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Technical standardization of laparoscopic lymphatic sparing varicocelectomy in children using isosulfan blue

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ABSTRACT

Purpose: The lymphatic preservation to prevent hydrocele formation after laparoscopic varicocelectomy is essential. Lymphatic sparing procedures using scrotal injection give a rate of mapping failures of 20%–30%. The aim of the present study is to standardize the technique of injection to perform a lymphatic sparing procedure in case of laparoscopic varicocelectomy.
Methods: We retrospectively evaluated 50 patients who underwent laparoscopic varicocelectomy from July 2010 to July 2013. Patients were divided into two groups: G1 (25 patients) those who underwent a classical isosulfan blue scrotal intra-dartos injection and G2 (25 patients) those who underwent the new standardized isosulfan blue scrotal intra-dartos/intra-testicular injection.
Results: In G1 lymphatic vessels were identified as blue coloured in 19/25 of cases (76%), in G2 in 25/25 of cases (100%). The results were analyzed using test χ^2 with Yates' correction and there was a statistically significant difference ($\chi^2 = 0.05{,}1$) between G2 and G1. Postoperative hydrocele was noted in 2/6 patients of G1 in whom the lymphatic vessels were not identified.
Conclusions: Laparoscopic lymphatic sparing varicocelectomy is an effective procedure to adopt in children with varicocele. The intra-dartos/intra-testicular injection of isosulfan blue is significantly better than the previously described intra-dartos injection, permitting to identify lymphatic vessels in 100% of cases in our series. No allergy to isosulfan blue was reported in both groups.

Laparoscopic varicocelectomy according to the Palomo technique is the most common procedure adopted in children with testicular varicocele [1,2]. This procedure involves the ligation of the internal spermatic vessels and is associated with a 3% to 5% incidence of recurrence and about 10% to 30% incidence of post-operative hydrocele [3,4].

Hydrocele and testicular edema following varicocelectomy are very common conditions that can lead to a testicular discomfort and sometime to a second surgical procedure to solve the problem [5]. For this reason, in recent years, lymphatic sparing procedures associated to varicocele repair have been described, decreasing the incidence of secondary hydrocele and ensuring a better andrological outcome [6–11].

A common lymphatic sparing procedure adopted in children with varicocele consists of a scrotal intra-dartos injection of Patent blue V, or its isomer isosulfan blue [12–14]. This procedure gives a rate of successful lymphatics mapping of 70%–80% with about 20%–30% of mapping failures with no identification of lymphatic vessels [15,16].

After a previous experience with an intra-dartos injection with a mapping failure of about 20% [15], we have modified the technique of injection to standardize it and to obtain the 100% of lymphatic identification.

The aim of the present study is to report the results of a comparative study between 2 groups of patients using standard method of isosulfan blue injection and the new method of intra-dartos/intra-testicular injection.

1. Patients and methods

We retrospectively reviewed the files of 50 patients who underwent laparoscopic left varicocelectomy according to the Palomo technique from July 2010 to July 2013.

Patients had a mean age of 12.7 years (range 9–16 years) and all had primary grade III varicocele according to Horner classification on the left side. Indications for the intervention were in all patients the high degree of varicocele and the coexistence with a left testicular hypotrophy of more than 20% compared to contralateral side in 31 patients (62%), or testicular pain or discomfort in 19 cases (38%).

All the patients before surgery received a color Doppler testicular ultrasonography to confirm the diagnosis.

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We adopted in all the patients isosulfan blue scrotal injection preoperatively to identify lymphatics (Fig. 1). Patients were divided into two groups: G1 (25 patients) those who underwent a classical isosulfan blue scrotal intra-dartos injection and G2 (25 patients) those who underwent a new standardized isosulfan blue scrotal intra-dartos/intra-testicular injection. As for the technical details of intra-dartos/intra-testicular injection of blue isosulfan, we used a 23 gauge needle that was inserted firstly into intra-dartos space with an angulation of about 30°. After aspiration to control the presence of blood with a syringe with a saline solution, we connected the needle to the syringe with 2.5% isosulfan blue solution. In G1 2 mL of 2.5% isosulfan blue solution was injected only in intra-dartos space as previously published; in G2 after injection of 2 mL of the solution into intra-dartos space as performed in G1, we inserted the needle with a 90° angle within the body of the testis and we injected further 0.5 ml of the solution into testicular parenchyma. The injection was performed 5 min before starting surgery.

1.1. Surgical technique

The surgical procedure was performed under general anesthesia with endotracheal intubation. The patients were placed in supine position with slight Trendelenburg. After scrotal injection of vital dye, a transperitoneal approach was used. We adopted a 5 or a 10 mm 0° optic according to available instruments introduced via an open approach. Two other 5-mm trocars were adopted in triangulation with the optic to have a better ergonomy. A peritoneal window was made at the level of dilated spermatic vessels at a distance of 3 to 5 cm from the internal inguinal ring. By using a curved dissector, all spermatic bundle was freed from the retroperitoneal tissues; if lymphatic vessels were identified (because they are blue coloured) they were spared (Fig. 2). Two 5-mm titanium clips were applied distally and 2 proximally on the spermatic vessels. Vessels were cut between the clips according to the Palomo procedure (Fig. 3). The surgical area was inspected for hemostasis at the end of procedure.

