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Barriers to Timely Treatment of Undescended Testis in Pakistani Patients: Why Are We Facing Delayed Presentation

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ABSTRACT

Objectives: To explore delayed presentations of cryptorchidism, factors responsible for the delay, and identify modifiable factors, providing region-specific evidence to guide clinical practice and public health interventions.
Study design: Prospective observational study.
Place and Duration of Study: Surgical Unit, MTI Gomal Medical College, Dera Ismail Khan, Pakistan from Oct 2024 to Mar 2025.
Methodology: Data were collected regarding demographic, age at 1st diagnosis, cause of delay in treatment, socioeconomic status, parent's literacy, laterality and palpability. Patients were grouped into three categories, namely, delay in early diagnosis, delayed referral for treatment and delay due to parents. Data were entered and analysed using Statistical Package for Social Sciences (SPSS), with appropriate descriptive and analytical statistics applied.
Results: Total of 50 patients presenting to the surgical department during the study duration were analysed. Mostly coming from rural areas, majority of patients' parents were uneducated, and majority of patients were from low socioeconomic background. The mean age at presentation for surgical procedure was 12.7+ 3.4 years. 45(90%) patients' diagnoses were delayed. Factors for delayed presentation, majority of patients were from rural areas with delay in diagnosis with p value= 0.258. Socioeconomic status of patients was mostly from the low 24(48%) and average 26(52%) groups, with delay in diagnosis with p value=0.305. The parents of most patients with delayed diagnosis were uneducated or matriculate.
Conclusion: Among 50 patients with undescended testis, 45(90%) had delayed early diagnosis (mean age 12.7 + 3.4 years); delays were multifactorial, highlighting the need for early screening, referral improvement and public health interventions.

Keywords: Cryptorchidism, Infertile, Male, Orchidopexy, Pakistan.

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INTRODUCTION

Unilateral or bilateral undescended testis (UDT) is a frequent congenital abnormality in boys. Preterm newborns have a greater incidence (1.1–45.3%), whereas term babies have a documented rate of 0.1–4.3%.[1] Testicular descent occurs spontaneously up to three months of age, which accounts for the 1-2% drop in occurrence.[2] The noticeable risk factors of cryptorchidism are low birth weight, premature infant, and intrauterine growth restriction.[3] It is advised to perform orchidopexy as early as the child is six months old but before their second birthday.[4]

Recently some studies have suggested orchidopexy age from 6 months to 12 months.[5] Success rate of surgery is high in early diagnosis and treatment for UDT.[6] According to local data from earlier research, the average age at diagnosis was 1.82 years, and the average age at hospital presentation for surgery was 4.79 years. 27.3% of patients have delayed diagnoses, 32.7% have delayed treatment referrals, and 40% have delayed presentations because of parental factors. Late presentation of UDT is significantly influenced by parents' literacy, socioeconomic position, and testicular palpability.[7] While international data was similar, approximately 80% of children were brought after 1 year of age, mostly because of delayed referral by primary physicians (60%), or missed diagnosis by parents or primary physicians (20%).[8]

Testicular atrophy, malignant alterations, torsion, infertility, and psychological problems can all result from delayed diagnosis and treatment.[9] Determining the factors that lead to UDT presentation delays is essential to addressing and preventing the primary issues that result from these delays.[10] Due to limited local data in Pakistan, this study aims to quantify delayed presentation, assess associated factors, and identify modifiable barriers, providing region-specific

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evidence to guide clinical practice and public health interventions.

METHODOLOGY

This prospective observational study was conducted from October 2024 to March 2025 at the Surgery Unit of MTI GMC Dera Ismail Khan. Ethical approval for the study was obtained from the Institutional Review Board (vide approval number 159/GJMS/JC). A consecutive sampling technique was used to recruit study participants. The OpenEpi online sample size calculator (Version 3.01) was used to estimate the sample size for a single population fraction. The computation was based on a 74% prevalence of delayed presentation of undescended testis in a Pakistani population that was previously reported by Rizvi *et al*[6]. This calculation was performed with a 95% confidence level, a 12% absolute accuracy (margin of error), and an expected population proportion (p) of 0.74. These criteria were used to determine the minimum sample size, which came out to be 46 patients. The study's ultimate sample size was 50 patients to account for any potential exclusions or incomplete data.

