

Retrospective Study Over the Hypospadias Surgery in a Single Tertiary Center

RADU FRUNTELATĂ¹, GEORGE ALIN STOICA², MIRCEA OVIDIU CIOBANU²,
MARIUS EUGEN CIUREA³, OLIVIU NICA³, MARIA STOICA⁴

¹PhD Student, Department of Pediatric Surgery, University of Medicine and Pharmacy of Craiova, Romania

²Department of Pediatric Surgery, University of Medicine and Pharmacy of Craiova, Romania

³Department of Plastic and Reconstructive Surgery, University of Medicine and Pharmacy of Craiova, Romania

⁴Department of ICU and Anesthesia, University of Medicine and Pharmacy of Craiova, Romania

ABSTRACT: Hypospadias surgery is a common activity in every department for pediatric surgery, increased incidence of this condition contributing this aspect. For this purpose permanent review of the data of cases is probably necessary, in order to promptly evaluate short and long term results. Material and methods. The authors are presenting this retrospective clinical and statistical study, enrolling 149 patients, hospitalized and operated in the Department of Pediatric Surgery and Orthopedics, between 2009 and 2018. several parameters were taken into consideration: moment of conception, type of hypospadias, associated malformations, use of meatoplasty, age at meatoplasty, age at urethroplasty, type of urethroplasty, postoperative incidents and complications. Results. Most of the patients included in the study were classified as anterior type of hypospadias, associated malformations were present in 20,13% of the patients, and 80% of the associated malformations belonged to the urogenital system. Over 60% of the cases underwent meatoplasty as a tactical procedure. Mathieu was the most appreciated procedure (74,5%) for urethroplasty and over a half of the patients were operated after the age of 3 years. Early and late postoperative fistula formation was noted in 18,12% of cases. Conclusions. Better parameters to assess the exact type of hypospadias are needed to be introduced. Also, clear protocols for preoperative work-up in detection of other abnormalities, especially genito-urinary. Meatoplasty as a tactical procedure is having unclear influence for urethroplasty. Decreasing the age at urethroplasty should be the next goal. Some surgeons should really get overspecialized for this type of surgery.

KEYWORDS: *Hypospadias, urethroplasty, complications, associated malformations.*

Introduction

Hypospadias is a developmental anomaly characterized by a urethral meatus that opens onto the ventral surface of the penis, proximal to the end of the glans. The meatus may be located anywhere along the shaft of the penis, from the glans to the perineum [1].

The first description of hypospadias and its surgical correction was reported in the 1st and 2nd centuries by the Alexandrian surgeons Heliodorus and Antyllus [2,3].

The incidence of this condition is estimated between 0,8 and 8,2 per 1000 live male births, but there is a big variation due to geographic and racial differences. Many studies are not reporting the minor cases of hypospadias, so probably if all these cases are published, the incidence will be around 1 in 125 live births [4].

A defect in the androgen stimulation of the developing penis, which precludes complete formation of the urethra and its surrounding structures, is the ultimate cause of hypospadias. This defect can occur from deficient andro-gen production by the testes and placenta, from failure of testosterone to convert to dihydrotestosterone by the 5 α -reductase enzyme, or from deficient androgen receptors in the

penis. Various disorders of sexual differentiation can cause deficiencies at any point along the androgen- stimulation axis. A higher incidence of hypospadias has been noted in winter conceptions [5], also a weak association between hypospadias and the maternal ingestion of progestin-like agents has been noted [6,7].

Genetic factors are indicated by the higher incidence of the anomaly in first-degree relatives of hypospadias patients [7,8,9].

Material and Methods

This is a retrospective clinical and statistical study, enrolling 149 cases of hypospadias hospitalized and operated in the Department of Pediatric Surgery, Emergency County Hospital of Craiova, Romania, between 2009 and 2018. All data was collected from: clinical observation files and operation description protocols. Several parameters were taken into consideration: moment of conception, type of hypospadias, associated malformations, age at meatoplasty, age at urethroplasty, type of urethroplasty, type of all surgical procedures, duration of urethroplasty, type of suture for neourethra, type of urethro-vesical (UV) catheter, use of antibiotics, early complications and incidents, late complications and re-do surgery.

Concerning the type of hypospadias all cases were distributed in three main groups: anterior (77,18%) (including glandular, coronal, distal penile shaft), middle (16,1%) (including: middle penile shaft) and posterior (6,71%) (including: proximal penile shaft, penoscrotal, scrotal and perineal).

