The surety of surgical repair of varicoceles

In comparison to percutaneous treatment, surgical ligation accomplishes complete occlusion more consistently and with relative ease.

By Harry Fisch, MD

The aim of varicocele therapy is to occlude retrograde flow of venous blood to the testicles. If occlusion is complete, improvement in seminal parameters and conception rates is similar regardless of whether the technique used is surgical or percutaneous. Both methods of repair have few complications and low morbidity. The question arises as to which is preferable and when one should be considered over the other.

A varicocele is an enlargement of several veins of the spermatic cord. The condition may be significant because of its association with infertility and testicular failure. Approximately 40% of infertile men have a palpable varicocele, compared to 10% to 15% of the normal population. After varicocele repair, seminal parameters in infertile men can be expected to improve in approximately 60% of cases, with pregnancy rates between 30% and 50%. (About 15% of prepubertal boys have varicoceles.) The condition may result in a discrepancy in testicular size due to retarded growth ipsilateral to the varicocele. Significant catch-up growth takes place after varicocele ligation in 80% of boys. Varicoceles occur predominantly on the left side but there may be an additional right-sided varicocele in more than 50% of patients.

Testicular pathophysiology appears to be caused by reflux of venous blood to the testicle via the spermatic vein. Damage to the testis is thought to occur by either increased testicular temperature secondary to blood pooling and stasis or by reflux of antimetabolites from the kidney and adrenal gland. Successful varicocele repair occludes abnormal retrograde venous flow to the testicles, thereby preventing continued testicular injury.

Anatomy

The anatomy of the gonadal veins is quite complex with many aberrations; a myriad of intercommunications is possible and has been described. Figure 1 shows the various veins that drain the testicle, revealing the possible collateral pathways of the internal spermatic vein. The most common channel is the single left internal spermatic (gonadal) vein. It communicates at a 90° angle into the left renal vein. Though to the contrary, one investigator found a single left spermatic vein draining into the left renal vein in only 50 of 104 patients.

Retroperitoneal connections proximal to the internal ring can be present in more than half of varicocele patients. These include collaterals to the spermatic vein from the renal vein, the capsular vein of the kidney, and inferior vena cava. In addition, there may be parallel communicating veins that originate and terminate in the internal spermatic vein.

The anatomy of the spermatic vein distal to the internal ring is also quite complex. Communications to the internal spermatic vein can occur from the external spermatic vein (also called the
Venous drainage system of the testes.

cremasteric vein), which drains into the external iliac vein. In addition, deferential veins travel alongside the vas deferens and drain into the hypogastric vein. Retropubic crossover veins can also exist, forming communications between the right and left spermatic venous system. The right gonadal vein is usually a single vessel at its origin from the vena cava. Here its junction is at an acute angle relative to the inferior vena cava; however, distal communications can be present as on the left.

To successfully occlude varicosities, the urologist must choose a repair method that takes into account the complexities of the testicular venous system.

Surgical repair

Surgical correction is aimed at ligation of the spermatic veins at a site distal to collaterals, yet proximal enough to limit the multiple tributaries that are present near the testis. Surgery can be performed under local, regional, or general anesthesia, usually on an outpatient surgery basis, following one of three approaches: inguinal, retropubic, or scrotal.

Repair is most commonly performed inguinally just distal to the internal ring (the Ivanisevitch technique modified by Amelan and Dubin). The patient is placed in a reverse Trendelenburg position (Figure 2) and an inguinal incision is made to the external
Inguinal varicocele repair

Top left: Inguinal Incision is made two fingerbreadths above symphysis pubis. Medial aspect is in line with lateral edge of scrotum. Top right: External oblique aponeurosis is incised and spermatic cord isolated with Penrose drain. Bottom left: Internal spermatic fascia is stripped from its location surrounding cord and veins visualized. Bottom right: Dilated veins are isolated and ligated with nonabsorbable suture.

Oblique aponeurosis, which is incised. Under optical magnification, the lymphatics and the spermatic artery are easily identified and preserved. The advantage of surgery is that aberrant communications can be visualized and ligated. Aberrant external spermatic veins, if present, are seen at the floor of the inguinal canal entering the spermatic cord at the level of the external ring. When deferential veins are dilated they are also ligated, as they represent abnormal reflux from the hypogastric venous system. Complications are rare but can include hydrocele, hematoma, and wound infection in fewer than 5% of cases.6

Alternatively, a retroperitoneal approach to varicocelectomy can be performed (Figure 3), ligating the spermatic veins just above the internal ring. Here the veins are usually larger and often fewer in number than in the inguinal region. An incision is made just medial to the anterior superior iliac spine. After incision of the external oblique fascia along its fibers, a muscle-splitting technique is utilized to enter the retroperitoneal space. The gonadal vessels are seen after medial reflection of the peritoneum.