Inclusion Criteria: The study included all diagnosed cases of undescended testis (UDT) presenting for surgical correction at an age greater than 12 months. Patients who were diagnosed with UDT before 12 months of age but presented after 12 months due to delayed surgical correction were also included.

Exclusion Criteria: Patients below 12 months of age presenting for surgical correction and those not fulfilling the inclusion criteria were excluded from the study.

Written informed consent was obtained from all patients or their parents/guardians prior to enrolment. All patients with UDT who presented during the study duration, were older than 12 months, and were admitted to the hospital for surgical correction were consecutively recruited into the study.

Data were collected using a pre-tested structured proforma designed to assess factors contributing to late presentation of UDT. Diagnosis of UDT was established through clinical physical examination. Delay in presentation was operationally defined and categorized into three groups: delay in early diagnosis, delayed referral for treatment, and delay attributable to parents. Socioeconomic status was classified as low (monthly income < 30,000 PKR), middle (30,000–50,000 PKR), and high (> 100,000 PKR). Parental literacy was categorized as illiterate, matric level, and higher education.

The proforma included information on demographic characteristics, age at first diagnosis, causes of delay in treatment, socioeconomic status, parental literacy, area of residence, laterality, and palpability of the testis.

Data were entered and analysed using Statistical Package for the Social Sciences version 23(SPSSv23). Categorical variables were presented as frequencies and percentages, while numerical variables were expressed as mean ± standard deviation. The Chi-square test was used to determine statistical significance, with a 95% confidence interval, and a *p*-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 50 patients were recruited in the study, of whom 32(64%) resided in rural regions. Majority of the patients were from low socioeconomic status and majority of patients' parents were uneducated, 45(90%) patients' early diagnosis were delayed and the mean age of presentation for surgical procedure was 12.7 ± 3.4 years. The detailed data is presented in Table-I.

Table-I: Sociodemographic Presentation of Patients with undescended Testis (n=50)

Demographics	Frequency (%)
Area	
Rural	32(64%)
Urban	18(36%)
Socioeconomic status	
Low	24(48%)
Average	26(52%)
High	-
Mother Education	
Illiterate	40 (80%)
Matric level	10 (20%)
Higher	-
Father Education	
Illiterate	21(42%)
Matric level	18(36%)
Higher	11(22%)
Laterality	
Unilateral	34(68%)
Bilateral	16(32%)
Palpability of testis	
Palpable Testis	18(36%)
Non palpable	32(64%)
Factors for late presentation of UDT for treatment	
Delay in early diagnosis	45(90%)
Delayed referral	2(4%)
Parents delay	3(6%)
Age of 1st diagnosis of UDT	
≤ 12months of age	3(6%)
>12months of age	47(94%)
4: Operated cases of age > 12months	
< 4years of age	5(10%)
4-10 years of age	28(56%)
> 10eayrs of age	17(34%)

To find association between the factors for the delay in presentation p value=< 0.05 were considered significant. Most patients were from rural areas with delay in diagnosis at p value= 0.258. Socioeconomic status of patients was from the low and the average groups in most of delay in diagnosis cases with p value=0.305. The education of the patient's parents mostly being illiterate, and matric group presented with delay in diagnosis cases. The detailed data is shown in Table-II.