In our department there is still a "fashion" to use meatoplasty as a preparatory intervention for hypospadias repair, in order to correct the diameter of the meatus, providing a smooth line-up of the future neo-urethra. Some surgeon prefer to do the meatoplasty early, before 6 months of age and others after this age, as a scheduled operation, or if the patient came later in life, after the age of one year.

Statistical analysis was performed using Microsoft Excel (Microsoft Corp., Redmond, WA, USA), and IBM SPSS Statistics 20.0 (IBM Corporation, Armonk, NY, USA) for processing

the data. To describe the numerical data used in the present study, we used the following statistical indicators: arithmetic mean, median, quartiles and interquartile interval, minimum and maximum. For categorical data, we computed absolute and relative values.

This study was approved by the Ethics Board of the Emergency County Hospital of Craiova, the authors obtaining permission to review medical records on-site, without extracting any personal identification data.

Results

Regarding the risk factors for hypospadias, as we already mentioned above, it is published in the literature the high risk of this condition, related to winter conceptions. In our study the highest incidence was recorded in Fall (33,55%) and Winter (24,83%) (Figure 1).

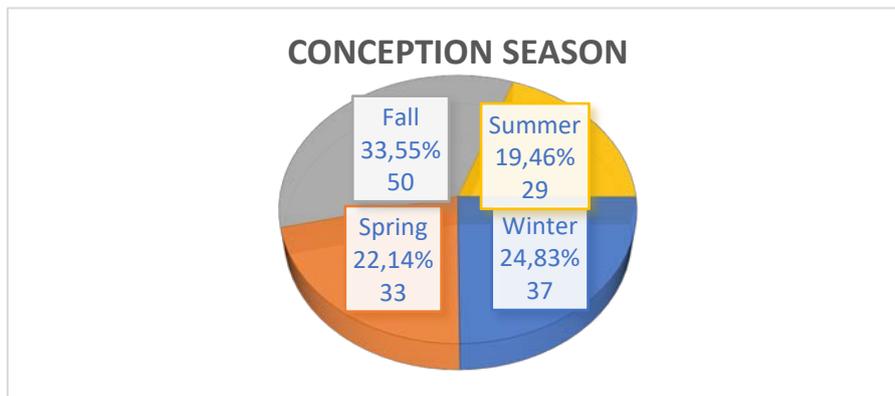


Figure 1. Season of conception of pregnancy in the cases included in the study.

Most of the cases included in the study are classified as the anterior type (77,18%, 115 cases) of hypospadias (including glandular, coronal, distal penile shaft) (Figure 1).

Sometimes we have noted a misinterpretation of a middle hypospadias as an anterior type, depending on the opinion of the surgeon or trainee who wrote the diagnosis in the clinical transcript files.



Figure 2. Clinical aspect of a case with anterior hypospadias. Coronal localization of the meatus (arrow). No significant curvature of the penile shaft (dart line).

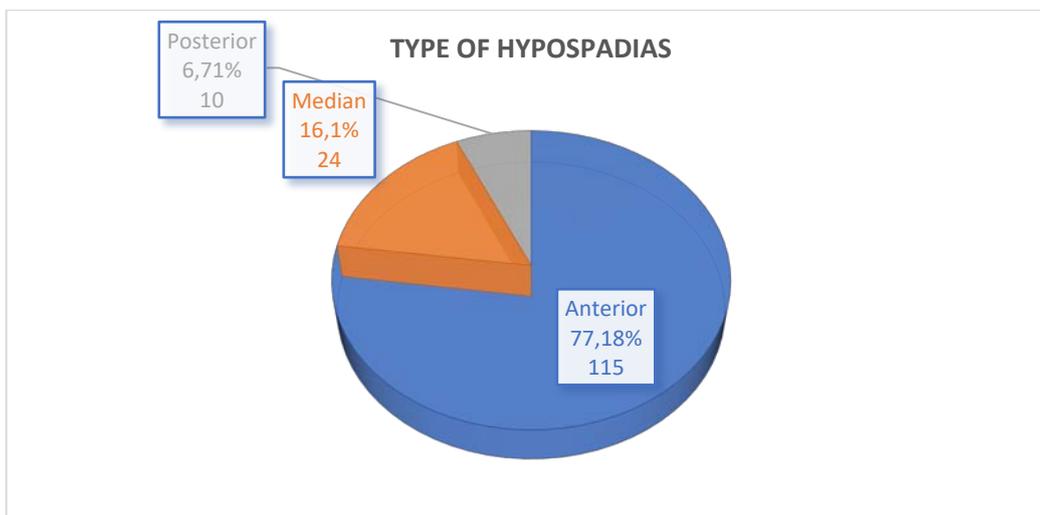


Figure 3. Cases according to the type of hypospadias.

