بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

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MONA MAGHRABY

Effect Of Varicocele Catheter Guided Glue Embolization On Male Fertility

Submitted for PARTIAL FULILMENT OF M.D. DEGREE IN RADIOLOGY

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2020

INTRODUCTION

A varicocele comprises of anomalous widened and convoluted veins inside the pampiniform plexus of the spermatic cord ***(Wein et al., 2012).***

15% of men have varicocele, 35 % of men who have primary infertility have varicocele, and approximately 80 % of men with secondary infertility have varicoele. Although the majority of them are asymptomatic, there is a clear proof that varicocele is related with continuous decrease in testicular capacity with impeded semen parameters and perhaps diminished serum testosterone ***(Pastuszak et al., 2015).***

Accordingly, varicocele treatment can arrest the continued decline in the function of the testicles, as well as improving semen parameters and serum testosterone**.** Thus, varicocele treatment can spare the need for assisted reproduction including various interventions, cost, and psychological stress. ***(Tanrikut et al., 2011)***

Varicocele can also causes scrotal pain, and varicocele treatment can benefit men with failed conservative measures ***(Puche-Sanz et al., 2014).***

Treatment of varicocele include both non surgical and surgical approaches. The conventional inguinal or subinguinal operative approach involves an incision in the inguinal region with ligation of all visibly tortous, dilated spermatic veins.

Varicocelectomy via laparoscopy is a less invasive option, which is used to ligating the gonadal veins proximally ***(Halpern et al., 2016).***

Interventional radiological approaches include identification of the internal spermatic and collateral veins via venography. Then, occluding these veins using various embolization techniques. The results in semen parameters including sperm motility and sperm count, semen testosterone level, and pregnancy rates determine the procedure efficacy. The main aim of varicocele embolization if the complain was pain is to alleviate the pain ***(Halpern et al., 2016).***

Among all the available options, Percutaneous varicocele treatment is the least invasive. Percutaneous interventional approaches do not require surgical incisions as traditional surgeries and thus, can be performed using only local anaesthesia. Surgical failure may be due to pre-existing collateral gonadal veins, Varicocele embolization is therefore better done after venography to identify these collaterals ***(Jargiello et al., 2015).***

The use of venography enables the precise identification of the gonadal veins, in addition to any collaterals ***(Moon et al., 2012).***

Moreover, the trans-venous method eliminates any risk to damage to the testicular artery ***(Halpern et al., 2016).***

AIM OF THE WORK

The purpose of this study is to measure the success rate of the embolization technique in patients with clinical and radiological varicocele by U/S.

Chapter 1

ANATOMY

Testes are an ovoid organ being paired and responsible for the male reproductive functions, it measures about 25 ml in volume, with average dimensions of 3.5-5 x 3 x 3 cm. The testis is enwrapped by a fibrous capsule, which is tough called tunica albuginea. This layer invaginates posteriorly to form the mediastinum testis, where multiple septa divide the testicles into seminipherous tubules, which in turn is responsible for the production of the nutrient fluid as well as the sperms **(Figure 1)**.

The tunica vaginalis is the next layer, which is composed of two parts, one is surrounding the testis, epididymis as well as the vas deferens named the visceral layer; and the other, which is in contact with the internal spermatic fascia called parietal layer. ***(Swartz et al., 2006)*.**

The epididymis appears like a comma, it is a single fine tubular structure measuring about 6 meters. It is highly convoluted and compressed so that it appears as if it is a solid structure. The epididymis consists of three parts: the head, body, and the tail. It is found on the testicles' posterior border and The epididymis head is situated at the upper pole of the testis, receiving these fluids from the ducts found in the testis, then allowing the passage of sperms to reach the distal part of the epididymis. The epididymis provides an adequate space for

the storage as well as the maturation of the sperms. The narrow tail continues to be the vas deferens ***(Swartz et al., 2006).***

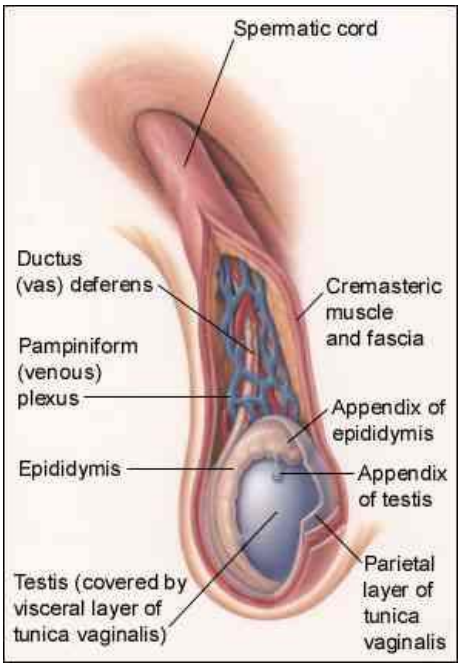

Figure (1): Anatomy of the testes ***(Agur and Dalley, 2009).***

The appendix testis looks like a pear shaped structure, which is the remnant of the cranial end of the paramesonephric duct. It is embryologically corresponding to the uterus in females. It is present in about 92% of all testes. It is located mainly in the superior pole of the testes **(Figure 2)**.

