Introduction

Varicocele is defined as an abnormal tortuosity and dilatation of the veins of the pampiniform plexus (PP). Primary varicocele is usually asymptomatic, it is noticed as an asymmetry in scrotal size, and presented as heaviness in the scrotum or, rarely with testicular pain. In most cases, the patient is unaware of varicocele, and it is discovered during a regular physical examination or examination for military service. **(Skoog SJ 1997)**

Varicocele is the most commonly seen and correctable cause of male factor infertility. Although the incidence of varicocele in the general male population is approximately 15%, it is implicated as a factor in about one-third of infertile males21-41% in men with primary infertility and 75-81% in men with secondary infertility.

(**JI Gorelick, M Goldstein1971)**

Clinical grades of varicocele:

The size and grade of varicocele has been used to predict the outcome of surgery. It has been suggested that the degree of spermatogenic defect and subsequent improvement is directly related to the grade of varicocele. **(Cayan et al., 2004)**

Varicoceles grades are defined as follow:

Grade I: Palpable only with Valsalva.

Grade II: palpable without Valsalva.

Grade III: Visible **(Armand, 2002)**

Subclinical varicocele in which the pampiniform plexus is not distended even during Valsalva maneuver, this type could not be detected by history and physical examination but it need more sophisticated tools to be diagnosed as scrotal duplex sonography **(Eswek et al., 1993).**

Correction of larger varicocele is more likely to produce significant improvement .On the other hand, subclinical varicocele detected purely on imaging investigation should not be treated since there is no evidence to suggest that correction these help to improve the semen parameters **(Schlegel et al., 2004).**

Aim of the Work

The purpose of this work is to compare the results of sub inguinal versus inguinal approach in subfertile males including safety and effectiveness .the following parameters will be evaluated for both sub inguinal and inguinal procedures:

1- Operative technique.

2- Operative time.

3- Patient selection.

4- Operative complication

5- Postoperative complications including recurrence.

6- Hospital stay.

7- Laboratory result "semen analysis ".

I- Blood supply and lymphatic drainage of the testis

Testicular arteries:

The testicular arteries are two long slender vessels which arise anteriorly from the aorta a little inferior to the renal arteries each passes inferiorly under the parietal peritoneum on psoas minor the right testicular artery lies anterior to the inferior vena cava and posterior to the horizontal part of the duodenum, right colic and ileocolic arteries, root of the mesentery and terminal ileum. The left vein left colic artery and lower part of the descending colon. Each artery crosses anterior to the genitofemoral nerve, ureter and the lower part of the external iliac artery and passes to the deep inguinal ring to enter the spermatic cord and travel via the inguinal canal to enter the scrotum at the posterosuperior aspect of the testis the testicular artery divides into two branches. These pass into the mediastinum testis and loop back before reaching their distribution capillaries lying next to seminiferous tubules to penetrate the layers of interstitial tissue and are of interest as part of blood testis barrier. They run either parallel to the tubules or across them but do not enter their wall **(Snell, 2004).**

The testis also receives blood from the cremasteric branch of inferior epigastric artery and from the vassal artery which arise from the inferior or superior vesical artery **(Mundy, 2005).**

Venous drainage:

There is dual venous drainage for the testis and epididymis: the deep or primary system, and the superficial or secondary system **(James et al., 2002).**

Deep or primary system consisting of the following veins:

1- Internal spermatic (testicular) vein that drain into the left renal vein or to the inferior vena cava on the right side in the majority of cases

2- Cremasteric (external spermatic or funicular) veins which are smaller than those of the pampiniform plexus, poorly muscularized and valveless. They drain into the pudendal vein then into the saphenous system or into the inferior epigastric vein then into the saphenous system or into the inferior epigastric and then external iliac vein.

3- Vasal (Deferntial) veins: which drain into the superior vesical vein then into the internal iliac vein **(Mundy, 2005).**

Superficial system:

Blood from the testis is drained to a superficial layer of veins under the tunica albuginea:

1- Superficial and deep inferior epigastric veins

2- Superficial internal circumflex iliac vein

3- Scrotal tributaries of the superficial and deep external and internal pudendal veins.

