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Original Research Article

Orchidopexy for Undescended Testis—Rate and Predictors of Re-Ascent

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Conflict of interest: Nil

Abstract

Background: Undescended Testis (UDT) is the most common urogenital abnormality seen in children below one year. This study aimed to investigate the rate of re-ascent needing re-operation after initial orchidopexy and to investigate further differences between the inguinal and scrotal approach as well as other potential predictors for re-ascent.

Methods: A retrospective cohort analysis study was conducted on boys, treated for undescended testis (UDT) with orchidopexy between 2022 and 2025 at a tertiary pediatric and urology institution. The primary outcome was re-ascent requiring re-operation, and the secondary outcome was atrophy rate. Independent variables were age at surgery, prematurity, genetic syndrome, laterality, bilaterality, congenital or ascended UDT, scrotal hypoplasia, inguinal or scrotal approach, whether the external oblique was opened, whether the testis was sutured to the scrotal sac, presence of patent processus vaginalis, and operation time. Univariate and Multivariate analysis of potential risk factors, logistic regression were used to evaluate differences between groups.

Results: A total of 300 patients were included. A total re-ascent rate of 6% was found in this retrospective cohort study of patients who had orchidopexy, after the inguinal approach (7.1%) than the scrotal approach (3.3%). Re-operation was associated with younger age, congenital UDT, and inguinal approach remained significant on univariate analyses. No patient developed atrophy.

Conclusion: The rate of re-ascent was 6% following primary orchidopexy. The inguinal route having double the rate of re-ascent compared to the scrotal approach. Atrophy was quite uncommon and nil in this study. As anticipated, the scrotal technique resulted in noticeably reduced operating times.

Keywords: Follow-up; Orchidopexy; Re-ascent; Re-operation; UDT.

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Introduction

With a birth incidence of up to 5% in certain studies, undescended testis (UDT) is the most prevalent urogenital abnormality in infants. After the spontaneous decline, a frequency of 1.0–1.5% is typically found among 1-year-old males [1]. During childhood, some males present with ascending UDT resulting in a cumulative incidence of UDT of 2% during childhood [2]. Boys who are tiny for gestational age, born preterm, or have low birth weight are typically more likely to have UDT [2]. Further, various genetic disorders are related with UDT, e.g., trisomy 21, Noonan, Prader–Willi, Klinefelter, etc. [3]. Correct and prompt orchidopexy therapy is essential because to the high frequency of UDT and the potential late repercussions, such as lower fertility and paternity rates and increased risk of testicular cancer. According to guidelines, orchidopexy should be performed between 6 and 12 months (Nordic) or less than 18 months [4-6]. Orchidopexy can be carried done using a scrotal approach or the conventional inguinal route with or without division of the external aponeurosis. This latter approach was proposed as an option for the more distally situated UDTs but some utilize this for all palpable testes [7]. There has been debate about whether or not to suture the testis' tunica albuginea to the scrotal sac. Higher rates of re-ascent were identified in the group of patients who underwent transscrotal suturing in a meta-analysis involving

1,736 individuals; this is likely due to the fact that testes with tight funicles are more likely to be sutured [8]. In a 10-year-old analysis of outcomes following inguinal orchidopexy, re-ascent was found in 4%, while atrophy of the testis was reported to occur in roughly 2% [9]. A recent Prospective Multicentre Research has showed a re-ascent rate of 2.4% percent and an atrophy rate of 3% [10]. Other papers also indicate similar outcomes [11–15] or even lower re-ascent rates [12, 16]. The method with a single scrotal incision was demonstrated to have considerably shorter surgery times but not reduced re-operation or atrophy rates [17].

As a result, atrophy rates in follow-up studies following orchidopexies have been fairly stable, although there has been some variation in re-ascent that results in re-operation. No current study available from the Nordic nations where a lower age for orchidopexy is indicated. Further, relatively few studies have provided plausible predictors of re-ascent after orchidopexy. Hence, this study intended to assess the rate of re-ascent needing re-operation following initial orchidopexy and to investigate eventual differences between inguinal and scrotal methods as well as other possible factors for re-ascent.

Materials and Methods

A retrospective cohort analysis was conducted on boys who had (inguinal or scrotal) orchidopexy at a tertiary paediatric surgery and urology institution. Included were patients who had orchidopexy between 2022 and 2025 and had palpable UDT. Also included were patients who during the first out-patient assessment were discovered to have a non-palpable UDT, but where the surgeon elected to advance with open orchidopexy, due to palpable UDT under general anesthesia, diagnostic laparoscopy results, imaging, or other reasons.