The appendices of the epididymis are representing remnants of the cranial end of the mesonephric (Wolfian) duct, the embryonic duct, which forms the vas deferens in males. Approximately 23% of the testes have it. Its main position may

vary, however it is usually projecting from the head of the epididymis **(Figure 3).**

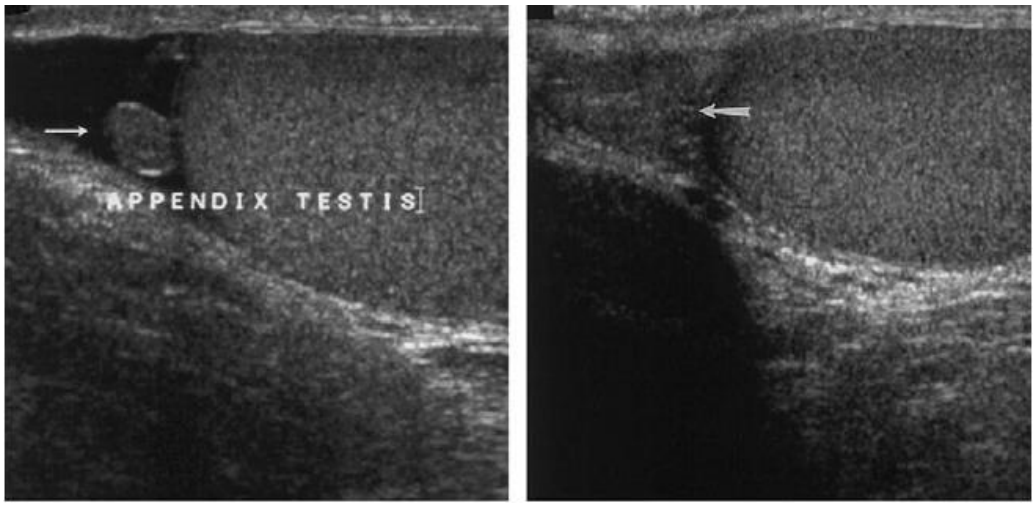

Figure (2): (a) longitudinal US scan of a normal testis showing the appendix testis (marked by the arrow) as a hypoechoic structure. Associated hydrocele renders the appendix testis more visible. (b) Longitudinal US scan of a normal epididymis ***(Dorga et al., 2003)***.

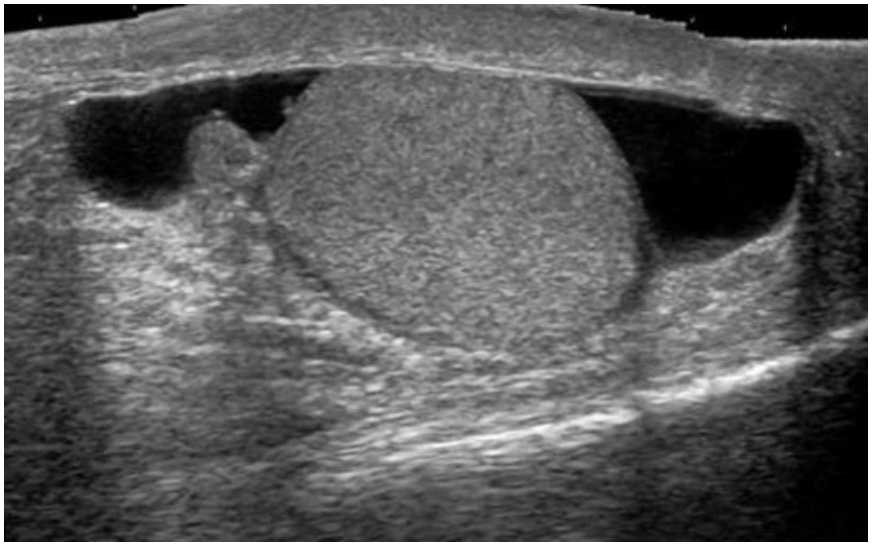

Figure (3): High-resolution ultrasound of the scrotum reveals appendages of the upper pole of the testis ***(Sellrs, 2003)***.

Testicular Blood Supply

Arterial Blood Supply:

1- Testicular artery:

It arises from the abdominal aorta at L2-3 vertebra with a straight course down to the testes, however, a tortuous, more curved course has also been mentioned in the literature ***(Skowronski et al., 2003)*.**

Its termination varies with the majority of terminating at the upper mediastinum testis; it might also end 4-8cm above the mediastinum testis, or it even descend along it without division.

