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Laparoscopic treatment of nonpalpable testicle. Factors predictive for diminished size

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ABSTRACT

Purpose: The purposes of this study were to demonstrate the usefulness of laparoscopy in intraabdominal testicle (IAT) and to determine factors associated with diminished size during the final outcome after laparoscopic orchidopexy.
Methods: This is a retrospective analysis of consecutive patients from 1999 to 2013 with a minimum follow-up of 1 year. Patient and testicular factors were related to diminished size.
Results: Sixty one patients, and 92 testicles were included. Median age at operation was 42 months. Initially we found 66 normal sized testes (71.7%), 22 hypotrophic (23.9%) and four atrophic (4.3%). Eighty seven testes were brought down laparoscopically, 50 in one surgical stage and 37 in two stages. Mean follow-up was 40.2 months and the final outcome was success: 73.5% and diminished size: 26.5%. Variables associated with diminished size were hypotrophy during initial evaluation, short spermatic vessels, section of spermatic vessels, two-stage surgery and tension to reach contralateral inguinal ring. Multivariate analysis showed that initial hypotrophy (odds ratio [OR] 4.96, confidence interval 95% [CI] 1.36–18.10) and tension to reach contralateral ring (OR 4.11, 95% CI 1.18–14.34) were associated with diminished size.
Conclusions: Laparoscopy is useful in treating IAT. Initial size and tension to reach contralateral ring are factors associated with diminished size.

Empty scrotum is a frequent reason for pediatric consultation. Within this scenario, cryptorchidism is the most common reason, affecting between 2.2% and 3.8% of term newborns weighing >2500 g, whereas in preterm babies the incidence increases to 20–30% [1]. In 20% of these patients the testicle is not palpable because it may be intraabdominal, within the inguinal canal, in the deep inguinal orifice, atrophic or absent [2]. Traditionally, in order to establish the location of the nonpalpable testicle (NPT), various imaging methods have been used such as ultrasound and nuclear magnetic resonance; however, the sensitivity of these studies varies between 45% and 62% [3,4]. Since the latter part of the last century, reports appeared regarding laparoscopy as a useful diagnostic method [5]. Currently, it is considered the gold standard to determine the precise location of the testicles in NPT [6].

Regarding the treatment for cryptorchidism, it is a well-known fact that orchidopexy decreases the risk of testicular cancer [7] and improves spermatogenesis [8,9]. The open inguinal route has been used since 1959 to carry out the Fowler–Stephens orchidopexy for intraabdominal testis (IAT) which included division of the testicular vasculature to allow mobilization and preserve testicular viability based on collateral circulation. Twenty five years later it was recommended that the procedure should be carried out in two surgical stages with a time interval between ligation of the vessels and mobilization of the testicle to allow better collateral circulation [6].

At the end of the 1990s, laparoscopy was introduced for ligation of vessels and recently to carry out orchidopexy in a palpable inguinal testicle [10]. Regarding laparoscopy in NPT, it was used initially as a diagnostic method to accurately localize the testicle, but with questionable effectiveness as reported by Ferro et al. who recommended that, if the behavior of the surgeon was to perform open orchidopexy, the use of laparoscopy only increases cost, surgical and anesthetic time [11]. Laparoscopy as a diagnostic method has been used as an adjuvant to open orchidopexy as reported by Dhanani et al. who published a mixed laparoscopic and inguinal incision to pull down the testicle. Depending on the height of the testis, the authors would decide on whether or not to do an open or mixed Fowler–Stephens procedure in two stages [12]. Finally, publications appeared in which orchidopexy was done laparoscopically, with growing numbers trough time, although with variable follow-up and failure rates [5,13–18]. The objective of the present study was to demonstrate the usefulness of laparoscopy in IAT with a minimum 1-year follow-up and to explore patient and surgical factors related to diminished size in the final outcome.

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1. Materials and methods

We retrospectively reviewed the medical records of consecutive patients between January 1, 1999 and December 31, 2012 operated with diagnosis of NPT. We included patients in whom the testicle was not palpated even after carrying out the examination under anesthesia. Patients required laparoscopy for diagnostic confirmation and performing orchidopexy. We excluded those patients who were operated outside of our hospital and those with follow-up <12 months after testicular descent.

Analyzed variables for patients were: age at the time of the first surgery, weight at the first surgery, comorbidities associated with undescended testicle such as Down, Noonan or Prune belly syndrome. Surgical variables were: side, proximity to the ipsilateral inguinal ring, characteristics of the spermatic vessels, laterality of the IAT, initial size of the testicle, number of surgical stages for orchidopexy, section of spermatic vessels, tension to bring the dissected testicle to the contralateral inguinal ring and complications.

