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Is it safe to solely use ventral penile tissues in hypospadias repair? Long-term outcomes of 578 Duplay urethroplasties performed in a single institution over a period of 14 years

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Abstract *Objectives:* Urethral plate tubulization (Thiersch-Duplay procedure) is a widespread procedure mostly used for distal hypospadias. Concerns of long-term outcome have led to this review of the results of a series of 578 cases.
Patients and methods: A retrospective review was conducted of 578 patients treated in a single institution following the same procedure and with the same follow-up. Most patients had distal hypospadias (517/578) and were operated on between 12 and 24 months of age (343 patients). The mean follow-up was 25.6 months (6 months-17 years). Evaluation was focused on urethral complications related to inadequate healing of the reconstructed urethra (fistula, urethral dehiscence, urethral stenosis and clinical dysuria). Complications were arbitrarily categorized into early (when occurring less than one year after surgery) and late (after one year). All data were submitted to statistical analysis.
Results: Of the 578 patients, 153 (26.5%) had unsatisfactory outcomes, of which 118 (20.4%) had inadequate urethral healing. Of these, 97 appeared early (57%) and 73 appeared late (43%). Fistula and dehiscence were significantly more frequent in the first post-operative year ($p < 0.0001$), whereas stenosis of the reconstructed urethra was more frequent after one year. Follow-up and age at last consultation were significantly higher in patients with complications.

Limits and flaws of this study focused on the absence of consensus on evaluation of hypospadias surgery. The paucity of literature on long-term outcomes of urethral plate

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tubulization was highlighted. A possible explanation of late stenosis of the reconstructed urethra was the poor growth capacity of the dysplastic tissues located beyond the division of the corpus spongiosum. Urethroplasties solely using ventral tissues may represent an additional risk of late failure, as they may not grow with the rest of the genital tubercle.
Conclusion: Significant short and late complications occur with techniques tubularizing the urethral plate, mostly fistulae in the first post-operative year and urethral stenosis after 1 year following surgery. Urethroplasties using ventral tissues may not grow at the same pace as the rest of the genital tubercle and may explain late urethral dysfunction. This series confirms the necessity of long-term follow-up of hypospadias reconstructions.

Introduction

Techniques of hypospadias reconstruction are variable, depending on the severity of hypospadias and the surgeon's technique. Three main groups of procedures can be distinguished: techniques respecting the urethral plate, those replacing the whole urethra with non-urethral tissues and those mobilizing the whole normal urethra. In the first group, the urethra can either be reconstructed with the sole ventral tissues (Thiersch-Duplay, tubularized incised plate (TIP), Mathieu) or can combine the urethral plate with other substitutive material (onlay or inlay urethroplasties). In the second group, the urethral substitution is mostly completed using foreskin material or buccal mucosa (Asopa-Duckett tube, Koyanagi-Hayashi procedure, Cloutier-Bracka). In the third group, tissues located beyond the ectopic meatus are discarded and the whole penile urethra is moved towards the tip of the glans only using urethral tissues (Beck, Koff, Turner-Warwick) [1].

From the history of hypospadias, the techniques of urethroplasty have been shown to be popular and then questioned when more data became available. The current trend in hypospadiology is to extend the indications of tubularizing the urethral plate. It is a simple technique to learn and immediate good results validate this approach and explain its popularity. Late dysfunction of the reconstructed portion of the urethra seems, however, to have become a significant problem in several publications, which shows that growth of the genital tubercle is an essential parameter in the long-term evaluation of hypospadias reconstruction. This retrospective study of 578 Duplay urethroplasties performed between 1992 and 2006 in a single institution raised some concerns on the growth of the reconstructed urethra and the late outcome of surgery when solely using ventral material.

Patients and methods

A total of 600 patients who underwent a Duplay urethroplasty performed by one surgeon and his team in a single institution between 1992 and 2006, using the same technique and follow-up recommendations, were selected. Of this 600, 22 were lost to follow-up and 578 had complete records, with a mean follow-up of 25.6 months (6 months-17 years). The technique used was published in 2003 [2] and was mostly based on the tubularization of the urethral plate without TIP, followed by a spongioplasty.

All patients who had undergone hypospadias surgery were re-examined for evaluation of outcome at 2—3 months after surgery, then 12 months after surgery and, if possible, at puberty. The children's families were asked to contact the surgeon if the child experienced dysuria (poor urine stream, thin stream, spraying stream, long micturition or pain when starting or during micturition) or urinary infections during childhood.

Evaluation of outcome was mainly focused on urethral complications related to inadequate healing (fistula, urethral dehiscence, urethral stenosis, clinical dysuria). Complications were arbitrarily categorized into early complications (when occurring less than one year after surgery) and late complications (for those occurring more than one year after surgery). Secondary ventral curvature of the genital tubercle was inconsistently recorded in the notes and could not be reliably reported. Recurrent complications occurring in the same patient were excluded because they were not necessarily related to the primary surgical procedure.

In number of complications, data revealed the severity of hypospadias and the onset of the undesirable event. Distribution between early and late complications were compared using a Chi-square test with Yates correction. Quantitative variables were expressed in median form, and compared using a Mann—Whitney *U* test. A *P*-value less than 0.05 was considered to be statistically significant. Statistical analysis was performed using Medcalc version 9.6.4.0 (Medcalc, Mariakerke, Belgium).

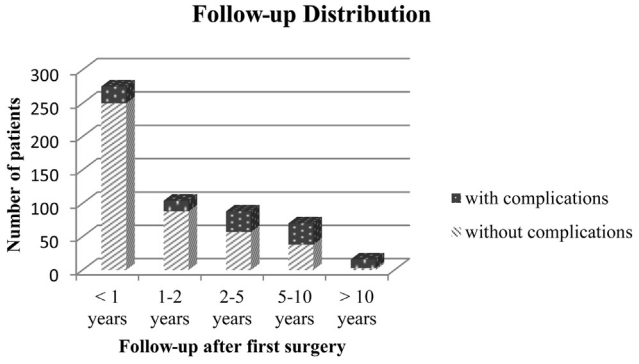

Figure 1 Distribution of patients with and without complications according to the length of follow-up.