AN ANALYSIS OF FACTORS ASSOCIATED WITH DELAYED DIAGNOSIS AND TREATMENT OF UNDESCENDED TESTIS

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ABSTRACT

Objective: *This study aimed to analyze factors contributing to delayed diagnosis and treatment of UDT patients at Saiful Anwar General Hospital in Malang.* ***Material &Methods:*** *This retrospective study was conducted at Saiful Anwar General Hospital focusing on patients who underwent orchiopexy or orchiectomy for UDT between January 2019 to February 2024. Delays in treatment were defined as surgery performed after 18 months of age. Statistical analysis involved a comparative study between delayed and non-delayed cases, with a significance level of p<0.05.* ***Results:*** *This study evaluated 140 patients with UDT, aged 3.7 ± 3.87 years old, with 77.1% experiencing delayed referrals. The most common associated anomaly was hypospadias (29.3%). Factors contributing to delayed referral include undiagnosed UDT, inadequate follow-up, and advice to await spontaneous testicular descent, observed in 62% of delayed cases (p = 0.025). Parental unawareness of the risks associated with delayed surgery and misdiagnosis by healthcare providers were significant contributors, affecting 72% and 74% of delayed cases, respectively (p = 0.032 and p < 0.005). Referral sources differed significantly, with pediatricians accounting for 43% of non-delayed referrals, compared to only 8% for delayed cases. General practitioners were responsible for 70% of delayed referrals, and 22% were self-referred (p < 0.005).* ***Conclusion:****Most pediatric patients at Dr. Saiful Anwar General Hospital experienced delayed treatment of UDT, often due to referral delays and undiagnosed conditions. Training for primary health-care providers and routine testicular examinations are essential.*

Keywords: *Delayed factors, diagnosis and treatment, undescended testis.*

ABSTRAK

Tujuan: *Penelitian ini bertujuan untuk menganalisis faktor-faktor yang berkontribusi terhadap keterlambatan diagnosis dan pengobatan pasien UDT di RSUD Dr. Saiful Anwar, Malang.* ***Bahan & Cara:****Penelitian retrospektif ini dilakukan di Rumah Sakit Umum Pusat Dr. Saiful Anwar yang berfokus pada pasien yang menjalani orchiopexy atau orchiectomy untuk UDT antara Januari 2019 hingga Februari 2024. Keterlambatan pengobatan didefinisikan sebagai operasi yang dilakukan setelah usia 18 bulan. Analisis statistik melibatkan studi komparatif antara kasus yang tertunda dan yang tidak tertunda, dengan tingkat signifikansi p<0,05.****Hasil:*** *Penelitian ini mengevaluasi 140 pasien dengan UDT, berusia 3,7 ± 3,87 tahun, dengan 77,1% mengalami penundaan rujukan. Kelainan yang paling sering ditemukan adalah hipospadia (29,3%). Faktor-faktor yang berkontribusi terhadap penundaan rujukan termasuk UDT yang tidak terdiagnosis, tindak lanjut yang tidak memadai, dan saran untuk menunggu turunnya testis secara spontan, yang diamati pada 62% kasus yang tertunda (p = 0,025). Ketidaktahuan orang tua akan risiko yang terkait dengan penundaan operasi dan kesalahan diagnosis oleh penyedia layanan kesehatan merupakan kontributor yang signifikan, yang masing-masing mempengaruhi 72% dan 74% kasus yang tertunda (p = 0,032 dan p <0,005). Sumber rujukan berbeda secara signifikan, dengan dokter anak menyumbang 43% dari rujukan yang tidak tertunda, dibandingkan dengan hanya 8% untuk kasus yang tertunda. Dokter umum bertanggung jawab atas 70% dari rujukan yang tertunda, dan 22% dirujuk sendiri (p <0,005).****Simpulan:*** *Sebagian besar pasien anak di Rumah Sakit Umum Pusat Dr. Saiful Anwar mengalami penundaan pengobatan UDT, sering kali disebabkan oleh penundaan rujukan dan kondisi yang tidak terdiagnosis. Pelatihan untuk penyedia layanan kesehatan primer dan pemeriksaan testis rutin sangat penting.*

Kata kunci: *Faktor keterlambatan, diagnosis dan tatalaksana, undescended testis.*

