COMMENTS FOR THE AUTHOR(S):

Reviewer #1:

The author introduced a series of cases about hypospadias repair surgeries

in MNH,Tanzania，to show reasonable procedures during the management of

hypospadias to control the complications. We think the author confuse

case-control study with cohort study. So, the manuscript must be revised

carefully before publication.

1.    Methods: The data in Table 4.1,Table 4.2 and Table 5 indicates that it

should be reasonable to design a case-control study in this case.

2.    The exclusion and inclusion criteria need to be clearly defined.

3.    The surgical techniques need to be introduced in methods.

4.    Statistic method was not stated in the method. To explore the factors

influencing outcome, a case-control study would be suitable. So, the groups

in Table 5 need to be revised, and amend RR to OR.

5.    The English is not clear and concise, please pay close attention to the

spelling and English which need some improvement.

6.    P values should written in italics.

The number of references is expected to be increased.

Reviewer #2:

The manuscript is good and is worthy of publication after the highlighted

corrections are performed.

Kindly make highlighted corrections including the typos and grammatical

errors.

(The revision mark of Reviewer #2 has been placed in the attachment, please

check.)

**A single center experience of Hypospadias Repair in Dar es Salaam, Tanzania**

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# ABSTRACT

**Background:** Hypospadias is one of the common congenital anomaly that affects children. It can present classically with abnormal ventral opening, chordee and dorsal hood however isolate hypospadias do also exist. Hypospadias repair is one of the commonly performed surgical procedures at Muhimbili National Hospital (MNH) and the outcome of repair is influenced by several factors. Our study aimed to assess the Profile and Early Outcome of Hypospadias repair at Muhimbili National Hospital.

**Methodology:** This was a cross sectional study which involved all children with hypospadias aged ≥6 months and underwent first repair recruited by convenient sampling at Muhimbili national Hospital from March 2018 to January 2019 with a follow up of 30 days from surgery. We excluded children who had Repair before, those who underwent hypospadias repair and died within 24 hours post-operative. Mothers of each participating patient gave an informed consent. Data were collected by a standardized questionnaire and analyzed by using SPSS program version 20.

**Results:** Sixty-three children were enrolled in the study with mean age of 3.7 years. Majority of our patient had Subcorona hypospadias with Snodgrass tubularized incised plate urethroplasty being the common surgical technique. Thirty-seven (58.7%) patients had successful hypospadias repair while 26(41.3%) had complications. The most commonly found early complications were surgical site infection, hematoma, oedema, flap necrosis, urethrocutenous fistula, urethral stricture, wound dehiscent and meatal stenosis. Age>3.5 years at repair, previous circumcised, type and duration of urine drainage< 7 days, type of dressing and changing the 1st dressing < 3 days were found to influence complications rate.

**Conclusion:** Hypospadias is still the common pediatric urological condition with Snodgrass technique being preferred for repair. The outcome of the repair can be influence by different factors regardless of the technique of repair.

**Key words**: Hypospadias, Repair, Outcome

**Introduction:**

Hypospadias is a congenital anomaly characterized by proximal urethral meatus, dorsal hooded prepuce and may have a ventral curvature (chordee). It may also be a part of disorder of sex differentiation, when present with Congenital anomalies such as Cryptorchidism, scrotal and /or Anorectal anomalies. These deformities impair the dual functions of penis which are voiding in a standing posture, cosmetic appearance, sexual intercourse (coitus) and insemination. The incidence is highest among Caucasians, less in Hispanics and least in blacks. It probably results from multiple factors such as endocrine, genetic and environmental factors (1-2).

Classification of hypospadias is based on the position of the urethral meatus, such as distal hypospadias meatus at Glans penis, Corona or Subcoronal, Mid hypospadias urethral meatus at Distal, Mid penile or Proximal penile location, the proximal hypospadias with urethral meatus at penoscrotal, scrotal or perineal position (3).

