemia.[12]

External spermatic sheath injection for vasal nerve block has been used for 10 million vasectomies in China. We have used the method in over 500 cases in the United States, and we have not detected any complications attributable to this technique. Adoption of this technique facilitates the performance of pain-free outpatient vasectomy.

New York Hospital-Cornell Medical Center
525 East 68th Street
New York, New York 10021
(DR. GOLDSTEIN)

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