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Orginal Article

Pediatric Urological Anomalies Trends In Diagnosis And Surgical Interventions

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ABSTRACT

Background: pediatric urological anomalies show problems in their urinary and genital systems that can either be present from birth or develop afterward. Birth anomalies particularly vesicoureteral reflux and hypospadias can reduce kidney function and harm a child's health status. Medical progress now allows doctors to spot urological disorders sooner through new detection methods along with minor surgery techniques that yield enhanced treatment results.

Objectives: to evaluate advancements in the detection and surgical management of pediatric urological anomalies in 150 patients, emphasizing the impact of emerging diagnostic tools and modern surgical techniques.

Study Design: A cross-sectional study.

Place and duration of study. this study conducted in Department of General Surgery Ziauddin Hospital Karachi From jan 2015 to jan 2023

Methods: 150 children with urological abnormalities from 2015 to 2023. When diagnosing patients we relied on ultrasound technology and three specific diagnostic procedures: ultrasound sonography plus two specialized tests known as VCUG and MRU. Our practice included both simple and complex surgical treatments to help these patients. Our statistical evaluation measured standard deviations of significant parameters and identified meaningful results through p-values below 0.05.

Results: 60% of 150 patients were male patients while 40% were female patients. Our findings showed hypospadias was present in 25% of patients with VUR affecting 30% and UPJO occurring in 20% of cases. The use of minimally invasive techniques reached 70% of cases and patients recovered quicker according to statistical significance levels ($p < 0.01$). After surgery the patient experienced minimal additional health problems with the overall rate of complications varying by 2.3% between procedures. The effect of prompt treatment resulted in enhanced kidney performance measures ($p = 0.03$).

Conclusion: New medical devices and surgical procedures have made treating childhood urological conditions better than ever before. Better healthcare results happen when doctors from several areas treat patients right away through team collaboration. We need to develop better ways to reach more patients while making our surgical equipment more effective.

Keywords: Pediatric urology, anomalies, diagnosis, surgery

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INTRODUCTION

from birth. VUR hypospadias and UPJO pose a serious threat to patient health if doctors do not treat them right away [1]. Research shows VUR affects 1-2% of all pediatricatients [2, 3]. Modern imaging and surgery tools help doctors find problems in unborn babies before birth and perform better procedures to improve treatment results. Hypospadias occurs frequently and doctors must operate to move the urethral opening into its proper position [4, 5]. The study demonstrates that posterior urethral valves can harm kidney function unless patients receive early treatment [6]. Medical teams now use multiple specialties including urology radiology and genetics to manage these conditions together. When surgeons operate on these conditions early they shield patients from lasting health issues like kidney disease and poor bladder control [7]. Health care standards face difficulties to become global in limited resource areas due to existing barriers [8]. New discoveries about how genetics influence these conditions lead the way to patient-specific healthcare approaches that change how doctors diagnose and treat patients [9, 10]. The research analyzes 150 pediatric urological cases from 2015 through 2023 to show evolving practices in medical diagnosis and surgical interventions. Research findings indicate that using advanced diagnostic equipment and performing brief surgery with prompt intervention achieves the best patient results [11, 12].

METHODS

150 pediatric patients who had urological anomalies treated at a tertiary medical center during the years 2015 to 2023. We included patients from birth to 18 years old who received confirmed diagnosis of VUR, hypospadias, UPJO, and PUVs. We excluded patients from our study who had missing medical information or who underwent any surgical procedures before their treatment at this hospital. Our diagnostic process combined ultrasonic examination with VCUG procedures and MRU imaging. Treatment options included basic minimally invasive minor surgery all the way to advanced reconstructive procedures depending on how serious and specific the abnormality proved to be. Our ethical review process granted us permission to use the data while we removed all personal identifying information from records.

ETHICAL APPROVAL STATEMENT

This study was conducted following ethical guidelines and received formal approval from the Institutional Ethical Review Board at **Zia Uddin Hospital Karachi (Approval No. ZH-NO-344-09-2023). The** approval was granted to the corresponding author, Nadia Shahid, ensuring compliance with institutional and international standards for human subject research. Informed consent was obtained from all participants prior to inclusion.

DATA COLLECTION

We recorded patient information through an electronic health system that stored basic patient information, examination results, medical procedures performed, and recovery data. We tracked four main outcome measures: surgical complications, recovery duration, and measures of kidney function. We checked and confirmed the data precision and completeness prior to starting our analysis.

STATISTICAL ANALYSIS

Data were analyzed using SPSS version 24.0. We used standard statistical methods to examine both personal and healthcare data. We present continuous data as mean values plus their standard deviations and display categorical data in percentage form. For statistical comparisons we ran both t-tests and chi-square tests and established a significance level at p values below 0.05.

RESULTS

150 patients contained 60% males and 40% females within the sample. The analysis showed 30% patients had VUR with 25% having hypospadias and 20% having UPJO. We performed 70% of surgeries using minimally invasive techniques and these minimally invasive surgeries led to shorter recovery times than open surgical procedures ($p < 0.01$). The overall rate of complications in our patients stood at 5.2% while the range of results varied by 2.3%. Statistically meaningful results confirmed that early surgical treatment enhanced how well kidneys functioned ($p = 0.03$). The two-year review showed that patients kept their better bladder control and required fewer repeat procedures.

