Journal of Pediatric Urology (2023) 19, 293.e1–293.e8

Sexual well-being and penile appearance in adolescents operated for distal hypospadias in childhood

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Keywords
Genital malformation; Hypospadias; Penile perception; Sexual well-being; Voiding function

Received 22 August 2022
Revised 21 February 2023
Accepted 1 March 2023
Available online 7 March 2023

Summary

Background
The importance of patient-reported outcomes (PRO) in hypospadias is increasing. However, more knowledge is needed concerning genital self-perception on appearance and function in adolescents. The complication rates for distal hypospadias is different from that for severe hypospadias, and expected outcomes related to sexual well-being and cosmetics may also differ.

Objective
To investigate 16-year-olds' self-reported outcomes on penile appearance, sexual well-being, and voiding function in distal hypospadias, and compare with that of healthy male adolescents and a surgeon's view.

Study design
Sixteen-year-old patients operated for distal hypospadias were included in this cross-sectional study and compared to a group of healthy adolescents. The assessment tools included the adolescents' self-perception on genital appearance and function measured by Pediatric Penile Perception Score (PPPS) and their responses to a structured interview. We also included information on clinical data from the electronic medical records, together with a physical examination and an uroflowmetry.

Results
Seventy patients and 61 healthy adolescents participated. Patients and the comparison group reported no differences on sexual well-being. The patients were satisfied with penile appearance, however their overall PPPS was significantly lower (8.9), compared to the comparison group (9.6, $p = 0.03$). Thirty-nine percent of patients had complications leading to re-interventions and reported lower scores on genital self-perception on appearance and function compared to those who had not re-interventions. Voiding function was normal. The surgeon's score on appearance was comparable to the patients' score.

Discussion
A key finding in our study is the patients' high satisfaction on sexual well-being, which was similar to healthy adolescents. The patients were also satisfied with penile appearance but scored significantly lower than the comparison group. Surgeons and patients had comparable scores on appearance; however, they seemed to emphasize different aspects of appearance. Our results on penile appearance and sexual well-being are comparable to those of other studies on distal hypospadias. In our study, re-interventions were associated with more negative genital self-perception on appearance and function, similar to findings in other studies.

Conclusion
Our results show overall positive satisfaction on sexual well-being, voiding function and penile appearance despite less satisfaction on penile appearance when compared with the comparison group. Satisfaction was reported to be good also in patients experiencing re-interventions.

https://doi.org/10.1016/j.jpurol.2023.03.001

Summary Table Pediatric Penile Perception Score. Overall and item scores + individuals scoring as dissatisfied on any item. In addition, a surgeon not involved in the primary surgery evaluated the patients.

	Healthy n = 61[a]		Distal n = 70		p-value [c]	Surgeon n = 61[d]	p-value [e]
	Mean ± SD	Dissatisfied freq. (percent)	Mean ± SD	Dissatisfied freq. (percent)		Mean ± SD	
Overall PPPS [range 0–12] [b]	9.56 ± 1.75		8.89 ± 1.73		**0.03**	9.13 ± 1.96	0.50
Meatus [range 0–3] [b]	2.49 ± 0.50	0	2.23 ± 0.57	5 (7)	**0.007**	2.20 ± 0.68	0.51
Glans [range 0–3] [b]	2.46 ± 0.50	0	2.31 ± 0.55	3 (4)	0.11	2.31 ± 0.56	1.00
Skin [range 0–3] [b]	2.30 ± 0.59	4 (7)	2.10 ± 0.59	9 (13)	0.06	2.23 ± 0.67	0.23
General appearance [range 0–3] [b]	2.31 ± 0.50	1 (2)	2.24 ± 0.46	1 (1)	0.41	2.39 ± 0.56	0.09
Penile length [f] [range 0–3] [b]	2.20 ± 0.54	4 (7)	2.20 ± 0.44	1 (1)	1.00		
Penile curvature [f] [range 0–3] [b]	2.34 ± 0.48	0	2.27 ± 0.48	1 (1)	0.41		
Genital appearance VAS [range 0–10] [g]	1.74 ± 1.57	0[g]	2.30 ± 1.57	2 (3)[g]	**0.04**		
Genital function VAS [range 0–10] [g]	1.18 ± 1.32	0[g]	1.60 ± 1.70	2 (3)[g]	0.12		

SD = standard deviation.
[a] Norwegian normal data, a healthy comparison group (16 and 17 years old) [16].
[b] Higher scores indicate higher satisfaction.
[c] p-value from independent t test comparing patients and healthy controls.
[d] Nine patients refused clinical examination.
[e] p-value from paired t test comparing patients' and surgeon's score.
[f] Items not included in the PPPS overall score.
[g] Higher scores indicate lower satisfaction. A score of 6–10 on the VAS was considered an important negative influence.