The evolution of the surgical management of hypospadias can be grouped into three distinct periods, the first starts in first 3 centuries AD, the second during the middle ages or Medieval period and the third period runs from the 19th century until today. These periods seem to be closely linked to advances in instrument manufacture, anesthesia and suture material and surgical technique (1). There are about 250 surgical procedures of hypospdias repair but they can be mainly divided into single stage or multistage repair. The sequence of surgical repair consists of orthoplasty, urethroplasty, meatoplasty and glanuloplasty, scrotoplasty and skin coverage. Outcome of surgical repair is influenced by several factors such as severity of deformity, androgen therapy, and timing of surgery, instruments, use of magnification, suture materials and techniques, urine drainage, preoperative and post-operative antibiotics (4-6). Our study aimed to assess the Profile and Early Outcome of Hypospadias repair at Muhimbili National Hospital.

**Materials and Methods**

This was a hospital based cross sectional study that was conducted at Muhimbili National Hospital. Muhimbili is a National Referral Hospital and University Teaching Hospital with 1,500 bed facility, attending 1,000 to 1,200 out patients week, admitting 1,000 to 1,200 inpatients per week. It is located in Dar es Salaam, Ilala district, Upanga ward. MNH has 3 pediatrics surgeons, 8 urologists and 3 professors in urology that operates on hypospadias patients. Our study targeted all children who were admitted and underwent hypospadias repair at Pediatrics surgery wards, kibasila wards 14, 16 and Sewahaji wards 17, 18 for the period of March 2018 to January 2019 with a follow up of 30 days from surgery being recruited by convenient sampling. We excluded children who had Repair before, those who underwent hypospadias repair and died within 24 hours post-operative. Data were collected by a standardized questionnaire and analyzed by using SPSS program version 20 while association between variables was determined by chi square test. Association with p value of < 0.05 was considered significant.

**Ethical issues**

Ethical clearance was obtained from the Muhimbili University of Health and Allied Sciences (MUHAS) research and publication committee and MNH research and publication committee and the permission to conduct the study in the hospital was obtained from MNH management. Mothers of each participating patient gave an informed consent.

**RESULTS**

A total of 63 patients met our inclusion criterion and were recruited in the study. Majority (52.4%) patients had age between 1-3 years with mean age of 3.7 years. {**Table 1**}.

Table 1: Age group of patient with hypospadias at primary repair at MNH

|  |  |  |
| --- | --- | --- |
| Age group in years | Frequency | Percentage |
| < 1 year | 1 | 1.6 |
| 1-3 years | 33 | 52.4 |
| >3 - 6 years | 20 | 31.7 |
| >6 years | 9 | 14.3 |
| Total | 63 | 100 |

Most our patients (92.1%) had dorsal hooded prepuce while 30(47.6%) patients were found to have ventral curvature (chordee) of varying degree, 3(4.8%) had small glans penis warranting the to be given testosterone for 3 weeks before surgery together with 4(6.3%) who had small penile shaft {**Tables 2**}.

Table 2: Clinical presentation N=63

|  |  |  |
| --- | --- | --- |
|  | Frequency | Percentage |
| Presence of Prepuce |  |  |
| Dorsal hooded prepuce | 58 | 92.1 |
| **Previous Circumcised** | **5** | **7.9** |
|  |  |  |
| Size of Glans penis |  |  |
| **Small (<14 mm)** | **3** | **4.8** |
| Adequate (≥14 mm) | 60 | 95.2 |
|  |  |  |
| Size of penis |  |  |
| Small | 4 | 6.3 |
| Adequate | 59 | 93.7 |
|  |  |  |
| Location of urethral meatus |  |  |
| Glans penis (megameatus) | 1 | 1.6 |
| **Subcorona** | **21** | **33.3** |
| Distal penile | 8 | 12.7 |
| Mid penile | 8 | 12.7 |
| **Proximal penile** | **16** | **25.4** |
| Scrotal | 6 | 9.5 |
| Perineal | 3 | 4.8 |
|  |  |  |
| Ventral curvature |  |  |
| **Yes** | **30** | **47.6** |
| No | 33 | 52.4 |
|  |  |  |
| **Presence of testes** |  |  |
| Yes | 61 | 96.8 |
| **No** | **2** | **3.2** |
|  |  |  |

Four surgical techniques were commonly used at Muhimbili National Hospital with Tubularized incised plate (Snodgrass) being most popular by 55.6% followed by staged hypospadias repair 14(22.2%). Meatal advancement and Glanuloplasty was applied by 13(20.6%) while Onlay prepucial skin graft was a least popular technique by (1.6%). {**Table 3 below**}.