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INTRODUCTION

Undescended testes (UDT) refer to the condition where one or both testicles fail to descend into the scrotum at birth. It is among the most common urogenital birth anomalies observed in male newborns.[1] In full-term male infants, the prevalence of UDT is approximately 4-5%, with a

higher incidence in premature or low-birth-weight infants.[2] UDT can lead to complications such as infertility, an increased risk of malignancy, and testicular torsion. Males with a history of cryptorchidism have a 4 to 5 times greater risk of developing testicular cancer, with this increased risk affecting both testes. Furthermore, despite early surgical intervention (orchidopexy), most individuals with UDT exhibit compromised semen quality. This condition is associated with impaired spermatogenesis in both testicles, underscoring its bilateral impact.[3-4]

Approximately 80% of undescended testes are palpable, while the remaining 20% are nonpalpable. Thus, a thorough and careful physical examination by a physician is essential. Current guidelines recommend referring any undescended testes persisting beyond six months of age for orchiopexy, as cryptorchidism can have lasting effects on testicular function. These include impaired spermatogenesis and an increased risk of testicular cancer, even after successful intervention. A critical issue in these cases is the delay in initiating treatment, often attributed to missed diagnoses during screenings and delayed referrals by healthcare providers.[5-6]

There is limited information on UDT's incidence and prevalence in Indonesia. During the course of this study, no epidemiological data specific to UDT in East Java could be identified.

OBJECTIVE

This study aimed to analyze factors associated with delayed diagnosis and treatment in patients with UDT at Dr. Saiful Anwar General Hospital Malang.

MATERIAL &METHODS

This study employed a cohort design with a retrospective approach, conducted at a single tertiary referral centre, Dr. Saiful Anwar General Hospital, Malang, Indonesia. Ethical clearance No. 400/235/K.3/1027/2024 for the research was obtained from the hospital's ethics committee before the data was collected. The study focuses on reviewing medical records of patients who underwent either orchiopexy or orchiectomy for UDT between January 2019 to February 2024.

The sampling method used was total population sampling, in which all cases of UDT treated at the hospital during the study period were included in the analysis. A total of 140 patients were identified. The variables recorded for each patient include demographic data, birth history, physical examination findings, age at referral, the origin of referral, and the type of insurance utilized for treatment. The exclusion criteria were cases with initial surgical intervention for UDT performed outside this hospital.

The study specifically analyzes the age of referral, defined as the patient's age at the time of their first consultation with a urological surgeon. This data was further categorized into two groups: delayed referrals, where patients were referred at an age greater than 18 months, and non-delayed referrals where patients were referred at 18 months of age or younger. A thorough physical examination by a urologist was also documented, noting whether the undescended testes were palpable or non-palpable. Additionally, the study identified any associated genitourinary malformations, whether they necessitated surgical intervention or not.

Data analysis was performed using SPSS statistical software version 21.0 (IBM, Chicago, IL, USA). Descriptive statistics were utilized to summarize patient characteristics, while comparative analyses were conducted using Mann–Whitney and Chi-square tests for normally distributed data. A significance level of $p < 0.05$ was established for all statistical tests. Furthermore, regression analysis was performed to identify factors contributing to the delayed referrals. This additional analysis aimed to determine which variables played the most significant role in delayed diagnosis and treatment, offering valuable insights into areas for improvement in early referral and management of UDT cases.

RESULTS

The average referral age analyzed in this study was 3.8 ± 3.87 years old with a mean age of orchiopexy was 3.55 ± 3.81 years old, with an average waiting time for surgery of 1.5 ± 1.09 years. Most cases involved unilateral undescended testes (88.57%), while 11.43% were bilateral. Regarding laterality, 51.43% of cases affected the left testis, 40.71% affected the right, and 7.86% were bilateral, affecting both testes. Preoperative examination revealed that 80.71% of the testes were palpable, while 19.29% were nonpalpable. The majority of cases (69.29%) were congenital, while the other 30.71% were classified as acquired (Table 1).

Intraoperatively, the testis was located in the inguinal region for 83.57% of cases, intra-abdominal in 13.57%, and pre-pubic in 2.86%. Associated genitourinary malformations were observed in some patients, with 29.29% presenting with hypospadias and 5.71% with hydrocele. Regarding management, orchiopexy was performed in 95% of cases, while orchiectomy was required in 5%. The majority of referrals (82.86%) were from healthcare providers, while 17.14% of patients sought care independently (Table 1).

Table 1. Demographic Characteristic of Patient.