Introduction

Hypospadias is the most common malformation of the penis, affecting approximately 1 in 300 boys worldwide [1]. About 70% of hypospadias patients have a mild form with a distal urethral meatus and a minimal ventral curvature [2].

The importance of patient-reported outcomes (PRO) in hypospadias is increasingly acknowledged [3], and several studies are now reporting on PRO after hypospadias surgery. Most studies reporting PRO include mainly adults [3–6]. Furthermore, most published PRO data on sexual well-being (including sexual function) and penile appearance are from a heterogenic group of patients with hypospadias. A handful of studies have focused on severe hypospadias [7–9], and distal hypospadias have received even less attention [10,11]. Very few studies assess adolescents' views on penile appearance and sexual well-being after surgery [7,12–15]. These studies vary in terms of number of patients, severity of hypospadias, age, and surgical methods. Thus, PRO on sexual well-being and cosmesis in adolescents after surgery in childhood for distal hypospadias needs to be further explored.

Recent outcome studies after hypospadias surgery have identified and highlighted five crucial domains for future studies within this area: penile appearance, voiding function, sexual well-being, social function and psychological/behavioral function. Together, these create a comprehensive framework of hypospadias-specific health-related quality of life (HRQoL) [1].

The aim of the present study was to compare adolescents operated for distal hypospadias in childhood with a healthy comparison group in three of the crucial domains: penile appearance, voiding function, and sexual well-being. We hypothesized a priori that the reported outcome after distal hypospadias surgery regarding these domains would be similar to what we have previously reported in healthy adolescents [16].

In studies reporting on both PRO and surgeons' assessments for operated hypospadias patients, the assessments of penile appearance often differ between patients and surgeons [15,17–20]. Hence, a secondary aim was to compare PRO on penile appearance with a surgeon's outcome scores.

Material and methods

Subjects

We identified 108 patients with distal hypospadias operated in childhood at Oslo University Hospital (OUH), being 16 years or turning 16 during the period of inclusion from

March 2019 to March 2021. All patients were invited by letter to participate in a cross-sectional study that directly followed a clinical program at the outpatient clinic at the hospital where they had their childhood operation. Exclusion criteria were impairment or inability to communicate in Norwegian, intellectual disability, and anorectal malformations (ARM) which can lead to serious urinary and fecal incontinence. Distal hypospadias was defined as a preoperative meatal position with a glanular, sulcus or distal penile position, with minimal curvature (Appendix Fig. 1) [4]. The primary surgeries were performed in two different departments at OUH (plastic surgery and pediatric surgery), and several surgeons were involved. The comparison population consisted of healthy adolescents aged 16 and 17 years recruited from upper-secondary school and presented in a recently published study [16].

Outcome measures

Clinical data were collected from electronic medical records (EMR). Complications and re-interventions were classified using the Clavien Dindo (CD) classification system, validated in the field of urology [21].

A pediatric surgeon, not involved in the primary surgeries, conducted the physical examination and documented the outcomes on cosmetics and function—using the surgeon version of the Pediatric Penile Perception Score (PPPS) questionnaire (Appendix Fig. 2) [20] and conducting an uroflowmetry with residual urine. The surgeon used the Tanner scale to assess puberty development.

The principal investigator distributed questionnaires and conducted a non-validated structured interview in which the adolescents reported outcomes on penile appearance, voiding function, and sexual well-being. The non-validated structured interviews were conducted verbally with each individual patient and allowed the teenagers to specify their answers. The adolescents were asked to self-report on a Visual Analog Scale (VAS) and other questions were answered using the categories "yes"/"no"/"not sure". If any specified remark was given to any of the questions, the interviewer asked the patient to write it down in the box under the question (Appendix Fig. 3). The project methodology was quality assured through a pilot study (Appendix Fig. 4).

Penile appearance

Penile appearance was measured using the validated PPPS questionnaire [20]. The patient and the surgeon versions of the PPPS both consist of a standardized questionnaire with four items: penile self-perception with regard to meatus, glans, skin, and general appearance [20]. Answer categories were "very dissatisfied" (0), "dissatisfied" (1), "satisfied" (2) and "very satisfied" (3), yielding an overall score ranging from 0 to 12 (Appendix Fig. 2). In addition, we asked for a self-report on penile length and curvature using the same values as in the PPPS, similar to previous studies [7,16]. To address recurrent curvature, the patients also reported on a questionnaire containing five sketches, choosing the one most closely representing their penis anatomy regarding curvature (Appendix Fig. 5). This measure for self-reported penile curvature has been used in previous studies [22].

