

Clinical Study

Hypospadias Repair: A Single-Centre Experience with Clinical Presentations, Operative Techniques and Outcome

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Keywords

Hypospadias
Koyanagi operation
Penile malformation
Thiersch- Duplay repair
Urethro-cutaneous fistula
Urethroplasty

Abbreviations

TIPU - Tubularized Incised
Plate Urethroplasty

Abstract

Background: *Hypospadias is the most common congenital abnormality of the penis. Its incidence is on the rise; however, its reconstructive repair remains a huge challenge. We reviewed our experience with an aim to expand our understanding and modify the treatment protocols.*

Patients and Methods: *This is a retrospective evaluation of all consecutive cases of hypospadias repaired at a Nigerian Teaching Hospital between January 2013 and June 2018. Data on demography, presentations, type of anomaly, repair techniques and outcome were extracted from case records and analyzed.*

Results: *A total of 64 boys had primary repair for hypospadias. The median age at presentation and at repair was 17 and 28.5 months respectively. At presentation, 32% had already been circumcised and 71% of them had been done by nurses. The most commonly associated anomaly was inguinal hernias in 3 (5%) and chordee in 39(61%). The location of the meatus was glanular in 2 (3%), coronal in 20 (31%), distal penile in 17 (27%), mid-penile in 6 (9%), proximal penile in 5 (8%), penoscrotal in 7 (11%), interscrotal in 2 (3%) and perineal in 5 (8%). Case volume doubled in two successive years with a peak of 15 per year. Techniques of repair were tubularized incised plate urethroplasty (TIPU) in 51 (80%), Koyanagi in 7 (11%), Thiersch-Duplay in 4 (6%) and staged repair in 2 (3%). Urethro-cutaneous fistulae occurred in 16 (25%); however, in 12 (75%) fistula healed spontaneously. There was a drop in fistula rate from 40% in 2015 to 6.3% in 2018.*

Conclusion: *The incidence of hypospadias in our center is on the increase. In proximal variants staged repairs or Koyanagi technique have better outcomes than TIPU. Sustained practice and modification of techniques reduce complications.*

INTRODUCTION

Hypospadias is the most common congenital penile abnormalities with an incidence of 1 in 250 males in the United States of America.^(1,2,3) Its incidence is found to be on the increase in Western countries and this has been attributed to disruption of endocrine milieu by environmental pollution.^(2,4) There is paucity of epidemiological data from Africa; however, Okeke et.al⁽⁵⁾ reported an incidence of 1.1% in a community study from south-east Nigeria.

According to the location of the external urethral meatus, hypospadias is classified into anterior (glanular, coronal and subcoronal), middle (distal penile, midpenile) and proximal (proximal penile, penoscrotal, inter-scrotal and perineal).⁽⁶⁾ Hadidi further sub-classified the anomalies for standardization and comparison of various subtypes.⁽⁷⁾ He introduced factors such as the nature of the prepuce, the urethral plate, presence or absence of chordee, penile rotation and scrotal transposition. The most commonly associated anomalies are cryptorchidism and inguinal hernias.⁽⁸⁾

Repair of hypospadias continues to pose huge reconstructive challenges to pediatric surgeons, urologists and plastic surgeons. There have been over 300 techniques described in literature;^(1,9) yet none have been successfully and satisfactorily applied to all the variants of the anomalies by all surgeons. Each case is repaired on its merits and according to the surgeon's experience.

The pediatric surgery unit of our hospital began routine repairs of hypospadias in 2013. With an increasing caseload, we considered it necessary to review our experience to highlight the unique challenges and overall outcome in our settings.

PATIENTS AND METHODS

This is a retrospective study of all consecutive cases of hypospadias that were repaired at the Nnamdi Azikiwe University Teaching Hospital,

Nnewi, Nigeria between January 1, 2013 and June 31, 2018. Data on demography, clinical presentation, type of anomaly, repair techniques and the outcomes were extracted from operation theatre registers, patients' case notes and ward records.

