

# Unsuccessful Hypospadias Repair in Children: An Analysis of Possible Predictive Factors

Chukwubuike Kevin Emeka\*, Anijunsi Patrick Livinus, Eze Thaddeus Chikaodili

Department of Surgery, Enugu State University Teaching Hospital, Nigeria

\*Corresponding author: Chukwubuike Kevin Emeka, Department of Surgery, Enugu State University Teaching Hospital, Enugu, Nigeria.

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## Abstract

**Background:** Functional and cosmetic benefits are the reasons for the surgical repair of hypospadias. However, this can be challenging to the surgeon and the repair is fraught with complications. The aim of this study was to evaluate children who developed complications following primary hypospadias repair. **Materials and Methods:** This was a retrospective analysis of children who had primary hypospadias repair; over a 5-year period, at the pediatric surgery unit of a teaching hospital in Enugu, Nigeria. The information analyzed included the patients' age (in months) at surgery, type of hypospadias based on location of the meatus, state of the prepuce (circumcised/uncircumcised), method of urethroplasty, post-operative complications, outcome of treatment and possible predictive factors. The possible predictive factors evaluated included experience of the surgeon, location of the hypospadiac meatus and state of the prepuce.

**Results:** A total of 39 cases of hypospadias were repaired during the study period. Out of this number, 8 (20.5%) patients developed one complication or the other. The mean age of the patients at surgery was 24 months. Coronal hypospadias was the most common type of hypospadias in the patients. About half the patients were circumcised at presentation and tubularized incised plate was the most common method of urethroplasty. One-fifth of the patients developed complications postoperatively with urethrocutaneous fistula as the most common complication.

**Conclusion:** Hypospadias repair is a time and energy consuming task that confounds and humbles the surgeon. Some predictive factors such as experience of the surgeon, location of the hypospadiac meatus and circumcision may be predictive of unsuccessful hypospadias repair.

**Keywords:** Children, Hypospadias Repair, Predictive Factors, Unsuccessful.

## Introduction

Hypospadias is a congenital anomaly of the penis that consists of abnormal ventral opening of the urethral meatus, abnormal ventral curvature of the penis (chordee), deficiency of the ventral wall of the distal segment of the urethra leaving a remnant dorsal urethral plate and deficiency of the ventral prepuce leaving a remnant dorsal hood [1,2]. Hypospadias is one of the most prevalent anomalies of the male genitalia and is seen in one in 300 live births [3, 4]. Abnormally ventrally located opening of the urethral meatus anywhere from ventral aspect of the glans to the perineum is a constant feature of hypospadias [5]. Functional and cosmetic benefits are the reasons for the surgical repair of hypospadias [6]. The goal of hypospadias repair is to have a straight penis and to have a meatus as distal as possible in order to create a forward directed urinary stream [3]. There are several methods of hypospadias repair with each method having its benefits and challenges. The diverse specialties (pediatric surgeons, plastic surgeons and urologists) involved in hypospadias repair also contribute to the different techniques and results [4]. Children with an initial unsuccessful hypospadias repair may require repeat surgeries. Unsuccessful hypospadias repair may

have psychological effects on the patient. Several complications can result from unsuccessful hypospadias repair. Such complications include urethrocutaneous fistula, meatal stenosis, urethral stricture and persistent chordee. Factors responsible for failed hypospadias repair are a subject of controversy and discussion [5,6]. The aim of this study was to evaluate children who developed complications following primary hypospadias repair. For the purposes of this study, a hypospadias repair is considered unsuccessful when a complication occurs and such complications will require another surgery for the correction. A surgeon of more than 10 years post fellowship experience is considered a senior consultant while a surgeon of less than 10 years (post fellowship) is considered a junior consultant.