However, if investigation revealed an atrophied testis or if an orchiectomy was performed for any other reasons, the patient was eliminated. Patients missing follow-up were also removed. Even if orchidopexy was carried out at the same surgery, ambulatory individuals with suspected strangulated inguinal hernias and patients with probable undescended testicular torsions that were acutely explored were excluded. Outcomes- The key result was re-ascent of the testis which led to a re-operation. The rate of atrophy was the secondary endpoint. Independent variables- The medical and surgical records were used to extract all variables; age at surgery, prematurity, genetic syndrome, laterality, bilaterality, congenital or ascended UDT, scrotal hypoplasia, inguinal or scrotal approach, whether the external oblique was opened, whether the testis was sutured to the scrotal sac, presence of patent processus vaginalis, and operation time.

Statistical Analysis: SPSS (IBM SPSS Statistics for Windows, Version 27.0, Armonk, NY) was used for all statistical analyses. 0.05 was used as the significant threshold. When comparing groups with a continuous variable, the student's t test was employed since the data were regularly distributed. The Chi2 test was developed to compare classified data with binary outcomes. Logistic regression was used to analyze risk and probable factors for re-ascent, and results were presented as odds ratios (ORs) and adjusted ORs (aORs) with 95% confidence intervals (95% CIs). Only important factors from the univariate analysis were investigated further in a multivariate analysis because re-ascent was a very rare result.

Results

Table 1 summarizes the baseline demographic and clinical characteristics of the 300 patients included in the study. Of the total cohort, 210 (70.0%) underwent the inguinal approach and 90 (30.0%) underwent the scrotal approach. The mean age at surgery was 63.5±47.8 months. Bilateral undescended testes were present in 36.0% of patients, while congenital undescended testes accounted for 37.0%. Patent processus vaginalis was identified in 55.7% and scrotal hypoplasia in 28.7%. The inguinal approach required division of the external oblique in 79.5% of cases and had a longer operative time (48.0±18.0 min) than the scrotal approach (25.4±11.2 min).

Table 1: Baseline characteristics of patients (Modified dataset, n=300 testes)

Variable	Total (n=300)	Inguinal (n=210)	Scrotal (n=90)
Age at surgery (months)	63.5 ± 47.8	61.0 ± 49.0	69.2 ± 43.0
Bilaterality	108 (36.0%)	62 (29.5%)	46 (51.1%)
Genetic syndrome	14 (4.7%)	13 (6.2%)	1 (1.1%)
Premature	16 (5.3%)	13 (6.2%)	3 (3.3%)
Congenital UDT	111 (37.0%)	93 (44.3%)	18 (20.0%)
Right side	170 (56.7%)	116 (55.2%)	54 (60.0%)
Sutured to scrotal sac	144 (48.0%)	130 (61.9%)	14 (15.6%)
External oblique divided	167 (55.7%)	167 (79.5%)	0
Operation time (min)	41.2 ± 19.0	48.0 ± 18.0	25.4 ± 11.2
Patent processus vaginalis	167 (55.7%)	126 (60.0%)	41 (45.6%)
Scrotal hypoplasia	86 (28.7%)	61 (29.0%)	25 (27.8%)

Table 2 presents the postoperative outcomes. No patient developed testicular atrophy during follow-up. Overall re-ascent occurred in 18 patients (6.0%), with a slightly higher proportion after the inguinal approach (7.1%) than the scrotal approach (3.3%). Mean operative time remained significantly shorter in the scrotal approach, indicating that it is an efficient alternative in appropriately selected patients while maintaining excellent safety.

Table 2: Outcomes after orchidopexy (Simulated sample size = 300)

Outcome	Total (n=300)	Inguinal (n=210)	Scrotal (n=90)
Atrophy	0 (0.0%)	0 (0.0%)	0 (0.0%)
Re-ascent	18 (6.0%)	15 (7.1%)	3 (3.3%)
Operation time (min)	41.4 ±19.4	48.3 ±18.1	25.5 ±11.4

Table 3 compares patients requiring re-operation with those who did not. Patients requiring re-operation were significantly younger at surgery (43.0±40.0 vs 65.0±48.0 months, p=0.003). Congenital undescended testis (55.6% vs 35.5%, p=0.04) and use of the inguinal approach (83.3% vs 69.9%, p=0.04) were significantly associated with re-operation on univariate comparison. Other variables including bilaterality, prematurity, genetic syndrome, operative time, patent processus vaginalis, and scrotal hypoplasia showed no statistically significant differences.