All the patients were seen in the clinics of our two pediatric surgery units. Repairs were done by 3 pediatric surgeons and the choice of technique was dependent on the location of the meatus, status of prior circumcision and the experience of the surgeon. We employed 4 major techniques of repair namely, tubularized incised plate urethroplasty (TIPU), Koyanagi repair, Thiersch-Duplay technique and staged procedures. All the procedures were done using fine instruments and atraumatic polyglactin-910 sutures (size 6-0 and 5-0). Hemostasis for the mid-penile and distal variants was achieved with tourniquet application while that of proximal types was achieved by subdermal infiltration of lignocaine with adrenalin (1:100,000 dilution) along the line of incision. It was injected using a 29G needle mounted on a 1ml syringe. The urethral stents used were either pure silicon catheters or appropriate-sized feeding tubes. The stents were allowed to drain freely into the diapers without connecting them to urobags. Suprapubic cystostomy was not done in any patient for urinary diversion. Antibiotic coverage was given with a third-generation cephalosporin (Ceftazidime). Small-size penises were augmented with 1-3 doses of intramuscular testosterone 25 mg, given 3 weekly prior to surgery. Patients were followed up for 3 months -5 years.

Data extracted were entered in a Microsoft Excel spreadsheet and were analyzed using the Statistical Software Package for Social Sciences (IBM SPSS Version 22 Chicago Il). Results are presented in frequencies, percentage (Tables 1-3). Association between categorical variables was tested with the Chi-square test and the statistical significance was set at a p value < 0.05 .

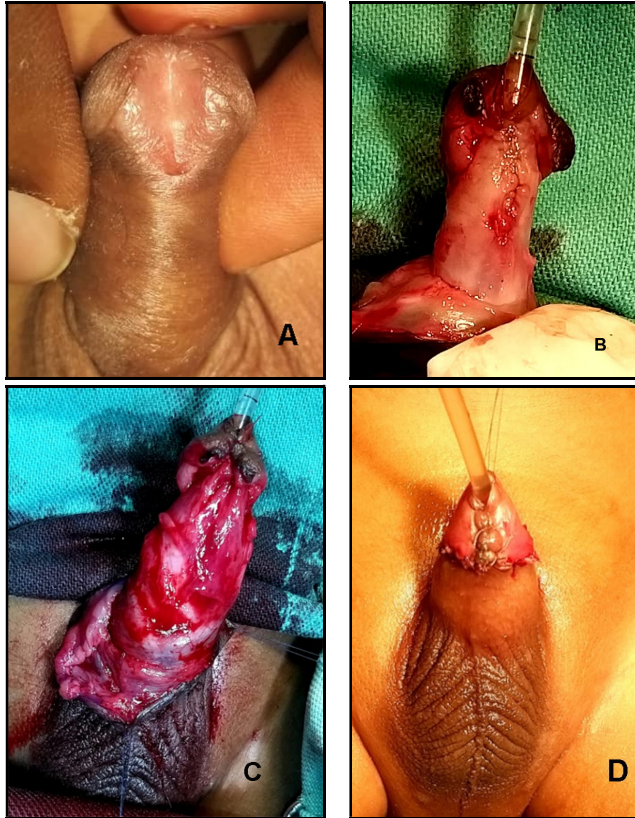


Fig 1. Modified tubularized incised-plate urethroplasty: (A) Distal penile hypospadias in uncircumcised penis; (B) Penile shaft degloved and neo-urethral tubularization done in 2 layers with polyglactin-910 after vertical midline incision on the urethral plate; (C) Vascularized Dartos fascia cover as third layer; (D) Final appearance after glanuloplasty and penile resurfacing.

RESULTS

A total of 64 boys had primary repair of hypospadias within the study period. Our case volume per year was 4 in 2013 (6%), 8 in 2014 (13%), 15 in 2015 (23%), 12 in 2016 (19%) and 10 in the first half of 2018 (16%). The median age at presentation was 17 months (range 2 weeks - 9 years) while the median age at repair was 28.5 months (range 6 months -10 years).