Hypospadias can be associated with other type of malformations and sometimes can be a part of a syndrome (Tables 1,2). In our study 20,13% (30) of all cases was noted to have at least one associated malformation, and 80% of associated malformations cases belong to the urologic and genitalia system.

Table 1. (up) and 2 (below). Associated malformation detected in the study.

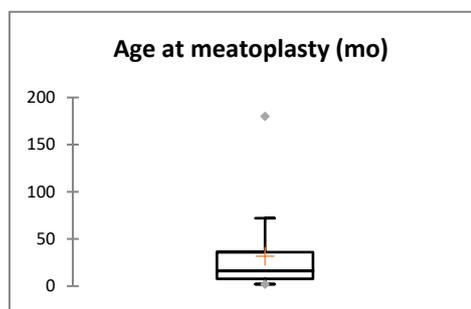
Associated malformations	No. of cases
Preauricular condyloma	1
Undescended testis	9
Duplex kidney	2
DSA	4
Inguinal hernia	1
UPJ stenosis	6
Anorectal mal and undescended testis	2
Horseshoe kidney	2
VUR	3
(without)	119

Associated malformations Yes/No	Incidence
Yes	20,13% (30)
No	79,87% (119)
Urinary and genitalia malformations	80% from all cases with associated malformations

Meatoplasty was proffered in 61,74% of all cases, even if today is an optional maneuver before the total repair, in many centers. In the rest of the cases the meatus has normal aspect or the surgeon preferred to do the repair without meatoplasty. In the same time, according to traditional guidelines for hypospadias repair, meatoplasty was indicated starting with the age of 6 months. 48,92% of boys underwent meatoplasty as a preparational procedure until the age of 6 months (Table 3 and Figure 4).

Table 3. The use of meatoplasty as the first step of hypospadias repair.

Meatoplasty	
Yes	61,74% (92)
No	38,26% (57)
Age at meatoplasty	No. of cases
>6 Mo	51,08% (47)
≤6 Mo	48,92% (45)
(no meatoplasty)	38,26%



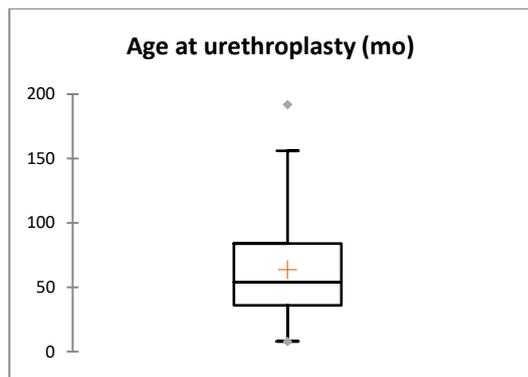
Age at meatoplasty	
Mean	57,17284
Standard Error	24,01329
Median	33,31637
Standard Deviation	67,91983
Sample Variance	4613,104
Kurtosis	0,218128
Skewness	1,356831
Range	178
Minimum	2
Maximum	180
Sum	457,3827
Count	8
CFI (95,0%)	56,7824

Figure 4. Age of the patients at the moment of meatoplasty.

The main procedure, urethroplasty was indicated in different periods of childhood, in our study (Table 4). Less than 10% (9,40%) were operated before the age of 1 year and 8,72% (13) operated before the age of 2 years (Figure 5).

Table 4. The age at urethroplasty for all cases.

Age at urethroplasty - years	No. of cases
<1	9,40% (14)
1-2	8,72% (13)
2-3	16,78% (25)
3-10	50,34% (75)
Over 10	14,77% (22)



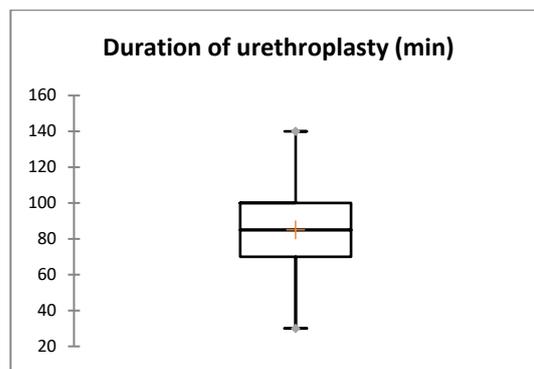
Age at urethroplasty	
Mean	78,60756
Standard Error	21,87643
Median	58,86577
Mode	#N/A
Standard Deviation	61,87588
Sample Variance	3828,624
Kurtosis	0,250789
Skewness	1,053971
Range	184
Minimum	8
Maximum	192
Sum	628,8605
Count	8
Confidence Level (95,0%)	51,72953

