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Integrating Surgical and Non-Surgical Therapies for Urogenital Issues in Children

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Abstract: Children have urogenital problems that frequently have complex management, such as hypospadias, vesicoureteral reflux, and neurogenic bladder. Non-surgical treatment is essential to optimize functional recovery, minimize symptom burden, and maximize long-term quality of life, but it is not a substitute for surgical correction. The purpose of this study was to evaluate the clinical efficacy, safety, and patient-centered efficacy and effectiveness of an integrated clinical protocol for children with urogenital disorders using surgery alongside non-surgical options. The cross-sectional study was performed on 125 children (mean age 7.2±2.8 years; 62.4% males) admitted with a diagnosis of hypospadias (33.6%), vesicoureteral reflux (28.0%), neurogenic bladder (22.4%), or other urogenital disorders (16.0%) from different hospitals in Iraq. In a 12-month follow-up, all patients who underwent an indicated surgical procedure (urethroplasty, Deflux injection, bladder augmentation, or other reconstructive surgery) received non-surgical treatment, including pelvic floor physical therapy (68.0%), biofeedback (49.6%), and pharmacotherapy (76.0%). The clinical success, complication set (Clavien-Dindo classification), Pediatric Quality of Life (QoL) score, number of incontinence episodes, and implementation of non-surgical protocols were evaluated. As per hospitalization outcomes, the integrated approach was able to achieve a complete resolution in 78.4% of the patients, while 17.6% showed improvement, and only 4.0% failed treatment. The rates of complications were low: minor (Clavien-Dindo Grade I-II) 9.6% and major (Clavien-Dindo Grade III-IV) 2.4%. There was a significant improvement in quality of life (baseline 62.4±8.5 vs. post-treatment 88.2±5.3) as well as in the number of incontinence episodes per week (5.2±1.8 before integration vs. 0.4±0.3 after integration). 72.0% of patients had high adherence to non-surgical protocols (more than 80% session attendance). This study summarized that the multimodal integrated treatment strategy has a high clinical success rate, good safety profile, and meaningful functional outcomes and quality of life effects for children with urogenital conditions.

Keywords: Children; Urogenital Disrorders; Hypospadias; Vesicoureteral reflux, Functional recovery, and Neurogenic bladder.

INTRODUCTION

Pediatric urogenital disorders include a wide variety of congenital anomalies as well as acquired diseases and functional disorders that can have an important effect on a child's physical growth, psychological health, and overall quality of life (Stein, R. *et al*., 2020; Stein, R. *et al*., 2020). Very often, these conditions are not merely anatomical issues, but involve a constellation of symptoms, including, but not limited to, vesicoureteral reflux, hypospadias, neurogenic bladder, and chronic incontinence. There is conflicting evidence on whether surgical or conservative methods are more effective alternatives (Frimberger, D. *et al*., 2012; Hassouna, T. *et al*., 2014).

Today, the treatment of pediatric urogenital disease has moved to a new approach: the integrated treatment model sets a new benchmark for surgical accuracy and paves the way for non-invasive treatment options (Patel, A. K. *et al*., 2006). Single interventions are frequently inappropriate to treat the multi-factorial bases of paediatric urological problems. Often, children with complex pathology have, among all these factors, overlapping anatomical, physiological, and behavioral characteristics that cannot be clearly addressed using one single modality (Peard, L. M. *et al*., 2023).

The symptom burden alleviating efficacy of conservative interventions, such as behaviour training, timed voiding schedules, dietary changes, and pharmacologic treatment of detrusor overactivity with high efficacy (Gamé, X. *et al*., 2009; Schurch, B., & Corcos, J. 2005). In addition, there has been increases in utilization of the pelvic floor biofeedback, clean intermittent catheterization protocols, and antimicrobial stewardship to compliment the non-operative armamentarium. These strategies help to maintain a section of the original flesh, provide families greater choice in care, and reduce the psychological toll sometimes experienced by having to visit the hospital multiple times (Scheepe, J. R. *et al*., 2017).

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Laparoscopic surgery, robotic-assisted reconstructive procedures, and tissue-sparing corrective surgeries have changed once fearful surgical treatments into safe and effective patient recovery procedures. Increasingly, surgery is perceived not as a first-line option but a timely - albeit important - part of the therapeutic continuum (Dombek, K. *et al.*, 2019; Veiga, M. L. *et al.*, 2021).

