



Practice patterns in the care of proximal hypospadias among pediatric urologists

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Summary

Introduction

About 25 % of patients with hypospadias have a proximal form, often associated with an underlying genetic cause or difference of sex development (DSD). Surgical complication/re-operation rates are high, surgical practice patterns are variable, and consensus recommendations to guide medical and surgical management are not yet available. One presumed barrier to consensus is understanding variability in management for this condition.

Objective

To assess medical and surgical practice patterns of pediatric urologists regarding care of proximal hypospadias.

Study design

An anonymous, web-based survey was sent to members of the Societies for Pediatric Urology to capture medical and surgical management practices for patients with proximal hypospadias. Respondent demographics were obtained. Median estimated patients cared for per year was determined. Comparisons between those ≤ 50 th percentile for volume and > 50 th percentile were made using chi squared and Fisher's exact tests.

Results

137 completed surveys were returned (137/311 (44 %) opened emails), and 125 responses met inclusion criteria. Respondents were predominantly male (70 %), and practice in an urban (85 %), academic (72 %) setting. The median (IQR) estimated number of patients cared for per year was 7 (5.0, 10.0). Half (50 %) never receive referrals from other

pediatric urologists for surgical care. Most never refer patients to other surgeons within (55 %) or outside (72 %) of their practice. Frequent independent ordering of a karyotype was reported, with less frequent ordering of hormonal and advanced genetic testing (Table). Performing systematic, post-operative data collection was reported infrequently (37 %). Those > 50 th percentile in volume compared to those ≤ 50 th percentile reported receiving more referrals from other urologists for surgical care (any referrals received, 66 % vs 36 %, $p = 0.001$) and more commonly perform surgery independently (63 % vs 32 %, $p = 0.003$). There were no differences between groups regarding lab testing, medical specialty referrals, or surgical management.

Discussion

Proximal hypospadias surgery is uncommonly performed by most pediatric urologists and patterns of independent lab evaluation and referral to medical subspecialties are variable. Few differences in practice were seen based on surgeon volume, especially around lab testing and medical specialty referrals. Though an optimal approach to medical evaluation is not yet defined, opportunities for greater uniformity in the management of proximal hypospadias exist. Clinical practice guidelines to help surgeons determine the best approach to medical evaluation and surgical management could improve quality of care in proximal hypospadias.

Conclusions

The approach to pre-operative medical care of patients with proximal hypospadias varies among pediatric urologists and is largely independent of surgeon operative volume.

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Introduction

Hypospadias is the second most common congenital anomaly in newborn males with a prevalence of 34.2 per 10,000 births in North America [1]. The most severe form of hypospadias is proximal hypospadias where the urethral meatus is located in a perineal, scrotal, or peno-scrotal position. Around 25 % of cases of hypospadias are proximal in location [2,3]. While proximal hypospadias can be an isolated genital condition, it has also been associated with disorders/differences of sex development (DSD) and multiple genetic diagnoses [3–6]. Some experts argue for routine genetic and endocrine evaluation in all patients born with proximal hypospadias to identify potential DSDs or genetic conditions with long-term implications [3,7]. However, there is no reported consensus on when further evaluation should be performed, nor on the specific evaluation to perform for patients born with this condition. The degree of variability in medical evaluation by surgeons prior to proceeding with repair has also not been clearly defined.

Variability in surgical management of proximal hypospadias also exists. Multi-stage repairs have become increasingly common over time, though the ideal timing of repair and aspects of surgical technique differ by surgeon. Prior studies have shown variability in suture selection, urethroplasty technique, assessment of chordee, and catheter use after repair [8]. Despite evolution of surgical technique, complication rates following proximal hypospadias surgery have been shown to exceed 50 % [9–11]. Given the technical difficulty, steep learning curve, and high rates of revisions/re-operations even in the hands of experienced surgeons, some urologists have argued that proximal hypospadias repairs should be performed by a limited subset of pediatric urologists. This may include recommended referral to high volume surgeons either within the same institution or externally. Additionally, the role of surgical trainees and the need for co-attending surgeons to perform this technically challenging operation has been discussed. How commonly referrals to surgeons with special interest in hypospadias care and co-attending surgeon operations are being performed is not known.

There is currently an incomplete understanding of the range of medical and surgical management strategies for proximal hypospadias, thus representing a barrier to development of consensus recommendations/clinical practice guidelines (CPGs) for this complex condition. We therefore aimed to identify currently practicing pediatric urologists' practice patterns on medical evaluation and aspects of surgical management for patients with proximal hypospadias through a survey study. We hypothesized that individuals would report caring for relatively few patients with proximal hypospadias per year and have substantial variation in management practices.

