Original Article

Outcome of surgical management of non-palpable testes

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Abstract

Background: We reviewed the success rates of orchidopexies performed for non-palpable testes at our institution and correlated preoperative and intraoperative findings to eventual outcomes.

Materials and Methods: We retrospectively reviewed ninty five medical records of patients who underwent laparoscopic exploration for the assessment of a non-palpable testes between 1996 and 2009. Intra-operative data for one hundrad eight non-palpable testes were collected. Operative success was defined as a testis comparable in size or slightly smaller than the contra-lateral testis with normal consistency on the last follow-up.

Results: There were seventy (65%) viable testes at exploration, thirty one nubbins (29%) removed and 7 (6%) absent. In the seventy six unilateral cases, contra-lateral hypertrophy was found in twinty five (33%) testes. Of which, twinty one (84%) were associated with absent testes or finding of a nubbin rather than a viable testis. In contrast, absent testes or finding of a nubbin was noted in 12 of 51 (23.5%) patients without contra-lateral hypertrophy. The difference was statistically significant ($P < 0.001$). Mean follow-up was seventeen months. Of the fifty testes in which the testicular artery was preserved, 7 were lost to follow-up and 3 of the remaining fourty three (7%) were atrophic. The twinty testes that underwent Fowler-Stephens orchidopexy (FSO) had a similar rate of atrophy, with only 1 (5%) atrophic testis identified following staged FSO ($P > 0.83$).

Interpretation: Testicular atrophy rate was similar in both artery sparing and Fowler-Stephens orchidopexies. Contra-lateral hypertrophy was significantly associated with absent testes or finding of a nubbin rather than a viable testis.

Key Words: Contra-lateral hypertrophy, Fowler-Stephens orchidopexy, non-palpable testes

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INTRODUCTION

Cryptorchidism is one of the most common congenital anomalies of the male reproductive system affecting 2-5% of male infants born at term,[1] and up to 30% of those born prematurely.[2] Cryptorchidism has been associated with a higher risk of germinal cell tumours,[3] infertility,[4] testicular trauma, and psychological issues.

Approximately 20% of cryptorchid testes are non-palpable.[5,6] A subset of these patients with a non-palpable testis may represent a surgical challenge, as identifying the correct location of the undescended testis is important in order to properly select the surgical treatment. The non-palpable testis may be intra-abdominal and thus associated with either an open or closed internal inguinal ring. Alternatively, some testes may migrate back and forth across the internal inguinal ring, thus being palpable on 1 exam and non-palpable on a subsequent exam, and are referred to as peeping testes. The testis may also be completely absent or atrophic.

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Surgeon experience and available resources in a facility are important factors that determine the surgical approach, and the success rates of each procedure and the potential complications must be considered.[7-10]

We performed a retrospective chart review at our institution to determine the success rates for orchidopexies performed for non-palpable testes with special emphasis on comparing artery sparing technique versus Fowler-Stephens orchidopexy (FSO). Moreover, given that vanishing or nubbin testes may require shorter operating room time in comparison to viable testes, we also sought to identify preoperative signs that predicted an absent or nubbin testis on surgical exploration, as these may improve the efficacy and efficiency of operative time management and aid in preoperative counseling for parents.

MATERIALS AND METHODS

Medical records of all patients who underwent laparoscopic exploration for the assessment of a non-palpable testis between 1996 and 2009 were retrospectively reviewed. Overall, ninety five records were examined yielding a sample of one hundred eight non-palpable testes. Relevant data for each testis was collected, including age at surgery, presence of contralateral testicular hypertrophy, the initial location of the testicle prior to intervention, and type of surgical procedure. Given that no testicular measurements were obtained for our study, contra-lateral hypertrophy in unilateral cases was determined solely by documentation in the preoperative notes.

Orchidopexy was performed on all testes that were thought to be of sufficient size and texture. The surgical technique was chosen according to the location of the testes and the surgeon preference. Three surgeons have performed the surgery in this review. Orchiectomy was performed for non-viable "nubbin" testes. The post-operative size of the testis, whether atrophic, small or normal, as determined at the last follow-up, was noted. An atrophic testis was determined by the absence of normal texture and size when compared to the contra-lateral testis. Operative success was defined as a testis that was comparable in size or slightly smaller than the contra-lateral testis and retained a normal consistency.

The type of surgical procedure performed was compared to the initial location of the testis. Cross-tabulations were also performed to examine the relationship between contra-lateral hypertrophy and viability of the non-palpable testis in unilateral cases. Testis size on last follow-up was also compared between artery sparing technique and FSO as well as the initial location of the testis. Chi-square analyses were reported for each cross-tabulation and those with a P value of less than 0.05 were considered statistically significant.

RESULTS

The average age at surgery was twenty six months (range: 6 months to 8 years). Bilateral cryptorchidism was seen in nineteen (20%) patients of whom 13 also had bilateral non-palpable testes. All patients with bilateral non-palpable testes had negative work-up for disorders of sexual differentiation. Sixty two (81.5%) of the unilateral undescended testes were on the left side.