In the structured interview, the adolescents were asked to self-report on satisfaction with genital appearance on a VAS from 0 ("very satisfied") to 10 ("very dissatisfied"). The interview was conducted using a questionnaire developed for a previous study on patients with urogenital malformations at OUH [23]. This questionnaire was also used in the comparison group consisting of healthy Norwegian adolescents (Appendix Fig. 3) [16].

Voiding function

Urological function was assessed by uroflowmetry with residual urine. A voided volume (VV) under 50 ml was not registered. Uroflow rates from studies on healthy adolescents were used as reference values [24]. In the structured interview, the adolescents were also asked to report satisfaction with genital function on a VAS from 0 to 10, where 0 represented "very satisfied" and 10 "very dissatisfied", and specify if problems were related to voiding function.

Sexual well-being

In the structured interview, the adolescents were asked to self-report on experiences related to erection, ejaculation, masturbation, orgasm, and intercourse (Appendix Fig. 3). They were also asked to report on satisfaction with genital function on a VAS from 0 ("very satisfied") to 10 ("very dissatisfied"), and specify if problems were related to sexual function. Tailored questions were also added to the structured interview to explore sexual well-being (Appendix Fig. 3). Finally, gender identity and sexual orientation were self-reported on a VAS from 0 to 10 (Appendix Fig. 3).

Statistics

Data were entered using EpiData, version 4.4.3.1 (EpiData Association, Odense, Denmark) and transferred to Stata version 15 for statistical analyses.

Descriptive statistics were presented as means with standard deviation (SD) and range for continuous variables and as frequencies and proportions for categorical variables. Comparisons of means between patients and controls were analyzed with independent two-sample t tests, while a Fisher's Mid-P test was used for categorical data due to the small sample size. Paired t tests were used to compare mean scores between patients and surgeon. The inter-observer reliability between the surgeon and patient overall PPPS was measured by intraclass correlation coefficients (ICC).

Among patients, we performed multivariable linear regression analyses to assess the associations between re-intervention and age of primary surgery on genital self-perception (appearance and function). Three separate outcomes were studied (PPSS overall, genital appearance VAS and genital function VAS). Results were presented as beta coefficients with 95% confidence intervals (CI). A p value < 0.05 was considered statistically significant.

Ethics

All patients were recruited by an invitation letter and informed about the study both in the letter and on arrival at the outpatient clinic. Participation was voluntary. Written

Table 1 Characteristics of patients with distal hypospadias, aged 16 at survey, n = 70.

	Mean ± SD [range] or n (%)
Age at primary surgery [months]	43.6 ± 32.5 [12–192]
Primary surgery≤36 months	38 (54)
Primary surgery >36 months	32 (46)
One or more complications	29 (41)
Fistula	14 (35)[b]
Meatus stenosis	9 (23)
Phimosis	6 (15)
Wound rupture	5 (13)
Glans dehiscence	2 (5)
Hematoma	1 (3)
Urethral stricture	1 (3)
Other	2 (5)
One or more re-interventions[a]	
Fistula closure	11 (33)[b]
Meatotomy	8 (24)
Prepuceplasty	6 (18)
Redo surgery	3 (9)
Urethral dilatation	1 (3)
Circumcision[c]	1 (3)
Other	3 (9)
Age at first re-intervention after primary surgery [months]	50.7 ± 53.0 [1–175]

[a] Interventions classified for grade IIIb in the CD classification system: requiring a surgical intervention under general anesthesia. Twenty-seven experienced at least one re-intervention, of whom six experienced two re-interventions.
[b] Proportion of complications and re-interventions.
[c] Circumcision due to complications. Furthermore, 11 of the patients had been circumcised at the request of their parents for religious reasons.

consent was obtained from each individual, and parental consent was requested for patients who had not yet turned 16 at time of inclusion. The study protocol was approved by the Data Inspectorate and the Regional Ethics Committee (REC South East: 2018/1894). The study was conducted in accordance with the Declaration of Helsinki.

Results

Characteristics of the study sample

Seventy patients (65%) agreed to participate and were enrolled in the study at 16 years of age. See Table 1 for characteristics of the included individuals and Fig. 1 for a complete flow-chart of patient selection. Further information related to types of surgery, types of complication, number of complications, and pending complication repair is found in Appendix Table 1.