Abnormality of the penis was noticed by parents in 44(69%), doctors in 14(21%), nurses in 5(8%) and grandmother in 1(2%). Table-1 summarizes the types of hypospadias encountered based on the location of the meatus. Chordee was present in 39(61%). The more proximal variants are significantly associated with increased frequency of chordee ($P=0.001$).

Among the 21 boys (33%) who had had circumcised prior to presentation, 15 (71%) were done by nurses, 4 (19%) by doctors, 1 (5%) by traditional circumcisionist and 1(5%) by unknown person.

The most commonly associated co-morbidity was inguinal hernias in 3(5%); others include hemophilia, hydrocele and patent ductus arteriosus (PDA) - each found in 1(2%) patient. Various techniques of repair employed are represented in Table 2. The mean duration of antibiotic therapy was 9.6 ± 2 days (range 5-14).

Complications were reported in 25 (39%) patients (Tables 1-3). Urethro-cutaneous fistula occurred in 16 (25%) however 12(75%) of them healed spontaneously. Of all those who had various complications, only 10 (16%) needed a second surgery. None required a third operation.

Table 1: Frequency of the types of hypospadias and post-operative complications

Location of the meatus	n (%)	Chordee n (%)	Complication n (%)
Glanular	2 (3%)	0 (0%)	1 (50%)
Coronal	20 (31%)	12 (60%)	5 (25%)
Distal penile	17 (27%)	12 (71%)	7 (41%)
Mid-penile	6 (9%)	6 (100%)	3 (50%)
Prox. penile	5 (8%)	5 (100%)	3 (60%)
Penoscrotal	7(11%)	6 (85%)	4 (57%)
Interscrotal	2 (3%)	2 (100%)	1 (50%)
Perineal	5 (8%)	5 (100%)	1(20%)

Prox. - Proximal

Table 2: Technique of hypospadias repair and complications

Surgical Technique	n (%)	Complications n (%)*
TIPU	51 (80%)	20 (39%)
Koyanagi	7 (11%)	3 (42%)
Thiersch-Duplay	4 (6%)	2 (50%)
Staged Repair	2 (3%)	0 (0%)