Table 3: Common surgical technique used

|  |  |  |
| --- | --- | --- |
|  | Frequency | Percent |
| **Tubularized incised plate (Snodgrass)** | **35** | **55.6** |
| Staged hypospadias repair | 14 | 22.2 |
| Meatal advancement and glanuloplasty | 13 | 20.6 |
| Onlay prepucial skin flap | 1 | 1.6 |
| Total | 63 | 100 |

Majority of our patients 37(58.7%) had successful hypospadias repair upon a follow up of 30 days while 26(41.3%) patients had complications post hypospadias repair in which surgical site infection was the commonest complication 23(36.5%) followed by hematoma formation 20(31.7%), urethral stricture and flap necrosis involving skin only rare complications by1(1.6%) respectively. {**Tables 4.1 and 4.2**}.

|  |  |  |
| --- | --- | --- |
| **Table 4.1; Early outcome of hypospadias repair before being discharged N=63** | | |
|  | Frequency | Percentage |
| Hematoma |  |  |
| **Yes** | **20** | **31.7** |
| No | 43 | 68.3 |
|  |  |  |
| Oedema |  |  |
| Severe | 18 | 28.6 |
| Mild | 45 | 71.4 |
|  |  |  |
| Surgical site infection |  |  |
| **Yes** | **23** | **36.5** |
| No | 40 | 63.5 |
|  |  |  |
| Flap necrosis involving skin only |  |  |
| Yes | 1 | 1.6 |
| No | 62 | 98.4 |
|  |  |  |
| Flap necrosis involving both skin and dartos fascia | |  |
| **Yes** | **17** | **27** |
| No | 46 | 73 |
|  |  |  |
| Urethrocutenous fistulae |  |  |
| Yes | 11 | 17.5 |
| No | 52 | 82.5 |
|  |  |  |
| Poor urine stream with straining |  |  |
| Yes | 1 | 1.6 |
| No | 62 | 98.4 |
|  |  |  |
| Complete urethroplasty dehiscence |  |  |
| **Yes** | **7** | **11.1** |
| No | 56 | 88.9 |
|  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 4.2; Outcome of hypospadias patient 30 days post repair and dicharge N=63** | | | | | | | | | | | |
|  | | | |  |  | |  | Frequency | | Percentage | |
| **Successful repair** | | | | |  | |  |  | |  | |
| Yes | | | |  |  | |  | 37 | | 58.7 | |
| No | | | |  |  | |  | 26 | | 41.3 | |
| Urethral meatus at the tip of glans penis | | | | | | | |  | |  | |
| Yes | | | |  |  | |  | 52 | | 82.5 | |
| No | | | |  |  | |  | 11 | | 17.5 | |
|  |  |  |  | | |
| Meatal stenosis | | | | |  | |  |  | |  | |
| Yes | | | |  |  | |  | 11 | | 17.5 | |
| No | | | |  |  | |  | 52 | | 82.5 | |
|  |  |  |  | | |  | | |
| **Urethrocutenous fistula** | | | | | | |  |  | |  | |
| Yes | | | |  |  | |  | 15 | | 23.8 | |
| No | | | |  |  | |  | 48 | | 76.2 | |
|  |  |  |  | | |  | | |
| **Urethra stricture** | | | | |  | |  |  | |  | |
| Yes | | | |  |  | |  | 3 | | 4.8 | |
| No | | | |  |  | |  | 60 | | 95.2 | |
| Complete urethroplasty dehiscence | | | | | | | |  | |  |
| Yes | | | | | | | | 7 | | 11.1 |
| No | | | | | | | | 56 | | 88.9 |