1.1. Surgical technique

Under general anesthesia and with the patient in Trendelenburg position, with or without a mild lateralization toward the contralateral side of the affected testicle, a 5-mm trocar with Hasson technique was inserted in the umbilicus and a 30° lens was placed along with two trocars of 5 or 3 mm (depending on patient age) in both flanks. Colon adhesions were released as necessary to visualize the testicle. Testicle size was evaluated at the time of the first surgery in all patients. Size was classified as normal in unilateral cases when it had at least 80% of the size of the contralateral testis; for bilateral cases, it was compared with the size expected for age. Size was classified as hypotrophic with a size <80% based on the same standards and atrophic when there was minimal testicular tissue found. According to the findings, a low testicle was classified when it was found 1 cm or less from the ipsilateral internal inguinal orifice and high when the distance was >1 cm. Spermatic vessels were classified as short when they were straight and measured <3 cm from the testicle to the inferior pole of the kidney and long when redundant between the testicle and the inferior pole of the kidney, measuring >3 cm. All measurements of the testicles and the distances were performed using a 5-mm laparoscopic Maryland clamp whose opened point measured 1.5 cm. The measurements of the gonads were done prior to dissection. The decision as to whether or not orchidopexy would be done in one or two surgical stages was based on the height of the testicle and the vessels characteristics: when the testicle was low, orchidopexy was carried out in one surgical stage with the exception of those whose vessels were straight and short; when it was high it was usually done in two surgical stages with the exception of those whose vessels were very redundant and long. Only in cases operated in two surgical stages the spermatic vessels were transected. For orchidopexy in one surgical stage, dissection was done with a peritoneal flap obtained by cutting it medial and lateral to the vessels up to the inferior pole of the kidney. Once the testicle and its vessels were fully dissected, it was brought to the contralateral inguinal ring, noting whether it reached with or without tension. Orchidopexy was then done, cutting through the gubernaculum and preserving the vessels. The testicle was brought down using a laparoscopic forceps, which was introduced into the scrotum and under laparoscopic guidance passed through the inguinal canal to create traction on the gubernaculum and, in this manner, attach the testicle to a dartos pouch. Once the patient was able to tolerate oral intake, he was discharged from the hospital for follow-up. When the testicle was seen to be high or with short vessels, the two-stage Fowler–Stephens technique was performed: two titanium clips were placed in the spermatic vessels from 1 to 2 cm above the testicle during the first stage. The second stage was done at least 6 months later. During this procedure, a peritoneal flap was cut around the vas deferens and the vessels previously clipped and transected in the first stage, to gain length. Once the testicle and its peritoneal flap were fully dissected, the tension with which it reached the contralateral inguinal ring was noted and then brought down using the same technique for the one-stage procedure. Once the patient was able to tolerate oral intake, he was discharged from the hospital for follow-up.

1.2. Main result: final outcome

Reference is made to the last outpatient visit for clinical assessment of the testicle but with a minimum of 12 months after descent. Size of testis was determined by direct transscrotal measurement of the gonad. It was defined as successful when the testicle remained in the scrotum with a normal size (80% or greater) and normal consistency compared with the contralateral side for the case of unilateral IAT or, in the case of bilateral IAT, when compared with that expected for age. Hypotrophy was considered when the testicle was found within the scrotum but smaller than expected in size (less than 80%), and atrophy was defined when the testicle was located within the scrotum and with a size <50% of that expected. To avoid evaluator bias between hypotrophy and atrophy, the sum of the atrophic and hypotrophic testicles was defined as diminished size.

As a secondary result, we analyzed, only in those operated in two surgical stages, the response of the first Fowler–Stephens procedure, so during the second surgical stage, testicle size was assessed and compared with the size of the testicle on the first surgical stage. It was classified as equal when the size was the same and hypotrophic when it decreased in size.

2. Plan of analysis

For the overall series, data were analyzed using measures of central tendency if the distribution was symmetric, if not, nonparametric measurements were used. In addition, a univariate analysis was performed calculating odds ratios (OR) with a confidence interval (CI) of 95% to determine the relationship of the patient and testicular variables with the diminished size in the final outcome. Quantitative variables were compared using Student t test and qualitative variables with χ^2. For univariate analysis, the following patient or surgical variables were taken into consideration: patient age, patient weight, inherent comorbidities of IAT such as Down, Noonan or Prune belly syndrome, height of the testicle, side affected, length of the vessels, unilateral or bilateral disease, number of surgical stages required for descent, time interval between surgical stages in cases of Fowler–Stephens, difficulty bringing the dissected testicle to the contralateral inguinal ring and complications. Using the significant variables, binary logistic regression analysis to define the specific weight for each variable was used; $p < 0.05$ was accepted as statistically significant.

We performed additional analysis of those testes which were initially normal sized to look for factors associated with hypotrophy and in those which were hypotrophic looking for factors leading to atrophy. Stata v.13.1 was used for statistical analysis.

3. Results

3.1. Characteristics of patients and testicles

A total of 90 files of patients with NPT were reviewed; 29 were excluded because of being operated at other institutions (17 patients) or because of failure to complete the minimum follow-up of 12 months after descent (12 patients), leaving a sample of 61 patients. Of these, 30 were unilateral and 31 bilateral, providing 92 testicles to be analyzed.

The age and weight of the patients in the first surgery had an asymmetric distribution, the median was 42 months (range: 12–168, mode 36 months) with median weight of 14.8 kg (range: 8–56, mode