Hydrocele after 2 Different Interventions for Varicocele and its Relation to Outcome

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ABSTRACT

Background: Hydrocele is one of the common complication after varicocele surgery. Hydrocele following varicocelectomy has a lymphatic origin due to iatrogenic disruption of lymphatics draining the testis during varicocelectomy.

Patient and Method: This study includes 100 patients with clinical varicocele presenting with infertility and abnormal semen parameters. 50 patients underwent loop assisted varicocelectomy and 50 patients underwent laparoscopic varicocelectomy.

Result: Lymphatics injury during operation was documented by histological examination in 10 patients (20%) among laparoscopic varicocelectomy group and in 5 patients (10%) among loop assisted varicocelectomy group.

Conclusion: Loop assisted varicocelectomy has good result than laparoscopic technique about, hydrocele formation, and operative time when microscopic technique not available.

Keywords: ??????????

Introduction

Varicocele is an abnormal dilatation, elongation and tortuosity of the testicular veins within the pampiniform plexus. [1] varicocele constitute about 10–20% of the general male population and about 35–40% of men with primary infertility [1, 2]. Varicocele is one of the most common correctable causes of male infertility [3, 4]

varicocele is common on the left than right because the left testicular vein enters the left renal vein at right angle. Prolonged standing, obstruction by left renal artery, venous congestion due to unrelieved sexual excitement and obstruction by tumors is implicated etiological factors (4).

There is different varicocele related pathogenic mechanisms hazarding spermatogenesis as scrotal hyperthermia, increased sperm DNA damage and semen oxidative stress that was found to be corrected by successful Varicocelectomy (5, 6).

Treatment options include open inguinal ligation of the spermatic veins, subinguinal microscopic technique, and, most recently, laparoscopy varicocelectomy, sclerotherapy and embolization, but the ideal operation for varicocele treatment is still have controversy [6,7,8,]

Loop assisted varicocelectomy can identifies small spermatic veins, the testicular artery and lymphatic better,

thus avoid recurrence and decrease the incidence of complications [9]

The ideal procedure for varicocelectomy should be followed by a low rate of recurrence, hydrocele formation, and testicular atrophy in addition to better outcome in terms of semen parameters and pregnancy rate [10].

The lymphatics of the testis form 4-5 trunks move upwards in the spermatic cord to accompany the testicular blood vessels and drain to paraaortic nodes [11].

Hydrocele is an abnormal collection of fluid, the sac of the tunica vaginalis. It represents as one of the common complication after varicocele surgery. Hydrocele following varicocele surgery has a lymphatic origin due to iatrogenic disruption of lymphatics draining the testis during varicocelectomy [12].

Lymphatic vessels are responsible for draining interstitial fluid and returning it to the bloodstream. These vessels typically have thin walls and delicate valves that prevent backflow. Lymphatic vessels notably lack red blood cells, which help distinguish them from veins. The lymphatic system also plays an important role in generating immune responses. [13]

Until recent years there was a lack of a reliable marker that can distinguish the lymphatic endothelium from the blood

capillary endothelium. Now there is certain lymphatic endothelial cell specific proteins have been identified, including vascular endothelial growth factor receptor-3, lymphatic endothelial hyaluronan receptor-1 (LYVE-1), podoplanin, prox-1, D6 and D2-40.[14'15] Among these, an antibody to D2-40 has been shown to detect lymphatic endothelium in formalin-fixed paraffin-embedded tissues and does not react with the blood vessel endothelium. This antibody has already been employed to detect lymphatics in various tissues [16'17].

D2-40 antibody reacts with podoplanin, a cell membrane protein, the expression of which has been confirmed on the endothelial cells of lymph vessels in various normal tissues, but also in vascular tumors and in some tumors of non-vascular origin. [18]

Our aim is to compare the laparoscopic technique in comparison to the open Loop assisted sub inguinal varicocelelectomy, as regards lymphatic injury and its relation to hydrocele formation.

Patients and Methods

This study is done Between January 2014 and June 2017. 100 patients with clinical varicocele presenting with infertility and abnormal semen parameters. 50 patients underwent loop assisted varicocelelectomy and 50 patients underwent laparoscopic varicocelelectomy at the general surgery and Urology Departments of al-azhar university hospital faculty of medicine asuit branch.

A detailed informed consent was obtained from all patients. 1-year duration of infertility, defined as failure to establish a pregnancy in 12 months with regular sexual relation, to be included in the study group.

All patients underwent complete history taking and complete physical examination. Testicular ultrasonography was performed on all patients. Scrotal color Doppler ultrasound is done to confirm the presence of varicocele and confirm the presence of a subclinical varicocele and to evaluate testicular sizes. Semen analyses were performed in all patients by masturbation after at least 2 days abstinence.

We included patients with palpable unilateral or bilateral clinical varicocele. Those with subclinical varicocele were included only in case of right subclinical varicocele associated with left clinical one.

We excluded patients with history of specific genital diseases other than clinical varicocele as orchitis, and we also excluded patients with already present hydrocele.