## Materials and Methods

This was a retrospective analysis of children who had primary hypospadias repair at the pediatric surgery unit of Enugu State University Teaching Hospital (ESUTH), Enugu, Nigeria. The study covered a 5-year period, from January 2017 to December 2021. Children who had previous hypospadias surgeries or penile surgeries were excluded from the study. The patients were cate-

gorized into successful and unsuccessful groups. A hypospadias repair is considered successful if there were no complications. ESUTH is a tertiary hospital located in Enugu, South East Nigeria. The hospital serves the whole of Enugu State, which according to the 2016 estimates of the National Population Commission and Nigerian National Bureau of Statistics, has a population of about 4 million people and a population density of 616.0/km<sup>2</sup>. The hospital also receives referrals from its neighboring states. Information was extracted from the case notes, operation notes, operation register and admission-discharge records. The information analyzed included the patients' age (in months) at presentation, age at surgery, type of hypospadias based on location of the meatus, state of the prepuce (circumcised/uncircumcised), method of urethroplasty, post-operative complications, outcome of treatment and possible predictive factors. The follow-up period was 6 months. The possible predictive factors evaluated included experience of the surgeon, location of the hypospadiac meatus and state of the prepuce. Ethical approval was obtained from the ethics and research committee of ESUTH and informed consent from the patients' caregivers was not required due to retrospective nature of the study and identities of the patients were not revealed. Statistical Package for Social Science (SPSS) version 21 (manufactured by IBM Corporation Chicago Illinois) was used for data entry and analysis. Data were expressed as percentages, mean, and range.

## Results

### Patients' demographics

A total of 39 cases of hypospadias were repaired during the study period. Out of this number, 8 (20.5%) patients developed one complication or the other. The mean ages of the patients at presentation and at surgery were 4 months and 24 months respectively.

Types of hypospadias (n=39)

The types of hypospadias are shown in Table 1.

**Table 1: Hypospadias types**

Types of hypospadias	Number of patients (%)
Coronal	27 (69.2)
Distal penile	4 (10.3)
Glanular	3 (7.7)
Mid penile	3 (7.7)
Proximal penile	2 (5.1)

### State of the prepuce at presentation

Twenty (51.3%) patients were not circumcised whereas 19 (48.7%) patients were circumcised at presentation.

### Method of urethroplasty

All the patients had tubularized incised plate method of urethroplasty.

### Treatment outcome/post-operative complications

Thirty-one (79.5%) patients achieved good cosmetic and functional outcome whereas 8 (20.5%) patients developed complications. The complications are shown in Table 2.

**Table 2: Post-operative complications**

Post-operative complication	Number of patients (%)
Urethrocutaneous fistula	4 (10.3)
Meatal stenosis	1 (2.6)
Urethral stricture	1 (2.6)
Dehiscence	1 (2.6)
Recurrent chordee	1 (2.6)

### Possible predictive factors

The possible predictive factors evaluated included experience of the surgeon, location of the hypospadiac meatus and state of the prepuce. Details are depicted in Table 3.

**Table 3: Predictive factors**

Predictive factors	Number of patients with success (%)
Experience of the surgeon	
Senior consultant	25 (64.1)
Junior consultant	6 (15.4)
Location of the meatus	
Distal	27 (69.2)
Proximal	4 (10.3)
State of the prepuce	
Uncircumcised	18 (46.2)
Circumcised	13 (33.3)

## Discussion

Hypospadias was first described in the first and second century AD by Galen, a Greek physician. The initial treatment of hypospadias dates back to ancient times of Alexandrian surgeons who practiced penile amputation distal to the hypospadiac meatus and Dieffenbach<sup>5</sup> that reconstructed the neourethra by perforating the glans with a cannula [7]. Hypospadias repair is continuously evolving [8]. The first attempt to correct hypospadias by surgery was made by Duplay, a French surgeon, in 1874 [9]. Hypospadias repair in children is a difficult problem to solve in pediatric urology as it demands the construction of a functional urethra and a good cosmetic appearance [10].

In the present study, about one-fifth of the patients developed complications. This complication rate is comparable to the report of Winberg et al [11]. However, complication rates as low as 5% and as high as 40% have been reported [12, 13]. The type of hypospadias and other variables may account for the differences in complication rates. The mean age of our patient at surgery was 24 months. This age is consistent with the report of a study from New York, USA [14]. Howbeit, a study from Abuja, Nigeria reported the mean age, at surgery, of 44.9 months [15]. The age at surgery may be relative to the age of presentation of the patient to the hospital. Moreover, lack of theatre spaces and the preference given to emergency surgical cases may have delayed operative repair of hypospadias. Idiiodi-Thomas et al reported that most frequent contributory factor to delay in hypospadias repair was unavailable theatre space [Idiiodi-Thomas]. Current guidelines considers the optimal age for hypospadias repair to be 6 months to 18 months depending on the severity of the hypospadias [16].

