

Age at surgery and outcomes of patients with undescended testes at Klerksdorp/Tshepong Complex Hospital, North West, South Africa

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Purpose: Description of the demographic profile of patients with cryptorchidism who present to the Klerksdorp/Tshepong (K/T) Complex Hospital. The aim of this study is to examine the referral and surgical age and outcome of patients with cryptorchidism and compare them with results worldwide. Educational programmes that target general practitioners, paediatricians and parents are recommended to raise awareness of the importance of the early diagnosis and timed surgical management of undescended testes (UDT).

Methods: This retrospective study was done by reviewing hospital records of all cases of patients with UDT who underwent orchidopexy at the K/T Complex Hospital in the north-western part of South Africa between 1 June 2016 and 31 May 2021. **Selection criteria:** All patients diagnosed with cryptorchidism who underwent orchidopexy at K/T Complex Hospital. Patients were divided into two groups, depending on age at the time of surgery: a) before/at 24 months (Group 1), and b) after 24 months (Group 2).

Results: Of the 196 patients with UDT who underwent surgery at K/T Complex Hospital, 77.6% had unilateral disease vs 22.4% with bilateral disease; 73.1% had a right UDT vs 26.9% with left UDT; and 82.6% of patients had their testes located in the inguinal location (9.7% of patients had ectopic testes and 7.7% of patients had abdominal testes). Postoperative complications were reported in 6.1% of cases. Very importantly, up to 93.4% of patients with UDT presented after the recommended age of intervention. Statistically, analysis revealed that the age at referral was a significant risk factor affecting the time of surgery. The rate of orchidectomy was 10.6% affecting patients in late presentation, i.e. those above 13 years due to testicular atrophy/torsion.

Conclusion: Data showed almost all patients with UDT (93.4%) managed at K/T Complex Hospital urology service in the study period were beyond the age recommended by international guidelines. Also, delayed patient presentation led to increased risk of orchidectomy.

Keywords: undescended testes, cryptorchidism, hormonal treatment, surgical treatment, fertility, malignancy

Introduction

Undescended testes (UDT) is the absence of at least one testicle from the scrotum.¹ Approximately one-third of premature boys have at least a unilateral UDT, compared to 2–8% incidence in full-term boys, which makes cryptorchidism the most common anomaly in boys.² Spontaneous descent of the testis after six months of age occurs very rarely, therefore the “watchful waiting” strategy is not justified in these boys. Unilateral UDT is four times more common than bilateral UDT. Locally there is a paucity of data surrounding patients with UDT. At what age these patients first present and the waiting time till surgery is unknown. The incidence and prevalence of unilateral versus bilateral UDT and if this compares to international data is also not known. This study can illuminate an African perspective on this worldwide condition.

The aetiology of cryptorchidism remains largely unknown, and several hypotheses have been proposed. Among others, placental dysfunction with reduced hCG secretion may be responsible for hormonal and other disturbances during the foetal period of life.³ According to some researchers, the primary fault lies in the testis itself.⁴

In a study undertaken by Prof. CF Heyns, the importance of gubernaculum during testicular descent in the human foetus was clearly presented and illustrated.⁵

Management

Figure 1 illustrates approaches to the patient with UDT.

It is suggested that spontaneous descent of the testis during the first six months of life should be awaited, however, patients must be evaluated on an individual basis.⁶ Surgery should be performed at the latest by 12–24 months of age or upon diagnosis in older boys.⁷ Every UDT should be brought to the scrotum as early as possible, regardless of its primary dimensions and position, using an appropriate surgical technique. Boys with a non-palpable testis should undergo diagnostic and therapeutic laparoscopy.⁸

History of recommended time for surgery

In the 1950s, orchidopexy was recommended in boys aged 10–15 years⁹ and in the 1970s in 5–6-year-old boys.¹⁰ During the 1970s and early 1980s the age of orchidopexy declined to two years of age.¹¹ Currently orchidopexy is recommended between 12–24 months.¹²

Material and method

This retrospective study involved the review of the hospital files of all patients with UDT who underwent orchidopexy at Klerksdorp/Tshepong (K/T) Complex Hospital, North West Province, RSA from June 2016 to May 2021. The study was approved by the Research Ethics Committee of UKZN medical school. The study protected participants' privacy. The participants' data were not used for any

