Original Article

Selective use of laparoscopy in nonpalpable undescended testes

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Abstract

Introduction: Approximately, 20% of undescended testes (UDT) are nonpalpable. Surgical management of the nonpalpable testis comprises laparoscopy. The aim of this study was to determine if ultrasonography can be used as a preoperative tool to localize the nonpalpable inguinal testis, eliminating the need for laparoscopy.

Methods: We identified 46 patients diagnosed with nonpalpable UDT between 2007 and 2012 who underwent an inguino-scrotal ultrasound preoperatively. We analyzed correlations between radiological and surgical findings.

Results: A total of 46 patients (53 UDT), median age 14 months (quartile 1st: 7; 3rd: 80) were included. Ultrasound localized the testis as intracanalicular in 24/53 (45.2%), intraabdominal in 10/53 (18.8%), scrotal in 1/53 (1.8%), and could not localize 18/53 (33.9%) testes. In 35/53 (66%) testes, the ultrasound location correlated with the surgical findings ($P < 0.001$). Ultrasound detection showed 96% sensitivity and 56% specificity for intracanalicular testes.

Conclusion: The use of preoperative ultrasound in this series was helpful in identifying the location of nonpalpable testes in children. In particular, the ultrasound finding of an intracanalicular testis may preclude the need for laparoscopy.

Key Words: Children, cryptorchidism, diagnosis, ultrasound, undescended testis

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INTRODUCTION

Isolated cryptorchidism is one of the most common congenital anomalies, affecting approximately 3% of full-term male infants and 30% of premature infants.[1,2] Between 3 and 6 months of age, the incidence of undescended testis (UDT) decreases to 1–1.5% due to spontaneous descent. The most useful determinant of management for cryptorchidism is whether the testis is palpable on physical examination. It can, however, be difficult to accurately determine the exact location of the testis by palpation; body habitus, testicular position, and compliance of the child may impede the physical examination. Approximately 20% of UDT are nonpalpable, and these testes may be intra-abdominal, inguinal, ectopic or absent. Most intra-abdominal testes are found within a few centimeters of the internal ring, however approximately 20–40% of nonpalpable testes are absent upon surgical exploration.[3] The surgical management for nonpalpable testes is diagnostic laparoscopy.[4] The evidence shows that radiologic studies to localize the testis are of very little value, with sensitivity and specificity of approximately 45% and 78%, respectively.[5-7] In one series, it was reported that ultrasonography had no value

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in the diagnosis of the nonpalpable testis.[8] The objective of this study was to determine if ultrasonography is accurate as a preoperative tool to localize nonpalpable testes in order to prevent unnecessary laparoscopy.

METHODS

We retrospectively collected demographic, radiological, and surgical data for patients diagnosed with nonpalpable UDT, who underwent an inguino-scrotal ultrasound preoperatively between June 2007 and June 2012 at our institution. We examined correlations between radiological and surgical findings for these patients.

RESULTS

We identified 46 patients with a total of 53 nonpalpable UDT, who underwent ultrasonography during the study period. Median age was 14 months (quartile 1st: 7; 3rd: 80). The UDT was on the left in 25/46 (54.3%) patients, right in 14/46 (30.4%) patients, and bilateral in 7/46 (15.2%) patients. Ultrasonography identified 24/53 (45.2%) testes as intracanalicular, 10/53 (18.8%) as intra-abdominal, 1/53 (1.8%) as scrotal, and 18/53 (33.9%) as absent. Inguinal orchiopexy was performed for 21/53 (39.6%) testes, Fowler-Stephens orchiopexy for 10/53 (18.8%), and orchiectomy for 22/53 (41.5%). In 35/53 (66%) testes, the ultrasound correlated with the surgical findings ($P < 0.001$). Importantly, the ultrasound showed 96% sensitivity and 56% specificity for testes surgically confirmed to be located in the inguinal canal [Table 1].