According to the type of operation the patients in the study were divided into 2 groups:

Group 1: patient with laparoscopic Varicocelelectomy

Group 2: patient loop assisted varicocelelectomy

Technique for loop assisted subinguinal varicocelelectomy

Varicocelelectomy is done using a loop assisted subinguinal approach, we try to spare artery and lymphatic in this technique, through a small transverse skin incision overlying the external inguinal ring, and the spermatic cord was delivered with a Babcock clamp. The spermatic cord was then delivered through the incision.

The cord was examined. Once the internal and external spermatic fascia were opened the arteries then dissected free from the underlying veins and encircled with a 3/0 polyglactin suture for identification. Caution was taken to prevent lymphatic injury to avoid the occurrence of postoperative fluid collection. All veins except the vasal veins were then ligated with 3/0 polygalactan and divided. Then, the operation was ended by closure of subcutaneous tissue and skin using polyglactin subcuticular sutures [19].

Technique of Laparoscopic Varicocelelectomy: A 5-mm port is placed subumbilical. This serves as the camera port for a 30-degree lens. A second port is placed lateral to the epigastric vessels on the right side midway between the umbilicus and pubic symphysis, and a third port is placed lateral to the epigastric vessels on the left side at a level 1 to 2 cm inferior to the umbilicus.

Once the ports have been placed, the posterior peritoneum is incised just lateral to the spermatic cord. The initial posterior peritoneal window is extended medially and distally. A large placed vein is identified and gently grasped with a Maryland dissector. Adjacent tissue is swept away, and the vein is clipped. Lymphatics often appear as a net of small white or translucent vessels. The dissection progresses medially and posteriorly to identify other veins and lymphatics. It is possible to visualize the artery [20].

Histological Analysis: All samples (100 specimens) were fixed in 10% formalin. Immediately after excision and processed for paraffin sections. Specimens were histologically assessed using H&E sections.

Immunohistochemistry: The immunohistochemistry was carried out with the streptavidin-biotin-peroxidase complex technique (Anti-polyvalent HRP Diaminobenzidine

Detection System, Catalog TPD-15; Spring Bioscience). Briefly, the 4-mm paraffin sections were deparaffinized in xylol and rehydrated in graded alcohol series. Sections were heated up to 98°C for 20 min. in 0.01 M citrate buffer (pH 6.0). Endogenous peroxidases were inactivated with 3 % hydrogen peroxide in methanol for 10 min., followed by washing in PBS. Tissue sections were incubated with

monoclonal mouse antihuman, podoplanin (clone D2-40, Dako) diluted 1:100 for 2 h. Sections were then sequentially washed in PBS and incubated with biotinylated goat anti-polyvalent antibody for 10 min., streptavidin peroxidase for 10 min., and developed with 3,3'-diamino-benzidine (DAB Substrate) for 10 min. Appropriated positive and negative controls were included in each run. Negative controls were performed by omission of the primary antibody and angiosarcoma was used as positive control. The slides were counterstained with haematoxylin.

Patients were seen at 1 weak for stitches removal and at 2, 4, 6 and 12 months with clinical and sonographic assessment of hydrocele. Clinical and semen evaluation was done at one year follow up to allows for observation of late developing hydrocele in addition to pregnancy outcome.

Results

In this study, 50 patients underwent loop assisted varicocelelectomy, compared with another 50 laparoscopic varicocelelectomy.

The patients age ranging between 20 and 45 years. Most of these patient age 31 and 40 years (60%). A detailed history, taking examination and investigations of hundred men with infertility was done. They were married for between 1 and 12 years. 70 patients had primary infertility and 30 had secondary infertility. All of patients suffered abnormal semen parameters.

No significant differences were found between 2 groups in preoperative semen parameters (table-1).

Operation time ranged from 30 – 60 min. No significant difference between mean operative time for both techniques (40 ± 11 minutes for loop and 45 ± 12 minutes for laparoscopic technique).

Lymphatics injury during operation was documented by histological examination in 10 patients (20%) among laparoscopic varicocelelectomy group and in 5 patients (10%) among loop assisted varicocelelectomy group ($p < 0.001$) (figures....).

Postvaricocelelectomy Semen Parameters and Complications: Post-operative semen parameters were obtained in 48 patients in loop assisted and 45 patients in laparoscopic varicocelelectomy at 6 months after surgery and were significantly better in loop assisted varicocelelectomy group (table-2)

Scrotal and spermatic cord edema occurred in 12 patients of loop assisted group (25%) and 10 patients in laparoscopic group (22%) with no significant difference and spontaneous regression at 3-month follow up in all patients.

Occurrence of persistent hydrocele at 1 tear post-surgery was detected in 9 (20%) of laparoscopic varicocelelectomy group and 3(6%) of loop assisted varicocelelectomy group ($p < 0.01$) (fig.4).

Comparison between postoperative semen parameters in those with and without hydrocele at the end of 1-year post surgery revealed no significant difference (table 3).

Table 1: Comparison of preoperative semen parameters in 2 group.

