



COMPARATIVE STUDY OF POLYDIOXANONE (PDS) AND POLYGLACTIN (VICRYL) IN SINGLE STAGED HYPOSPADIAS REPAIR - OUR EXPERIENCE

Dr Kandan Nivetha^{1*}, Dr Gaddala Hasanthi², Dr Jeeru Bhaskar Reddy³, Dr Gorthi Rajendra Prasad⁴

^{1*}MS, Resident, Department of Pediatric Surgery, Andhra Medical College, Visakhapatnam.

(Corresponding Author) nivetha.kandan@gmail.com

²MS, MCh., Associate Professor, Department of Pediatric Surgery, Andhra Medical College, Visakhapatnam.

³MS, MCh., Associate Professor, Department of Pediatric Surgery, Andhra Medical College, Visakhapatnam.

⁴MS, MCh., Professor, Department of Pediatric Surgery, Andhra Medical College, Visakhapatnam.

***Corresponding Author:** Dr Kandan Nivetha

*MS, Resident, Department of Pediatric Surgery, Andhra Medical College, Visakhapatnam.

ABSTRACT

Background: Hypospadias is the second most common congenital urogenital anomaly in male children followed by cryptorchidism. Although various surgical techniques are available for the successful correction of hypospadias repair, the selection of suture material plays a vital role in the cosmetic and functional outcomes of hypospadias repair, especially the development of urethrocuteaneous fistula.

Objective: The main objective of the study is to compare the surgical outcomes following usage of 6/0 polydioxanone (PDS) and 6/0 polyglactin (vicryl) in single staged hypospadias repair, especially urethrocuteaneous fistula formation.

Materials and Methods: This is a prospective observational hospital- based study done in the Department of Pediatric Surgery at a tertiary care hospital, during the period from April 2022 to March 2023. A total of 48 hypospadias patients were taken and divided into two groups A and B. Group A consisted of 25 patients who were repaired using 6/0 polyglactin and group B consisted of 23 patients who were repaired using 6/0 polydioxanone.

Results: The mean age of group A was 4.7 +/- 1.2 years and mean age of group B patients was 3.5 +/- 2 years. Out of the 48 children, Theirsch Duplay repair was done in 79.16% cases (n=38), Meatal

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advancement and glanuloplasty incorporated (MAGPI) was done in 10.41% cases (n=5), longitudinal dorsal island flap (LDIF) was done in 6.25% cases (n=3) and Mathieu's repair was done 4.16% cases (n=2). In Group A, the complication rate was 48% (n= 12 out of 25 cases) and in Group B, it was 17.39% (n= 4 out of 23 cases). The most common complication noted was urethrocutaneous fistula (UCF), as 10 cases had UCF in Group A (40%) and 3 cases in group B (13.04%). The next most complication being meatal stenosis with 4 cases in Group A (16%) and two cases in Group B (8.6%). These values of complication rates are subjected to change with increase in the number of subjects and duration.

CONCLUSION: Polydioxanone is considered one of the suitable suture material in hypospadias repair with minimal complication rate and better outcome rates. Urethrocutaneous fistula is the most common complication following hypospadias repair and a difficult one to treat.

KEYWORDS: Hypospadias, Polydioxanone, Polyglactin, Urethrocutaneous fistula

INTRODUCTION

Hypospadias is the most common congenital penile abnormality, which includes a spectrum of disorders that occurs as a result of failure of fusion of the urethral folds completely, thus, resulting in the urethral meatal opening to be positioned on the ventral surface anywhere between glans to perineum. The incidence rate of hypospadias ranges from 1 in 150 to 1 in 300 males¹. Various classifications have been proposed , but the most commonly used was given by Duckett, which describes urethral meatal location after chordee correction as anterior (glanular and subcoronal), middle (distal penile, shaft and proximal penile) and posterior (penoscrotal, scrotal and perineal)¹. Surgical penile reconstruction is the only treatment option in the management of hypospadias. The primary objectives of hypospadias repair are orthoplasty(straight penis), urethroplasty, meatoplasty(single vertical slit like urethral meatus) , glansplasty (conical shaped glans) , spongioplasty and scrotoplasty(if penoscrotal transposition present)². Although more than 200 surgical procedures have been described for hypospadias repair , there is no ideal procedure.