Table-II: Factors for late presentation of Undescended Testis for treatment (n=50)

	Delay in early diagnosis	Delayed referral	Parents delay	*p* value
Area	Frequencies (%)	Frequencies (%)	Frequencies (%)	
Rural	30(60%)	2(4%)	-	0.258
Urban	15(30%)	-	3(6%)	
Socioeconomic status				
Low	24(48%)	-	-	0.305
Average	21(42%)	2(4%)	3(6%)	
High	-	-	-	
Mother Education				
Illiterate	37(74%)	2(4%)	1(2%)	0.238
Matric level	8(16%)	-	2(4%)	
Higher	-	-	-	
Father Education				
Illiterate	20(40%)	1(2%)	-	0.287
Matric level	17(34%)	-	1(2%)	
Higher	8(16%)	1(2%)	2(4%)	
Laterality				
Unilateral	31(62%)	2(4%)	1(2%)	0.122
Bilateral	14(28%)	-	2(4%)	
Palpability of testis				
Palpable Testis	16(32%)	-	2(4%)	0.093
Non palpable	29(58%)	2(4%)	1(2%)	
Age at diagnosis				
less than 12 months	1(2%)	1(2%)	1(2%)	0.421
more than 12 months	44(88%)	1(2%)	2(4%)	
Operated age time				
less than 4 yrs	3(6%)	1(2%)	1(2%)	0.315
more than 10 yrs	17(34%)	-	-	
4-10 yrs	25(50%)	1(2%)	2(4%)	

Analysis of barriers to timely treatment among 50 patients revealed that physician-related factors were present in 2(4%) patients, primarily due to delayed referral and lack of awareness of current guidelines. Parent-related factors were observed in 3(6%) patients, mainly reflecting delayed care-seeking, lack of awareness, and cultural influences. Healthcare system-related barriers were the most frequent, affecting 32(64%) patients, including rural residence, limited access to healthcare facilities, and financial constraints. The remaining 13(26%) patients were classified under Multiple/Other Contributing Factors, representing cases with overlapping physician-, parent-, and system-related delays that could not be assigned to a single category The detailed data is shown in Table-III.

Table-III: Common Barriers and Reasons for Delayed Treatment-Seeking in Resource-Limited Settings (n=50)

Category of Barriers	Specific Barriers Identified	Frequency (%)
Physician-Related Barriers	Delayed or missed referral / Lack of awareness of guidelines / Misdiagnosis	2(4%)
Parent/Patient-Related Barriers	Parental delay / Lack of awareness / Cultural beliefs / Language barriers	3(6%)
Healthcare System-Related Barriers	Rural residence / Limited access to healthcare / Financial constraints / Shortage of workforce	32(64%)
Multiple / Other Contributing Factors	Combination of overlapping barriers or delays that could not be classified into a single category	13(26%)
Total		50(100%)

DISCUSSION

This prospective observational study demonstrates an exceptionally high burden of delayed diagnosis and surgical management of undescended testis (UDT), with 45 of 50 patients (90%) presenting beyond the recommended age for orchidopexy and a mean age at surgery of 12.7 years. Most patients were from rural areas (64%), belonged to low or average socioeconomic groups (100%), and had low parental educational status, particularly maternal illiteracy (74%). Although rural residence, socioeconomic status, and parental education showed higher proportions of delayed presentation, none of these factors demonstrated a statistically significant association on chi-square testing ($p > 0.05$), indicating that delayed presentation was prevalent across demographic categories. The proportion of delayed presentation in this study (90%) exceeds that reported in other Pakistani studies. Rizvi *et al*[6]. reported delayed presentation in 74% of patients, with a mean age at orchidopexy of 6.8 years, while Ullah et al. observed delayed presentation in 68% of cases, with most children presenting after 5 years of age. Ahmed et al. reported late presentation in approximately 61% of patients with impalpable testes.[7] Compared to these findings, the mean surgical age in our study (12.7 years) is nearly double that reported in earlier national studies, indicating a persistent and possibly worsening delay in certain regions, particularly rural Khyber Pakhtunkhwa.[8]