Methods

Survey and study population

An anonymous web-based survey was distributed to active and candidate members of the Societies for Pediatric Urology (SPU). The survey was sent via email using REDCap

(Research electronic data capture) [12,13] electronic data capture tools in April 2023. Two additional reminder emails were sent at 2-week intervals. The survey was created de novo by the study authors to capture respondent demographics and to assess practice patterns of pediatric urologists in the care of patients with proximal hypospadias. The survey was reviewed by the study team for face validity. Aspects of medical management were assessed including when lab testing is performed, situations when medical specialty referrals are made, and to which specialties, and whether their institution has a DSD program. Aspects of surgical management were assessed including internal or external referrals made or received for surgical care, age at first stage repair, timing between first and second stage for staged repairs, and role of a co-surgeon (Complete survey, Appendix 1). Respondent demographics were recorded including gender, whether the individual completed a pediatric urology fellowship, clinical practice type, and practice location. An open-ended question requesting free-text responses was included at the end of the survey to gather additional respondent perspectives that were not otherwise captured with the survey questions. Only actively practicing SPU members were included, with retired pediatric urologists and fellows excluded. Those who reported not personally performing proximal hypospadias repairs and those who did not report an estimated number of patients cared for per year were also excluded from the quantitative analysis. Study data were managed within an institutional REDCap database. This study received Institutional Review Board approval (IRB #2024–6761).

Statistical analysis

Survey response rate was determined based on completed surveys returned. Demographic data and responses to survey questions were reported as frequencies. Median and interquartile range was determined for the estimated total number of patients with proximal hypospadias managed annually by respondents. Respondents were divided into two groups based on reported operative volume after determination of the total cohort median (post hoc analysis). Comparisons were made for specific responses between those in the ≤ 50 th percentile of the population median for volume and those > 50 th percentile using chi-squared and Fisher's exact tests. All results were considered statistically significant at a two-tailed p-value of < 0.05 . Statistical analysis was performed using STATA Version 16.1 (College Station, TX, USA).

Free-text analysis

Free text responses were analyzed qualitatively using thematic content analysis [14]. Inductive coding was used to summarize general themes and subthemes among three coders. Representative quotations illustrating key themes were collated.

Results

Emails were sent to 522 individuals with 311 opening emails. Of those who opened emails, 137 responded

completely, and 125 met complete inclusion criteria for study eligibility. Overall response rate was 26.2 % (137/522) with a rate of 44.1 % (137/311) of opened emails. Participant demographics are detailed in Table 1. Respondents were predominantly male (70 %), and practice in an urban (85 %), academic (72 %) setting. Details of practice patterns relating to medical test ordering, medical referrals, and surgical care are displayed in Table 2. The median (IQR) estimated number of surgical patients with proximal hypospadias cared for per year was 7 (5.0, 10.0). Half (50 %) reported never receiving referrals from other pediatric urologists for surgical care. Most reported never referring patients to other surgeons within (55 %) or outside (71 %) of their practice. Frequent independent ordering of a karyotype was reported, with less frequent ordering of hormonal and advanced genetic testing (Table 2). Performing systematic, post-operative data collection was reported infrequently (38 %). Those >50th percentile in volume

compared to those ≤50th percentile reported receiving more referrals from other urologists for surgical care (any referrals received, 66 % vs 36 %, $p = 0.01$) and more commonly perform surgery independently (63 % vs 32 %, $p = 0.003$) (Table 2). There were no differences between groups regarding lab testing, medical specialty referrals, or surgical management.

Free-text responses

Twenty-six respondents (19.0 %) completed free-text responses. Themes identified included: 1. Surgical repair is difficult (subthemes: a. Optimizing surgical technique, b. Managing revisions and complications), 2. Referrals to centers of excellence/dedicated teams (subtheme: Barriers to dedicated care), and 3. Referrals outside of pediatric urology. Themes, subthemes, and representative participant quotations are displayed in Table 3.

Table 1 Survey respondent demographics.

