Journal of Radiology Nursing 38 (2019) 227–230

Contents lists available at ScienceDirect

Journal of Radiology Nursing

journal homepage: www.sciencedirect.com/journal/journal-of-radiology-nursing

Under the Beam

Varicoceles

Samantha Kobeissi, MPH, RT(R) (VI) [a], Bill S. Majdalany, MD [b,*], Abhishek K. Goswami, BS [c], Christopher N. Kanaan, BS [d], Nima Kokabi, MD [b], Minhaj S. Khaja, MD, MBA [a]

[a] Division of Vascular and Interventional Radiology, Department of Radiology, University of Michigan Health System, Ann Arbor, MI
[b] Division of Vascular and Interventional Radiology, Department of Radiology and Imaging Sciences, Emory University Hospital, Atlanta, GA
[c] Emory University School of Medicine, Atlanta, GA
[d] Oakland University William Beaumont School of Medicine, Rochester, MI

Introduction

Varicoceles are tortuous, abnormally dilated veins in the pampiniform plexus of the male spermatic cord and are the male analog of female pelvic congestion syndrome (Kobeissi 2019). Approximately, 15-20% of all males are afflicted with varicoceles, which is the most common treatable cause of male infertility (Alsaikhan 2016). Over time, untreated varicoceles can decrease testicular function, impair semen parameters, and diminish serum testosterone. On treatment of the varicocele, testicular function, including sperm production, may stabilize and serum parameters, including serum testosterone, may improve (Pastuszak 2015). Herein, the etiology, clinical manifestations, imaging findings, surgical treatment, and endovascular therapeutic approaches for varicocele are presented.

Anatomy and etiology

The underlying etiology of varicocele comes from retrograde flow of venous blood from insufficient or incompetent valves of the testicular or internal spermatic vein. Over time, the veins that drain the testicle dilate and become dysfunctional, leading to an increase of temperature in the seminiferous tubules, decreasing sperm quality (Baazeem 2011). Left-sided varicoceles are most common, occurring in up to 80-90% of men with varicoceles, and are due to the angulation of testicular venous drainage into the left renal vein. The right testicular vein drains directly into the inferior vena cava. Right-sided or bilateral varicoceles are present in 10-15% of the male population (Alsaikhan 2016). A unilateral right-sided varicocele should raise concern for the clinician as this may be related to a mass in the retroperitoneum.

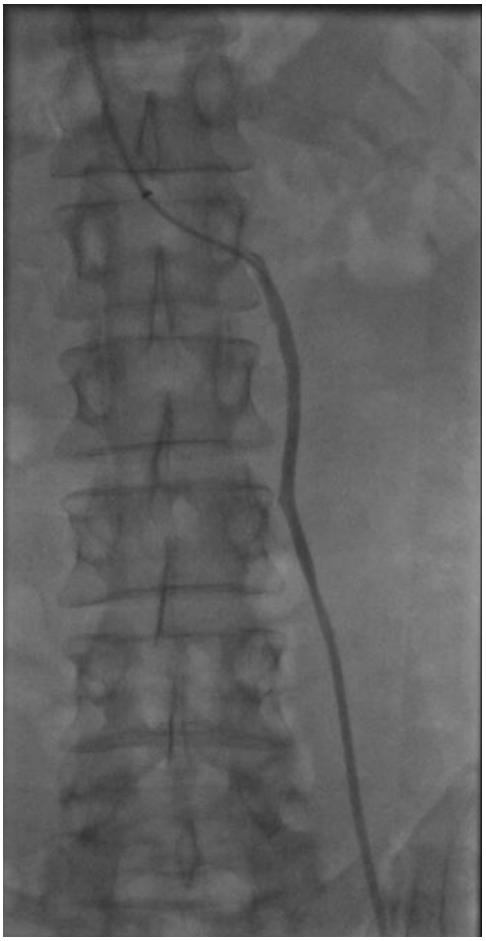

Figure 1. 34-year-old male with a left varicocele. Fluoroscopic image of a catheter placed via the right internal jugular vein and into the left gonadal vein. Contrast injection reveals reflux of contrast towards the pelvis.

