ORIGINAL RESEARCH

International Journal of Surgery 9 (2011) 626–631

Contents lists available at SciVerse ScienceDirect

International Journal of Surgery

journal homepage: www.theijs.com

Original research

Dye assisted lymphatic sparing subinguinal varicocelectomy. A prospective randomized study

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ARTICLE INFO

Article history:
Received 27 June 2011
Accepted 15 July 2011
Available online 23 August 2011

Keywords:
Varicocele
Methylene blue
Lymphatic vessels
Subinguinal varicocelectomy
Hydrocele
Testicular edema

ABSTRACT

Background: Division of lymphatic vessels during varicocelectomy could lead to hydrocele formation and decrease in testicular function due to testicular edema. We determined if the use of methylene blue combined with optical magnification reduces the incidence of post-varicocelectomy hydrocele.
Methods: Consecutive patients treated for varicocele at our institution were evaluated for inclusion. Participants were randomly allocated to receive either subinguinal varicocelectomy after 2 ml intra-tunical space injection of methylene blue and group 2 in whom no mapping technique was adopted during subinguinal varicocelectomy. After surgery, the patients were assessed at 2 weeks, 6 and 12 months for hydrocele, testicular edema, varicocele recurrence, atrophy, pain or other complications with mean follow-up was 15 ± 7 months.
Results: Eighty patients with varicocele were randomized and completed the study. There were no intra complications in either group. In group (1) no patient had a hydrocele after surgery. By contrast, in group (2) there were four cases of secondary hydrocele (10%; $P = 0.041$)); no testicular hypertrophy was observed following lymphatic sparing surgery; One patient in each group had varicocele recurrence. Pregnancy was reported in 30 patients (37.5%) during the follow-up period, 17 of them (42.5%) were group (1) difference was not significantly different among both groups.
Conclusions: Subinguinal varicocelectomy using combination of optical magnification and lymphatic staining (methylene blue) offers simple and quick preservation of the draining lymphatic vessels and avoids secondary hydrocele formation.
ClinicalTrials.gov ID: NCT01259258

1. Introduction

A clinical varicocele is observed in 10–20% of the general population, in 35–40% of patients with primary infertility and in up to 80% of patients with secondary infertility[1] Varicocelectomy is indicated in the case of infertility, when the testicular volume is decreased, such as in adolescents, and when associated with persistent pain.[2]

The ideal method of spermatic vein ligation for treating varicocele is still a matter of controversy. No general agreement has been reached on the technique of varicocele ligation, many surgical approaches to transect the internal spermatic veins, such as retroperitoneal approach by Palomo,[3] trans-inguinal ligation by Ivanissevich,[4] subinguinal ligation by Marmar,[5] and laparoscopic supra-inguinal ligation. Each technique has its own advantages and disadvantages, and conflicting results have been obtained from different studies.[6,7]

Hydrocele formation is the most common complication reported after nonmicroscopic varicocelectomy. The incidence of this complication varies from 3% to 33% (average about 7%).[8] Lymphatic obstruction is more likely than venous obstruction to be the cause of this complication.[9,10] Moreover, it was reported that impaired lymphatic drainage also impairs testicular function and that postoperative catch up growth is due to interstitial edema. Even testicular histology is changed due to lymphatic stasis.[11]

There are different approaches to preserve lymphatic drainage; For example, microscopic varicocelectomy,[12] using laparoscopic varicocelectomy,[13] lymphatic hydrodissection,[14] and dye assisted technique using methylene blue[15] or isosulfan blue,[16] to help identify and preserve lymphatic vessels during varicocelectomy.

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doi:10.1016/j.ijsu.2011.07.430

The purpose of this study was to evaluate the feasibility of methylene blue based lymphatic vessel preservation and its impact on the complications of subinguinal varicocelectomy in a randomized prospective trial.

2. Patients and method

Consecutive patients who were treated for varicocele at Mansoura University Hospital, Mansoura, Egypt, during the period from January 2008 through Feb. 2010 were eligible for the study.

Varicocele was primarily diagnosed by physical examination with the patient in an erect position. All findings were confirmed by color Doppler ultrasound .The varicocele was graded from I to III according to severity (DubineAmelar's classification).[17]

Testicular volume was measured ultrasonographically using the formula: 0.71 – Length – Width – Height. Testicular hypotrophy defined as 20% volume or greater differential between testicles.[18] Hypertrophy of the left testicle was defined as at least a 10% increase in size over the right testicle.[11]

Inclusion criteria: all left sided varicocele with impaired sperm counts, testicular pain and/or testicular atrophy. Exclusion criteria were preexisting hydrocele, previous groin surgery, concomitant hernia, allergy against methylene blue. All patients had undergone two seminal analyses at a 15-day interval before and 6 months after the operation. The mean value of these **2** tests was considered that showed at least 1 abnormal parameter (motility less than 50%, count less than 20 million and velocity abnormal forms of more than 40%, on computer-assisted semen analysis).[6]

Informed consent was obtained from all patients to be included in the study, after explanation of the nature of the disease and possible treatment. The study was approved by the local ethics committee.