A number of factors determines the outcomes of the hypospadias repair , out of which the suture material used for neo-urethral reconstruction plays a vital role. The ideal suture material should be absorbable with enough tensile strength to support the suture line and to resist the urine flow³.

MATERIALS AND METHODS

This is a prospective observational hospital-based comparative study conducted in the Department of Pediatric Surgery at a tertiary care hospital from April 2022 to March 2023 for a duration of one year. This study includes 48 male children who were operated by the same surgeon and were followed up for a period of 6 months postoperatively. The total number of children were divided randomly into two groups based on the suture material used during hypospadias repair. In group A , a total of 25 children were present who were operated with 6/0 polyglactin (vicryl) and group B included 23 children who were operated using 6/0 polydioxanone . Data was recorded in a pretested questionnaire and were filled by history taking and clinical examination pre-operatively ,immediate post-operative period and post-operatively after 6months. All the children were hospitalized for a duration of 10 days

, two dressings were done each on post-operative day 7 and 10 and catheter removed on post-operative day 10. They were ordered to come for follow up to out-patient department after one month, two months and six month's consecutively. During their visits, the children were examined regarding urinary stream, function, cosmetic appearance, any complications such fistulas, strictures , hematomas , bleeding, post- operative infections, urinary retention. Children who had poor urinary stream (suggestive of stenosis) were subjected to urethral calibration under anesthesia. The study variables included in the study were demographic data, time of diagnosis,presentation, hypospadias type, associated chordee, other associated anomalies, timing of surgery, surgery type, type of suture material and post-operative complications.

RESULTS

The mean age of children in group A was 4.7 +/- 1.2 years and mean age of children in group B patients was 3.5 +/- 2 years. The children presented with chief complaints like passing urine from undersurface of penis (93.75%) and ventral curvature of penis only (6.25%). Chordee was found in 83.3% , associated undescended testis was seen in 25% and inguinal hernia was seen in 12.5% All the children in the study were operated by a single staged hypospadias repair.

TYPE OF HYPOSPADIAS	PERCENTAGE
Coronal	37.5%
Glanular	16.67%
Distal penile	37.5%
Mid-penile	8.33%

Table 1: Distribution based on type of hypospadias

TYPE OF SURGERY	PERCENTAGE
Theirsch Duplay repair	79.16%
MAGPI	10.41%
LDIF	6.25%
Mathieu's repair	4.1%

Table 2: Distribution based on type of surgery

The mean duration of urethral catheterization was 8.7+/-2 days and mean duration of hospital stay was 8.7+/-2 days. The complication rate was 48% in group A and 17.39% in group B.

The most common complication noted was urethrocutaneous fistula(UCF) with 40% in group A and 13.04% in group B. The next most complication being meatal stenosis with 4 cases in Group A(16%) and 2 cases in Group B (8.6%).

DISCUSSION

In this series, the overall complication rate was 33.33% (16 out of 48 cases) as shown in table 4, with a significant p value of 0.0246 indicating that 6/0 polydioxanone as a suture material which had better outcomes when compared to 6/0 polyglactin. The most common complication noted was

urethrocutaneous fistula followed by the next common complication being meatal stenosis. The other complications being edema, bleeding and postoperative infection.