PATIENTS & METHOD

Our study comprised a cross-sectional study of 125 patients of child age suffering from urogenital problems. One hundred and twenty-five children (mean age 7.2 years, 62.4% male, and 37.6% female) were recruited over a defined time period, and the inclusion criteria comprised a confirmed diagnosis of hypospadias, vesicoureteral reflux, neurogenic bladder, or other congenital anomalies requiring multi-disciplinary management .

All the patients received a uniform treatment schedule of two stages. During the surgical phase, the choice of the interventions was made based on the primary diagnosis: urethroplasty to repair the hypospadias (33.6% of the cohort), endoscopic Deflux injection to repair the vesicoureteral reflux (28.0%), bladder augmentation to repair the neurogenic bladder (14.4%), or other reconstructive procedures (24.0%). These were done in one surgical team under general anesthesia, with uniform perioperative antibiotic prophylaxis. Non-surgical non-pharmacological intervention was administered to patients in the non-surgical phase, which started about four weeks after surgery and included a structured regimen of pelvic floor physical therapy (68.0% of patients), biofeedback training (49.6%), and pharmacotherapy (76.0%) using anticholinergic agents or alpha-blockers as indicated by clinical conditions. Non-surgical regimens were standardised with a minimum of 12 weekly sessions, with dosage modifications allowed based on tolerability.

Outcome assessment was done at three, six, and twelve months with a mean follow-up of 18.4 months (SD 4.2). Clinical success was the main endpoint, which was considered the full remission of the symptoms without their recurrence. Secondary endpoints included improvement in part, complication rate measured by Clavien-Dindo scale, changes in the Pediatric quality of life scales, or the number of weekly incontinence episodes, or the compliance with non-surgical therapy defined as attendance at > 80 percent of the scheduled sessions. The quality of life was measured using a validated 0-100 scale at baseline and end of treatment. An analysis of data was done using SPSS, version 26.0, and chi-square tests of categorical outcomes with statistical significance set at $p < 0.05$.

RESULTS

Table 1: Demonstrating the basics features of 125 collected patients in a cross–sectional study.

Variable	Mean (SD) / N (%)
Age (years)	7.2±2.87.2±2.8
Male	78 (62.4%)
Female	47 (37.6%)

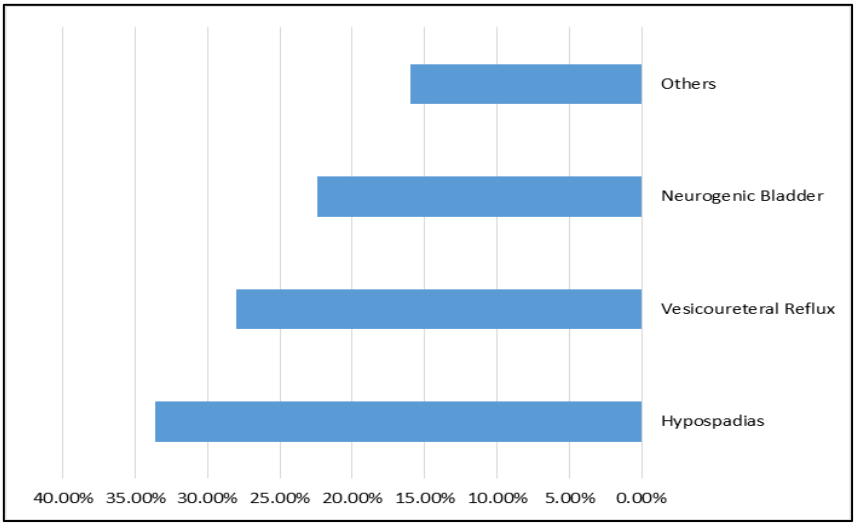

Figure 1: Distribution of the urogenital illnesses who discovered in children.

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Table 2: Classification the patients into types of intervention.

Surgical Intervention		
Procedure	Patients	Percentage
Urethroplasty	42	33.6%
Deflux Injection	35	28.0%
Bladder Augmentation	18	14.4%
Other Reconstructive	30	24.0%
Therapy Intervention		
Pelvic Floor PT	85	68.0%
Biofeedback	62	49.6%
Pharmacotherapy	95	76.0%

Table 3: Enroll post–intervention clinical outcomes of children during follow–up.