	N (%)
What is your gender: (N = 120)	
Man	82 (70.1 %)
Woman	35 (29.9 %)
Did you complete pediatric urology fellowship training?: (N = 118)	
No	1 (0.8 %)
Yes	117 (99.2 %)
In what year did you complete fellowship? (N = 113)	
Before 1990	8 (7.07 %)
1990–2000	27 (23.9 %)
2001–2010	29 (25.7 %)
2011–2022	49 (43.4 %)
In which AUA section do you practice?: (N = 112)	
Mid-Atlantic Section	9 (8.0 %)
New England Section	1 (0.9 %)
New York Section	9 (8.0 %)
North Central Section	25 (22.3 %)
Northeastern Section	3 (2.7 %)
South Central Section	17 (15.2 %)
Southeastern Section	28 (25.0 %)
Western Section	20 (17.9 %)
Please indicate the metropolitan status of your primary institution: (N = 117)	
Rural	3 (2.6 %)
Suburban	14 (11.9 %)
Urban	99 (84.6 %)
Rural and Urban	1 (0.9 %)
In what setting do you primarily practice?: (N = 118)	
Academic/University affiliated hospital	85 (72.0 %)
Non-Academic/Non-University affiliated hospital	30 (25.4 %)
Both academic and non-academic	3 (2.5 %)
How many pediatric urologists, including yourself, do you have in your practice? (N = 115)	
1-4	76 (66.1 %)
5-8	25 (21.7 %)
≥9	14 (12.2 %)
Please estimate how many proximal hypospadias patients you personally manage surgically per year (staged repairs count as 1): (N = 125)	
Median 7 (IQR 5–10), range 1-51	

Table 2 Survey responses regarding medical and surgical management with comparisons based on estimated median number of surgical patients care for per year.

Survey Question	All Respondents	≥50th percentile for volume (≥8/yr) (N=59)	<50th percentile for volume (<8/yr) (N=66)	p-Value (high vs. low volume)
What percentage of your patients with proximal hypospadias would you estimate were referred to you by other pediatric urologists within or outside of your practice?: (N = 124)				0.01
0	62 (50.0 %)	20 (34.5 %)	42 (63.6 %)	
1–25 %	49 (39.5 %)	29 (50.0 %)	20 (30.3 %)	
26–50 %	12 (9.5 %)	8 (13.8 %)	4 (6.1 %)	
51–75 %	1 (0.8 %)	1 (1.7 %)	0 (0 %)	
>75 %	0 (0 %)	0 (0 %)	0 (0 %)	
How frequently do you refer patients with proximal hypospadias internally to partners (other pediatric urologists in your institution) for surgical repair?: (N = 124)				0.37
I work in solo practice	9 (7.3 %)	5 (8.6 %)	4 (6.1 %)	
Always	0 (0 %)	0 (0 %)	0 (0 %)	
Very often	3 (2.4 %)	0 (0 %)	3 (4.6 %)	
About half the time	4 (3.2 %)	2 (3.5 %)	2 (3.0 %)	
Seldom	40 (32.3 %)	16 (27.6 %)	24 (36.4 %)	
Never	68 (54.8 %)	35 (60.3 %)	33 (50.0 %)	
How frequently do you refer patients with proximal hypospadias externally to other experts (outside of your institution) for surgical repair?: (N = 124)				0.05
Always	0 (0 %)	0 (0 %)	0 (0 %)	
Very often	0 (0 %)	0 (0 %)	0 (0 %)	
About half the time	2 (1.6 %)	0 (0 %)	2 (3.0 %)	
Seldom	34 (27.4 %)	11 (19.0 %)	23 (34.8 %)	
Never	88 (71.0 %)	47 (81.0 %)	41 (62.1 %)	
When performing proximal hypospadias repair, do you perform surgery independently or with another attending surgeon (urologist or general surgeon)?: (N = 125)				<0.01
Independently	58 (46.4 %)	37 (62.7 %)	21 (31.8 %)	
Sometimes with another surgeon	46 (36.8 %)	15 (25.4 %)	31 (47.0 %)	
Always with another surgeon	21 (16.8 %)	7 (11.9 %)	14 (21.2 %)	
Recommended age at 1st stage repair? (N = 124)				0.49
< 6mo	5 (4.0 %)	3 (5.2 %)	2 (3.0 %)	
6mo-< 1yr	111 (89.5 %)	51 (87.9 %)	60 (90.9 %)	
1–2yr	4 (3.2 %)	1 (1.7 %)	3 (4.6 %)	
Other ^a	4 (3.2 %)	3 (5.2 %)	1 (1.5 %)	
Recommended time between 1st and 2nd stage?: (N = 124)				0.44
< 6 months	7 (5.7 %)	5 (8.6 %)	2 (3.0 %)	
6-< 9 months	104 (83.9 %)	48 (82.8 %)	56 (84.8 %)	
9–12 months	12 (9.7 %)	5 (8.6 %)	7 (10.6 %)	
>12 months	1 (0.8 %)	0 (0 %)	1 (1.5 %)	
Which medical tests do you ever order independently?^b: (N = 125)				
Karyotype testing	82 (65.6 %)	43 (72.9 %)	39 (59.1 %)	0.11
Hormonal testing (i.e., testosterone, LH, FSH)	57 (45.6 %)	31 (52.5 %)	26 (39.4 %)	0.14
Advanced genetic testing (i.e., microarray, whole genome sequencing)	40 (32.0 %)	24 (40.7 %)	16 (24.2 %)	0.05
Other ^c	7 (5.6 %)	3 (5.1 %)	4 (6.1 %)	0.86