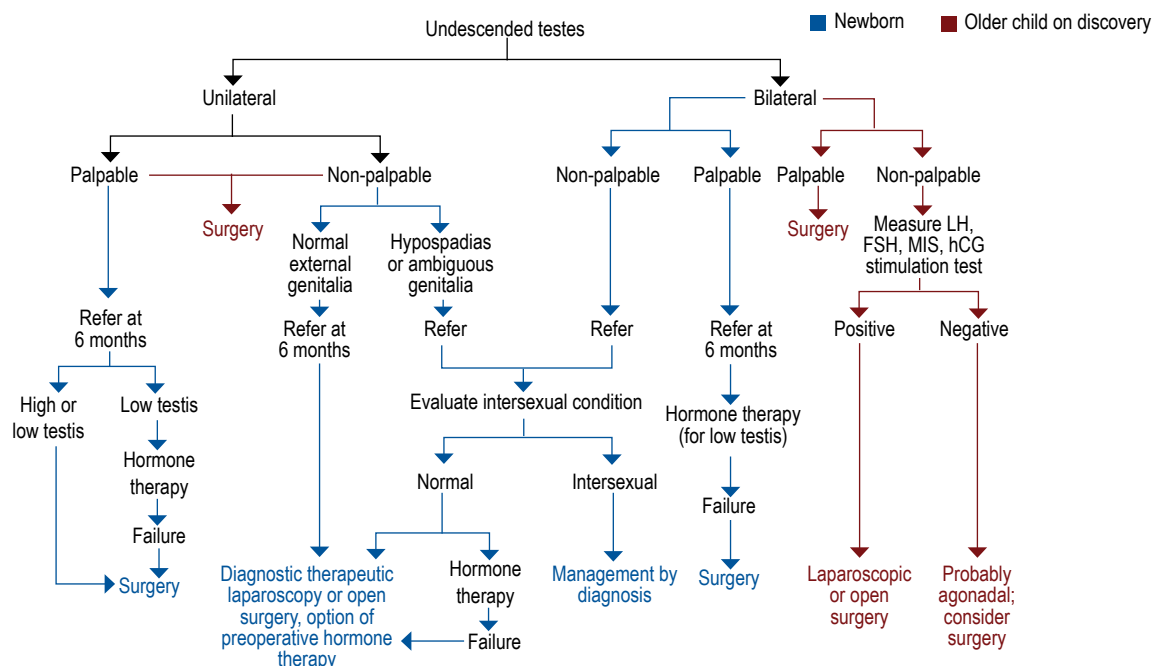


Figure 1: Approaches to the patient with undescended testes

purpose outside this study. Personal data (e.g. name, contact info) were not entered in the datasheet. Exclusion criteria were patients with incomplete data in hospital medical records. Patients' data were extracted from their medical records using their patient file number (PFN). Data was recorded into an Excel datasheet. The collected data included the following: 1) age at referral and surgery; 2) year of surgery; 3) the side of the UDT (right, left or bilateral); 4) whether the testis was palpable or not on clinical examination; 5) site of the UDT; 6) type of surgical technique; and 7) postoperative complications. Patients were divided into two groups according to the timing of the surgery: at/before two years of age (Group1) or later (Group 2). Descriptive statistics will be used to summarise the data.

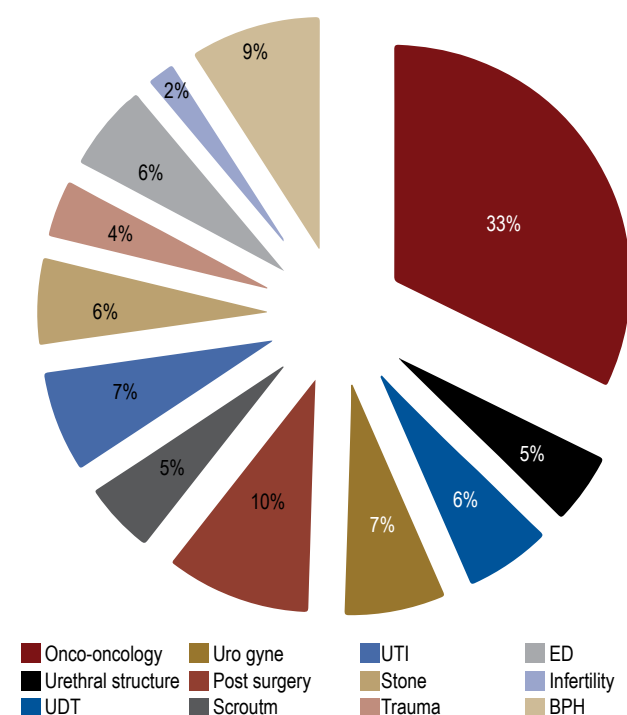


Figure 2: Diagnosis and percentage of the different urology cases

Percentage and frequencies will be used for categorical data, such as severity, location, type of operation. Frequency distribution of numerical data, waiting time and, delay time of surgical intervention, will be examined for normality and means (SD) or median (IQR) and p -value used as appropriate.