COMPLICATIONS	GROUP A, n (%)	GROUP B, n (%)	TOTAL, n (%)	p value
UC fistula	10 (40%)	3 (13.04%)	13 (27.08%)	0.035
Meatal stenosis	4 (16%)	2 (8.66%)	6 (12.5%)	0.6681
Edema	3 (12%)	2(8.66%)	5 (10.41%)	0.70
COMPLICATIONS	GROUP A, n (%)	GROUP B, n (%)	TOTAL, n (%)	p value
Postoperative infection	4 (16%)	2 (8.66%)	6 (12.5%)	0.6681
Bleeding	2 (8%)	1(4.3%)	3 (6.25%)	0.60

Table 3: Complications following hypospadias repair in each group

In this series, only single staged hypospadias repair cases were taken. Urethrocutaneous fistula is the most common complication noted in the study with a total of 13 children (27.08%), with maximum number of subjects in group A when compared to group B. Comparing the two groups statistically as seen in the above table, it is statistically significant (p value <0.05) indicating that the incidence of urethrocutaneous fistula is more in group A subjects where polyglactin was used when compared to group B where polydioxanone was used. This result came in similar fashion in concordance to local, national and international studies, as the UCF incidence in literature ranged from 0-30%⁴.

OUTCOME	GROUP A, n (%)	GROUP B, n (%)	TOTAL, n (%)
Successful	13 (52%)	19 (82.6%)	32 (66.67%)
Complications	12(48%)	4 (17.39%)	16 (33.33%)

Table 4: Outcomes of hypospadias repair in each group ; The results showed p value of 0.0246, that is statistically significant.

Another significant complication following hypospadias repair is urethral meatal stenosis. The incidence rate of meatal stenosis is 16% in group A and 8.66% in group B, but they aren't statistically significant. All these subjects were managed by regular urethral dilatation. According to a study done at Saudi Arabia, the incidence of urethral stenosis was 3.1% , but it is far less when compared to the overall incidence of urethral stenosis on our study , which is around 12.5%(both the groups together)⁵. Regarding edema ,bleeding and postoperative infection, though were present in both the groups , they are not statistically significant to prove the superiority of PDS over vicryl. In the literature, the incidence of edema is about 11.11%, but in most cases ,it didn't affect the outcomes⁶. In comparison to two other studies in literature comparing PDS and vicryl, none of the patients had postoperative wound infections^{7,8}. In a recent study by Ulman et al. to evaluate the effect of suturing techniques and suture material on the incidence of complication rate showed similar results to this study⁸.

There are a number of other factors that affect the development of UCF following hypospadias repair which includes type of hypospadias, type of surgery, presence or absence of chordee, timing of

surgery, presence of postoperative bleeding, wound infection, period of hospital stay , period of catheterization and postoperative edema.

Yildiz et al. stated that younger children had better outcomes and older children had increased incidence of UCF, but in this study , there was no statistical significance to prove that point⁹. The other factor that played an important role in the etiology of UCF is the type of hypospadias with a statistically significant p value of 0.02 indicating that more the proximal the meatal opening, more the chances of developing UCF. In a similar study by Chung et al.,the risk of developing UCF after hypospadias surgery was dependent on location of hypospadias¹⁰. In our study, 79.16% underwent Theirsch-Duplay repair, 10.41% underwent MAGPI (Meatal Advancement and Glanuloplasty Incorporated), 6.25% underwent LDIF(Longitudinal Dorsal Island Flap repair) and 4.1% underwent Mathieu's repair. This study showed a statistical significance (p value of 0.03) in relation to association between type of surgery and incidence of postoperative UCF. In this study, all the children underwent single stage hypospadias repair, but various other studies have compared the incidence of UCF in single stage vs multi-stage repair. In a meta- analysis done in Egypt, they mentioned that the complication rate in single stage repair was approximately 8%-61.5% , when compared to 15%-70% in multi- stage repair with similar types of post- operative complications like fistula , stenosis, glans dehiscence and urethral diverticulum⁸. In our study, the duration of catheterization was not a risk factor in UCF development. One of the main drawbacks of this study is small study population and limited study duration, as a result which these high values of complication rates have occurred and with future continuation of the study these values are subjected to change. Though many factors exist influencing the outcomes of hypospadias repair , in view of small sample size in the study it has been difficult to analyze each and every factor affecting further outcomes.

CONCLUSION

Polydioxanone is considered a suitable suture material in hypospadias repair as it is associated with better outcomes and decreased complication rates especially urethrocutaneous fistula which is the most difficult one to treat.

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