Pneumoperitoneum pressure during the procedure was 8 to 10 mmHg.

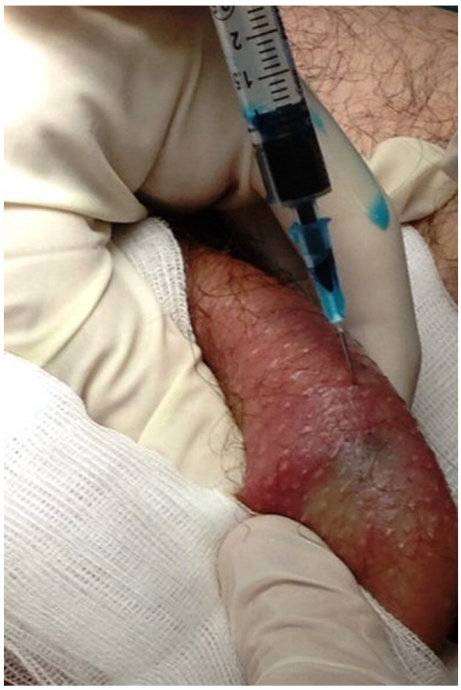

Fig. 1. Isosulfan blue scrotal injection.

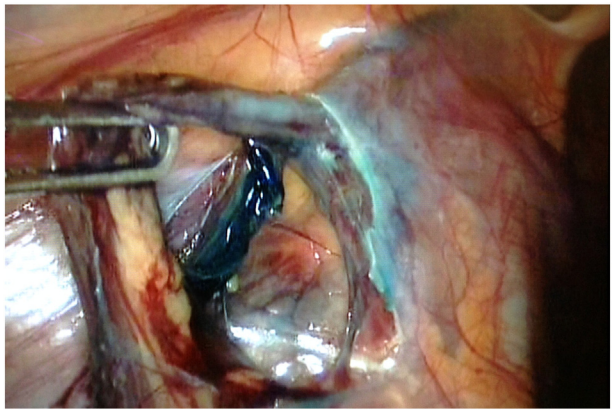

Fig. 2. It is easy to spare the 2 lymphatics located posteriorly to the bundle.

2. Results

All the procedures were completed in laparoscopy.

Mean length of surgery was 15 min (5 to 40 min).

In G1, the lymphatic vessels were identified as blue coloured in 19/25 of cases (76%). In G2, the lymphatic vessels were identified as blue coloured in 25/25 of cases (100%). As for quality of visualization of the coloured lymphatic vessels, we observed no significant difference between older and younger patients. However in older patients, probably for a faster lymphatic drainage, we observed a shorter duration of blue visualization of the lymphatic vessels that return to a normal colour in a shorter period of time. In all the patients we observed at least 2 lymphatics posteriorly to the bundle, which were always and easily spared, and we observed always 1 lymphatic anteriorly to the bundle that was spared rarely because it was difficult to dissect. Mean length of hospitalization was 36 h (range, 1–2 days).

All patients were followed-up clinically 7, 30, 180 days, then 1 and 2 years after surgery; after 2 years we stopped follow-up and the patients were invited to contact the hospital in case of problems (recurrence or hydrocele appearance).

The results were analyzed using the test χ^2 with Yates' correction and there was a statistically significant difference ($\chi^2 = 0.05{,}1$) between G2 and G1 as for the lymphatic identification (Table 1). Postoperative hydrocele was noted in 2/6 patients of G1 in whom the lymphatic vessels were not identified. Hydrocele appeared always in the first year after surgery, 3 and 7 months after the procedure, respectively.

We had no problems related to allergy to the product in both groups.

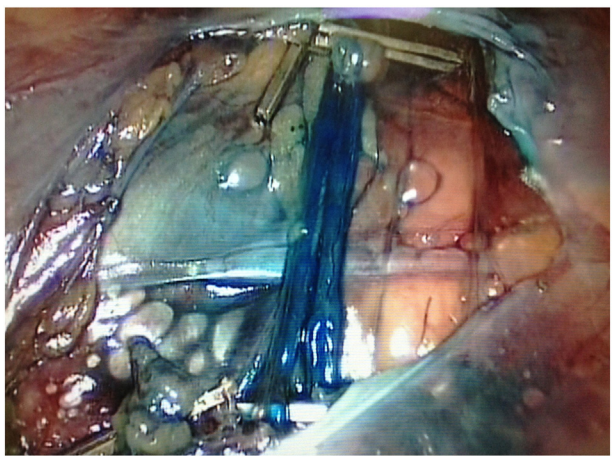

Fig. 3. At the end of Palomo procedure, the two residual lymphatics are clearly visible.