Vasectomy and vasectomy reversal : development of newly designed nonabsorbable polymeric stent for reconstructing the vas deferens

Vrijhof, Henricus Joesphus Elisabeth Johannes

Chapter 3

Vasovasostomy; the technical performance

Henricus.J.E.J. Vrijhof

Department of Urology, Catharina Hospital, Eindhoven, The Netherlands

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Review chapter

The microsurgical technique

In the early beginning vasovasostomies were done macroscopically. Macroscopic reapproximation represents the development of an anastomosis done without any type of optical magnification [1, 2]. Because microscopical reconstructions led to better results compared to macroscopical reconstructions [3,4,5,6], we switched over to the microscopical procedure. Before starting with microscopical reconstructions one should follow a course on microsurgery. Spending a whole week reconstructing blood vessels in rats in a microsurgical-training center in Rotterdam, The Netherlands was a good training. It is important to learn the proper hand and finger positions for holding microsurgical instruments; ergonomic principles to prevent hand and finger tremors and functioning of the various parts of the operating microscope. Optical loupes can be used. Optical loupes with 2.5x to 3.5x are used commonly by surgeons to visualize fine structures in the operating field. Structures more then 3 mm in diameter can be optimally approached with optical loupes. But for smaller structures an operating microscope is absolutely necessary. The disadvantage of optical loupes is the fact that the surgeon must hold his head virtually motionless in order to keep the structures in the operating field in focus. If the power of magnification increases it is even harder to maintain a fixed focus.

Operating microscopes provide light that is coaxial to the field of view and offers adequate illumination of the operating field [7, 8, 9]. In contrast with the surgical loupes, focusing of the microscope is done electronically by moving the head of the microscope rather then moving your own head which is time consuming and less precise. Eyepieces are available in several strengths and diopter scales are provided on the eyepiece for individual adjustment. Double vision should be corrected by adjusting the interpupillary distance. This binocular view permits stereoscopic viewing. Most microscopes have binocular tubes that can be adjusted to various angles. We use a diploscope arrangement in our operations. A diploscope configuration is useful for most microsurgical procedures. The eyepieces of the surgeon are directly opposite the eyepieces of his assistant. Such an arrangement uses a single objective lens and a beam splitter to provide the surgeon and the assistant with one-half of the available light each. The advantage of this system is that the assistant uses the same amount of magnification as the surgeon. The cooperation is in this way more efficient. The magnification changer permits variation in magnification. In our setting it is controlled automatically by a foot pedal. The length of the binocular tubes, the power of the eyepiece, the properties of the magnification changer and the focal length of the objective lens determine magnification. Objective lenses are available in focal length ranging from 150-400mm. For each 25 mm increase in focal length, the objective lens will focus 25 mm farther away from the operating field. Magnification decreases, and the size of the field of view increases, as the focal length of the objective lens increases. If the focal length is to short than the surgeon is forced to assume a kyphotic position if it is too long he is required to stand up. This illustrates that optimal care has to be taken for the exact positioning of the microscope because non optimal visualization can be of bother during the entire operation. Good positioning can also be achieved by adjusting the organs in the operating field and prevent unnecessary disturbing reflection from light. Our microscope is mounted on a floor stand and contains a horizontal suspension arm. After macroscopically preparing the operation field the microscope can easily be directed towards the surgeon and his assistant, taking in account the principles of sterility. If the focal length is difficult to install one should also consider in moving the operation table as a possible alternative.

What kind of microsurgical instruments do we need?

First of all the microsurgical instruments should be demagnetized. Because most microsurgical instruments are made of stainless steel (as in our hospital) instruments may become magnetized. The surgeon experiences difficulty in picking up needles with a magnetized instrument. Titanium is an alternative but very expensive. The gloves used should not be too slippery. The movement of the instruments in the hand should be optimally controlled. Gloves that provide a certain roughness provide a more sufficient control of the instruments. (Supersensitive, Biogel ®). Microsurgical instruments are extremely delicate. Dropping such an instrument could lead to irreversible damage. Therefore the instruments are kept in a special tray designed for protection. Tip covers are useful and highly recommended. Having your own instruments is an advantage, because providing these instruments to other surgeons could invariably lead to damage or loss. During the procedure the instruments should be cleaned and the deposition of blood cloth between the blades prevented. Cleaning can be done in water using a surgical sponge and dried. Using round handles for the instruments makes it easier to manipulate compared to flat handles. Pro- and supination is simplified so the needle can be passed easier through the tissue. There are various needle holders. You have nonlocking and locking needle holders. We prefer the nonlocking holders because it prevents grove movements if you want to reposition the needle holder. Next to that, uncontrolled unlocking may give rise to tear through the tissue and may influence the water tightness eventually. In performing an operation we need 2 needle holders, 3 or 4 forceps, preferably Harms forceps with platforms on the end of each blade for easy pick up of needles, 2 scissors (cutting tissue and trimming vessel ends and cutting ligatures), vas dilator (judging elasticity and dilation to ease introduction of the needle) and an approximator. We use a Silber folding approximation clamp. During the operation we use bipolar cautery to prevent damage to the anastomosis and vascularity of the vas.

Underneath the area of the newly developed anastomosis, we place a blue flexible thin plastic slip. The advantages are multiple: less reflection of light, reduced distraction from the surrounding tissues, perfect overview over the anastomosis due to less disturbance of blood flow over the operation field and finally no hooking of the needles in the surrounding tissues with facilitates pulling through of the loops of the sutures. We use 8.0 prolene sutures double armoured with flat needles (30-150 micrometer) allowing the surgeon to hold the needle more securely. Important is that the forearms are supported by the table to prevent any form of tremor. We always use double armoured sutures so that we can be sure that the needle goes from the inside through the mucosal edges towards the outside of the vas wall. We start at 6 o'clock, and this first suture is tied. Then we place 3 or 4 additional sutures anti-clockwise at the corresponding area's (3, 12 and 9 o'clock) of the vas. These separate sutures are covered to prevent strangulation of the loop ends. After placing all the sutures there is a final check to be sure that the position of the sutures is congruent over both vas ends so that torsion is prevented. Magnification for tying the sutures can be reduced which makes it much easier to perform. To check the water tightness of the anastomosis, we compress the area of the epididymis if no sperm leakage is observed we end the operation. If there is still some leakage we place an additional serosal suture at the place of the leakage. A final check is done for hemostasis and the vas is replaced in the scrotal area. Tunica dartos is closed with 4.0 Vicryl and the skin is closed with 4.0 Vicryl Rapide. A tight short with drapes at the wound area is attached and after a final wound check at the end of the day the patient is dismissed from the hospital. At 2 weeks there is a wound inspection and the first semen check will be done 5 weeks later. Semen analyses will be done with an interval of three months. If the quality of the sperm after 1 year remains poor and insufficient for a spontaneous pregnancy, the couple is send to the gynecologist for IUI, IVF or ICSI or in case of azoospermia a renewed vasectomy reversal is considered.

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