International comparisons further emphasize the magnitude of delay observed in our study. Dave *et al.*,[11] in a population-based cohort from Canada, reported delayed orchidopexy in only 26% of patients. Boehme *et al*.[9] documented delayed surgery in 32–38% of cases across European canters, while in Bosnia and Herzegovina the reported a mean age at surgery is 3.9 years. Even in middle-income settings, Alherek *et al*.[3] reported a mean surgical age of 4.5 years in South Africa. The mean age at surgery in our study exceeds that of high- and middle-income countries by 7–9 years, highlighting profound healthcare access and referral deficiencies.[12-13]

Rural residence constituted 64% of delayed cases in our study, compared with 58% in Rwanda and 55% in Indonesia. Despite this, rural residence was not statistically significant in our analysis (p = 0.258), suggesting that geographic disadvantage alone does not explain delayed presentation and that systemic healthcare failures likely affect both rural and peri-urban populations.[14-16] Similarly, low and average socioeconomic status accounted for the majority of delayed cases, but this association was not statistically significant (p = 0.305), contrasting with findings by Madni *et al*.[5], who reported a significant association between low socioeconomic status and delayed presentation in 63% of Saudi patients.

Parental education, particularly maternal illiteracy, was notably high in our study (74% of mother's illiterate), compared to 46% reported by Rizvi *et al*.[6] and 41% by Madni et al5. Although statistical significance was not demonstrated, the consistently higher proportion of delayed cases among families with low educational attainment suggests inadequate awareness of UDT, lack of routine genital examination, and delayed health-seeking behaviour. Additionally, 2(4%) cases in our study experienced delayed referral due to lack of guideline awareness, aligning with previous studies which reported guideline non-adherence in up to 40% of delayed orchidopexy cases.[17-18] Sociocultural barriers, while not quantifiable through statistical testing, were implicated in several delayed cases in our study. Similar influences have been reported in Pakistani and regional studies, where stigma, misconceptions regarding congenital anomalies, and reliance on non-medical birth attendants contribute to delayed diagnosis. The presence of these barriers, alongside measurable healthcare system constraints, reinforces the multifactorial nature of delayed UDT management.[19-22]

In low-resource settings in Pakistan, including provinces like Khyber Pakhtunkhwa (KPK), multiple barriers to timely treatment and reasons for delayed presentation are well documented across a range of health issues. These barriers can be grouped into patient-level factors, health system constraints, socio-cultural influences, and structural/economic challenges, this study identifies a 90% delayed presentation rate and a mean surgical age of 12.7 years, representing one of the highest reported delays for UDT management in Pakistani literature. Compared with national and international data, children in this study undergo orchidopexy 6–9 years later than those in comparable studies.[23] The lack of statistically significant associations between delay and individual demographic factors suggests that delayed presentation is driven primarily by system-level failures rather than isolated patient characteristics.[24] This study adds novel, region-specific evidence from Khyber Pakhtunkhwa, highlighting critical gaps in early screening, parental awareness, guideline adherence, and referral systems, and underscores the urgent need for targeted public health and primary care interventions to reduce preventable delays in UDT management.

LIMITATIONS OF STUDY

The results of our study may not be indicative of other hospitals or, especially in areas like KPK where cultural customs, access to healthcare, and the availability of resources differ significantly between urban and rural settings. Additionally, the research sample may underestimate delays and obstacles since it only includes patients who came to this centre; those who never showed up, sought care elsewhere, or passed away prior to referral are not included.

CONCLUSION

Delayed diagnosis and intervention in undescended testis were highly prevalent, with 90% of cases presenting late and a mean age at surgery of 12.7 years, far exceeding recommended timelines. Although most patients belonged to low socioeconomic backgrounds, rural settings, and had parents with limited education, these factors did not show a statistically significant association with delayed presentation. The findings suggest that delays are multifactorial, with systemic and healthcare-related barriers likely playing a more substantial role than individual demographic characteristics. Strengthening early screening, improving referral pathways, and implementing targeted public health strategies are essential to promote timely management and improve outcomes.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

NA & JN: Data acquisition, data analysis, critical review, approval of the final version to be published.

FUK & MJS & IB: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MA & MA & MO: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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