Characteristic	Frequency (%)
Age at referral (years), mean ± SD	3.8 ± 3.87
Age at orchidopexy (year), mean± SD	3.55 ± 3.81
Operation waiting time (mean ± SD)	1.5 ± 1.09
Unilateral/bilateral testis	
Unilateral	124 (88,57)
Bilateral	16 (11,43)
Right/left UDT	
Left	72 (51,43)
Right	57 (40,71)
Bilateral	11 (7,86)
Pre-operative examination	
Non-palpable	27 (19,29)
Palpable	113 (80,71)
Congenital versus acquired	
Acquired	43 (30,71)
Congenital	97 (69,29)
Intraoperative testis site	
Inguinal	117 (83,57)
Intraabdominal	19 (13,57)
Pre-pubic	4 (2,86)
Accompanied by genitourinary malformation	
Hypospadias	41 (29,29)
Hydrocele	8 (5,71)
Management UDT	
Orchidopexy	133 (95,00)
Orchidectomy	7 (5,00)
Referral source	
Health-care provider	116 (82,86)
Come alone	24 (17,14)

Table 2 represents the comparative test results of delayed and non-delayed UDT patients. Among the study population, UDT cases were categorized into unilateral and bilateral types. A higher proportion of delayed referrals involved unilateral UDT (95%) and bilateral cases (5%). On the other hand, non-delayed referrals included 81% of unilateral cases and 19% of bilateral cases, although the difference between the delayed and non-delayed cases was not statistically significant (p = 0.338). Genitourinary malformations were present in 41% of delayed referral cases, compared to only 16% in non-delayed cases, though the difference was also not significant (p = 0.475). A significant factor contributing to delayed referrals was receiving advice from medical staff to wait for spontaneous testicular descent. This was reported in 62% of delayed cases but none of the non-delayed cases (p = 0.025). Parental ignorance of the risks associated with delaying surgery was another factor, observed in 72% of delayed cases compared to 11% of non-delayed cases (p = 0.032). Misdiagnosis by medical staff was a prominent issue, occurring in 74% of delayed cases but in none of the non-delayed cases (p < 0.005).

Table 2. Comparative Test Results of Delayed and Non-Delayed UDT

Category	Non-Delayed		Delayed		p-value
	n	%	n	%	
UDT Type					
Unilateral	26	81	103	95	0,338
Bilateral	6	19	5	5	
Accompanied by genitourinary malformation					
(-)	27	84	64	59	0,475
(+)	5	16	44	41	
Get advice to wait for a spontaneous descensus by a doctor or medical staff					
No	32	100	41	38	0,025
Yes	0	0	67	62	
Ignorance of the risk of delaying surgery by parents					
No	28	89	30	28	0,032
Yes	4	11	78	72	
Misdiagnosis by doctor/medical staff					
No	32	100	28	26	<0,005
Yes	0	0	80	74	
Referral souurce					
Pediatrician	14	43	9	8	<0,005
General practititioner at health facility 1	18	57	75	70	
Come alone	0	0	24	22	

Referral sources also showed significant differences. Pediatricians accounted for 43% of non-delayed referrals and only 8% of delayed cases. In contrast, general practitioners at primary health facilities were responsible for 70% of delayed referrals and 57% of non-delayed referrals. Notably, 22% of delayed cases involved patients who sought care independently, compared to none in the non-delayed group ($p < 0.005$). The key factors associated with delayed referral include advice from medical staff to wait for spontaneous testicular descent, parental lack of awareness regarding the risks of delaying surgery, and misdiagnosis by healthcare providers.

DISCUSSION

It is recommended that correction for UDT be performed at the age of 2 in 1929.[7] Over time, this recommendation has evolved, with significant changes occurring in 1996, when studies on alterations in the germinal epithelium suggested lowering the recommended age to 1 year of age.[8] Currently, the European Urology Association (EUA) advises performing orchiopexy between 6 to 12 months of age, based on clinical evidence.[9-10] This shift toward earlier intervention stems from a growing awareness of the long-term risks associated with UDT, particularly infertility and testicular cancer. Infertility, in particular, has profound social and psychological consequences for men. Research consistently indicates that performing orchiopexy at a younger age significantly reduces the likelihood of infertility and malignancy later in life.[11-12]

In this study, the average age of patients with UDT at referral was 3.8 ± 3.87 years old, the average age of orchiopexy (OP) was 3.55 ± 3.81 years old, and the average waiting period was 1.5 ± 1.09 years for surgery. The Canadian, American, and European Urological Associations' guidelines agree that orchiopexy for children with UDT should be carried out by 18 months of age.[6] Evidence has shown that the loss of germ cells and Leydig cells begins around 12 months, so delay in surgery can negatively affect the fertility potential and elevate the risk of testicular cancer. Performing the surgery earlier also supports testicular growth, which is not observed if OP is done later than 3 years of age.[13]