Penile appearance

Patients with distal hypospadias had a mean overall PPPS of 8.9, significantly lower than the mean score of 9.6 in the healthy comparison group (p = 0.03) (Summary Table). For single items, patients reported significantly lower scores only on the meatus item. When asked to specify during the interview, the patients reported negatively on the shape ("scars") of the meatus; none mentioned its position. Further, 13% of the patients reported dissatisfaction with skin. Only one patient reported dissatisfaction with penile length, compared to four in the comparison group. The surgeon's overall PPPS (mean 9.1) were not statistically different from the patients' scores (mean 8.9) when performing a paired t test (p = 0.50). In addition, the agreement between the surgeon's and patients' score was poor (ICC 0.23, 95% CI 0.05, 0.48) (Appendix Table 2). Concerning curvature, only two patients (3%) selected sketch number four (defined as severe).

Compared to the healthy comparison group, patients were less satisfied with their genital appearance on a VAS (mean 2.30 vs 1.74, p = 0.04) (Summary Table). Two patients (3%) scored higher than five indicating a negative appraisal.

Voiding function

In the hypospadias patients mean ± SD voided volume and maximal flow rate were 317 ± 156 ml and 27.5 ± 7.4 per second, respectively. Both values are within normal age-adjusted references [24]. Results from urinary flow charts were available for 56 of the 61 individuals (92%) participating in the clinical examination.

Sexual well-being

Almost all participants (98%) were in stages four or five on the Tanner scale. There was no difference between patients and the healthy comparison group on any of the five sexual function domains (Table 2), or on satisfaction with genital function on a VAS (Summary Table).

During the interview, two patients reported poor sexual function (VAS >5; a score of 6–10 was considered an important negative influence)—and one reported pain when masturbating when asked to specify. Sixty-six (94%) answered no when asked if being born with hypospadias and operated in early childhood had any negative impact on their sexuality.

Concerning gender identity, 66 patients (94%) and 57 (93%) in the comparison group identified themselves as male only. On sexual orientation, 63 patients (90%) and 53 (87%) in the comparison group felt attracted only to the opposite sex.

Re-interventions were associated with reduced genital self-perception (appearance and function)

Surgical complications and re-interventions extracted from the EMR, and patients' age at surgery, are listed in Table 1. Twenty-seven patients (39%) operated for a distal hypospadias had complications leading to at least one re-intervention classified as CDIIIb, of which fistulas were the most common. Patients with re-interventions had a significantly lower overall PPPS score when compared to those who had not had re-interventions (beta −1.42, 95% CI -2.21, −0.63, p = 0.001), also when adjusted for age of