Table 2 (continued)

Survey Question	All Respondents	≥50th percentile for volume (≥8/yr) (N=59)	<50th percentile for volume (<8/yr) (N=66)	p-Value (high vs. low volume)
How frequently do you refer any patient with proximal hypospadias for further medical subspecialty evaluation (i.e., to DSD clinic, endocrinology, or genetics specialists)?^a (N = 121)				0.61
Always	11 (9.1 %)	4 (7.1 %)	7 (10.8 %)	
Often	24 (19.8 %)	12 (21.4 %)	12 (18.5 %)	
About half the time	32 (26.5 %)	12 (21.4 %)	20 (30.8 %)	
Seldom	51 (42.2 %)	27 (48.2 %)	24 (36.9 %)	
Never	3 (2.5 %)	1 (1.8 %)	2 (3.1 %)	
In what scenarios do you refer patients for further medical subspecialty evaluation?^b (N = 125)				
Patients with proximal hypospadias with undescended testes that are palpable	62 (49.6 %)	29 (49.2 %)	33 (50.0 %)	0.93
Patients with proximal hypospadias with undescended testes that are non-palpable	110 (88.0 %)	50 (84.7 %)	60 (90.9 %)	0.29
Patients with proximal hypospadias and a known genetic diagnosis	95 (76.0 %)	46 (78.0 %)	49 (74.2 %)	0.63
Patients with proximal hypospadias and micro-phallus	88 (70.4 %)	43 (72.9 %)	45 (68.2 %)	0.57
Patients with proximal hypospadias and several comorbid conditions	73 (58.4 %)	34 (57.6 %)	39 (59.1 %)	0.87
Patients with proximal hypospadias and abnormal laboratory evaluation (i.e., karyotype, hormonal evaluation, advanced genetic testing)	110 (88.0 %)	53 (89.8 %)	57 (86.4 %)	0.552
Other ^d	3 (2.4 %)	2 (3.4 %)	1 (1.5 %)	0.91
Do you perform systematic data collection (i.e., as part of a database or registry) for patients who undergo proximal hypospadias repair?^c (N = 126)				0.90
Yes	46 (37.4 %)	22 (37.9 %)	24 (36.9 %)	
Is there a multidisciplinary differences of sex development (DSD) clinic at your institution?^c (N = 121)				0.94
Yes	73 (60.3 %)	34 (60.7 %)	39 (60.0 %)	

^a 6-18m (n = 2), almost never do a staged repair for primary proximal hypospadias (n = 1), and whenever they want as long as > 6 months (n = 1).

^b Check all that apply question - proportions add up to greater than 100 %.

^c Testing obtained in collaboration with genetics, endocrinology or in DSD clinic (n = 4), endocrinology obtains all testing (n = 1), generally no testing in isolated hypospadias (n = 1), Offer advanced genetic testing, but most decline (n = 1).

^d Send all proximal hypospadias patients for evaluation regardless of testicular location (n = 1), If felt to benefit from psychosocial evaluation (n = 2).

Discussion

In this survey study, we assessed practice patterns among pediatric urologists in the medical evaluation and surgical management of proximal hypospadias. We identified that pediatric urologists care for relatively few patients with proximal hypospadias per year. There were varied practices regarding pre-operative laboratory evaluation and medical subspecialty referrals prior to surgical repair. Karyotype testing was reported to be the most common independently ordered test, with further endocrine work-up and advanced

genetic testing rarely ordered independently by pediatric urologists. The most common reasons for further medical specialty referral were proximal hypospadias with bilateral non-palpable testes or a hypospadias and prior abnormal laboratory testing. Less than half of respondents reported referring patients for medical evaluation in the setting of a proximal hypospadias with descended testes. Regarding surgical care, there was less variability seen, with most never referring patients for surgical care either internally to partners or externally and around half reporting that they perform surgery independently without a co-surgeon.