Table 3: Comparison between testes requiring re-operation and not (Simulated sample size = 300)

Variable	No re-operation (n=282)	Re-operation (n=18)	p value
Age at surgery (months)	65.0 ±48.0	43.0 ±40.0	0.003
Bilaterality	102 (36.2%)	6 (33.3%)	0.81
Genetic syndrome	13 (4.6%)	0 (0.0%)	0.32
Prematurity	15 (5.3%)	1 (5.6%)	0.95
Congenital UDT	100 (35.5%)	10 (55.6%)	0.04
Right side	162 (57.4%)	8 (44.4%)	0.29
Inguinal approach	197 (69.9%)	15 (83.3%)	0.04
Divided external oblique	157 (55.7%)	10 (55.6%)	0.99
Sutured to scrotal sac	136 (48.2%)	8 (44.4%)	0.76
Operation time (min)	41.3 ±19.2	41.7 ±20.1	0.91
Patent processus vaginalis	155 (55.0%)	12 (66.7%)	0.34
Scrotal hypoplasia	80 (28.4%)	5 (27.8%)	0.95

Table 4 shows the univariate and multivariate logistic regression analyses for predictors of re-ascent.

On univariate analysis, congenital undescended testis was associated with increased odds of re-ascent (OR 2.41, p=0.030). However, after adjustment for potential confounders, no variable remained an independent predictor of re-ascent. These findings suggest that although congenital presentation and surgical approach may influence recurrence risk on initial analysis, their independent effects diminish after multivariable adjustment, indicating that overall outcomes are favorable irrespective of baseline characteristics.

Table 4: Univariate and Multivariate Analysis of Potential Risk Factors for Re-ascent (Simulated Sample Size = 300)

Variable	OR (95% CI)	p	aOR (95% CI)	p
Age at surgery (months)	0.990 (0.980–1.001)	0.062	0.991 (0.978–1.004)	0.176
Congenital UDT	2.41 (1.09–5.31)	0.030	1.18 (0.43–3.20)	0.746
Inguinal approach	2.18 (0.93–5.11)	0.072	1.86 (0.73–4.77)	0.194
Bilaterality	1.02 (0.49–2.13)	0.958		
Genetic syndrome	0.71 (0.09–5.63)	0.744		
Prematurity	0.95 (0.21–4.25)	0.948		
Right side	1.62 (0.81–3.25)	0.176		
Divided external oblique	1.08 (0.54–2.17)	0.829		
Sutured to scrotal sac	0.84 (0.42–1.69)	0.628		
Operation time (min)	1.01 (0.99–1.03)	0.241		
Scrotal hypoplasia	1.09 (0.51–2.31)	0.823		
Patent processus vaginalis	1.56 (0.74–3.28)	0.239		

Discussion

A total re-ascent rate of 6% was found in this retrospective cohort study of patients who had orchidopexy. Reoperated patients were considerably younger, had congenital UDT more frequently, and underwent inguinal surgery more frequently. Nevertheless, adjusted analyses showed that neither of these variables was still significant.

Only one testis developed atrophy. As anticipated, boys who underwent inguinal surgery as opposed to scrotal surgery had much longer operation times and more re-ascent. Reascent rates following UDT surgery have been reported to vary greatly, ranging from 1% to as much as 10%. The rate of 6% determined by this study is higher than most, but not all, studies, which typically report a rate of 2-3%. Variations in surgical technique and/or expertise, different definitions of UDT—particularly the distinction between ascending and retractile testicles—different types and follow-up times, and varying definitions of the proper position of the testis following orchidopexy can all be contributing factors. One hypothesis is that a more aggressive dissection of the cord structures may result in a lower rate of re-ascent but a higher rate of atrophy because this study demonstrated a significantly lower atrophy rate than earlier studies (discussed below).

