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Place of Laparoscopic Approach in Non-Palpable Testis Management on Children: a Review about 20 Cases

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PURPOSE: The objective of this work is to report the results of laparoscopy in the management of non-palpable testis at the pediatric surgery department over a two-year period.

PATIENTS AND METHODS: we report a study on the interest of laparoscopy in impalpable testis, carried out over a period of two years, at the Pediatric Surgery Department of Albert Royer Children's Hospital in Dakar and the General Surgery Department of Heinrich LUBKE Hospital in Diourbel. Laparoscopy was used as the first-line approach to locate and reposition the test is in the scrotal sac.

RESULTS: The average age of the children was 4.7 years with extremes of 2.5 and 6 years. The right side was affected in 8 patients, the left side in 11 patients, whereas the disease was bilateral in one patient. Out of the 21 investigated non-palpable test is, coelios copy identified 14 testis aside the inguinal canal deep orifice, 4 in ectopic position and 3 agenesis testis. We performed 14 single-stage repositioning, 4 two-stage repositioning according to Fowler Stephens method, and 3 cases of residue ablations. Post-operative follow-up was conducted in 13 patients and revealed that 11 testicles were in intrascrotal position and 2 non-palpable. Testicular size remained normal in 10 of the 13 patients after surgery; one case of atrophy was recorded in a patient who underwent a two-stage repositioning. Testicular ascent was not recorded.

CONCLUSION: Laparoscopic approach is our core therapy procedureof impalpable testicles because of its low morbidity and a high success rate.

KEY WORDS: non-palpable testicle, child, laparoscopy.

I. INTRODUCTION

Testicular migration abnormalities include a broad clinical situations. The testicle might be on the normal descent path or not [1].

It is a common condition occuring in children that can sometimes lead to management issues, especially in intra-abdominal forms where the testicle is not palpable [1].

Coeliscopic screening, described by Cortes [2] in 1976, has been implemented for several years as an effective method for providing enough information and avoiding further diagnostic investigations in these situations of non-palpable testicle. It also allows to begin the surgical treatment meanwhile.

II. MATERIALS AND METHODS

This is a forward-looking and descriptive study conducted on 20 patients with non-palpable testis. The patients were treated in the Pediatric Surgery department of the Albert ROYER Children's Hospital and the General Surgery department of the Heinrich LUBKE Hospital in Diourbel, where paediatric surgery activities are carried out.

The study was performed in 2 years and included all patients under 16 years of age with a non-palpable testis who underwent laparoscopic screening.

The required laparoscopic materials comprised: a blade scalpel N°11, valve trocars; a 10 mm trocar and 25 mm trocars, windowed atraumatic grippers, a coagulator hook and dissection scissors, a bipolar coagulation forceps, a washing-suction system and classical surgical equipments.

The anesthetic standards for laparoscopic surgery applied. They included a peripheral venous route, oxymeter monitoring, and especially a capnometry, and a urine catheter. General anesthesia was the core procedure, with endotracheal intubation and controlled ventilation. An important dose of curare was necessary to reduce intra-abdominal pressure and relax the wall.

The patient was placed in supine position, with the arm positioned at the other side of the ectopy along the body when it was about a unilateral non-palpable testicle; and across when the non-palpable testicle was bilateral. In addition both lower limbs were ecarted with a Trendelenburg position of 30 degrees. The surgical site involved the abdomen and scrotum.

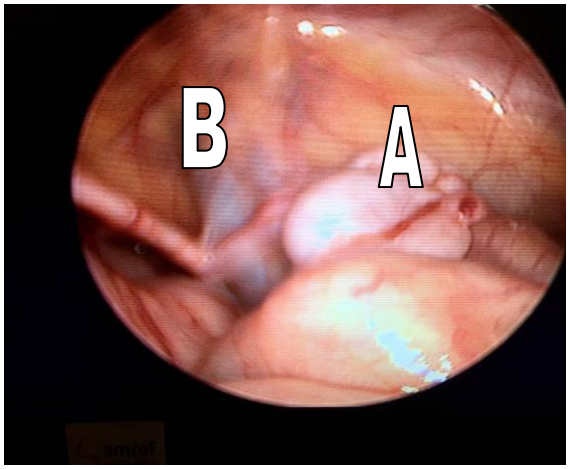
An arciform incision was made under umbilic, corresponding to open laparoscopy method. A 10mm trocar was introduced at first allowing the creation of pneumoperitoneum by insufflation (a pressure of 6 to 8 mmhg between 1 and 3 years old; 10 to 12 mm hg in older children). The introduction of a 5mm optic fiber allowed the exploration of the pelvic cavity and the identification of the testis, deferens and testicular vessels. The markers comprised the external iliac vessels, umbilical ligament, testicular vessels and deep inguinal orifice. One or two additional 5 mm trocars were placed laterally in case of need.