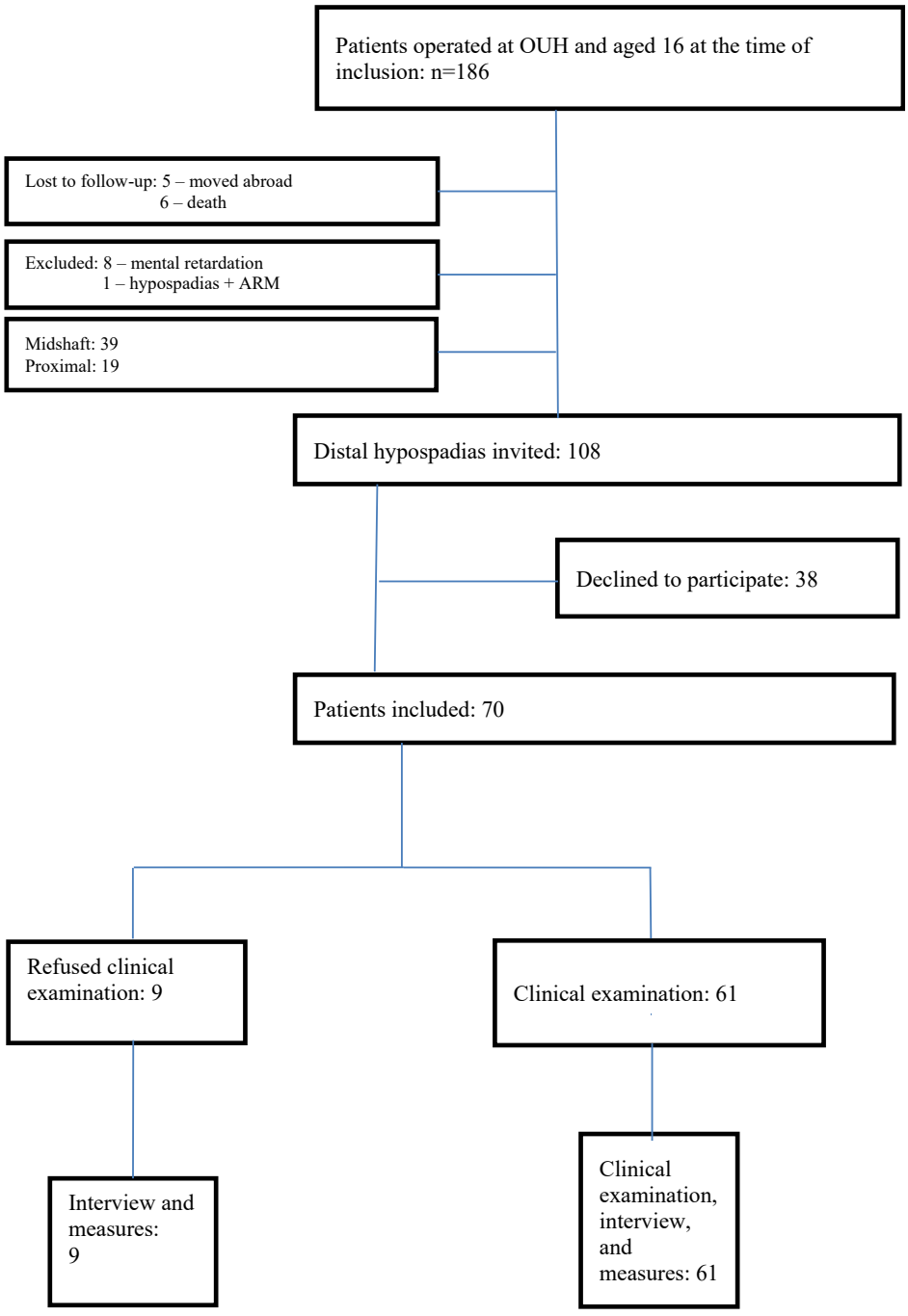

Fig. 1 Flow chart of the study design for patients participating in the cross-sectional study at OUH.

primary surgery (Table 3). Moreover, an increased negative genital appearance and genital function on a VAS was observed in patients with re-interventions when adjusted for age of primary surgery (Table 3).

Discussion

Our main finding was that 16-year-old boys operated for a distal hypospadias in early childhood are satisfied with sexual function, voiding function, and penile appearance. However, we did find a statistically significantly lower overall PPPS and a more negative appraisal on the VAS on genital appearance for patients compared to healthy adolescents. Thirty-nine percent of our patients had at least one re-intervention, and re-interventions were associated with lower genital self-perception scores on appearance and function.

Sexual well-being in our patients was similar to that of healthy adolescents. Other studies also report high satisfaction on sexual well-being in those with distal hypospadias, both in studies on adolescents when compared to proximal hypospadias and healthy controls [7,15] and in adult studies investigating only the distal group [11]. Our

Table 2 Adolescents' experience of sexual function.

	Comparison group[b] n = 61	Distal n = 70	p-value[c]
	n (%)	n (%)	
Masturbating[a]			
Yes	60 (98)	65 (93)	0.16
No	1 (2)	5 (7)	
Not sure	—	—	
Satisfied with erection			
Yes	59 (98)	63 (97)	0.80
No	—	—	
Not sure	1 (2)	2 (3)	
Ejaculation			
Yes	60 (100)	65 (100)	-
No	—	—	
Not sure	—	—	
Orgasm			
Yes	56 (94)	55 (85)	0.68
No	2 (3)	3 (5)	
Not sure	2 (3)	7 (10)	
Sexual intercourse			
Yes	13 (38)[d]	15 (21)	0.08
No	21 (62)[d]	55 (79)	
Not sure	—	—	

[a] The patients and boys in the comparison group who answered no on masturbation did not answer the other questions on sexual function.
[b] Norwegian normal data, 16 and 17 years of age [16].
[c] p-values from two-sided Fisher's Mid-P test.
[d] Boys from the comparison group were restricted to those aged16.

findings are in agreement with reviews that conclude that sexual well-being in those operated for distal hypospadias is comparable to that of the general (healthy) population [25]. Thus, our results support previous findings and observations concerning distal hypospadias, and adds to the knowledge gap concerning PRO on sexual well-being after hypospadias surgery in adolescents.

Patients in our cohort reported statistically significantly lower scores on the PPPS overall than the comparison group. Similar findings are reported in studies using the Penile Perception score (PPS) on adults operated for distal hypospadias [4,10]. In contrast, some studies—on children and adolescents operated for distal hypospadias—have found that satisfaction on penile appearance was similar to healthy controls [7,15]. Weber et al. found similar satisfaction on penile appearance both in patients operated for distal hypospadias and severe hypospadias when compared to controls [20]. We believe that the most likely explanations to these different findings among studies are differences in the measures used, analyses conducted, and heterogeneity in the population. In our study, the healthy adolescents in the comparison group had a high overall PPPS of 9.6. Thus, even though the overall PPPS is also high (8.9) in our patients, the difference becomes statistically significant. The clinical significance of this finding is not that obvious. Our patients' overall PPPS (close to 9) was similar to reported PPPS on distal hypospadias in other studies [7], and these scores show a good satisfaction in general. We also found that only three patients reported a negative appraisal of genital appearance in the interview. The most reasonable conclusion based on previous studies and the present study would appear to be that adolescent and adult patients operated for distal hypospadias are satisfied with their penile appearance.