Subgroup comparison of the characteristics of UDT by demographic characteristics, such as age at referral and surgery, will be done using Z score calculation for two populations.

Results

UTD cases represented up to 6% of total urology cases seen at the urology outpatient clinic in K/T Complex Hospital in 2019 (Figure 2).

The hospital files of urology patients who underwent surgery at our institution were reviewed. The total number of urology surgeries performed during the study period was 1 944. Out of these patients, 196 underwent orchidopexy and met the inclusion and exclusion

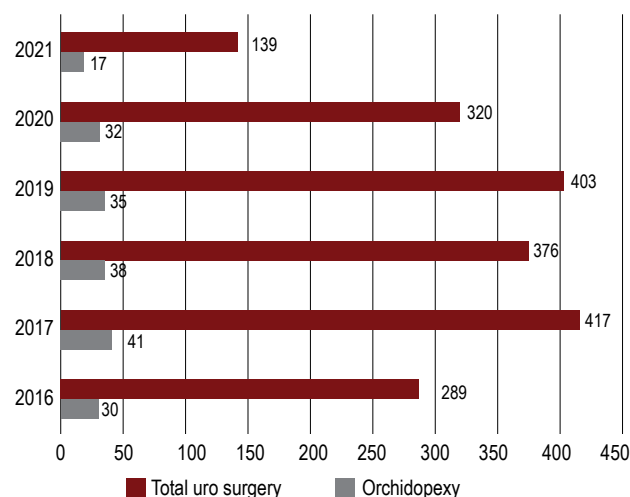


Figure 3: Total urology surgery compared to orchidopexy

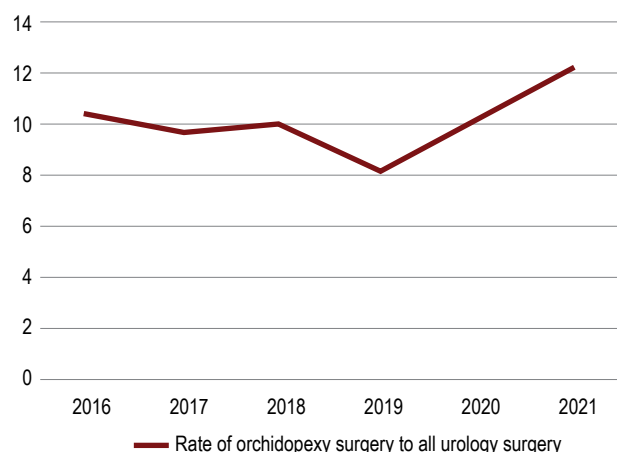


Figure 4: The rate of orchidopexy operations during the time of the study

criteria of this study. Thus, the rate of orchidopexy at K/T Complex Hospital was 10.1%.

The highest number of orchidopexy operations were carried out in 2017 ($n = 41$), followed by 2018 ($n = 38$), 2019 ($n = 35$), 2020 ($n = 35$), 2016 ($n = 30$), and 2021 ($n = 17$).

Statistical analysis shows that the median age was 7.2 years (86 months) at referral and 7.6 years (90 months) at surgery. The median duration between diagnosis and surgery was five months. Patients were divided into two groups according to their age at surgery. Group 1: Only 21 cases out of 196 (10.7%) underwent surgery during the recommended age period (at/before two years old). Group 2: 175 cases underwent surgery after two years old. The median age at referral was significantly higher in Group 2 than in Group 1 (7.8 years versus 1.6 years) $p < 0.001$. However, there was no significant difference between the two groups with respect