Figure 5. The age at urethroplasty for all cases

Seven types of operations were noted in our study. Mainly 4 types of urethroplasty were identified as preferred by the surgeons, but as we see in the Table 5, Mathieu is the most common procedure.

Table 5. Types of operations and type of urethroplasty in all patients.

Type of surgery	Cases
Fistula repair	4,03% (6)
Excision of neourethra	0,67% (1)
Dupley Fevre	12,08% (18)
Island Flap	1,34% (2)
Magpi	6,04% (9)
Mathieu	74,50% (111)
Meatoplasty only	1,34% (2)



Operative time for urethroplasty	
Mean	84,80653
Standard Error	16,31467
Median	85,05034
Mode	#N/A
Standard Deviation	46,14485
Sample Variance	2129,347
Kurtosis	-0,83628
Skewness	-0,02352
Range	129,6484
Minimum	19,35156
Maximum	149
Sum	678,4522
Count	8
Confidence Level(95,0%)	38,57806

Figure 6. Variation of operative time for all urethroplasties.

A wide range of UV catheters were utilized in the patients in our study but in the Table 6 we see that in the majority of cases, the polytene material was preferred. The catheter was maintained usually for 7 days, together with the antibiotic prophylaxis (Table 7). Also, in the wide majority of cases (almost 98%) separate stiches were used to suture the neourethra (Table 6).

Table 7. The use of antibiotics for prophylaxis in the postoperative period.

Antibiotherapy (days)	Cases
>7 days	26,17% (39)
≤7 days	73,83% (110)

The category of early postoperative complications was dominated by oedema of the skin of the prepuce and penis (Table 8).

Table 8. Early postoperative incidents and complications.

Complications/Incidents	Incidence
Ecchymosis	0,67%
Oedema	31,74%
Hematoma	0,67%
Hemorrhage	0,67%
Accidental removal of the UV cath (without)	0,67%
	66,25%

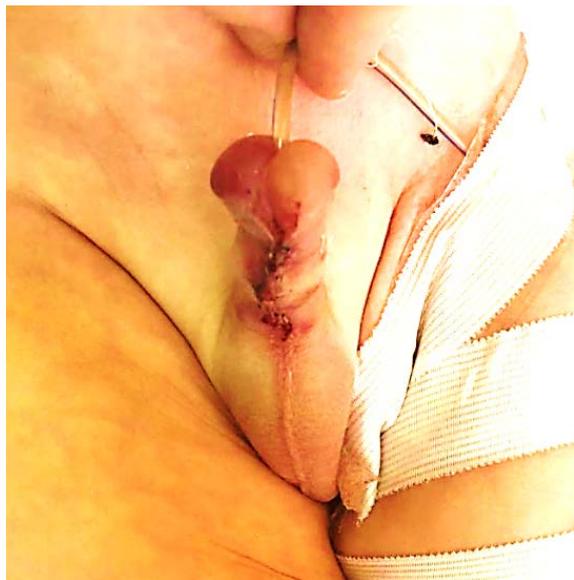


Figure 7. Postoperative oedema of the preputial skin and few ecchymosis.

As expected, the formation of fistula, was the main complication after hypospadias surgery, and only few cases of stenosis.

Table 9. Late complications after urethroplasty.

Complications	No. of cases
Fistula	18,12% (27)
Stenosis	1,34% (2)
Wound breakdown/nonunion	11,40% (17)
Stenosis, fistula	0,67% (1)



Figure 8. Postoperative fistula after hypospadias repair (arrow).

Discussions

Despite the actual knowledge and experience, hypospadias remains a open discussion topic, in every scientific reunion. And if we search for reasons, why after such many cases there are still complications and bad results, sometimes is not easy to understand them.

In our study, the theory regarding the increased incidence of hypospadias cases, with conception during winter is not clear. 58,38% of cases had a conception period during fall and winter (winter only 24,83%).

Most of the cases in the study were classified into anterior type of hypospadias (77,18%) comparing to literature 65-70% [1].