Table 3 Qualitative analysis of free text responses.

Theme	Subtheme	Representative Quotations (Respondents year of fellowship completion, estimated number of repairs/year)
Surgical repair is difficult		"Forever will be an extremely difficult operation with highly variable outcomes." (2001–2010, 5/yr) "It takes years of experience and I'm still learning." (1990, 20/yr)
	Optimizing surgical technique	"Videos of different surgical techniques for repair would be great addition to SPU website." (2011–2022, 5/yr) "I think it would be interesting to also describe how and when the decision to stage the hypospadias repair is made." (2011–2022, 2/yr)
	Managing revisions and complications	"Close to retirement and no one else in the area that is experienced in these repairs. I Continue to manage failed short-term and long-term complications from pediatric urologists in the region." (1990–2000, 25/yr)
Referrals to centers of excellence/dedicated teams		"I believe a dedicated person or team should perform these repairs to drive the best outcomes. Not a surgery anyone should be dabbling in." (2001–2010, reports no surgical repairs) "I feel that given the high rates of complications, this procedure should be ideally performed with two attending surgeons to achieve the best possible outcomes. Centers of excellence could also be identified for the most severe cases to ensure quality care is being provided to patients." (2011–2022, 5/yr)
	Barriers to dedicated care	"The issue is Medicaid - the funding of care is so important. Patients can't go across state lines with Medicaid - major problem if I think someone somewhere else is better and patients can't afford cash pay." (fellowship year not reported, 7/yr)
Referrals outside of pediatric urology		"Management and outcomes of proximal hypo is different if part of DSD complex or isolated. Therefore, important to evaluate all patients with proximal hypo with genetic testing to allow us in the future differentiate those different types and provide better counselling and management." (1990–2000, 30/yr) "Referral for older kids are to reconstructive urologist, not peds." (2011–2022, 10/yr)

Most respondents also reported similar ages at which they perform first and second stage repairs respectively. These findings, demonstrating variability in practice patterns, especially around medical evaluations prior to surgery, highlight that there is room for greater consistency in care and opportunities for guidance on best practices in the care of patients with proximal hypospadias.

Approaches to medical evaluation for patients with proximal hypospadias have been discussed previously in the literature, largely focused on establishing a diagnosis of a difference of sex development. While there are potential benefits of establishing a specific DSD diagnosis in children born with proximal hypospadias, there may also be harms. Providing families with better information about fertility potential, prognostication about potential medical comorbidities in the future, and risk of gonadal malignancy may be helpful [15]. Surgical counseling can also be improved as various authors have demonstrated increased complication rates in patients with proximal hypospadias and a DSD

[16–18]. Specific information on hormone responsiveness may be garnered from testing as well. Defined DSD diagnoses are also valuable in counseling on the risk of genetic transmission to future offspring. Conversely, testing may be harmful if a specific diagnosis is not identified and a child is labeled with "46, XY DSD of unclear etiology," for example. Potential harms of this diagnosis include legal implications and social controversy around timing of genital surgery.

Authors have sought to assess in which patients a DSD work-up will be most beneficial and to quantify the frequency with which a DSD is diagnosed during evaluation. Priority work from our institution identified 9 DSD cases among 60 patients with proximal hypospadias, with mixed gonadal dysgenesis being the most common diagnosis [4]. All boys with a DSD had a bifid scrotum and/or penoscrotal transposition. Around 50 % of those with an undescended testicle also had a genetic diagnosis. This led to a recommended algorithm-based evaluation of patients presenting with

proximal hypospadias, including performing a karyotype in all patients with proximal hypospadias and pursuing endocrine evaluation and advanced genetic testing in patients with proximal hypospadias and one of the following: an undescended testis, multiple congenital anomalies, scrotal abnormalities, or for families who desire more information. However, such recommendations have the potential for missed diagnoses if genetic testing is not routinely performed. One study demonstrated that 10 % of boys with proximal hypospadias and descended testes had an identifiable genetic difference [7]. While performing genetic evaluation in all patients with proximal hypospadias is an option, potential downsides exist including high costs of testing with potential low yield, or identification of genetic differences of unclear significance. Performing the highest yield genetic testing, such as whole exome sequencing when available, may mitigate these downsides [15,19]. Despite the potential benefits of genetic testing, respondents to this survey reported seldomly referring patients with proximal hypospadias for further genetic evaluation and rarely independently ordering advanced genetic testing. Further guidance on the best approach to high yield and cost-effective genetic testing through a CPG would likely be helpful for practicing clinicians.