In Norway, retaining the foreskin is of cultural importance and most parents want us to preserve the foreskin if possible. A foreskin reconstruction is therefore often done in distal hypospadias repair. Five of our patients described having a tight foreskin when attending our out-patient clinic and received surgery for phimosis when 16 years old. Experiencing a tight foreskin is likely to contribute to the low score on the skin item in the PPPS, with 13% reporting that they were dissatisfied or very dissatisfied. Notably, this study shows that foreskin reconstruction in distal hypospadias in childhood may cause surgical problems or concerns in adolescents. We therefore recommend a follow-up in puberty in countries where foreskin preservation is the norm.

A statistically significant difference was reported on the single item meatus. In the interview, patients reported the shape ("scars") of the meatus negatively, and to a lesser degree the position. Thus, it would seem that patients are

Table 3 Multivariable linear regression analyses of re-interventions and age of primary surgery on genital self-perception (appearance and function) in patents with distal hypospadias, n = 70.

Independent variables	Dependent variables		
	PPPS overall[a]	Genital appearance VAS[b]	Genital function VAS[b]
	Coefficient (95% CI)	Coefficient (95% CI)	Coefficient (95% CI)
Intervention CD IIIb[c]			
no	ref.	ref.	ref.
yes	**−1.42 (-2.21, -0.63)**[d]	**0.92 (0.17, 1.67)**[d]	**1.14 (0.34, 1.94)**[d]
Age of primary surgery			
≤36 months	ref.	ref.	ref.
>36 months	−0.47 (−1.24, 0.29)	0.27 (−0.46, 1.00)	0.13 (−0.65, 0.91)

CI = confidence interval.
[a] Overall PPPS (range 0−12)− higher scores indicate higher satisfaction.
[b] VAS (range 0−10)− higher scores indicate lower satisfaction.
[c] Interventions classified for grade IIIb in the CD classification system.
[d] All p values were statistically significant (<0.02).

placing more importance on the shape of the meatus than the position. We speculate that patients and surgeons may have differing expectations regarding meatal position. Previous studies on more severe hypospadias emphasize that, rather than pursuing a "perfect" result through re-interventions, a suboptimal aesthetic outcome—particularly a deviant meatal position—may be acceptable and better for the patient's sexual well-being [15,26]. Interestingly, meatal position in distal hypospadias was also reported to be of lesser importance by women [27].

Furthermore, we found no differences in mean PPPS between the surgeon and the patients. However, the inter-observer reliability between the surgeon and patients was poor. This is in line with other studies comparing surgeon and patient evaluations after hypospadias surgery [15] and suggests that patients and surgeons have differing expectations regarding cosmesis after surgery.

In the healthy comparison group 7% were dissatisfied with penile length [16], whereas only one of the patients operated for hypospadias reported dissatisfaction. Penile length has been reported to be an independent predictor of patients' satisfaction with penile appearance [18], and not amenable to hypospadias repair [20]. Thus, penile length is found to be of concern both in healthy individuals and patients [16,28]. Finally, we found normal voiding function in the population—in both PRO and uroflowmetry. In the interviews, only one participant was dissatisfied with voiding function and specified spraying when voiding as a concern. Satisfactory urinary function in distal hypospadias coincides with findings in other hypospadias studies focused on adolescents [13].

There was a high proportion of complications in our patients, 39% had re-interventions and 41% had complications. High proportions of complications and re-interventions in distal hypospadias has been reported both in adult studies [9] and in studies on adolescents, reporting up to 31% re-interventions [13]. However, most studies report fewer complications and re-interventions in distal hypospadias [18,29]. It is possible that the previous organization of hypospadias surgery at our hospital, with two departments and several surgeons involved in the primary surgery, contributed to the high proportion of complications. However, we believe that other explanations must also be considered. One study showed that complications appeared later in the distal group than in the proximal and midshaft groups [30]. The long follow-up in the present study might therefore contribute to the high proportion of complications and re-interventions. Six of our patients received a re-intervention due to tight foreskin—five were discovered late, at 16 years. Complications to foreskin reconstruction will of course be avoided by removing the foreskin during the primary surgery, which is done in many countries and centers. Re-interventions in our study are categorized using the CD system—a classification system used in very few hypospadias studies. We have a low threshold for general anesthesia for interventions in children at our center, which is thus categorized as CDIIIb. Finally, all complications and re-interventions after the primary surgery in our patients were treated at OUH. None were transferred to other hospitals, and no complications were missed.