In some cases probably there might be a confusion between anterior type and median during initial examination and typewrite of the diagnosis. Few cases were probably misplaced in a different group due to hospital software for disease classification.

In 1/5 of the patients associated malformations were detected and 4/5 of the associated malformations were genitourinary malformations. In different papers the associated malformations are varying, according the type of hypospadias, upper tract urinary abnormalities are present in peno-scrotal type [1].

Meatoplasty is a simple surgical procedure that is used in two different situations: to correct only a stenotic meatus, or a as technique for distal glandular hypospadias. In our cases this procedure is considered a tactical step, in order to prepare the future neourethra. It is considered that the enlargement of the meatus will provide a wide, good point of start, in creating the neourethra, avoiding possible strictures. It was adopted decades ago and perpetuated over generations of surgeons and trainees. For this reason 61,74% of cases underwent meatoplasty previously to urethroplasty. Also the border age for meatoplasty was considered in the past, the age of 6 months; 51,08% of the cases had meatoplasty after the age of 6 months but 38,26% from all cases had no meatoplasty. In 48,92% of cases the meatoplasty was performed earlier than 6 months.

Urethroplasty is the goal for correction of hypospadias, together with other abnormalities of the penis structures. In our group of patients there is a short list of surgical techniques for urethroplasty. Most of the cases were operated according to Mathieu technique (almost $\frac{3}{4}$ of the cases). Mathieu is a safe and easy to learn technique for hypospadias, of course adapted to the type of hypospadias. There are also

variations and artifices to the basic standard technique. Probably every surgeon adapted for "his self" this technique, using variable distance between stiches or the use of surget type suture, use of additional tissue layers over the neourethra, etc.

As we can see above (Table 5) over a half of the patients underwent urethroplasty after the age of 3 years, passing the ideal window, probably influenced by old ideas that advocate tissue improvement with penis enlargement and growth.

Mathiew procedure (1928) [3] seem very easy to be transmitted to trainees in order to develop their skills for hypospadias surgery, comparing to other more complicated techniques, suitable for more severe types of the malformation. The use of the tourniquet at the base of the penis was noted in 37,6% of the cases, in most of the cases a fragment of a surgical glove wrist ring.

The UV catheter was maintained, in most of the cases, until the 7th postoperative day (73,83%), also the antibiotherapy, with a wide variety of the type of the catheter (Table 6). In many reports the use of antibiotics is not advocated anymore [10].

This variation in choosing the UV catheter in our study, probably is dictated by the availability of the catheter. The golden rule for this aspect is: "how wide it can be".

The immediate postoperative incidents category was dominated by oedema of the skin of the penis, glans and prepuce (31,74%), treated conservatively, and remitted before the removal of the UV catheter and dehiscence of the glans and skin in 11,40% of the cases, as the most severe immediate postoperative course. In literature the rate for wound dehiscence is variable from 2,6% [11] to 16,7% [12].

Fistula formation early and late postoperative was encountered in 18,12% of our cases comparing cu variable data in different reports, varying from 3,5 to 30,1% [12,13,14,16,17]. The stenosis cases seems to be not well recorded and documented in our patients (only 1,34%). Fistula formation can be caused in many cases by the stenotic distal neourethra, but the detection of the fistula, by the surgeon, might became a "mirage" and the surgeon is not investigating the entire urethra.

Conclusions

Better including criteria for every case into a type of if necessary subtype of hypospadias.

A more extended plan for preoperative screening is necessary in order to detect the associated malformations (especially genitourinary) in order to prevent unexpected complication.

Hypospadias is a type of surgery requiring skills and tricks developed and acquired after many cases, so probably some surgeons in every department need to operate mostly hypospadias, in order to obtain better results.

Single step repair for anterior hypospadias should be considered in the future, because tactical meatoplasty, seems not to influence the rate of complications.

The age of urethroplasty is mandatory to be decreased by changing the information transmitted to trainees and residents.

Beyond complications, and technical results, in the future studies are needed to evaluate the interaction with the family of the patient with hypospadias, regarding the degree of satisfaction, coping techniques in front of this pathology, that sometimes takes many interventions and long hospital stay.

Conflict of interests

None to declare.

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*Corresponding Author: George Alin Stoica, Department of Pediatric Surgery and Orthopedics,
University of Medicine and Pharmacy of Craiova, Romania, Petru Rares, No. 2, 200349,
e-mail: alin.stoica76@gmail.com*