(Campobasso, 1997)

The veins of the superficial system communicate freely with each other and with the deep system through the cremasteric branches of the external spermatic vein at the level of the external inguinal ring by communicating veins that connect the three cord plexus dilatation and varicosities occur early in varicocele **(Chummy, 1999).**

The Pampiniform plexus is formed by the union of the testicular vein as it emerges from the back of the testis and tributaries from the epididymis. It forms the main mass of the spermatic cord and lies in the anterior compartment at the lower part of the cord in the front of thick transverse septum derived from the internal fascia and supported externally by the cremasteric relation to the vas deferens.

Pampiniform plexus divided into three groups as follow

A- Anterior or internal spermatic veins which accompany the testicular artery this group of veins anastomoses freely with each other near the testis.

Below the superficial inguinal ring, the veins, the plexus unit to form three or four veins which pass along the inguinal canal, and entering the abdomen through the deep inguinal ring, then coalesce to form two veins, which run upwards in front of the psoas major and the ureter, behind peritoneum, laying one on each side of the testicular artery.

These two veins unite to form a single vessel which on the right side opens into the inferior vena cava, at an acute angle, a little below the level of the renal vein. On the left side, it opens into the left renal vein at a right angle. Varicocele may affect any one of the 3 groups in most cases, the anterior group is the only one affected **(James et al., 2002).**

B- Middel group of veins accompany the vas deferens to the pelvic venous plexus including the hypogastric vein

C- Posterior (external or cremasteric) group passes from the epididymis up wards along the posterior aspect of the spermatic cord, and empties into branches of the superficial and deep epigastric and pudendal veins.

There is cross communication between the right and left pampiniform plexuses above the external inguinal ring, this anastomosis exist at several levels, including the pubic bone, inguinal canal and above the internal inguinal ring. Also collateral circulation, incompetence in some cases varicocele is reported e.g., superficial external pudendal vein. Collecting of this incompetence surgically accompanied with varicocele operation to prevent varicocele recurrence post-operatively **(Mundy, 2005).**

Other routes of communication:

Through the deep dorsal vein of the peins to the plexus. By superficial dorsal vein of the peins to the saphenous vein. By the trasverse branches connecting the plexus with veins at the scrotal neck **(Campobasso, 1997).**

Internal spermatic veins the vein of the testis and epididymis unit to form the pampiniform plexus .The pampiniform plexus is formed of six to ten large veins in the spermatic cord, lying in front of the vas deference and accompanying the testicular artery they coalesce to form the testicular vein .The testicular vein is composed of two

or three trunks at the level of the deep inguinal ring ,which become two in the iliolumbar region ,then a single venous trunk in the lumbar region **(Skowronski et al., 2003).**

Two or more venous trunks may be found in its course in a rope ladder anastomosis .The diameter of the testicular veins ranges from 4 to 12 mm. An average length of about 42 cm but differs from right and left veins one or more sets of valves are present along its course. A valve at the junction with the renal or at the junction with the inferior vena cava on the right side. Sometimes valves occurs in the middle or distal third of spermatic veins. Values are noted more in fetus and children than adults **(Snell, 2004).**

Studies show that absence or insufficiency of these valves is an important factor in pathogenesis of varicocele. Some studies considered the valvular insufficiency as a result of venous dilatation and not a cause .Many types of valves are present, the single leaf or complex valves consisting of multiple leaflets. The double leaf type is the commonest type **(Mundy, 2005).**

Some studies showed the absence of valves in the internal spermatic vein as a normal finding, thus excluding the role of valvular insufficiency or absence in causing varicocele. The investigator injected polyester resin into the

internal spermatic vein in cadaver, intraoperative spermatic vein venography, and dissection of the vein along its course these studies showed no valves in normal person and also in patient with varicocele **(Campobasso, 1997).**

Lymphatic drainage of the testis:

Lymphatics from the testis run back with the testicular artery to the para-aortic lymph nodes lined alongside the aorta at the level of the origin of the testicular arteries (L2 vertebra), just above the umbilicus .So the testicular lymph doesn't drain to the inguinal nodes although the overlying scrotal skin does **(Chummy, 1999).**

Clinical grades of varicocele:

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II- Etiology of varicocele

Varicocele are much more common (approximately 80-90%) in the left testicle than in the right because of several anatomic factors, including:

(1)- The angle at which the left testicular vein enters the left renal vein,

(2)- The lack of effective anti-reflux valves at the juncture of the testicular vein and renal vein,

(3)- The increased renal vein pressure due to its compression between the superior mesenteric artery and the aorta (ie, nutcracker effect).