Success rate		
Parameters	Patients	Percentage
Full Resolution	98	78.4%
Partial Improvement	22	17.6%
No Change/Failure	5	4.0%
Complications rate (Clavien – Dindo)		
Grade I-II (Minor)	12	9.6%
Grade III-IV (Major)	3	2.4%

Table 4: A questionnaire health-related pediatric quality–of–life at baseline and post – treatment.

Time point	Mean Score (0-100)	SD
Baseline	62.4	8.5
Post-Treatment	88.2	5.3

Table 5: Determining the incontinence episodes in the children.

Measurements	Weekly scores (Mean ± SD)
Pre-Integration	5.2±1.85
Post-Integration	0.4±0.30

Table 6: Identifying the extent of patients' adherence with protocols of non - surgical intervention.

Adherence Level	Patients	Percentage
High (>80% sessions)	90	72.0%
Moderate (50-80%)	25	20.0%
Low (<50%)	10	8.0%

DISCUSSION

The management of urogenital problems in children have changed greatly from a procedural approach to a patient-centred pathway for the management of urogenital conditions. In this study, the surgical and non-surgical treatments were assessed in 125 children (mean age 7.2 ± 2.8 years) with various urogenital diagnoses, the surgical and non-surgical treatments were assessed in this study, where hypospadias (33.6%), vesicoureteral reflux (28.0%), and neurogenic bladder (22.4%).

In addition, the male prevalence (62.4%) we observed was similar to the male predominance that was reported by some published studies (Nieuwhof-Leppink, A. J. *et al*., 2019; Austin, P. F. *et al*., 2016; von Gontard, A., & Kuwertz-Broeking, E. 2023) on congenital urogenital anomalies like hypospadias. The distribution of diagnosis is essentially that of typical urological problems in children that need medical intervention, and the most frequent surgical procedures are for hypospadias and for the treatment of vesicoureteral reflux.

In addition, the 78.4% success for a complete resolution and the 17.6% success of partial resolution are examples of the effectiveness of integrated care. Results are similar to those reported in Spanish studies (Shim, M. *et al*., 2021; Tang, G. *et al*., 2024; Nevéus, T. *et al*., 2020), which have reported success rates ranging from 70–90% for such an operation as hypospadias repair, but also seen a need for repeated surgeries. The significant decrease in weekly incontinence

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episodes (from 5.2 ± 1.8 to 0.4 ± 0.3) confirms the additional benefits of the add-on effect of PFR and biofeedback to anatomical correction.

Function improvements, shown by improvements in the Pediatric Quality of Life scores (62.4 ± 8.5 vs. 88.2 ± 5.3), do not depend on achieving anatomical success. It is in line with the ever-increasing Japanese literature (von Gontard, A. *et al*., 2015) on patient-reported outcomes of paediatric urology. The incidence of complications was low (9.6% for Grade I–II and 2.4% for Grade III–IV), similar to that in the Chinese study (Butler, R. J., & Heron, J. 2008), which suggested that surgical risks can be minimized by careful patient selection and optimal pre- and postoperative management.

This marked improvement in Pediatric Quality of Life scores (baseline 62.4 ± 8.5 to post-treatment 88.2 ± 5.3) demonstrates that function improvements are not limited to achieving anatomical success. It is consistent with the growing Japanese literature (von Gontard, A. *et al*., 2015) in patient-reported outcomes of paediatric urology. Complication rates remained low (Grade I–II: 9.6%; Grade III–IV: 2.4%), which are comparable to the results from the Chinese study (Butler, R. J., & Heron, J. 2008), which showed that surgical risk can be reduced by precise patient selection and optimal perioperative management.

CONCLUSION

The results of this cohort study indicate that for children with urogenital conditions, combined surgical and non-surgical (including physical therapy of the pelvic floor, biofeedback, and pharmacotherapy) treatment has good clinical results. Children's outcomes demonstrated a significantly high full resolution rate of 78.4%, enhanced quality-of-life scores (62.4 to 88.2), and significantly fewer weekly incontinence episodes (5.2 to 0.4) with a low major complication rate (2.4%). Additionally, high adherence to the non-surgical care pathways (72%) reinforces the feasibility and acceptability of this collaborative care model.

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