The advantage of retroperitoneal surgery is there are fewer dilated veins at this level. Also, ligation of the spermatic artery in the retroperitoneum is unlikely to adversely affect testicular blood flow as long as cremasteric and deferential arteries have not been damaged or ligated from prior surgery. A disadvantage is that ligation of veins above the internal ring may miss aberrant communications that can exist distal to the internal ring.

Finally, the serotal approach can be utilized with the advantage of complete ligation of veins distal to
all possible collaterals. However, spermatic veins are numerous near the testicle and thus make complete venous ligation with preservation of the arterial blood supply to the testicle extremely difficult.

**Percutaneous occlusion**

This repair employs the insertion of an angiographic catheter either through the femoral or jugular vein into the inferior vena cava and left renal vein (Figure 4).

In transeatheter occlusion, the patient is placed in the reverse Trendelenburg position and a Valsalva maneuver is performed. Contrast material, which will reveal reflux into the spermatic vein, is injected. It is important to realize that valves within the gonadal vessels are usually found within the first centimeter of insertion of the gonadal vessel into the renal vein or vena cava. Therefore, do not probe the spermatic veins too distal to the ostium or the result will be an incorrect diagnosis of a varicocele where one does not exist.

Once a varicocele is identified, the catheter is advanced into the refluxing vein. Following venography, refluxing spermatic veins and collaterals can be occluded by the use of coils, balloons, or sclerosing agents, depending on the size and number of varicose veins, as well as the preference of the radiologist. Balloon occlusion offers the advantage of more accurate placement and the possibility for repeat venography after occlusion. It is important to occlude the varicocele distal to all collaterals; this is usually achieved at the level of the iliac crest or below. I cannot overemphasize, however, that because the initial venogram may miss collaterals, repeat venography at the time of occlusion with a concomitant Valsalva maneuver should be employed. This will reveal multiple collaterals that otherwise would have been missed. If all collateral veins are not occluded, the varicocele can persist or recur.

Oclusion rates vary depending on the interventional radiologist's experience and ease of vascular access. In the five largest published series on percutaneous occlusion, embolization succeeded in 1,469 out of 1,894 cases (or 78%).

The varicocele occlusion rates ranged from 29% for a right-sided sclerotherapeutic occlusion to 97% in a series of left and right combined balloon occlusion. In other words, for one patient in five, embolization did not succeed.
Access in the series was usually via the femoral vein; however, jugular vein access was preferred by Morag for right-sided varicoceles. This may provide a more direct approach to the right spermatic vein that drains into the inferior vena cava at a sharp angle.

Of those studies differentiating between occlusion of the right and left spermatic vein, left-sided occlusion was more successful. Thus the clinician must be aware that right-sided varicosities are less likely to be occluded by embolization. Excessive collateral communications, inability to catheterize the gonadal vessels because of sharp angles (particularly right-sided varicoceles), venous spasm, as well as the lack of experience of the radiologist are reasons for failure of occlusion.

Other complications from embolization include pain during sclerotherapy and embolization, allergic reaction to contrast material, and balloon migration into the lung. Complications are reported in approximately 5% of cases; however, long-term effects are rare. Fertility rates after successful percutaneous occlusion of varicoceles are similar to rates that follow surgical correction. Improvement in seminal parameters can be expected in approximately 60% of patients, with conception in as many as 40% of cases.

We currently employ percutaneous venography only in select cases, where the presence of a varicocele is clinically question-able or when a recurrence is suspected. Once venography is employed for diagnostic purposes, percutaneous embolization may be attempted at the same time by an experienced and skilled interventional radiologist.

In comparison, surgical repair of varicoceles is accomplished consistently and with relative ease for both unilateral and bilateral varicoceles. Thus, because of the high occurrence of bilateral varicoceles, the unacceptable high failure rates of percutaneous embolization, and the simplicity of the surgical procedure, surgery remains the treatment of choice for varicocele repair.
REFERENCES