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Failed hypospadias repair: An algorithm for secondary reconstruction using remaining local tissue

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Summary Salvage hypospadias surgery is performed after failed primary reconstruction. Several treatment strategies have been suggested, all with pros and cons. The aim of this study was to evaluate our treatment algorithm for primary hypospadias repair applied to secondary cases in which a salvage procedure is indicated and, most importantly, local tissue is present. The algorithm was applied to 36 consecutive patients who had undergone a total of 109 surgical procedures before referral. In accordance with the algorithm, 12 patients without ventral curvature achieved a satisfactory result with one procedure by the use of local skin flaps. Six patients with moderate ventral curvature underwent orthoplasty, fistula closure, and/or urethral reconstruction using local skin flaps in one session. Eighteen patients with a severe ventral curvature or a proximal meatus were reconstructed in two stages using Byars' technique. After a median of two salvage procedures (range: 1–4), all patients but one, who awaits splitting of a skin bridge in the meatus, were successfully reconstructed. Two patients in active follow-up have potential problems requiring further surgery.

Our findings indicate that failed hypospadias repairs are often due to an underestimation of the ventral curvature at the initial repair. Therefore, reevaluation of the degree of curvature is important. One-stage salvage repairs can be used, provided that none or minimal curvature remains. In cases of marked curvature, however, a meticulous resection of the chordee and

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ventral scarring is crucial. The subsequent repair of the large ventral defect and the long urethral reconstruction can, in most cases, be safely managed in a two-stage procedure.

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Introduction

The goals of the primary surgical treatment of hypospadias are a straight penis with a functional urethra, without fistulas or strictures, and a cosmetically acceptable appearance. To achieve these goals, we used and evaluated a previously described treatment algorithm for primary reconstructions.^{1–3} For proximal hypospadias, and hypospadias with a significant ventral curvature, the two-stage procedure proposed by Byars⁴ has been used. More distal hypospadias with a slight ventral curvature has been corrected using the Scuderi technique.⁵ For the most distal hypospadias with little or no ventral curvature, we have used the local Mathieu flap⁶ with redistribution of the prepuce. In recent years, the tubularized incised plate urethroplasty (TIP procedure) has also been introduced in our unit.⁷

Secondary or salvage hypospadias repair is challenging due to scarring, shortage of tissue, obliterated tissue planes, and compromised blood supply. Therefore, compared with primary reconstruction, the healing capacity may be reduced. Moreover, in some cases, repeat hypospadias surgery can result in deformities that are even worse than the original malformation.⁸ Various treatment strategies for re-repairs have been proposed.^{8–18} However, the optimal management of these patients remains unclear. Thus, in 2007, we decided to apply our previously described algorithm^{1–3} to the increasing number of patients referred to us for secondary repair caused by a failed reconstruction. All referred patients had adequate local tissue to be reconstructed, and the aim of this study was to evaluate the efficacy of our algorithm for these cases. This algorithm does not cover those without sufficient local tissue. For such cases, we opted for other previously described treatment options.^{8–10,13,14,19}

Patients and methods

Patients and preoperative evaluation

From April 2007 through April 2014, 36 boys born between 1980 and 2008 were referred to our unit for re-repair due to previously failed hypospadias reconstructions. At the first outpatient visit, the clinical presentation was evaluated according to a standard protocol with particular focus on the presence of a ventral curvature. Medical records from the referring hospitals revealed that the patients had undergone 109 prior hypospadias-related surgical procedures (median: 3; range: 1–8), including isolated preputial plasty (six patients; 12 procedures). In addition to these procedures, meatotomies had been performed in eight cases.

In three cases, a conclusive preoperative evaluation could not be achieved during the outpatient visit. Therefore, the evaluation was supplemented with an examination under general anesthesia. The preoperative evaluation revealed that 21 patients (58%) had a remaining ventral curvature; 28 (78%) had fistulas, of which one involved the preputium only; 13 had meatal dystopia (36%); and 24 (67%) had an unfavorable aesthetic result. All boys had adequate local tissues to allow secondary repair in accordance with our algorithm. Surgical procedures were conducted from October 2007 through November 2014.

Treatment algorithm

Based on the preoperative outpatient evaluation, the patients were allocated to one of the following three treatment options (Figure 1):

1. Patients without a ventral curvature, but who needed fistula closure or supplementary urethral reconstruction, underwent a one-stage reconstruction. Fistulas were closed according to the general principles described subsequently. Local flaps were used for distal urethral reconstruction. Either local flaps or preputial flaps covered any ensuing ventral defect after urethral reconstruction or fistula closure.
2. In patients with a moderate ventral curvature, and who did not need fistula closure or supplementary distal reconstruction, an orthoplasty was incorporated into the procedure. Thus, all remaining chordee and other constricting tissues were excised before the fistulas were closed and/or the urethra was lengthened. This created a wide ventral defect that was closed by preputial flaps.
3. For patients with completely failed reconstructions and remaining prominent ventral curvature, the treatment was a two-stage reconstruction according to a modified Byars' technique.⁴ During the first stage, a thorough orthoplasty with excision of all remaining chordee and other constricting tissues was performed, and the dorsal prepuce was divided and moved ventrally to cover the defect. Six months later, the urethral reconstruction was performed by making a U-shaped incision encompassing the meatus and terminating on either side of the glans. The developed flap constituted the inner lining around the catheter, and the preputial flaps constituted the outer lining.

General surgical principles

Urethral defects were closed with mucosal inverted sutures using 6/0 Vicryl™ (polyglactin 910; Ethicon, Johnson & Johnson, Medical Limited, Norderstedt, Germany). In addition, a layer of soft tissue from the venterolateral

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