All authors have read and contributed to this manuscript.
The authors have no relevant disclosures.
There was no grant funding or financial support for this manuscript.
* Corresponding author: Bill S. Majdalany, Department of Radiology and Imaging Sciences, Emory University Hospital, 1364 Clifton Road NE, Suite AG05, Atlanta, GA 30322. Tel.: +1 404 712 7115; Fax: +1 404 686 2226.
E-mail address: bmajdal@emory.edu (B.S. Majdalany).

https://doi.org/10.1016/j.jradnu.2019.07.007
1546-0843/$36.00/

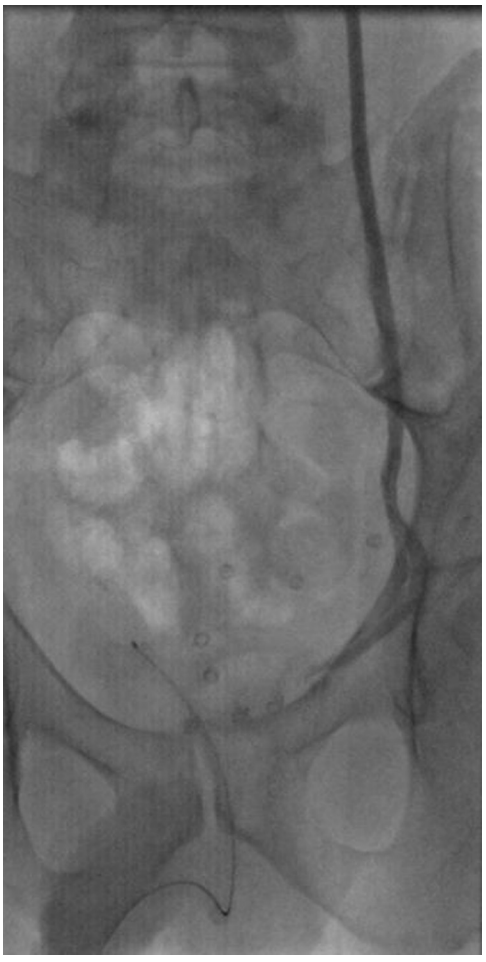

Figure 2. 34-year-old male with a left varicocele. Fluoroscopic image of the same patient as seen in Figure 1, imaged lower showing reflux of contrast towards the inguinal area.

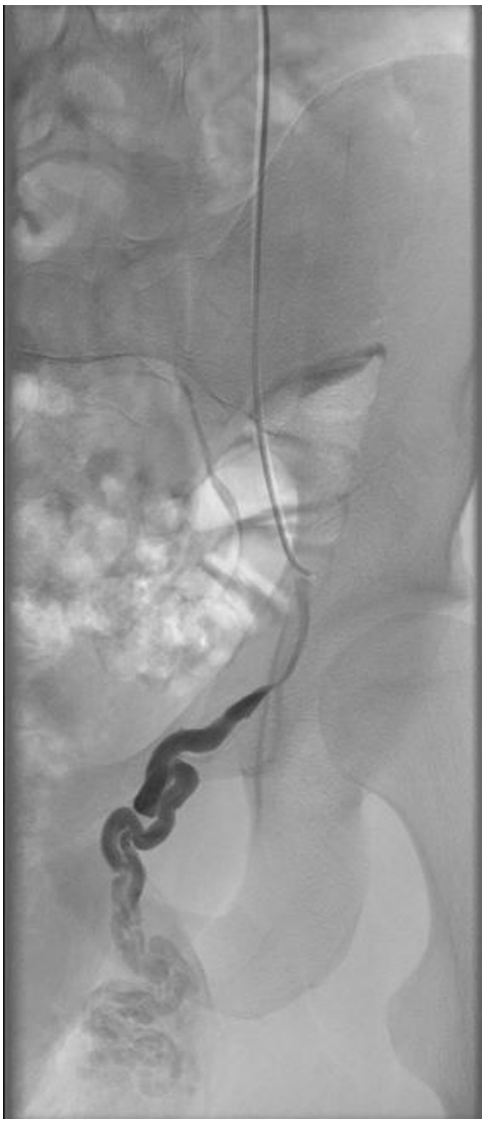

Figure 3. 34-year-old male with a left varicocele. Fluoroscopic image of the same patient as seen in Figures 1 and 2, confirming retrograde flow to the level of the varicocele. Tortuous vessels are present in the scrotum.