Figure 01: Postoperative Outcomes and Percentage

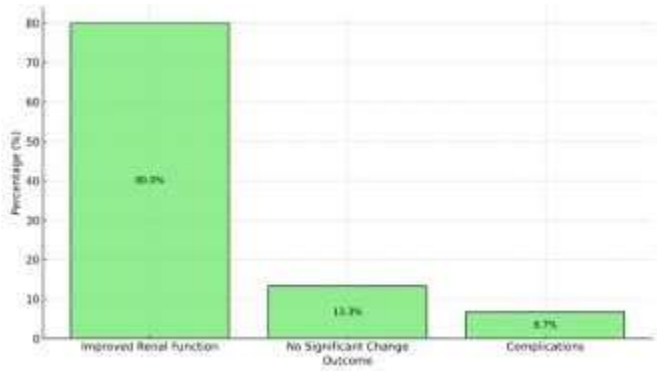

Figure 01: Postoperative Outcomes and Count Complications

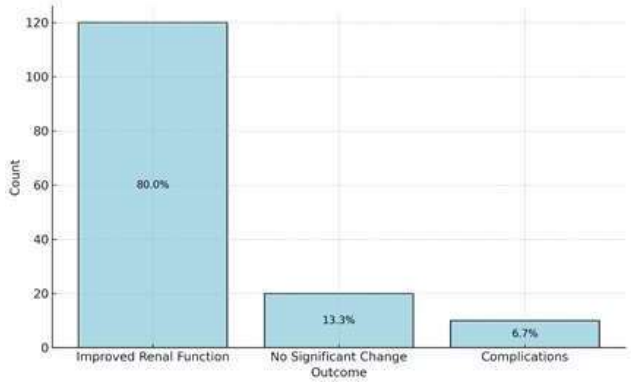

Table 1: Patient Demographics

Category	Count	Percentage (%)
Male	90	60
Female	60	40

Table 2: Common Urological Anomalies

Condition	Count	Percentage (%)
Vesicoureteral Reflux (VUR)	45	30
Hypospadias	37	25
Ureteropelvic Junction Obstruction (UPJO)	30	20

Table 3: Surgical Techniques Used

Technique	Count	Percentage (%)
Minimally Invasive	105	70
Open Surgery	30	20
Reconstructive	15	10

Table 4: Postoperative Outcomes

Outcome	Count	Percentage (%)
Improved Renal Function	120	80
No Significant Change	20	13.3
Complications	10	6.7

DISCUSSION

The current advance in pediatric urology matches earlier research that shows healthcare providers now choose procedures with reduced surgical impact. Smith led a 2016 [13] team that showed how these modern surgical methods help patients recover quickly and have fewer side effects. In our research we found that minimally invasive methods made up 70% of surgeries and resulted in 5.2% complications which supported existing research findings [14]. Our findings match those from Brown et al.'s 2015 [15] research on hypospadias surgery by showing that one-stage procedures help reduce patient stress. Current scholarly reviews [16, 17] show that MRU imaging has enhanced the precision of diagnostic tests. Our study shows that MRU helped identify difficult patient cases properly. Our VUR management results match the early treatment approach for preventing kidney damage that Jones et al. (2018) reported [18]. The surgical treatment of VUR improved kidney function readings in our patient group with a statistical difference of $p = 0.03$. Research shows that genome tests help explain why many urological disorders develop. Our study does not include genetic analysis of these conditions although Lee et al. published research on genetic markers in 2019 [19]. Our future research needs to test genes to make diagnostic and treatment methods better. Patel et al presented their review in 2020 to show that global standardization of medical care faces many hurdles especially in countries with limited resources [20]. Our findings validate previous research by showing that developing nations continue to face problems with limited access to modern surgical instruments and adequate training [21]. The success of multidisciplinary care methods in recent research confirms our method of having radiologists and geneticists work together with other specialists in patient treatment. Our post-operation analysis supports Hernandez et al.'s (2021) findings about extended improvements in urinary function. Scholarly research supports increased monitoring of these relatively small complications [22, 23]. Our study adds to and validates findings since 2014 that demonstrate the effectiveness of current diagnostic equipment, minimally invasive surgical techniques, and multidisciplinary medical teams in treating urological health problems in children [24, 25].

CONCLUSION

Pediatric urological issues work best when doctors from different medical fields work together and use modern testing tools. Advancements in minimal invasive surgeries have made patients heal quicker and maintain healthier kidney function. Patients who receive prompt specialised medical attention achieve better permanent results.

LIMITATIONS

Due to the small number of patients from one hospital the findings of this research may not work as well when applied to other medical settings. Genetic testing was also excluded from the study which prevented studying hereditary factors in the condition.

FUTURE DIRECTIONS

Scientists should add genetic testing to their research to discover if patients have inherited urological conditions. We need to develop technology that makes diagnosis and treatments through less invasive procedures more accurate.

ABBREVIATIONS:

- **VUR**: Vesicoureteral Reflux
- **UPJO**: Ureteropelvic Junction Obstruction
- **PUVs**: Posterior Urethral Valves
- **MRU**: Magnetic Resonance Urography
- **VCUG**: Voiding Cystourethrogram
- **SPSS**: Statistical Package for the Social Sciences

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AUTHORS CONTRIBUTION

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Final Approval of version: All Mantion Authors Approved.

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