The branches pattern varies which may be:

1- 70% of the cases, two main terminal branches; upper branch supplying the upper testicular anterior aspect and a lower branch supplying posterior lower testicular part. In 80% of this pattern, the lower polar branch gives branches to anastomose with branches arising from the cremasteric artery **(Figure 4).**

2- 16% of the cases, the upper polar branch gives a branch called the middle segmental one near the middle of the mediastinum testis then continue to the lower end of the testis to supply it with the epididymis then it recourses again upward and forward **(Figure 5).**

3- 8% of the cases, it descends along the mediastinum testis giving rise to three extra-testicular terminal branches: upper polar, middle sand lower polar branches.

4- 6% of the cases, it gives an upper polar branch before reaching the upper pole of the testis then continues along the mediastinum testis till the lower end of the testis and eventually curves forward and upward to supply the anterolateral aspect of the testis ***(Mostafa et al., 2008).***

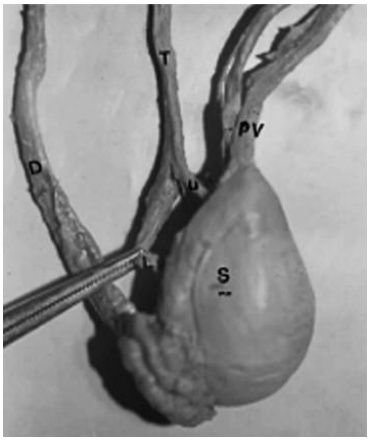

Figure (4): Dissected right testis (S) and its spermatic cord showing the first type (70%) of testicular artery (T) branching with upper polar and lower polar branches. U= Upper polar, L= lower polar, PV = venous plexus and D = vas deferens ***(Mostafa et al., 2008).***

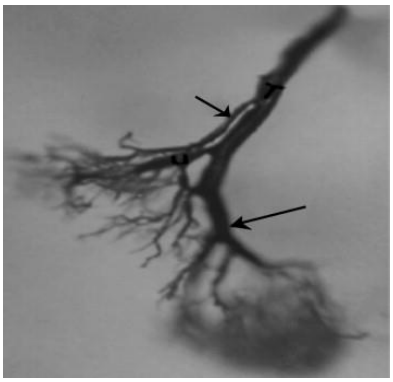

Figure (5): Testicular artery second pattern of branching; (16%) with a single upper polar branch (Short arrow) and then descends by itself (long arrow) ***(Mostafa et al., 2008).***

2- Cremasteric artery:

It arises in close relation to the deep inguinal ring from the inferior epigastric artery then enters the inguinal canal supplying the cremasteric contents ***(Mostafa et al., 2008)***.

3- Artery of Vas:

The artery of the vas arises from the inferior vesical artery giving many branches to supply the vas deferens along its whole course and finally ends by giving many capsular branches just close to the testicular mediastinum ***(Mostafa et al., 2008).***

Testicular venous drainage

There are dual venous drainage for both the testis as well as the epididymis: The deep or primary system, and the superficial or secondary system ***(Hinman, 2010)*.**

1. Deep venous network

The most common pathway is composed of three components:

a) Anterior set formed of the pampiniform plexus and the testicular vein.

b) Middle set formed of the differential vein.

c) Posterior set formed of the cremasteric vein.

A) Anterior set

The anterior portion is formed from the veins emerging from the testis and from the superficial plexus overlying the epididymis anterior part. These vessels give rise to about 10 branches, which form a mesh like complex of large veins, the pampiniform plexus **(Figure 6)** ***(Hinnman, 2010)*.**

A heat exchange mechanism is formed between the pampiniform plexus with the testicular artery tortuous branches below the external inguinal ring. After that, these veins ascend in front of the vas deferens, and then unite to form 3 or 4 veins

at the external inguinal ring. Finally, they ascend through the inguinal canal until they enter the abdomen from the deep inguinal ring in the form of two veins, which ascend on the psoas major muscle till they unite to form a single testicular vein on each side ***(Hinnman, 2010).***

The right and left pampiniform plexuses communicate with each other above the external inguinal ring; this kind of communication exists at several levels, including the pubic bone, inguinal canal and above the level of the internal inguinal ring ***(Mundy, 2005).***

B) Middle set

This set formed from funicular as well as the deferential veins. The posterior epididymal part is drained into the inferior epigastric and external iliac veins by the funicular veins. The deferential veins accompanying the vas deferens drain into the vesical, pampiniform and prostatic plexuses ***(Hinman, 2010).***

C) Posterior set

This set collects from the cremasteric veins separate from the cord near the external inguinal ring draining into the internal saphenous or inferior epigastric vein ***(Hinman, 2010).***