Varicocele (Scrotum Varicose Veins) —
Diagnosis and Treatment

Varicoceles are defined as abnormal dilations of the spermatic vein or the pampiniform plexus and are more common on the left side. Careful physical examination of the contralateral scrotal side is essential as bilateral varicoceles are common. While the diagnosis of varicoceles can be done clinically especially when seminal fluid analysis is impaired, imaging studies with color-flow Doppler remain an important part of the diagnostic workup. Symptomatic varicoceles or subfertile men with varicoceles should have their varicoceles surgically corrected either by a minimally invasive procedure, or by percutaneous embolization.

**Definition of Varicocele**

Varicocele is defined as the dilatation of the pampiniform venous plexus which is connected to the internal spermatic vein. Varicoceles are associated with impaired testicular hormonal function and infertility.

**Epidemiology of Varicocele**

To estimate the prevalence of varicoceles in males, it is good to differentiate between the general population and the subfertile population. While varicoceles can be identified in
up to 20% of the general population, they are at least twice more common in subfertile
men. Due to the relationship between varicoceles and subfertility, it has long been
postulated that varicoceles are a common cause of poor sperm production and
infertility.

Etiology of Varicocele

Varicoceles are left-sided in approximately 90% of the cases and this can be explained
by several anatomical features. The angle where the left testicular vein enters the left
renal vein is steeper, and the increased renal vein pressure, due to its compression
between the aorta and superior mesenteric arteries, both contribute to the increased
risk of left varicoceles.

In addition to normal anatomical features, certain conditions such as pelvic tumors and
masses can compress the renal and/or testicular veins and lead to varicoceles.

Pathophysiology of Varicocele

Varicoceles are associated with subfertility in a significant number of patients. The direct
physical pressure on the testicle, heat dysregulation and oxygen deprivation are
commonly encountered in varicoceles and can lead to impaired testicular sperm
production.

In addition to these direct effects on sperm production, large varicoceles are also
associated with impaired testosterone production and this can also lead to infertility.
It is important to note that experimental designs in animal models failed to prove any of
these theories except for heat injury which is now thought to be the most important
factor that adversely affects sperm production in men with varicoceles.

Clinical Presentation of Varicocele

Most men with varicoceles present to the clinic with infertility issues as varicoceles are
usually not large enough to be symptomatic. A careful analysis of the patient’s history
can reveal **scrotal pain and heaviness**, both being symptoms known to be common in men with varicoceles.

Physical examination is essential to diagnose varicoceles. **Palpation** of the affected side can reveal a **bag of worms structure**. It is important to palpate the other side, as **bilateral varicoceles** on physical examination are common and occur in 80% of the cases. Men with bilateral varicoceles and infertility need both sides to be treated to improve sperm quality and production.

Additionally, men with varicoceles should undergo a **semen analysis**. A normal seminal analysis usually means that varicoceles are not the cause of infertility and it is not advisable to treat varicoceles in this group of patients.

**Diagnostic Work-up for Varicocele**

A physical examination revealing a bag of ‘worms’ associated with infertility is usually enough to make a diagnosis of varicoceles and indicates the need for **surgical correction**. Unfortunately, this is not possible in some patients. In patients without a clear clinical picture or whose varicoceles arise suddenly, **advanced imaging studies** are needed to confirm the diagnosis and exclude possible secondary causes such as a **pelvic tumor**.

The best modality to visualize varicoceles is **high-resolution color-flow Doppler ultrasonography**. Additionally, **ultrasonography of the scrotum** usually shows a tubular lesion that increases in size when the patient does **Valsalva maneuver**.

When color-flow Doppler ultrasonography is used, the ultrasound operator is able to see **dilated veins with reversed blood flow**. Veins that are **larger than 3 mm in diameter** define a varicocele.

**Computed tomography scans** can be used to visualize varicoceles but are not routinely used.

As part of routine workup for infertility in men, a ** seminal fluid analysis** is usually
indicated. Seminal fluid analysis can show impaired seminal qualities such as abnormal configurations, shapes or motility in addition to a decreased number of viable sperms, indicative of poor production. **Testosterone** may be low in men with varicoceles.

## Treatment of Varicocele

When varicoceles are symptomatic or associated with infertility and an abnormal seminal fluid analysis, the only possible treatment is **surgical correction**.

Several surgical and interventional radiological approaches exist for correction of varicoceles. **Subinguinal microsurgical approaches** are safe and effective for the treatment of symptomatic varicoceles associated with infertility. Patients with bilateral varicoceles should undergo **bilateral surgical correction**.

If a surgical approach is advised, care must be taken to preserve the **testicular artery**, otherwise, **testicular necrosis** can happen and infertility can become worse.

Other possible surgical approaches include inguinal and abdominal. **Abdominal correction** of varicoceles can be performed **laparoscopically** but is associated with a **high recurrence rate** and **hydroceles** can form after surgery. This procedure is preferred in **pediatric populations**.

More recently, **percutaneous embolization** has been used to treat varicoceles. **Cannulation of the femoral vein** is performed after which the **internal spermatic vein** is accessed. Varicoceles are then occluded by a balloon or any other occluding approach.

Percutaneous embolization is known to be the most effective method to preserve the testicular artery but still carries its own risks such as **contrast allergy** or **thrombophlebitis**.

Additionally, this approach usually needs an **experienced interventionist radiologist** and access to the internal spermatic vein is not always easy. Due to these limitations, the subinguinal or infrainguinal approaches remain the best options to treat varicoceles in symptomatic or infertile men.

Patients who are asymptomatic or who have varicoceles but whose seminal fluid analysis is normal should not be treated for varicoceles. Several studies have shown that such patients are unlikely to have future deterioration in their seminal quality if left untreated, hence no treatment is recommended.

Large symptomatic varicoceles that are not associated with infertility should be treated with the least invasive procedure, i.e. **percutaneous embolization**, to lower the risks associated with conventional surgery.

## References

[Varicocele Imaging](https://medscape.com) via medscape.com

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