Age above 3.5 years at primary repair had complication was found to influence complications rate by 51.7% compared to 32.4% of patients with age ≤3.5years, previous circumcision influenced complication rate by 60%, single staged repair for posterior hypospadias was accompanied with complications when compared to 6(37.5%) patients with posterior hypospadias who underwent staged repair. Urine drainage by cystostomy and stent for more than 7 days was in favor of good outcome although it was not significant with a p value of 0.06. The influence to the outcome of suture materials, use of magnifying lens and surgeons experience were not established. {**Table 5**}

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table5; Univariate analysis of factors influencing outcome of hypospadias repair N=63** | | | | | |  |
| Variable | Total | | Complicated (%) | Successfully (%) | P value | RR(reference) |
| Age group in years at primary surgery | | |  |  | 0.12 |  |
| >3.5 | | 29 | 15(51.70) | 14(48.30) |  | 1.59(0.87-2.91) |
| ≤3.5 | | 34 | 11(32.40) | 23(67.60) |  |  |
|  | |  |  |  |  |  |
| Circumcision | |  |  |  | 0.64 |  |
| Yes | | 5 | 3(60.00) | 2(40.00) |  | 1.51(0.69-3.31) |
| No | | 58 | 23(39.70) | 35(60.30) |  |  |
|  | |  |  |  |  |  |
|  | |  |  |  |  |  |
| Glans penis size | |  |  |  | 0.1 |  |
| Small | | 3 | 1(33.30) | 2(66.70) |  | 0.80(0.15-4.07) |
| Adequate | | 60 | 25(41.70) | 35(58.30) |  |  |
|  | |  |  |  |  |  |
| location of urethral meatus | |  |  |  | 0.86 |  |
| Posterior | | 25 | 10(40.00) | 15(60.00) |  | 0.95(0.51-1.71) |
| Anterior | | 38 | 16(42.10) | 22(57.90) |  |  |
|  | |  |  |  |  |  |
| Duration of urine drainage | |  |  |  | 0.06 |  |
| <7 days | | 3 | 3(100) | 0 |  | 2.60(1.89-3.59) |
| ≥7 days | | 60 | 23(38.30) | 37(61.70) |  |  |
|  | |  |  |  |  |  |
| When is the first dressing changed | |  |  |  | 0.45 |  |
| <3 | | 14 | 7(50.00) | 7(50.00) |  | 1.28(0.68-2.42) |
| ≥3 | | 49 | 19(38.80) | 30(61.20) |  |  |
|  | |  |  |  |  |  |
| TIP (snodgrass) | |  |  |  | 0.77 |  |
| Yes | | 35 | 15(42.90) | 20(57.10) |  | 1.09(0.60-1.98) |
| No | | 28 | 11(39.30) | 17(60.70) |  |  |
|  | |  |  |  |  |  |
| Staged hypospadias | |  |  |  | 0.45 |  |
| Yes | | 14 | 7(50.00) | 7(50.00) |  | 1.28(0.68-2.42) |
| No | | 49 | 19(38.80) | 30(61.2) |  |  |
|  | |  |  |  |  |  |
| MAGPI | |  |  |  | 0.13 |  |
| Yes | | 13 | 3(23.10) | 10(76.90) |  | 0.50(0.17-1.14) |
| No | | 50 | 23(46.00) | 27(54.00) |  |  |

**Discussion**

Hypospadias is recommended for repair at the age of six months and above (2), in this study majority of patients 45 (71%) were within standard operating window 6/12 to 4years which is associated with less psychological trauma, which is compared with a study done by Ramanathan (5). At the same time majority of the patients 21(33.33%) had subcorona hypospadias, followed by proximal penile hypospadias 16(25.4%) patients, which is similar to the findings of the study conducted by Massati et al (4). We found that 3(4.8%) patients had small glans (≤14mm) penis and 4(6.3%) patients were found to have small penis(<3.8cm) necessitating them to be given testosterone for 3 weeks before surgery for good outcome, which is compared to the study by Sunil et al (7).It was also found undescended testes was the only associated anomalies found in 2(3.2%) patients and they underwent orchidopexy prior to hypospadias repair, while congenital hernia, hydrocele, torsion of penis or persisted mullerian duct structures were not found during the study period different results from the study by Khan M et al (2).