The studied parameters included: frequency, age, affected side, examination of the contralateral testis, laparoscopic datas (testicle position, testis appearance and size, pedicle length, persistence of the peritoneovaginal canal, epididymal-testicular abnormalities), laparoscopic treatment (one-stage repositioning, Fowler Stephens method, residue removal) and postoperative outcome (favourable, complications such as atrophy, recurrence, torsion).

III. RESULTS

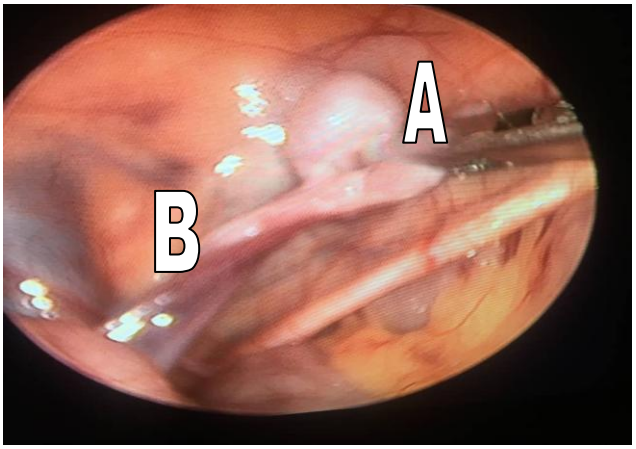
Twenty patient records were collected over a two-year period. The average age was 4.7 years, with extremes of 2.5 and 6 years. The right side was affected in 8 patients, the left side in 11 patients, while the disease was bilateral in one patient.

The examination of the contralateral testis revealed 19 testicles in an intrascrotal position and one non-palpable. Out of the 21 non-palpable testicles investigated, laparoscopy identified 14 testicles beside the inguinal canal deep opening, 4 in abdominal position and 3 agenesis testicles **(Figure 1).**



A : testicle
B : deep inguinal opening
Figure 1: testicle position

Among the 21 non-palpable testis, 16 were recorded to have normal size, 2 were hypotrophic, and the 3 left were agenesis.
The peritoneovaginal canal was present in 14 patients.
The spermatic pedicle was long enough to allow a one-stage repositioning in 14 patients **(Figure 2);** it was short in 3 patients. The pedicle was absent during agenesis.



A: deep inguinal orifice
B: spermatic pedicle
Figure 2: Length of the spermatic pedicle

A case of epididymal-testicular dysjunction was recorded in our series.
In a 6-year-old child who presented for a left-sided non-palpable testis, laparoscopic assessment revealed a cross-testicular ectopy.

A broad range of therapeutic procedures were undertaken for the different cases (Table 1). There was no intraoperative incidents. The various performed procedures are summurized in **table I**.

Table I: Actions taken

Therapeutic procedure	Amount of testicle	Percentage (%)
One-stage repositioning	14	66,6
Two-stage Fowler Stephens method	4	19
Residues ablation	3	14,4
Total	21	100

In 13 patients, post-operative follow-up revealed 11 testicles in intrascrotal position, and 2 not palpable.
Among the 11 testicles in scrotal position post-operatively, 10 patients had normal size whereas one patient had an atrophy.

Neither testicular ascent nor torsion or keloid scarring were found.

IV. Discussion

Non-palpable testis may correspond to different situations, either because the testicle does not exist (testicular agenesis), or because it has disappeared (testicular atrophy), or because it has remained very high on its migration path and is not palpable (testicle located in the upper part of the inguinal canal or in the abdomen).
Non-palpable testis is rated at about 20% of the undescended testis**[3].**
Testicular migration anomaly is a common complaint in pediatric surgery. As for Scorer**[4],** it affects 0.8% of 1-year-old children, 3% of full-term newborns and 20% of premature babies.
Among these cryptorchid testicles, 20% are really non-palpable and therefore leads to a diagnostic and therapeutic issues **[5].**
In our series, the frequency in regard to newborns is difficult to appreciate due to the lack of systematic screening in the birth room.
The indicated age for the management of non-palpable testis is controversial. Canaveese and al **[6]** and the Nordic consensus report **[7]** recommend surgical management before the age of 1 year, whereas the recommended age by the European Association of the Urology ranges from 12 to 18 months **[8].**
In our series it is 4.7 years higher than the ideal age for intervention before 2 years.
This occured because of late diagnosis due to parental neglect, ignorance of the condition by medical and paramedical staff, and lack of systematic screening in the birth room. For early diagnosed cases, it is the lack of knowledge of the operative age regarding medical staff, especially before 2 years to preserve spermatogenesis and prevent the risk of degeneration. Laparoscopy in children was limited by age, but with the advent of new anaesthetic techniques, it is increasingly performed in children.
In almost all series, there is a predominance of the left unilateral non-palpable testis. Stéfaniu **[5]** reports left side involvement in 50% of children, right side involvement in 34.4% of patients and bilateral involvement in 15.6% of cases. According to Denes series **[9],** 29% of the children had a left non-palpable testicle, 16% had a