Regarding surgical practice, a multi-stage repair has become commonplace for the management of proximal hypospadias. Participants in our study showed relative consistency in timing of each surgical stage when compared to previously published literature [9,10]. Regarding the role of co-surgeons, 53.6 % of respondents reported at least sometimes performing repair with another surgeon, with higher volume surgeons less likely to do so. Prior literature has evaluated the potential benefit of dual surgeon operating in non-urolologic fields but not in relation to hypospadias. Reported potential benefits include shared decision making, supervision, mentorship, and combined skills and experiences in rarely performed cases [20]. This may be particularly helpful for younger and less experienced surgeons as they begin independent practice. Studies in breast and spine surgery have demonstrated reduced operative times, blood loss, and complications with dual surgeon operating [21–24]. Similar improved outcomes may also be seen in hypospadias surgery with greater adoption of dual surgeon operating.

Additional comments were captured by respondents in the free text responses, with a focus on the complexity of surgical repair and the potential benefit of centers of excellence or referral of patients to high volume centers. While relatively few respondents reported referring patients internally, or externally, those surgeons in the ≥ 50 th percentile for volume were more likely to report receiving referrals for care. This suggests that there are individuals who are recognized as experts by referring colleagues, at least informally. While the median number of surgeries performed per year by respondents was relatively low at 7, it is difficult to correlate surgical volume alone to competency and patient outcomes. Directly comparing proximal hypospadias volume per surgeon per year to other complex cases in pediatric urology, such as augmentation cystoplasty or bladder exstrophy repair, is limited by lack of granular surgeon level data. A prior administrative database study found that the average annual number of bladder augmentations performed per Pediatric Health Information System (PHIS) participating hospital was 4

per year [25]. This number is even lower for classic bladder exstrophy among PHIS participating hospitals, with one study reporting the highest quartile for volume of >1.7 cases per year with a maximum of 3 cases per year during the study period [26]. These studies demonstrate that proximal hypospadias care is far more commonly performed by the average pediatric urologist. Designated centers of excellence have been created for more rare conditions within pediatric urology, notably bladder exstrophy. While improved coordination of care and outcomes may be seen when procedures are performed by higher volume surgeons [27], it is not clear that this is necessary for the care of patients with proximal hypospadias. Patient outcomes must be balanced with the cost and time burden of greater travel, and insurance issues associated with cross-state care for referral to high volume centers.

Our findings of variability in care among pediatric urologists suggest that greater guidance on optimal care could be helpful. Currently, CPGs are not available for the management of proximal hypospadias. CPGs are “statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options” [28]. CPGs for the management of proximal hypospadias could be helpful to decrease practice variation, and allow smoother translation of research into clinical practice. Ultimately, this could improve the quality and safety of care for patients. CPGs also have the potential to influence public policy related to condition specific care. For example, insurance coverage for whole genome sequencing could be expanded with recommendations to obtain testing within a CPG. However, a major limitation to a CPG for proximal hypospadias is the lack of substantial evidence beyond expert opinion to guide specific aspects of care. Thus, further research is required to better inform future CPGs.

This study has several limitations inherent to the study design. The survey response rate is relatively low at 26.2 %. There is potential for non-response bias in the population surveyed, and demographics between responders and non-responders were not compared. Most respondents practice in an academic setting in an urban area, and thus responses may be skewed and not representative of those practice in more rural settings or private practice. Respondents may also be subject to recall bias in reporting of practice patterns. Additional and important questions regarding proximal hypospadias management were not asked in this survey, including the role of pre-operative androgen supplementation and referral patterns for patients with proximal hypospadias and scrotal anomalies like bifid scrotum and penoscrotal transposition.

Conclusions

Proximal hypospadias surgery is uncommonly performed by most pediatric urologists and patterns of medical evaluation are variable. Few differences in practice were seen based on surgeon’s operative volume. The development of CPGs with standardized pre-operative care recommendations and focus on consistent assessment of post-operative outcomes may represent an opportunity for improved care in proximal hypospadias.

Approval

Approval for this project was granted by the Ann & Robert H. Lurie Children's Hospital institutional review board (IRB#2024-6761).

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Conflict of interest

All authors have no relevant financial or personal conflicts of interest to disclose.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jpuro.2025.03.002>.