Clinical manifestations and physical examination

Although infertility is the most common indication for varicocele treatment, other indications include ipsilateral testicular pain, testicular hypotrophy, and hypogonadism. Patients may report dull heaviness or pain in their scrotum, notice prominently dilated veins, or have difficulty conceiving (Halpern 2016). Clinical evaluation begins with a physical examination, which should be performed in a warm room while the patient stands in a relaxed state. The scrotum is inspected for obvious distention around the spermatic cord. Palpation of the varicocele is performed while the patient performs a Valsalva maneuver. Prominent varicoceles are described as a "bag of worms," but more subtle varicoceles are characterized as a thickened cord. Based on the degree prominence, varicoceles are graded from 1 to 3. Grade 1 varicoceles can only be palpated during Valsalva maneuver, grade 2 varicoceles can be palpated in a standing position, and grade 3 varicoceles can be visualized. Sensitivity of the physical examination ranges from 50% to 71% (Talaie 2016).

Imaging

In the 1970s, conventional venography was able to delineate incompetent spermatic veins (Lima 1978) (Figures 1-3). However, most patients initially undergo noninvasive imaging studies such as magnetic resonance venography (MRV), computed tomography venography (CTV), or duplex ultrasound (DUS) before any treatment. DUS is highly sensitive and specific for varicocele because it easily identifies venous structures in the scrotum. In addition, ultrasonography can identify the prominent tortuous veins in the pampiniform plexus, dynamically evaluate varicocele for increase in size with Valsalva maneuver, and reveal the direction of blood flow. Although DUS is best used to directly detect a varicocele, CTV and MRV are better for evaluating the anatomy for possible embolization. CTV and MRV are best used to evaluate the course and size of the gonadal vein from the left renal vein (left gonadal vein) and inferior vena cava (right gonadal vein) to the internal spermatic cord. CTV and MRV can exclude alternative etiologies for varicocele such as compression or obstruction of the left renal vein or retroperitoneal masses. However, they may not provide direct information regarding the size of the varicocele.

Surgical treatment

Surgical varicocelectomy consists of ligation or removal of the refluxing veins, which can be performed at different levels. Surgical

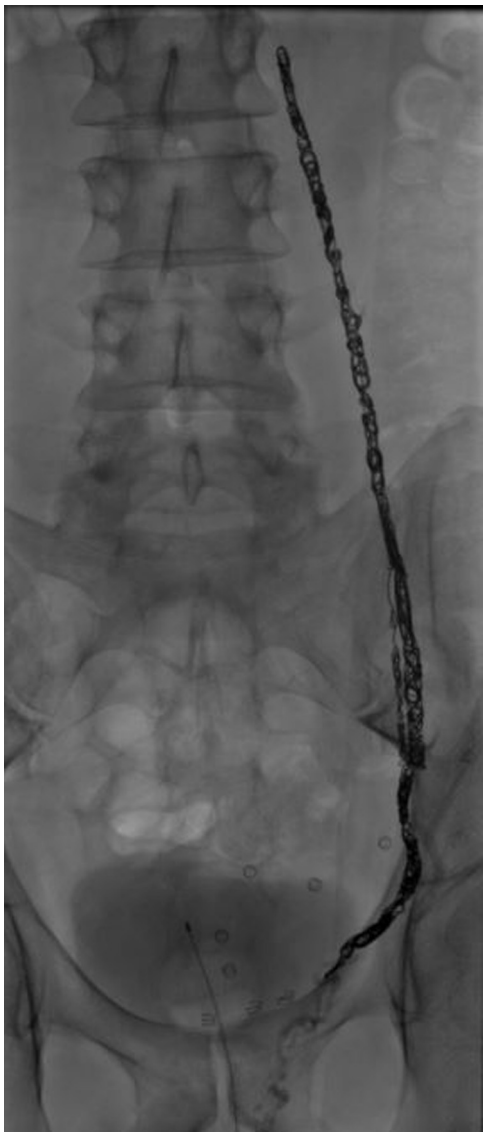

Figure 4. 37-year-old male with left varicocele had complete coil embolization of the left gonadal vein from the superior pubic ramus to its full extent, short of the left renal vein.