Patients in our study report reduced genital self-perception on appearance and function when experiencing re-interventions. Others report similar findings [13]. In addition, studies report negative psychosexual outcome related to increased number of re-interventions [15]. Interestingly, there is an ongoing debate regarding the need for corrective surgery in distal hypospadias, a surgery which is of a mainly cosmetic nature [18]. Postponing surgery for distal hypospadias until age of consent—and perhaps avoiding the corresponding stress, complications, and re-interventions—is considered by some [25,30]. In the present study, re-interventions were associated with reduced satisfaction in sexual well-being and penile appearance among adolescents. Reduced scores among those who experienced complications and re-interventions might be expected. But the present study also shows that adolescents operated for distal hypospadias in childhood were satisfied with penile appearance and function, even those who experienced complications and re-interventions. We therefore believe that surgery for distal hypospadias in childhood can be recommended. Future studies which compare outcomes after surgery in childhood, delayed surgery until age of consent and possibly non-intervention for distal hypospadias might change that recommendation.

This study is limited by the lack of information we have on the 38 patients who chose not to participate. A second limitation is that we lack detailed anatomic information before and after re-interventions on the patients participating in the study that could give the reader a more comprehensive understanding and shed light on the PPPS scores. Another limitation is the lack of validated instruments on PRO concerning sexual well-being and voiding symptoms using tailored questions. Finally, there is a possible bias using the written comments from the structured interview to understate our findings. Even though the comments are clearly stated by the patient in response to the question given, a potential bias may be found in the interpretation of the comments.

One strength of the present study is the comprehensive self-reported data from a large population of 16-year-old patients and the age-matched healthy comparison group. In addition, this study responds to critiques concerning the heterogeneity of age in the existing hypospadias literature [31]—and the inclusion rate is satisfactory compared to other studies on adolescents [7,13]. Importantly, the homogeneity in age between patients and controls also adds strength to the present study, avoiding the correction for age in analysis found in previous studies [15].

Conclusion

Overall, Norwegian adolescents operated for distal hypospadias in childhood report satisfaction on sexual well-being, voiding function, and penile appearance. Despite the high rate of re-intervention, satisfaction was reported to be good. Surgeons and patients agreement on cosmetic outcome was poor, supporting a focus on functional outcome rather than on cosmetics when re-interventions are an option.

Author statements

None declared.

Funding

None.

Conflicts of interest

The authors have no conflict of interest to disclose.