Randomization was achieved through a computer-generated schedule, and the results were sealed into envelopes. The envelopes were drawn and opened by a nurse not otherwise engaged in the study in the operating room. The patients were then randomized into two groups: Group 1 underwent subinguinal varicocelectomy with dye assisted using methylene blue group II underwent the conventional subinguinal varicocelectomy without using dye.

2.1. Operative procedure

A 3-cm transverse skin incision was made directly over the external ring. The subcutaneous tissue was then dissected until the spermatic cord was identified. The spermatic cord was then elevated into the wound using gentle traction with a Babcock forceps.

Mapping of testicular lymphatics was achieved by injection of 2 ml of methylene blue with a 30-G needle into the space between the tunica vaginalis and tunica albuginea. Gentle manipulation of the testis and hemiscrotum was done after injection for a few minutes (Fig. 1).

The cremasteric veins passing on the under surface of the cord were then dissected under loupe magnification and tied with absorbable 3-0 vicryl ties. The fascial layers of the cord were then opened. The vas deferens and its vessels were identified and preserved in their posterior fascial compartment. The testicular (internal spermatic) artery was then identified and preserved with the aid of the surgical loupe (3× magnification) and irrigated with diluted warm papaverine (2 mL; 30 mg papaverine was diluted in 10 mL saline).

All internal spermatic veins were ligated using 3-0 vicryl, the internal spermatic artery and numerous blue stained lymphatic vessels only were left behind (Figs. 1–3). The subcutaneous tissue

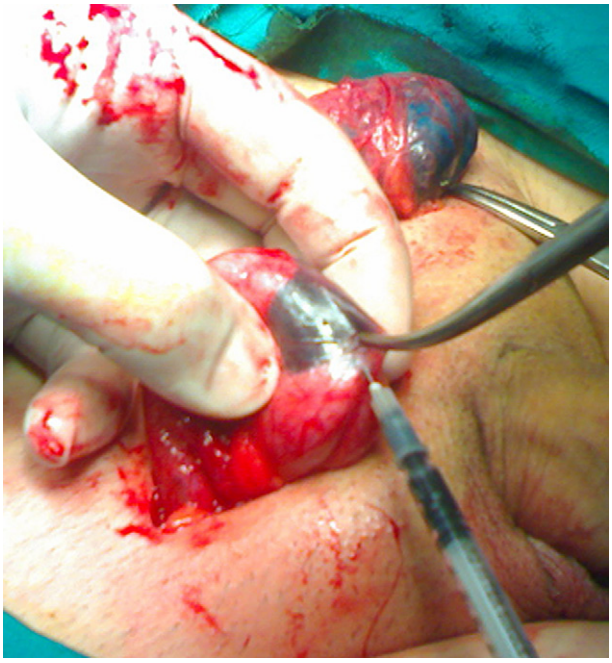

Fig. 1. Injection of 2 ml of methylene blue with a 30-G needle into the space between the tunica vaginalis and tunica albuginea.

was closed with 4-0 Vicryl sutures and the skin approximated using a running 4-0 white Vicryl stitch. All operations were performed by the same surgical team at the same university hospital.

In the other group, the same technique was carried out but with one difference that no methylene blue and the lymphatics were distinguished as colorless tubular structures accompanied by a small serpentine venule using the optical magnification.

2.2. Postoperative care

Patients were discharged the following day to allow for assessment of any immediate postoperative complications (eg, hematoma). A prescription of a non-steroidal anti-inflammatory drug was given (diclofinac 50 mg orally, whenever needed). Patients returned 5 days postoperatively for a wound check and were asked to return after 2 weeks, 6 months for and 12 months.

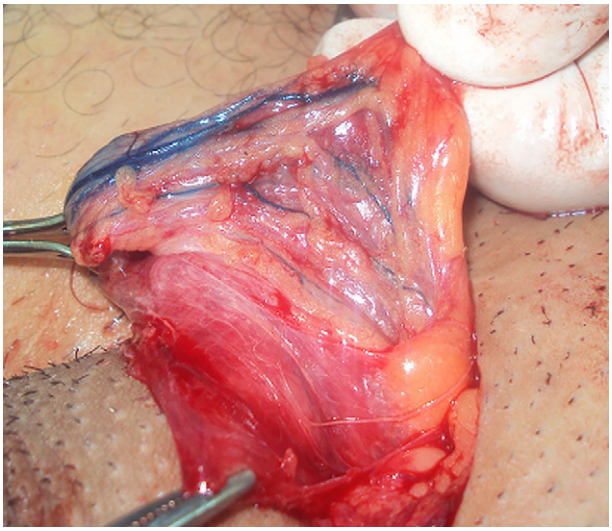

Fig. 2. Mapping of testicular lymphatics after injection of methylene blue.