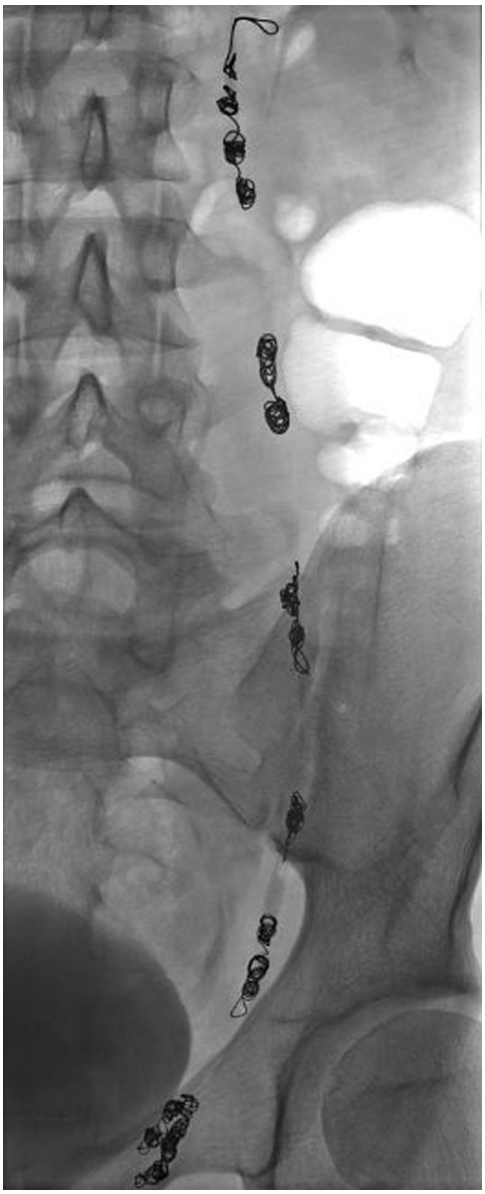

Figure 5. 42-year-old male with left varicocele had interspersed coil embolization with sclerotherapy of the left gonadal vein from the superior pubic rams to its full extent, short of the left renal vein.

techniques have evolved over time from open inguinal and high retroperitoneal repair to inguinal or subinguinal microsurgical and laparoscopic repair (Diegidio 2011). Although each technique has its own benefits and limitations, operator experience and the possible necessity of anesthesia are important factors to consider. Complications may include hydrocele, testicular artery injury, impotence, and varicocele recurrence (Diegidio 2011). Surgical varicocelectomy and embolization therapy generally have similar results, although endovascular embolization therapy allows for faster recovery.

Embolization therapy

In 1978, catheter-based left spermatic vein occlusion was performed from a femoral venous approach by injection of glucose and a sclerosing agent (Lima 1978). Over the years, techniques for varicocele embolization have evolved with the advent of different embolics. Varicocele embolization is performed from a common femoral or internal jugular approach in an interventional radiology suite, most often under conscious sedation on an outpatient basis. Venography of the gonadal veins is then performed to evaluate for venous reflux into the pampiniform plexus, with and without Valsalva maneuver. Anterograde flow during venography suggests a negative study, whereas retrograde flow suggests a positive study. To achieve technical success, embolization should interrupt the retrograde venous flow into the pampiniform plexus. In addition, evaluation for and embolization of collateral venous pathways are necessary to minimize the risk of varicocele recurrence (Halpern 2016). Operator preference and anatomic variations often will dictate what embolic is used. Various techniques to occlude varicoceles have been used successfully, ranging from boiling contrast, vascular plugs, coils, sclerosants (alcohol, 3% sotradecol, and so forth), and n-butyl cyanoacrylate (glue) to gelfoam and many others (Talaie 2016) (Figures 4-7). Vascular plugs and coils are notable among those techniques as they carry the advantage of being relatively painless in comparison to the remainder, which can create an inflammatory response.

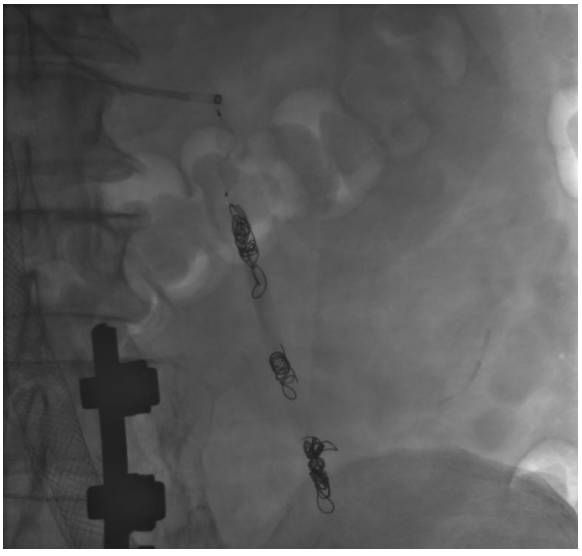

Figure 6. 38-year-old male with left varicocele had coil and plug embolization of the left gonadal vein.