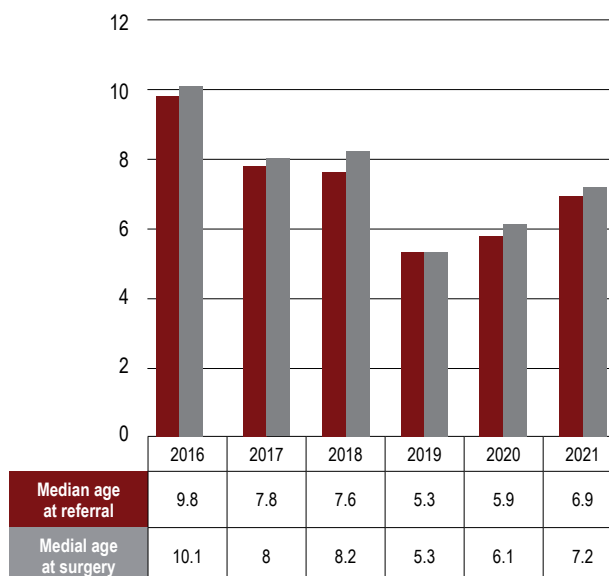


Figure 5: Median age at referral compared with median age at surgery

to the duration between referral and surgery (median age in Group 1 was three months, median age at Group 2 was four months) $p < 0.558$ (Table I).

The median age of patients at referral and at surgery was compared among the years studied, revealing no significant difference. The highest median age at referral and at surgery were in 2016. The median age at surgery was higher than the recommended age (before or at two years old) Figure 5.

The most common site of UDT among the studied patients was inguinal (82.6 %). The testis was not seen in 7.1% of cases. Most cases were unilateral, while only 22.4% of cases were bilateral. In

Table I: Age at referral, age at surgery

Group		Total cases 196 cases	Group 1 ≤ 2 years 21 cases	Group 2 > 2 years 175 cases	p-value
Age at referral	Range	1.2–24.3 years	1.2–1.11 years	2.4–24.3 years	$p < 0.001^*$
	Median IQR	85 months	18 months	92 months	
Age at surgery	Range	1.7–24.6 years	1.7–2 years	2.8–24.6 years	$p < 0.001^*$
	Median IQR	91 months	23 months	99 months	
Duration between referral and surgery	Range	1–9 months	1–7 months	1–9 months	$p < 0.565$
	Median IQR	4	3	4	

*significant at $p < 0.01$

Table II: Site, side and clinical examination finding

Cases		Total 196 cases	≤ 2 year 21 cases	> 2 years 175 cases	p-value
Site	Intra-abdominal	19	1	18	0,21
	Inguinal	165	18	147	0,42
	Ectopic	12	2	10	0,24
Side	Bilateral	44	4	40	0,34
	Unilateral left	41	5	36	0,36
	Unilateral right	111	12	99	0,48
Clinical examination	Palpable	160	20	140	0,04
	Non-palpable	36	1	35	0,04

There was no significant difference between the studied groups with respect to the site or side of UDT ($p < 0.01$)

Table III: Type of surgery done

	Cases	Total 196 cases	Group 1 ≤ 24 months 21 cases	%	Group 2 > 24 months 175 cases	%	p-value
Type of surgery	Open	183	20	95.2%	163	93.1%	0.72
	Laparoscopic	12	1	4.8%	11	7.4%	0.65
	Circumcision	40	5	23.8%	35	20%	0.68
Other associated operation at the same time	Hydrocelectomy	29	3	14.2%	26	14.9%	0.94
	Herniotomy	17	1	4.8%	16	9.1%	0.5
	Orchidectomy	19	0	0	19	10.6%	.112.

The result is significant at $p < 0.01$

most cases, the UDTs were palpable (80.1%), while only 19.9% of cases were impalpable (Table II).

Approximately two-thirds of cases had an associated operation at the same time as the orchidopexy, the most common of which was circumcision in 40 cases, followed by herniotomy in 17 cases, and hydrocelectomy in 29 cases. With respect to the surgical approach used, the majority of cases were operated by using open technique (93.4%). The open technique was used in all palpable UDTs, while the laparoscopic technique was used for impalpable testes (Table III).

The surgeries were eventless in the majority of cases, as complications were reported only in 6.0%. Scrotal haematoma was the most commonly recorded complication (seven cases). No significant associations were found between the time of surgery and type of complications (Table IV).

Table IV: Surgical complications

Complications	Total 196	Below 24 months 21 cases	Above 24 months 175 cases	p-value
Haematoma	7	0	7	.35238
Wound infection	4	0	4	.48392
Hydrocele	1	0	1	.72634

The result is *not* significant at $p < 0.05$

Statistical analysis was conducted to identify potential risk factors for delayed orchidopexy. This study found that age at referral was a significant risk factor that affected the time of surgery and also affected the size of testes and increased risk of loss of at least one of the testes by doing orchidectomy for atrophied/torsion testes (Tables I and III).