Semen Variable	Loop assisted varicocelelectomy group (n=50)	Laparoscopic varicocelelectomy group, (n=50)	P-value
Semen volume (ml) Mean $\pm$ SD	2.61 $\pm$ 1.40	2.56 $\pm$ 1.67	>0.05
Sperm Count (mil/ejaculate) Median Mean $\pm$ SD	25 29.90 $\pm$ 27.26	23 27.63 $\pm$ 25.00	>0.05
Normal sperm morphology% Mean $\pm$ SD	11.44 $\pm$ 9.19	13.00 $\pm$ 6.99	>0.05
Progressive sperm motility % Mean $\pm$ SD	19.04 $\pm$ 8.67	15.08 $\pm$ 9.41	>0.05

Table 2: Comparison of postoperative semen parameters in 2 group.

Semen Variable	Loop assisted varicocelelectomy group (n=48)	Laparoscopic varicocelelectomy group, (n=45)	P-value
Semen volume (ml) Mean $\pm$ SD	2.71 $\pm$ 1.22	2.68 $\pm$ 1.27	>0.05
Sperm Count (mil/ejaculate) Median	67	41	
Mean $\pm$ SD	81.90 $\pm$ 87.26	40.63 $\pm$ 65.00	<0.05
Normal sperm morphology% Mean $\pm$ SD	31.44 $\pm$ 15.19	19.00 $\pm$ 6.99	<0.05
Progressive sperm motility % Mean $\pm$ SD	35.04 $\pm$ 11.27	22.03 $\pm$ 10.41	<0.05

Table 3: Comparison of postoperative semen parameters in those with and without hydrocele at the end of 1-year post surgery.

Semen Variable	Hydrocele group (n=12)	Non-hydrocele group (n=12)	P-value
Semen volume (ml) Mean $\pm$ SD	2.61 $\pm$ 1.52	2.8 $\pm$ 1.23	>0.05
Sperm Count (mil/ejaculate) Median Mean $\pm$ SD	57 58.90 $\pm$ 61.24	61 62.63 $\pm$ 64.24	>0.05
Normal sperm morphology% Mean $\pm$ SD	29.34 $\pm$ 12.19	32.27 $\pm$ 8.99	>0.05
Progressive sperm motility % Mean $\pm$ SD	32.14 $\pm$ 10.37	34.13 $\pm$ 11.31	>0.05

Fig. 1: showing lymphatics at histopathological examination during laparoscopic varicocelectomy (H&E section x600). **Fig. 2: showing veins contain RBCs without presence of lymphatics of histopathological examination during loop assisted varicocelectomy (H&E section x200).** **Fig. 3: short arrow showing lymphatics at histopathological examination during laparoscopic varicocelectomy (immunohistochemistry).** **Fig. 4: short arrow showing lymphatics at histopathological examination during laparoscopic varicocelectomy (immunohistochemistry).**

Discussion

Varicocele is abnormally dilated pampiniform plexus of veins, which is the drainage of the testes. Normally, small valves prevent blood to retain to the testis.

There are many techniques for varicolectomy. The first varicocelelectomy was done by Celsus in the first century [21]

In this era, there are many techniques for varicocele operation include subinguinal, microscopic, loop assisted, microscopic and laparoscopic as an alternative for palomo high ligation however the most successful technique is still had controversy [22].

Hydrocele is a common complication of variable varicocele operations. The occurrence of hydrocele is 0.3% to 40.4% seen by Kocvara. [23]

The reason for the development of the hydrocele could be attributed to the iatrogenic disruption of the testicular lymphatics during the varicocele surgery. This led to defective drainage of the fluid normally secreted by the tunica vaginalis into the lymphatics with its subsequent accumulation [24]. In support of this explanation, many factors were present. First, our patient had no history of epididymitis or testicular trauma, which may act as precipitating factors triggering easy accumulation of hydrocele fluid after varicocele surgery [25]. Second, the excised tunica did not show any microscopic changes which might denote an underlying pathology. Third, ultrasound evaluation of our patient revealed the presence of multiple septa in his hydrocele sac. These sonographic features are characteristic of the protein content of the hydrocele [26]. This coincides with previous researchers who showed that PV hydroceles usually have a protein content [27].

Schwentner and colleagues show that hydrocele in 16% varicocelelectomy done by microscopic technique.

[28] Kocvara and colleagues [29] show that hydrocele occurrence 17.9% with laparoscopic varicocelelectomy

In our study, hydrocele after varicocele operation was in 6% and 8% after 2 years of follow up in laparoscopic group and loop assisted varicocelelectomy group respectively.

Tong et al and Huk [30] established that lymphatic-sparing laparoscopic is a suitable alternative of palomo technique and associated with low incidence of complications.

Our study showed that incidence of lymphatic injury during laparoscopic varicocelelectomy and loop assisted technique showing little difference with low complication rate.

Conclusion

Loop assisted varicocelelectomy has good result than laparoscopic technique as regards, hydrocele formation, and operative time when microscopic technique not available. Our study showed that early return to work and early ambulation in laparoscopic technique.

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