TIPU - Tubularized incised plate urethroplasty

* $P = 0.001$

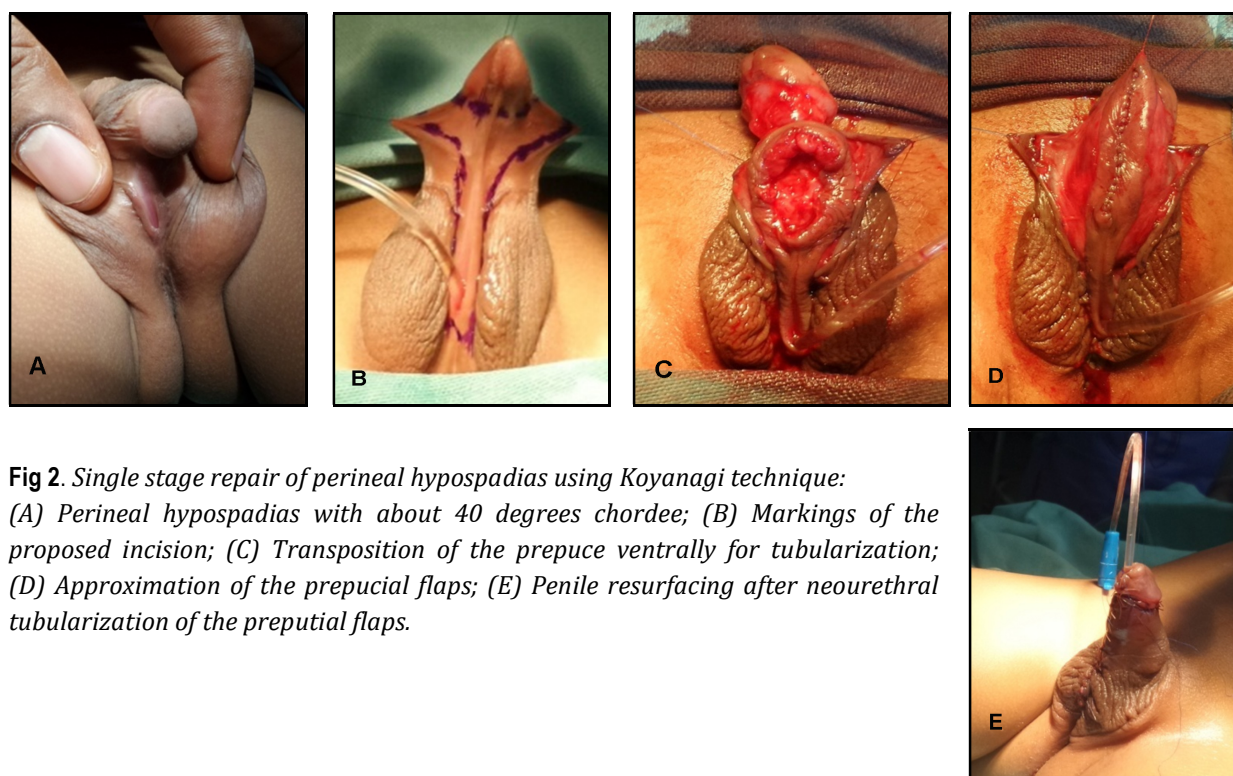


Fig 2. Single stage repair of perineal hypospadias using Koyanagi technique: (A) Perineal hypospadias with about 40 degrees chordee; (B) Markings of the proposed incision; (C) Transposition of the prepuce ventrally for tubularization; (D) Approximation of the prepucial flaps; (E) Penile resurfacing after neourethral tubularization of the preputial flaps.

There was no complication in those who had staged repair ($P = 0.001$). There was a drop in fistula rate from 40% in 2015 to 6.3% in 2018.

DISCUSSION

A two-fold increase in the case volume of hypospadias in our practice was observed for the first 3 years after which it reached a plateau before rising again in the first-half of 2018. This experience appears to be in concordance with the

reported global trend of rising incidence.⁽²⁾ It might also have been due to increased referrals to our center since we started providing the services. Possibly our case volume could have increased still further, but for the limited number of operating days.

The median age at repair in our practice is much higher than the widely recommended age of 6-18 months.^(1,10) Shadrach⁽¹¹⁾ and Bello⁽¹²⁾ operated at

44.9 months and 2 years of age respectively, which is quite similar to that of ours. This may be due to delayed presentations of patients or attributable to the limited availability of operating slots. The later problem was highlighted by Thomas⁽¹³⁾ from Lagos, Nigeria where the median age at repair was 4 years.

Table 3: Frequency of complications in hypospadias repair

Complications	n	%
Isolated Urethro-cutaneous fistula (UCF)	10	40
Partial wound breakdown (WB)	6	24
UCF with meatal stenosis	5	20
UCF with complete wound breakdown	1	4
Bleeding	1	4
Isolated meatal stenosis	1	4
Meatal stenosis with partial WB	1	4
Total	25	100

UCF - Urethro-cutaneous fistula, WB - Wound breakdown

In our series, most of hypospadiac defects were noticed by parents. Although we could not ascertain the place of delivery in this study due to its retrospective nature, this finding underscores the need for a complete evaluation of all newborns by a trained medical person at the time of neonatal circumcisions.