In this study the most common surgical technique used at Muhimbili National Hospital is Snodgrass tubularized incised plate urethroplasty with 35(55.6%) patients with 57.10% successful repair, which is compared to the study by Massati et al (5) and similar study by Snodgrass et al (8).

Most of our patients 37(58.7%) had successful hypospadias repair with overall complication rate of 41.3% mainly being surgical site infection 23 (36.5%) which is related to hematoma formation, oedema and peri-dripping stent urine leaking, different results when compared to the study by Ismail Y et al (6), similar study by Khan M et al(2), Where by 17(27%) patients had flap necrosis involving both skin and dartos fascia which may be due to destruction of blood supply during flap mobilization, which compared to the study by Khan M et al (2) and 15 (23.8%) patients developed urethrocutenous fistula which is associated with infection, flap necrosis involving both skin and dartos fascia and urethral meatal stenosi, which is compared to the study by Yung-chin et al (7) and similar study by Ismail et al (6), Also11(17.5%) patients were found to have meatal stenosis which is associated with ischemic changes post repair and surgeon attempt to reach the tip of glans penis, which is similar to the study by Bakal U et al (9). Furthermore 7(11.1%) of repaired patients had repair dehiscent associated with leaking of urine per incision site and surgical site infection contrary to the findings from the study by Snodgrass (8).

We found different factors including surgical technique used for hypospadias repair, other factors influencing outcomes of repair including age at repair as patients with age group ≤ 3.5 years had 19.3% less complication when compared to patients with age group >3.5 years which is similar to different studies (5,10-15).At the same time uncircumcised patients (dorsal hooded prepuce) has 20.3% less complication repair when compared to circumcised patients which is different when compared with the study done by Bang et al(11). Also severity of deformity and selection of surgical technique has influence on the outcome of repair as patients with posterior hypospadias who underwent staged repair had 6.9% less complication repair when compared to patients with posterior hypospadias who underwent single staged repair which is compared to the study by Asopa and Barbagli (15-16)

Moreover in our study patients who had urine drainage by cystostomy and dripping stent had 9.3% less complication when compared to patients dripping stent only and duration of urine drainage≥ 7 days have 61.7% less complication when compared to patients with < 7 days urine drainage with bladder spasm being more severe in patients with stenting alone presented by pain during micturition and peri-dripping stent leaking of urine this was similar to the study by Saleh et al (17). At the same time dressing material had no much influence on the outcome of repair but duration of first dressing has influence on the outcome, as patients with the first dressing changed ≥ 3 days has 11.2% less complication repair when compared to patients with first dressing changed <3dayswhich is compared to the study by Searles et al (18).

It was difficult to assess the influence of other factors such as suture material as this have been reported to influence outcome in different studies (12-13), use of magnifying lens and surgeons experience as there was mixing up of both monofilament and multifilament absorbable sutures and inconsistence of using magnifying lens. As well as less number of hypospadias patients to reach 50 cases per surgeon per year in our environment, different results from study by Searles et al (18) and Spinoit et al (19).

# Conclusion

Common early complications observed includes surgical site infection, hematoma, oedema, flap necrosis, urethrocutenous fistula, meatal stenosis, wound dehiscent and urethral stricture. Factors influencing the outcome of repair include age>3.5 years at repair, previous circumcised, type and duration of urine drainage< 7 days, type of dressing and changing the 1st dressing < 3 days. Further studies are recommended to find the influence of the factors including surgeon experience, suture material and use of magnifying lens together with long term follow up of patients.

**Competing interests:** The authors declare no competing interests.

**Authors’ contributions**

**DSM:** designed the study, collected data, performed data analysis and wrote the report with a manuscript.

**OVN:** participated in the study design and manuscript preparation.

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