right side involvement, and 55% of the cases were bilateral. This predominance on the left is embryologically explained by the long path of the testicular descent on the left.

By allowing a broad and meticulous exploration of the pelvic region and lower abdominal quadrants, laparoscopy provides a precision in regard of gonadal status. Laparoscopy is currently recognized as a reliable and efficient diagnostic method to verify the existence or not of a non-palpable testis and to locate it accurately if it exists. Only laparoscopy can confirm with certainty that there is no testicular residue at all. In 1976, Cortes **[2]**has proposed laparoscopy for diagnostic purposes and since then it has embodied itself as an essential technique providing information and deciding on the appropriate therapeutic strategy and enabling surgical treatment to be started at the same time.

Laparoscopic screening sensitivity to NPT is close to 100% **[10].**

According to Averous **[4],** the pathology of PVC is almost always associated with cryptorchidism. The incomplete closed canal mechanically stops the testicle migration in the inguinal canal path. In our series, the PVC is present in two thirds of cases. Technical approaches are chosen according to laparoscopic data. Indeed, the location of the testicle, its quality as well as the length and appearance of the spermatic pedicle impose the gesture and technique that worth **[2].**

The repositioning of the impalpable testis in one-stage surgery without sectioning the testicular vessels remains possible and is the ideal method. Several publications report the good outcome by using this technique **[5].** We performed testicular repositioning by one-stage operation for 14 testis and noted a 100% success rate. Its major indication is a low-located intra-abdominal testis, distant to less than 2 cm from the internal inguinal opening. However, the distance between the testis and the internal inguinal orifice alone does not always allow a decision on the most appropriate repositioning technique. Other factors must be taken into account, in particular the mobility and the spermactic vessels lenght. Therefore, a mobilization of the testis towards the contralateral internal opening is performed to assess whether the spermatic vessels is long enough to reach the scrotum **[11].**

If the spermatic vessels is estimated to not be long enough, the first step of the Fowler and Stephens technique is then implemented.

In Denes' series **[9],** among 124 non-palpable testis, 29 are managed by a one-step laparoscopic method. Three patients underwent vascular ligation with a success rate rated at 33% while the 26 remaining patients without vascular ligation had a success rate of 96%.

The Fowler and Stephens two-stage technique is performed within two steps, with an empirical interval of 4 to 6 months, which promotes revascularization from deferential vessels [12].

According to Stefaniu's series**[5]** including 141 non-palpable testis, 48.9% (69 testis) are operated through Fowler and Stephens two-stage technique with an estimated success rate of 78.5%. According to him, this technique deserves to be retained because of the good outcome by ensuring a better vascular supply of the testis.

According to Stéfaniu's series **[5],** a very dystrophic gonad is removed, while in our series, the ablation concerns 3 testicles (12% of cases). However, the others had a good macroscopic aspect (volume, color, consistency).

The size and location of the testis after surgery should be monitored and assessed by one week, one month, three months and six months by physical examination [13].

A good outcome is defined by a normal size and palpable testis with a normal intrascrotal position **[13].**

It is common that surgical failures, such as postoperative testicular atrophy and secondary ascent, cannot be estimated until at least one year after surgery **[14].**

Torsion is one of the complications that can occur before or after surgery. For Steven and al **[15],** the best way to prevent this complication is to make sure when ligating the vessels that the clips are placed at a sufficient distance from the testis.

Baker **[16]** and Esposito **[9]** describe in their series an atrophy rate corresponding to 14% and 16.7% respectively.

In our series, the atrophy rate is observed in 5% of cases. in regard to secondary ascent, it is reported by Hvistendahl series **[17]** in 6% of cases.

In our series, secondary ascent was not recorded.

V. CONCLUSION

Laparoscopy is a core technical approach among thebroad range of therapeutic methods for intra-abdominal testis repositioning. It is a reliable technique where surgical complications are low and controlled, with a very satisfactory success rate.

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