The most common type of hypospadias in our series was anterior hypospadias (61%) followed by the posterior and mid penile types (30% and 9% respectively). This is quite similar to previous studies^(8,10,11,14) that are both from within and outside Nigeria. Chordee was present in 39(61%) while absent in 25(39%) patients. Chordee was present in all mid-penile and proximal variants, but none in the glanular types. Frequent association of chordee with more proximal anomalies was statistically significant. Two Nigerian series reported a pattern of chordee identical to that of our experience.^(11,15)

In this study, 21(33%) were circumcised prior to initial presentation and 71% of the circumcisions had been performed by nurses and 19% by doctors. This is really of great concern. Although a majority of these anomalies were noticed by the parents, circumcision offered another opportunity of detection by healthcare professionals, but that was missed. There may be a need for re-education and retraining of nurses and doctors on the contraindications of circumcision.⁽¹⁶⁾ Prior circumcision does not affect the outcome of distal hypospadias repairs using TIPU.⁽¹⁷⁾ However, the same may not be true of proximal anomalies and for those who may wish to use other techniques of repair. Hence, we still advocate the preservation of the prepuce in all cases of hypospadias.

We encountered coexisting anomalies in 6 boys (9%) and inguinal hernia was the most common. We did not record any case of undescended testis although it is the most common comorbidity in other series.^(11,15)

Four major techniques of repair were employed as shown in table 2. The choice was dictated by the type of anomaly and surgeon's preference. The most commonly utilized technique was the TIPU (80%) and Koyanagi repair (11%). This is similar to the choices of Aisuodionoe-Shadrach et.al.⁽¹¹⁾ The preference of TIPU over other techniques is attributable to the higher prevalence of distal hypospadias than the proximal variants as TIPU is not appropriate for the latter. In contrast to this, Olajide⁽¹⁵⁾ used TIPU in only 2% of patients. We repaired proximal hypospadias using modified Koyanagi's technique or staged repair. Thiersch-Duplay was used for those distal variants with wide and pliable urethral plates while staged repairs were mostly used in those with proximal hypospadias who were already circumcised. It has been emphasized that no single technique assures consistent success in all variants in the hands all surgeons.^(1,18)

All the repairs were stented with per urethral catheter that were allowed to freely drain into diapers. The duration of the stents was between 4-14 days (mean 10.6 ± 2.0). Felicien⁽¹⁸⁾ kept the stents for 15-21 days. Earlier removal of stents may be appropriate in distal hypospadias repairs. In the present study, accidental dislodging of catheter before the 8th postoperative day did not cause increased complications or urine leak. This observation is worthy of persuasion by further research.

Early complications were observed in 25 patients (39%). The complication rate in our study is much higher than that reported by Okoro *et.al* ⁽¹⁹⁾ from Norwich (3.6 - 14%); however, they had higher proportion of distal hypospadias repair than us. Our complication rates are similar to that of Abdur-Rahman⁽²⁰⁾ (33.3%); but higher than that of Bello⁽¹²⁾ (20%) and less than that of Thomas⁽¹³⁾ (56%). The most common complication was urethro-cutaneous fistula in 25% of patients. Although this was statistically significant, 75% of them closed spontaneously. Overall, only 10 patients (15.6%) needed a second operation which had an overall successful rate of 84%. There were more complications in circumcised children (47.6%) than in uncircumcised (34.9%); but this was not statistically significant ($P=0.327$). We also observed that perineal hypospadias had fewer complications (20%) than proximal penile hypospadias (60%) (Table 1). We found that 5 out of 7 penoscrotal hypospadias were repaired with TIPU, while all the perineal variants underwent either Koyanagi or staged repair. The Koyanagi technique is considered an alternative to staged repair.⁽¹⁾ Therefore, we believe that proximal hypospadias are better repaired with either staged technique or Koyanagi operation rather than with TIPU. This has also been highlighted previously by Felicien.⁽¹⁸⁾ There was no complication in those who had staged repair. Initially, the overall complication rate in our series was as high as 53% in 2015 before it dropped to 10% in 2018.

A drop in complication arte is well known to occur with an increasing case volume.⁽⁸⁾

CONCLUSION

There appears to be an increase in the incidence of hypospadias in our setting. A significant number of them present late and are already circumcised. The major complication of repair remains urethro-cutaneous fistula, most of which closed spontaneously. The rate of complications continuously dropped with growing experience. Finally, the Koyanagi operation of staged procedure gave a better outcome for the more proximal variants.

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