Seventy testes (65%) were viable at exploration. Open (n = 36) or laparoscopic (n = 14) orchidopexy with testicular artery preservation was possible in 50 testes (20 peeping, 14 at the internal ring, and 16 abdominal) and single (n = 10) or two-stage (n = 10) Fowler-Stephens procedure was performed in twenty testes (1 at the internal ring, fourteen abdominal and 5 at the iliac vessels). All 2-stage and 1 single-stage Fowler-Stephens procedures were performed via laparoscopy. One-stage Fowler-Stephens procedure was performed via an open supra-inguinal incision in 9 patients. There was a significant difference between the initial location of the testis and the surgical procedures selected ($P < 0.001$).

Thirty one nubbins (29%) were removed (7 scrotal, seventeen inguinal and 7 abdominal). Of the thirty one removed testes, 1 abdominal nubbin (3%) demonstrated the presence of immature germ cells in the final pathology. Seven testes (6%) were absent. A flow chart of all patients and their outcomes are depicted in Figure 1.

In unilateral cases (N = 76), contra-lateral hypertrophy was noted in 25/76 (33%) cases. Of which, twenty one (84%) were associated with absent testes or finding of a nubbin rather than a viable testis. In the remaining 4 patients with contra-lateral hypertrophy, a viable testis was found. In

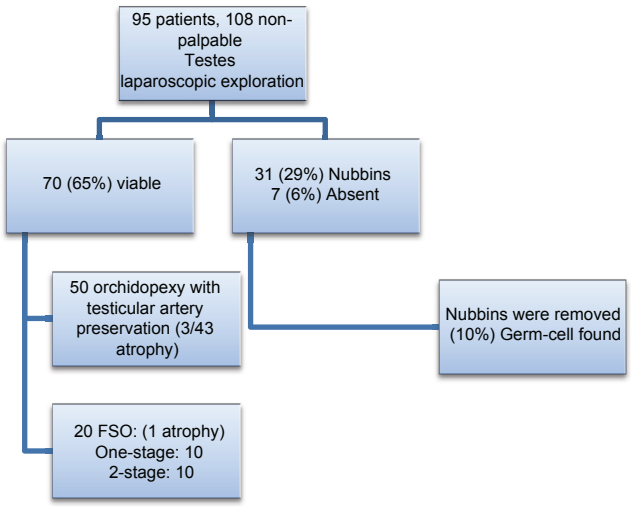

Figure 1: A flow chart of all patients and their outcome

contrast, absent testes or finding of a nubbin was noted in 12 of 51 (23.5%) patients without contra-lateral hypertrophy. Contra-lateral hypertrophy was significantly associated with absent testes or finding of a nubbin rather than a viable testis ($P < 0.001$). The odd ratio (95% CI) of the likelihood of absent testis with contralateral hypertrophy is 17.06 (4.9-59.5) ($P < 0.0001$). The mean age at surgery was not significantly different between those with and without contralateral hypertrophy, 27 vs. 28 months respectively.

Mean follow up was seventeen months (range: 6 months to 12 years). Of the fifty testes in which the testicular artery was preserved, 7 were lost to follow-up and 3 of the remaining fourty three (7%) were atrophic. Testes that underwent FSO had a similar rate of atrophy, with only 1 (5%) atrophic testis identified following staged FSO ($P > 0.83$) [Figure 2]. There is no significant difference in atrophy rate between 1-stage and 2-stage FSO ($P > 0.05$). The initial locations of the 4 atrophic testes in this series were 1 peeping (1.6%) and 3 abdominal (4.8%), $P > 0.47$. At last follow-up, twenty two testes were slightly smaller than the contra-lateral sides including 8 (40%) after FSO (3 single and 5 two-stage) and fourteen (33%) when the testicular artery was preserved ($P > 0.05$). No patient required an additional redo orchidopexy.

DISCUSSION

The surgical treatment of a non-palpable testis still remains controversial. Difficulty dissecting and mobilizing the testis and complications such as testicular atrophy and necrosis are all important factors to consider when choosing the correct surgical management. FSO, 1 or 2-stage, has been employed to overcome the short spermatic vessels. The reported success rates were 63% -95%.[7-9] On the other hand, some authors have preferred orchidopexy with spermatic artery preservation. Stecc *et al.*[9] have performed 1-stage orchidopexy without vessel division and reported a success rate of 89.1% for intra-abdominal testes with fewer failures observed when using

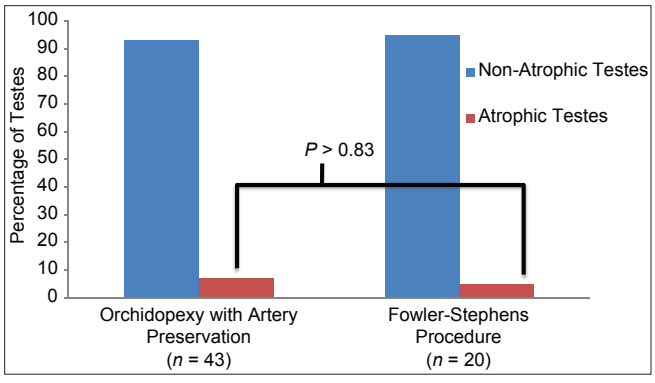

Figure 2: Testicular atrophy on follow up for artery sparing technique versus Fowler-Stephens orchidopexy

a laparoscopic approach. Moreover, Daher *et al.*[10] reported their experience in treating twenty six non-palpable abdominal testes, with all testes being successfully lowered to the scrotum through a standard open inguinal approach without division of the spermatic vessels.