References

[1] Bhatia VP, Mittal AG, Austin PF, Hilliard ME. The hypospadias-specific health-related quality of life conceptual framework: a scoping review of the literature. Qual Life Res 2021;9:9.
[2] van der Horst HJ, de Wall LL. Hypospadias, all there is to know. Eur J Pediatr 2017;176:435—41.
[3] Bhatia VP, Hilliard ME, Austin PF, Mittal AG. Evaluating quality of patient-reported outcome measures in patients with hypospadias. J Pediatr Urol 2021;17:50—8.
[4] Ortqvist L, Fossum M, Andersson M, Nordenstrom A, Frisen L, Holmdahl G, et al. Long-term followup of men born with hypospadias: urological and cosmetic results. J Urol 2015;193:975—81.
[5] Chertin B, Natsheh A, Ben-Zion I, Prat D, Kocherov S, Farkas A, et al. Objective and subjective sexual outcomes in adult patients after hypospadias repair performed in childhood. J Urol 2013;190:1556—60.
[6] Rynja SP, Wouters GA, Van Schaijk M, Kok ET, De Jong TP, De Kort LM. Long-term followup of hypospadias: functional and cosmetic results. J Urol 2009;182:1736—43.
[7] Andersson M, Sjostrom S, Wangqvist M, Ortqvist L, Nordenskjold A, Holmdahl G. Psychosocial and sexual outcomes in adolescents following surgery for proximal hypospadias in childhood. J Urol 2018;200:1362—70.
[8] Fraumann SA, Stephany HA, Clayton DB, Thomas JC, Pope JCt, Adams MC, et al. Long-term follow-up of children who underwent severe hypospadias repair using an online survey with validated questionnaires. J Pediatr Urol 2014;10:446—50.
[9] Rynja SP, de Jong T, Bosch J, de Kort LMO. Proximal hypospadias treated with a transverse preputial island tube: long-term functional, sexual, and cosmetic outcomes. BJU Int 2018;122:463—71.
[10] Belgacem A, Fourcade L, Pelette R, Bouchet E, Lescure V, Bertherat W, et al. Long-Term outcomes of distal hypospadias repair: a patients' point of view. Urol Times 2020;23:23.
[11] van den Dungen IAL, Rynja SP, Bosch J, de Jong T, de Kort LMO. Comparison of preputioplasty and circumcision in distal hypospadias correction: long-term follow-up. J Pediatr Urol 2019;15:47.e1. e9.
[12] Vandendriessche S, Baeyens D, Van Hoecke E, Indekeu A, Hoebeke P. Body image and sexuality in adolescents after hypospadias surgery. J Pediatr Urol 2010;6:54—9.
[13] Tack LJW, Springer A, Riedl S, Tonnhofer U, Hiess M, Weninger J, et al. Adolescent and young adult urogenital outcome following childhood hypospadias repair: perfection revisited. J Urol 2021;206:734-744..
[14] Schonbucher VB, Landolt MA, Gobet R, Weber DM. Psychosexual development of children and adolescents with hypospadias. J Sex Med 2008;5:1365—73.
[15] Tack LJW, Springer A, Riedl S, Tonnhofer U, Weninger J, Hiess M, et al. Psychosexual outcome, sexual function, and long-term satisfaction of adolescent and young adult men after childhood hypospadias repair. J Sex Med 2020;19:19.
[16] Gulseth E, Urdal A, Andersen MH, Diseth T, Aksnes G, Emblem R, et al. High satisfaction on genital self-perception and sexual function in healthy Norwegian male adolescents. J Pediatr Urol 2021;17:555.e1—8.
[17] Sullivan KJ, Hunter Z, Andrioli V, Guerra L, Leonard M, Klassen A, et al. Assessing quality of life of patients with hypospadias: a systematic review of validated patient-reported outcome instruments. J Pediatr Urol 2017;13:19—27.
[18] Winship BB, Rushton HG, Pohl HG. In pursuit of the perfect penis: hypospadias repair outcomes. J Pediatr Urol 2017;13:285—8.
[19] Mureau MA, Slijper FM, Slob AK, Verhulst FC, Nijman RJ. Satisfaction with penile appearance after hypospadias surgery: the patient and surgeon view. J Urol 1996;155:703—6.
[20] Weber DM, Schonbucher VB, Landolt MA, Gobet R. The Pediatric Penile Perception Score: an instrument for patient self-assessment and surgeon evaluation after hypospadias repair. J Urol 2008;180:1080—4. discussion 4.
[21] Mitropoulos D, Artibani W, Biyani CS, Bjerggaard Jensen J, Rouprêt M, Truss M. Validation of the clavien-dindo grading system in urology by the European association of urology guidelines ad hoc panel. Eur Urol Focus 2018;4:608—13.
[22] Menon V, Breyer B, Copp HL, Baskin L, Disandro M, Schlomer BJ. Do adult men with untreated ventral penile curvature have adverse outcomes? J Pediatr Urol 2016;12:31.e1—7.
[23] Diseth TH, Bjordal R, Schultz A, Stange M, Emblem R. Somatic function, mental health and psychosocial functioning in 22 adolescents with bladder exstrophy and epispadias. J Urol 1998;159:1684—9. discussion 9-90.
[24] Mattsson S. Flow rate nomograms in 7- to 16- year old healthy children. Neurourol Urodyn 1994;13:267—80.
[25] Sinatti C, Schechter MY, Spinoit AF, Hoebeke P. Long-term outcome of urethral and genital reconstruction in hypospadias and exstrophy-epispadias complex. Curr Opin Urol 2021;31:480—5.
[26] Andersson M, Sjostrom S, Doroszkiewicz M, Ortqvist L, Abrahamsson K, Sillen U, et al. Urological results and patient satisfaction in adolescents after surgery for proximal hypospadias in childhood. J Pediatr Urol 2020;16:660.e1—8.
[27] Ruppen-Greeff NK, Weber DM, Gobet R, Landolt MA. What is a good looking penis? How women rate the penile appearance of men with surgically corrected hypospadias. J Sex Med 2015;12:1737—45.
[28] Adams J, Bracka A. Reconstructive surgery for hypospadias: a systematic review of long-term patient satisfaction with cosmetic outcomes. Indian J Urol 2016;32:93—102.
[29] Spinoit AF, Waterschoot M, Sinatti C, Abbas T, Callens N, Cools M, et al. Fertility and sexuality issues in congenital lifelong urology patients: male aspects. World J Urol 2021;39:1013—9.
[30] Kim JK, Shiff M, Chua ME, Zu'bi F, Ming JM, Pokarowski M, et al. Time to event analysis for post-hypospadias repair complications: a single-surgeon experience. World J Urol 2021;8:8.
[31] Gul M, Hildorf S, Silay MS. Sexual functions and fertility outcomes after hypospadias repair. Int J Impot Res 2020;1:1.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpurol.2023.03.001.