Discussion

This study included 196 patients who underwent orchidopexy from 1 June 2016 to 31 May 2021, with an average of 38 cases operated annually. Surgery is a crucial treatment for UDT. Earlier surgery can prevent infertility and decrease the development of testicular cancer.⁴

The guidelines recommend that treatment should be started at the age of six months. In this study, the median age at surgery was 85 months, with only 10.7% cases performed in the recommended age period. Interestingly, this deviation from the recommendations

of international guidelines persisted throughout the study, as a high median age at surgery was detected each year. The median duration between referral and surgery was also relatively long (five months). Several studies from around the world have reported that the average age at orchidopexy was, unfortunately, higher than the age recommended by the guidelines. However, the reported ages at diagnosis and at surgery – as well as the waiting time for surgery – varied widely across these studies. Locally in Africa, no previous studies have been done.

Internationally, the study done by Alnoaiji et al. in Saudi Arabia showed that the age at diagnosis was a significant risk factor affecting the time of surgery.¹³ Schueuer et al. conducted a study in New South Wales, Australia, and reported the median age of orchidopexy to be 16.6 months.¹⁴ Another Australian study in Victoria reported a much older age at the time of surgery, as approximately 55% were at least five years old.¹⁵ Mallikarjuna et al. studied 30 cases at Chigateri General Hospital and Bapuji Hospital, Davangere, India. Their results demonstrated that 44.4% of boys presented for treatment after the age of three years.¹⁶ A recent study conducted in the USA found that approximately 70% of boys with UDT underwent orchidopexy at least six months later than the recommended age.¹⁷

In our study, cases of UDT were mostly unilateral (77.6%), and only 22.4% were bilateral. The most common side in unilateral UDT was the right (73.1%) versus 26.9% on the left side.

The study found 19.9% of cases had impalpable testes.

Most cases in this study (93.4%) were operated using the open surgical technique, while the laparoscopic technique was used in only 6.6% of cases. Sharif et al. reported the use of laparoscopy in only 9.65% of their cases.¹⁸

The open approach is usually used for palpable testes, while laparoscopic surgery is usually reserved for impalpable UDTs.¹⁹

Complications were recorded in 12 cases (6.1%) in this study.

The rate of orchidectomy was 17% affecting patients with late presentation, i.e. those older than 13 years, due to testicular atrophy/torsion. With respect to the causes of delayed orchidopexy for UDTs, we were not able to investigate all potential causes (such as educational level, socioeconomic status of the family, and physicians' experience) due to the retrospective nature of

the study. However, it was evident from our results that the age at referral significantly affected the time of surgery. Chen et al. in Taiwan showed that the age of patients at diagnosis, the number of clinic visits prior to surgery, the patient's residence, the age of the physician making the initial diagnosis, and the age of the surgeon performing the surgery were significantly associated with delayed surgery.²⁰

The delay in diagnosis and referral is attributed mainly to physicians' deficient knowledge of UDTs and poor attitude. A survey in the United States found that only 30% of paediatricians and 14% of general practitioners recommended orchidopexy before the first year of life.¹

Paediatricians and family doctors have a duty to screen neonates for congenital anomalies, refer the cases to specialists and counsel the parents on the complications of delayed intervention.²¹ Consequently, there is a need to establish a protocol for the examination of newborns in which paediatricians screen for congenital anomalies and then refer patients to urology or paediatric surgeons. Physicians can improve their knowledge and attitude with respect to the timely diagnosis and referral of children with UDTs.

Conclusion and recommendation

This study clearly showed that the majority of cases underwent orchidopexy after the age recommended by international guidelines. The age at referral seems to significantly affect the age at surgery and also increases the risk of loss of at least one of the testes by doing orchidectomy for atrophied/torsion testes.

Further studies must be done locally and in other African countries to determine African protocol for UDT management as well as to enhance awareness about this common congenital anomaly among healthcare providers and guardians of the patients to improve outcome and decrease complications.

In summary, it's advisable for healthcare providers to examine external genitalia of male newborns at birth. If the testes have not descended into the scrotum, the baby should be reviewed at six weeks and again at six months. If the testes are still not found in the scrotum, patients must be referred to urology or paediatric surgery for further management.

Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

The study was approved by the University of KwaZulu-Natal Research Ethics Committee BREC NO (00003555/2021).

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