Coronal hypospadias was the most common type of hypospadias recorded in the present study. Other publications on hypospadias also reported coronal hypospadias as the most common type [17, 18]. However, midpenile hypospadias was the most common in some series [19, 20]. The exact reason for the predominant type of hypospadias is not known. Geographical location may be account for the differences. For instance, midpenile is the most common type of hypospadias in Asia [19, 20]. Hypospadias may also be classified further into anterior (glanular, coronal, distal penile), middle (along the penile shaft) and posterior (proximal penile, penoscrotal, interscrotal, perineal) [21].

About half of the patients were circumcised before presentation to the hospital. Lack of parental awareness and societal pressure for neonatal circumcision may explain the high circumcision rate. The fact that most circumcisions, in low/middle income countries, are performed by less qualified personnel who do not check for hypospadias before circumcision may also be contributory. The surgical significance of not performing circumcision is that the prepuce is required for the hypospadias repair.

All our patients had tubularized incised plate technique of urethroplasty. The preference, training and experience of the surgeon may have informed this method of hypospadias repair. Roshandel et al in a study from northern Nigeria also reported tubularized incised plate as their predominant technique of urethroplasty [22]. Tubularized incised plate urethroplasty which was described by Warren Snodgrass in 1994, has gained worldwide acceptance for repair of distal and mid penile hypospadias because of its relatively simple surgical concepts, low complication rates and good cosmetic outcome [23, 24].

Urethrocutaneous fistula was the most common complication in our patients. This finding is in line with the report of other researchers [25, 26]. The reported incidence of urethrocutaneous fistula in the current study of 10% is within the range of incidence reported for urethrocutaneous fistula [27]. The incidence of urethrocutaneous fistula can be used to judge the success of hypospadias surgery. Urethrocutaneous fistula is believed to result from local infection, local ischemia, inadequate procedure, poor tissue handling, distal obstruction due to distal stenosis [27]. Treatment of urethrocutaneous fistula should be individualized and various techniques have been described for its repair.

On the evaluation of the predictive factors, two-thirds of the patients were treated successfully by the senior consultants. This is in comparison to the one-third treated successfully by the junior consultants. The learning curve theory may explain the difference in success rates. A study from New York, USA reported that successful repair of hypospadias improves with time and experience of the surgeon is pertinent, even amongst fellowship-trained pediatric urologists [28]. A successful repair is measured by the complication rates. Hisamatsu et al reported the positive impact of the surgeon's experience on the outcome of one-stage hypospadias repair [29]. They documented that the learning curve in proximal hypospadias repair stabilized after 50 cases [29]. Abdurrahman et al reported that more experience in performing hypospadias urethroplasty affects clinical outcome [30].

In the current study, the outcome in distal hypospadias was better when compared with proximal hypospadias. Bello et al also reported that distal hypospadias have better outcome than proximal hypospadias [31]. Other articles on hypospadias also reiterated the fact that treatment of proximal hypospadias is much less successful than the distal variant [32, 33]. The length of urethroplasty repaired and the defective tissues (corpus spongiosum, ventral wall of the urethra, supporting tissues) on the ventral aspect of the penis may explain the unimpressive outcome in proximal hypospadias.

The dorsal hood represents the remnant portion of the prepuce which is located dorsally. This dorsal hood is important in hypospadias repair and is the rational why circumcision is not advised. In the index study, the uncircumcised patients had a better outcome when compared with circumcised patients. However, one study from Tabriz, Iran reported no difference in post-operative complications even when the patient was circumcised [34].

## Conclusion

Hypospadias repair is a time and energy consuming task that confounds and humbles the surgeon. Some predictive factors such as experience of the surgeon, location of the hypospadiac meatus and circumcision may be predictive of unsuccessful hypospadias repair.

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