Also of importance is that a one-sided varicocele can often affect the opposite testicle. Up to 35-40% of men with a palpable left varicocele may actually have bilateral varicoceles that are discovered upon examination.

Gat et al suggested that up to 80% of men with a left clinical varicocele had bilateral varicoceles revealed by noninvasive radiologic testing **(Gat et al., 2004)**

III- Diagnosis

1-Clinical presentation:

On occasion, large varicoceles will produce clinical symptoms such as dull hemiscrotal discomfort or sense of heaviness and these patients will benefit from varicocele treatment. Adolescent males with unilateral or bilateral clinical varicoceles and ipsilateral testicular hypotrophy are also candidates for varicocele repair.Although there remains controversy with the threshold for testis size reduction to support varicocele intervention in the adolescent, authors have suggested 2-mL volume or 20% volume decrement from the contralateral testis as evidence of significant varicocele-induced damage **(Gargollo and Diamond, 2009).**

A patient with a varicocele is usually asymptomatic and often seeks an evaluation for infertility after failed attempts at conception.

He may also report scrotal pain or heaviness. Careful physical examination remains the primary method of varicocele detection. An obvious varicocele is often described as feeling like a bag of worms.

Scrotal examination for varicocele should be a facet of the standard urologic physical examination because of

the potential for varicoceles to cause significant testicular damage.The presence of a varicocele does not mean that surgical correction is a necessity.The investigators concluded that early screening for varicocele had no impact on paternity in adulthood. **(Bogaert et al., 2013)**

In men with a varicocele, the presence of an initially abnormal semen quality may be a risk factor for future deterioration of semen quality. In a prospective study of men with a mean follow-up of 5 years, among men with an abnormal semen analysis at presentation, the quality of semen degenerated in 28 subjects (87.5%); however, but among men with initially normal semen quality, only 6 patients (20%) had degenerated quality during follow-up **(Chen and Chen, 2012).**

2-Laboratory:

Laboratory testing is an important part of the male infertility evaluation.

a- Urinalysis:

A urinalysis is a simple test that can be performed during the initial office visit. It may indicate the presence of infection,

Hematuria, glucosuria, or renal disease, and as such may suggest anatomic or medical problems within the urinary tract.

b- Semen Analysis:

A carefully performed semen analysis is the primary source of information on sperm production and reproductive tract patency. However, it is not a measure of fertility. An abnormal semen analysis simply suggests the likelihood of decreased fertility. Studies have established that there are certain limits of adequacy below which it may be difficult to initiate a pregnancy **(Guzick et al., 2001).**

These semen analysis values were identified by the **World Health Organization (1999).**

It is statistically more difficult to achieve a pregnancy if a semen parameter falls below any of those listed. Of these semen variables, the count and motility appear to correlate best with fertility **(Guzick et al., 2001)**

- **Semen Collection:**

Semen quality can vary widely in a normal individual from day to day, and semen analysis results are dependent on collection technique. For example, the period of sexual abstinence before sample collection is a large source of variability **(Meng et al., 2001).**

With each day of abstinence (up to 1 week), semen volume can rise by up to 0.4 mL, and sperm concentration can increase by 10–15 million/mL. Sperm motility tends to fall when the abstinence period is longer than 5 days. **(World Health Organization, 1999).**

For this reason, it is recommended that semen be collected after 48–72 hours of sexual abstinence **(Zini et al., 2002).**

To establish a baseline of semen quality, at least 2 semen samples are needed. Semen should be collected by self-stimulation, by coitus interruptus (less ideal), or with a special, non-spermicidal condom into a clean glass or plastic container . Because sperm motility decreases after ejaculation, the specimen should be analyzed within 1 hour of procurement. During transit, the specimen should be kept at body temperature. **(World Health Organization, 1999).**

- **Physical characteristics and measured variables:**

Fresh semen is a coagulum that liquefies 15–30 minutes after ejaculation. Ejaculate volume should be at least 1.5 mL, as smaller volumes may not sufficiently buffer against vaginal acidity **(Guzick et al., 2001).**