DISCUSSION

The aim of surgical management of the UDT in young boys is to preserve spermatogenesis[9] and allow for screening and detection of any malignant transformation by performing an early orchiopexy.[10] Approximately 80% of UDT are palpable, and they are managed by an orchiopexy performed through a small inguinal incision. Nonpalpable testes, on the other hand, represent a diagnostic and therapeutic challenge. Such testes may be in an intra-abdominal location, intracanalicular, in an ectopic site or vanished due a prenatal torsion. Depending on the testicular viability and length of the spermatic cord, during exploration, the testicle is either secured in the scrotum or removed. The current initial surgical procedure of choice for the nonpalpable UDT is a diagnostic laparoscopy.[11] The findings on laparoscopy dictate the next step of management; either a one- or two-stage laparoscopic assisted orchiopexy, a laparoscopic orchiectomy or an inguinal exploration if the vas deferens and spermatic vessels pass through the internal ring into the inguinal canal.

Table 1: Correlation between the testicular location at surgery and preoperative ultrasound finding

	Testis location, *n* (%)			
	Intra-abdominal	Intracanalicular	Scrotal	Total
Correlated	10 (67)	24 (65)	1 (100)	35 (66)
Not correlated	5 (33)	13 (35)	0	18 (34)
Total	15	37	1	53

The laparoscopic procedure could be avoided in some cases if a preoperative imaging study could reliably localize a nonpalpable testis, which is situated in the inguinal canal. This would save time and resources as well as minimizing the operative risk to patients undergoing these procedures. Laparoscopy is widely and safely used by urologists, however, it carries some risks, especially in children given their size and the limited workspace in the peritoneum, as well as additional costs for the health care system. Vascular, bowel, and solid organ injuries are among the possible complications seen with laparoscopy.[12-14] We propose that modern day high-resolution ultrasound, performed by experienced sonographers, can be used as a tool to localize the nonpalpable inguinal UDT.

In this series, all 46 boys with UDT were examined by a pediatric urologist, and underwent ultrasonography at a tertiary pediatric hospital; all included patients underwent examination under anesthesia together with a diagnostic laparoscopy. We correlated the ultrasonographic finding in these boys with the surgical findings and found that in 66% of testes, ultrasound localization correlated with surgical findings ($P < 0.001$). The overall sensitivity and specificity of diagnostic ultrasonography were 96% and 56%, respectively, for testes in the inguinal canal. Thus, we feel that ultrasound localization of a nonpalpable inguinal UDT is a useful adjunct to the surgeon's armamentarium. Our findings suggest that visualization of a testis in the inguinal canal by ultrasound can allow the surgeon to proceed with confidence knowing that an inguinal exploration will be all that is required, and laparoscopy is not necessary.

We acknowledge that in most of the published literature, ultrasound performs poorly in localizing the nonpalpable UDT.[15] However, such studies were focused on using the ultrasound study to eliminate the surgical procedure, with a 35% probability of missing an intra-abdominal testis, which we are not proposing in this study. Our focus was using ultrasound for the detection of the nonpalpable intracanalicular testis, thus giving more confidence to the surgeon to proceed to inguinal exploration. When the testis is nonpalpable and seen by ultrasound as intra-abdominal or not visualized, diagnostic laparoscopy should be undertaken.[16]

Two recently published studies support our approach to the nonpalpable UDT. One study examined the use of ultrasound in

49 boys with 60 UDTs and revealed that ultrasound identified 97% of UDTs located in the inguinal canal, with 77% of these being palpable. Ultrasound was not found to be useful in identifying intra-abdominal testes.[17] A second prospective study used high-resolution ultrasound to examine 40 boys with 52 UDTs, comparing the findings to those at surgical exploration. Up to 91% of palpable and 87% of nonpalpable testes were identified, with an overall sensitivity of 90%, specificity 33%, positive predictive value 96% and negative predictive value 17%.[18]

The number of subjects, as well as the retrospective design, limits our study. Due to the retrospective data collection there is a possibility of bias such as classification and selection of nonpalpable testes. A prospective study with a larger subject numbers will be required to confirm these findings.

CONCLUSION

This series supports the use of diagnostic ultrasonography for preoperative assessment of patients with nonpalpable UDT. For those in whom an intracanalicular testis is seen on US, one may avoid laparoscopy and proceed with inguinal exploration. For patients in whom the testis is visualized intra-abdominally or not at all, laparoscopy should be undertaken.

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