This study identified that the primary factors contributing to delays in the surgical treatment of UDT were the delays in referrals from initial healthcare providers, such as pediatricians and primary care physicians, as well as undiagnosed UDT conditions, with a significance level of <0.005. These delays are further influenced by the actions of the healthcare providers before the patient is referred to a urological surgeon. A previous study by Janardhana et al. also supports this, highlighting that delays due to lack of follow-up by doctors or paramedics, unawareness of the risks associated with delayed surgery, and UDT conditions being undiagnosed by parents or healthcare professionals all contributed to significant delays, in which a greater proportion of patients experiencing these issues. Furthermore, the study also found a notable difference in referral sources with a significant p-value (<0.005)[5]..Another study by Bonane et al. revealed that delayed consultations in UDT cases were often caused by factors such as lack of knowledge and inadequate physical examinations, emphasizing the urgent need for increased awareness and improved collaboration among healthcare providers to ensure timely consultation and treatment.[14]

In our study, genitourinary malformations were found in 41% of cases with delayed referrals, compared to those 16% in timely referrals, although the difference was not statistically significant ($p = 0.475$). In contrast, a previous study showed that among patients with congenital UDT, 35.88% had associated inguinal hernia or hydrocele, while in the acquired UDT group, the prevalence was 21.21% ($p = 0.0084$). Additionally, in the congenital UDT group, bilateral inguinal hernia or hydrocele was present in 7% of cases, whereas only 1.02% of the acquired UDT group had bilateral involvement ($p = 0.0326$).[15] Prior research has indicated that the presence of genitourinary malformations can prompt parents to recognize the presence of UDT in their children. However, our findings contrast with those of Bayne et al., who suggested that such malformations lead to earlier referrals, as families are more likely to be aware of the condition, prompting a more thorough examination.[16]

In our study, another significant factor contributing to delayed referrals was receiving advice from medical staff to wait for spontaneous testicular descent ($p = 0.025$). The existing literature indicates that spontaneous descent of the testis after 6 months of age is an exceedingly rare occurrence. As a result, adopting a "watchful waiting" approach for boys with undescended testis beyond this age is not considered justified. Waiting for spontaneous descent increases the risk of delayed intervention,

which can have adverse consequences for the child. By postponing treatment, potential complications such as infertility or the risk of testicular malignancy may be exacerbated, and the window for optimal testicular development and growth may be missed. Early intervention through surgical orchiopexy is recommended to prevent these issues and ensure better outcomes for these patients.[17]

Parental lack of awareness regarding the risks of delaying surgery was another significant factor, with 72% of delayed referral cases showing this issue, compared to only 11% in non-delayed cases ($p = 0.032$). This underscores the need for education among referring healthcare providers to ensure prompt referral of patients, minimizing the negative consequences of delayed treatment. Socioeconomic factors and parental literacy also play a critical role in the late presentation of UDT. The delayed referral cases can be traced to insufficient education among families and the absence of routine testicular examinations by the referring physicians. To improve outcomes for cryptorchidism, there should be a focus on quality-based interventions, which include enhancing education and ensuring regular testicular screenings.[18-19] In rural areas of Indonesia, a lack of health education and ignorance have been identified as key factors influencing health-seeking behaviour, contributing to delayed referrals for UDT. Therefore, culturally tailored awareness campaigns targeting parents may be highly effective in increasing community knowledge about UDT and reducing delays in diagnosis and treatment.

The findings of this study can help in preventing and addressing early UDT in children by implementing community-based health education programs. Teaching the public to recognize the early signs of UDT is crucial for its prevention and effective management. Additionally, the study provides valuable insights for hospitals and local governments to enhance public health initiatives, as well as improve training programs for healthcare providers in rural areas. This will contribute to reducing misdiagnoses and promoting early detection of UDT before referral to a urologist.

A limitation of this study is that it was conducted at a single centre, which may limit the generalizability of the findings. Expanding the study to include multiple centres in areas with similar sociodemography and healthcare referral systems would provide more representative results and strengthen the conclusions drawn about UDT cases.

CONCLUSION

A significant number of pediatric patients with UDT in Dr. Saiful Anwar General Hospital experienced delays in receiving treatment, primarily due to delays in referrals and undiagnosed UDT conditions. These delays are often linked to a lack of early detection and insufficient follow-up by healthcare providers. Given the potentially long-term implications of delayed treatment, such as infertility or increased risk of testicular malignancy, it is crucial to implement comprehensive training programs for primary healthcare providers. Routine testicular examinations should be incorporated into regular health check-ups to ensure early identification of UDT. By enhancing awareness and ensuring consistent screenings, we can improve early diagnosis and reduce the incidence of delayed treatment, ultimately leading to better outcomes for pediatric patients with UDT.

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