Postprocedural care

Although a jugular venous approach allows patients to sit upright immediately after procedure, femoral venous access necessitates that patients lay flat with the accessed leg extended for 2 hours after procedure. Patients are ambulatory within hours and commonly discharged the same day. Nonsteroidal anti-inflammatory drugs are helpful for symptomatic management, and patients can return to a full range of activities within days. Procedure-specific potential complications can include nontarget embolization or migration of coils, although serious consequences are uncommon. Postprocedure pain or epididymitis usually subside within a few weeks with oral medications. Doppler ultrasound may be performed for all patients 3 months after the procedure and for patients whose indication was infertility, semen analysis 4-6 months after embolization (Talaie 2016).

Conclusion

Varicoceles are a common male condition and may result in infertility. Percutaneous embolization is an effective therapeutic option demonstrating high success and low complication rates for patients.

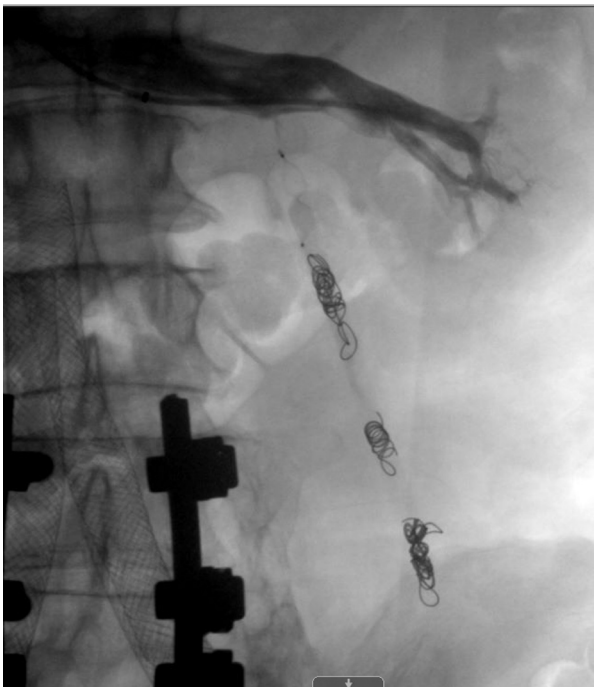

Figure 7. 38-year-old male with left varicocele had coil and plug embolization of the left gonadal vein. Left renal venography confirms that the embolization fell short of the left renal vein.

References

Alsaikhan, B., Alrabeeah, K., Delouya, G., & Zini, A. (2016). Epidemiology of varicocele. *Asian J Androl, 18*(2), 179-181.

Baazeem, A., Belzile, E., Ciampi, A., et al. (2011). Varicocele and male factor infertility treatment: a new meta-analysis and review of the role of varicocele repair. *Eur Urol, 60*(4), 796-808.

Diegidio, P., Jhaveri, J.K., Ghannam, S., Pinkhasov, R., Shabsigh, R., & Fisch, H. (2011). Review of current varicocelectomy techniques and their outcomes. *BJU Int, 108*(7), 1157-1172.

Halpern, J., Mittal, S., Pereira, K., Bhatia, S., & Ramasamy, R. (2016). Percutaneous embolization of varicocele: technique, indications, relative contraindications, and complications. *Asian J Andrology, 18*(2), 234-238.

Kobeissi, S., Majdalany, B.S., Kanaan, C.N., Gilbert, L.N., Majdalany, C.I., & Khaja, M.S. (2019). Under the Beam: Pelvic Congestion Syndrome. *J Rad Nursing, 38*(2), 82-85.

Lima, S.S., Castro, M.P., & Costa, O.F. (1978). A new method for the treatment of varicocele. *Andrologia, 10*(2), 103-106.

Pastuszak, A.W., & Wang, R. (2015). Varicocele and testicular function. *Asian J Androl, 17*(4), 659-667.

Talaie, R., Young, S., Shrestha, P., Flanagan, S., Rosenberg, M., & Golzarian, J. (2016). Image-Guided Treatment of Varicoceles: A Brief Literature Review and Technical Note. *Sem Interv Rad, 33*(03), 240-243.