In a recent series, Kim *et al.*[7] retrospectively reviewed the outcome of children who underwent laparoscopic orchidopexy for a non-palpable testis. Of 86 testes, sixty nine were treated with orchidopexy sparing the internal spermatic vessel, fourteen testes were treated with 1-stage FSO, and 3 testes were treated with 2-stage FSO. The overall testicular survival was 93.7%, 98% for spermatic artery preservation, 81% for 1-stage FSO, and 66% for 2-stage FSO. Of 59 viable testes at last follow-up, eleven (18.6%) testes were in the mid to high scrotum.

Esposito *et al.*[8] reviewed the long term outcome of twelve pediatric patients for high intra-abdominal testes using the 2-step FSO via laparoscopy. Patients were followed for 10-17 years. Two of the twelve patients (16.7%) had an atrophic testis in the scrotum. The operated testis was always smaller than the normal testis despite the good vascularization detected on echo color Doppler ultrasound. There was a statistically significant difference between the volume of the operated testis and the normal testis.

After reviewing the outcomes of different surgical treatment options for non-palpable testes in our institution, we determined that the testicular atrophy rate was similar in both artery sparing and Fowler-Stephens operations, with no significant difference in outcomes between 1-stage and 2-stage FSO. The results of the present study compare favorably to the previously published series. The favorable outcome of 1-stage FSO in our series could be explained partially by the fact that all 1-stage FSO were done by one surgeon.

The rate of testicular atrophy within our sample was much higher in testes originally located high in the abdomen. These testes atrophied at three times the rate of peeping testes, but due to our sample's paucity of atrophic testes at last follow-up, this difference was not statistically significant. Similar findings have also been noted by others.[7]

Previous studies,[11-15] have reported that the finding of a hypertrophied contra-lateral descended testis may predict the condition of the non-palpable undescended testis, with higher degrees of enlargement predicting absence of the non-palpable testis. Compensatory testicular hypertrophy was first reported in 1980 by Laron *et al.*[11] whose series included pre-pubertal, pubertal, and post-pubertal patients with both palpable and non-palpable cryptorchid testes. According to Koff,[12] the extent of contra-lateral testicular

enlargement is an important predictor of viability of the non-palpable testis. It is reported that the descended contra-lateral testis is significantly hypertrophied when the non-palpable testis is absent and the degree of contra-lateral testicular enlargement is less when the non-palpable testis is small or atrophic. Moreover, Hurwitz and Kaptein,[13] reported that a contra-lateral hypertrophied testis measuring ≥1.8 cm predicted an absent undescended testis 90% of the time, while hypertrophied testicles measuring below this cut-off were associated with an approximately 50% incidence of monorchia. Huff *et al*.[14] reported that a contra-lateral descended testis associated with an absent non-palpable testis has a greater mean volume than that of an intra-abdominal non-palpable testes. In addition, Shibata *et al*.[15] recently reported that contra-lateral hypertrophy is a strong predictor of an absent non-palpable testis in Japanese boys.

These findings suggest that the predictive value of contra-lateral testicular hypertrophy may be helpful in planning operating room time and may also be useful for preoperative counseling. Although the present study is limited by the fact that contra-lateral hypertrophy was determined only by written documentation in the preoperative record with no objective measurements used, the significant association between contra-lateral testicular hypertrophy and either absence of the non-palpable testis or finding of a non-viable nubbin has been noted. This highlights that a proper physical exam by a pediatric urologist can still be useful for counseling parents and perhaps improving operative time management.

Our study is a retrospective review, hence there may be specific characteristics that lead patients to be selected to undergo certain procedures. In addition, hypertrophy of the contra-lateral testis and operative success based on testicular health were determined by physical examination alone by the pediatric urologist. This makes our dataset liable to missing testes with contra-lateral hypertrophy that were not correctly documented, and also prevents us from being able to assess any numerical cut-offs that yield a high sensitivity for predicting a non-viable undescended testis. Moreover, the present study as well as previous one were unable to clearly explain the etiology and timing of contra-lateral testicular hypertrophy. Future prospective controlled studies to record consecutive objective measurements at birth as well as prior to surgery are warranted to shed some light on this phenomenon.

CONCLUSIONS

Our study has shown a high success rate following surgical management of non-palpable testes regardless of the technique. Testicular atrophy rate is similar in both artery sparing and FSO for non-palpable testes. There is no significant difference between 1-stage and 2-stage FSO. The significant association between contra-lateral testicular hypertrophy, determined solely by physical exam with no objective measurements, and absent testis or finding of a nubbin has been reproduced. This may be a helpful predictor for improving operative time management and preoperative counseling for parents.

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