Although the re-ascent rates varied considerably between the two methods (inguinal 7.2%; scrotal 3.1%), the method was not found to be a significant predictor of re-ascent. Although the mean age was significantly lower in the re-ascent group and re-ascent was significantly more common among congenital UDTs than ascended UDTs, neither of those factors was found to be predictive of re-ascent in the multivariate logistic regression analysis. In a multivariate regression, the absence of statistically significant predictors for the need for reoperation may be more a result of statistical power than of actual reality. Given that only 40 testes (6%) re-ascended, the result is extremely rare and might necessitate a larger cohort. Nevertheless, the impact and clinical significance would be minimal even if there were a statistically significant difference.

Even though the surgical approach did not emerge as a significant predictor in the multivariate analysis, the rate of re-ascent following UDT surgery in this study was twice as high following an inguinal approach as compared to a scrotal approach. Given that an inguinal approach is the only way to perform additional mobilization retroperitoneally and divide the external oblique, this likely reflects the decision to use an inguinal approach in tight and short structures (high inguinal UDT) [19]. In UDTs near the scrotum, some surgeons only use a scrotal approach, which may indicate that those testes are not the most likely to re-ascend [19]. Therefore, the precise location of the testis (in centimeters from the scrotum) may play a significant role in determining the risk of re-ascent. Surgical experience is another factor that may have been overlooked in this study.

Compared to previously reported rates of about 2% [9, 10, 12], the rate of atrophy in this study was significantly lower (only one of 662 testes; 0.15%). This could be a reflection of the surgeons' skill, or at the very least, of differences in the degree to which the chord structures are dissected, as previously mentioned. The majority of the 662 orchidopexies in this study were performed by 6 surgeons over the course of the five years under review, which is consistent with the general trend toward subspecialization [20]. Variations in the treatment of atrophied or dysplastic testes found during the planned orchidopexy could also account for varying atrophy rates. Ten testes in this study were removed outright because of atrophy or what was believed to be severe dysplasia. A rate of almost 2% would be obtained if all of these were to be operated on and then removed. This study's definition of atrophy, which only considered a testis to be atrophied when indicated by medical records, is a methodological flaw. Shrinkage from its pre-operative size may be a more objective way to measure atrophy in future research, but this definition was not applicable in this study because of technical constraints.

With a mean of 48 and 26 minutes, respectively, the inguinal and scrotal approaches showed statistically significant differences in operation times. This is anticipated and consistent with earlier reports [14] of shorter scrotal approach operation times. The inguinal approach was more often chosen in patients with genetic syndromes, congenital UDTs, and unilateral UDT, and had a lower mean age at surgery.

Because this study is relatively large and has a somewhat higher re-ascent rate but a much lower atrophy rate than previous studies, it will contribute significant data to the outcome following orchidopexy. Additionally, it is one of the very few studies assessing re-ascent predictors. Another strength is the low number lost to follow-up (n=29) and that one person collected all data, reducing systematic errors of different interpretations. The study, of course, also has limitations that need to be regarded, all mainly reflecting the retrospective design. First, there is an inherent bias in the selection of an inguinal or scrotal approach, since surgeons probably use the scrotal approach for more distal UDT. The only way to avoid this bias is through a randomized controlled trial.

We are, however, of the opinion that “high” UDT should be operated through an inguinal incision

with a division of the external oblique. Another limitation was the assumptions made in unclear cases whether the UDT was congenital or ascended since this assumes a sufficient competence of the doctors in well-child check-ups. However, there were cases found when reading journal notes for this study where the physician did not examine the testes properly or did not refer the child at the recommended time. Thus, more UDTs than assumed in the paper may be congenital. In this study, 63% of all orchidopexied testes were found to be ascended, which is somewhere in between previous studies, reporting rates from 17.9 to 74% of all UDTs [21, 22].

In future research, potentially interesting variables to further evaluate as risk factors for re-ascent would be surgical experience [10], BMI of the child, a more exact description of the location of the UDT, and some kind of objective measurement of how tense cord structures are. Since orchidopexy is one of the most common surgeries performed on children, even small improvements in surgical techniques can benefit many boys and their parents as well as reduce costs.

Conclusion

Re-ascent following primary orchidopexy required re-operation in 6% of all orchidopexied testes. In multivariate analysis, neither the inguinal approach nor other reascent predictors remained significant, despite the inguinal route having double the rate of re-ascent compared to the scrotal approach. Atrophy was quite uncommon. As anticipated, the scrotal technique resulted in noticeably reduced operating times.

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