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Choosing a technique for severe hypospadias

Alexis Arnaud, Luke Harper, Marie-Benedicte Aulagne, Jean-Luc Michel, Aude Maurel, Eric Dobremez, Laurent Fourcade, Lalatiana Andriamananarivo[1]

ABSTRACT

Introduction: We participate in humanitarian missions in Madagascar during which we treat severe hypospadias. We report our experience and results with these patients, in these conditions, and discuss our choice of technique in this particular setting. **Materials and Methods:** We retrospectively reviewed the data of 27 patients operated for severe hypospadias during our humanitarian missions in Madagascar between November 2006 and September 2009. Twenty one patients underwent a modified Koyanagi procedure, three underwent a Duckett urethroplasty, two an onlay island flap, one an augmented Duckett and one a tubularised plate urethroplasty. Two patients who underwent a modified Koyanagi repair also had a Nesbitt dorsal plication. **Results:** Patient age at the time of surgery ranged from 22 to 198 months with a median age of 54.1 months. Mean follow-up was 16 months. Of the 21 patients who underwent a modified Koyanagi procedure, 16 presented at least one complication (76%): A fistula developed in 12 patients (57%), meatal regression developed in 7 (33%) and 2 showed complete wound dehiscence (9.5%). None developed stenosis or urethrocoele. **Conclusion:** In this particular setting, the postoperative complication rate is high. Nevertheless, the Koyanagi technique is appropriate, because its complications are easy to treat and there is always sufficient ventral tissue for the secondary operation, if necessary.

Key words: Humanitarian, hypospadias, Koyanagi, severe

INTRODUCTION

Severe hypospadias, with the urethral opening at or proximal to the peno-scrotal junction and severe chordee, can be treated using a variety of methods. Whilst some surgeons prefer a two-stage technique,[1-3] several one-stage repairs have been described with variable success rates.[4-9] Each technique, whether two-stage or one-stage, has its advantages and drawbacks and not one technique has gained widespread popularity. Heralding one technique as the gold standard for posterior hypospadias is probably unrealistic and paediatric urologists have to master a variety of techniques because various patient-related specifics can favour one or another technique.

We participate in humanitarian missions in Madagascar during which we treat, amongst other pathologies, severe hypospadias. We report our experience and results with these patients, in these conditions, and discuss our choice of technique in this particular setting.

MATERIALS AND METHODS

We retrospectively reviewed the data of all patients operated for severe hypospadias during our humanitarian missions in Madagascar between November 2006 and September 2009. These missions are organised in conjunction with the non-governmental organisation Médecins du Monde, and consist of two one-week missions a year. The patients, who come to our missions from all over Madagascar, come because they cannot afford medical care and represent therefore the poorest community of the country. In consequence, many suffer from relative malnourishment and their living conditions are reduced to the bare minimum.

We defined severe hypospadias as hypospadias with the urethral opening at or proximal to the peno-scrotal junction, proximal division of the spongiosum and severe chordee. Preoperative endocrine and genetic work-ups were performed according to the aspect of the external genitalia and the presence or absence of palpable gonads. Hormonal stimulation was prescribed

Department of Paediatrics Surgery, CHR F Guyon, Saint-Denis, Reunion Island, and [1]Department of Paediatrics Surgery, CHU, Antananarivo, Madagascar

Address for correspondence:
Dr. L. Harper,
Department of Paediatric Surgery, CHR F Guyon, Bellepierre, Saint-Denis de La Réunion, 97405. Reunion Island.
E-mail: harper_luke@hotmail.com

according to the size of the penis.

Different techniques were performed: The Koyanagi-modified Hayashi procedure,[9] the tubularised transverse preputial island flap technique (Duckett),[10] the onlay preputial island flap urethroplasty,[11] the augmented Duckett (Duckett + Thiersch-Duplay),[12] and a simple tubularised plate urethroplasty without plate incision. The decision to transect the urethral plate was taken by the surgeon based on his preoperative judgment of the severity of the chordee. Following that the decision concerning the technique to be used was based on the length of necessary neourethra.

The decision to perform additional dorsal placation was taken if there was residual chordee following complete proximal mobilisation of the urethral plate.

All patients received the same postoperative protocol including a hydrocolloid dressing (DuoDERM®) and a bladder catheter. In some cases this was a Silastic drain, in others a Foley catheter and in other cases a simple feeding tube, according to availability. The dressing was removed on day 5 and the urethral catheter on day 8. All received an intravenous injection of cephalosporin at the time of surgery followed by oral sulphamethoxazole-trimethoprim until the catheter was removed.

RESULTS

Twenty-eight patients were treated for severe hypospadias during the study period. One patient was excluded because he was lost to follow-up after surgery and we have no information about his results.

The outcome of the remaining 27 patients was analyzed. Nineteen children presented with a peno-scrotal hypospadias, and nine with a perineal hypospadias. Four had previously undergone several[3-7] hypospadias surgeries with circumcision and six had been circumcised ritually. Four children received preoperative androgenic treatment as systemic androgens (100 mg/m^2) at least 6 months before surgery. Patient age at the time of surgery ranged from 22 to 198 months with a median age of 54.1 months. Twenty one patients underwent a modified Koyanagi procedure, three underwent a Duckett urethroplasty, two an onlay island flap, one an augmented Duckett and one a tubularised plate urethroplasty. Two patients who underwent a modified Koyanagi repair also had a Nesbitt dorsal plication. Surgery was performed by senior surgeons. The mean follow-up was 16 months with a Median at 14 months (12-34). Results of surgery are summarised in Table 1. Of the 21 patients who underwent a modified Koyanagi procedure, 16 presented at least one complication (76%): A fistula developed in 12 patients (57%), meatal regression developed in 7 (33%) and 2 showed complete wound dehiscence (9.5%). None developed stenosis or urethrocoele.

DISCUSSION

The management of severe hypospadias remains somewhat controversial. Some authors favour two-stage techniques,[1-2] while others prefer one-stage techniques;[4-8] however, not one technique is without complications. The controversy lies in the fact that though there will probably never be the one operation that will offer full satisfaction, the quest goes on for the ultimate technique.

Defining severe hypospadias can be difficult, and meatal location alone does not suffice to reflect the severity of the condition. Even with relatively strict criteria these patients represent a rather heterogeneous population. Some patients with proximal meatus may have a decent urethral plate and moderate chordee whilst others are very fibrotic with severe curvature and have hardly any native urethral plate at all. The true nature and severity of the hypospadias is often visible only during surgery when complete degloving of the penis has been performed. We defined severe hypospadias as

Table 1: Complications of hypospadias repair in our series

	Number of cases	Number of cases with complications	Number of cases with fistula	Number of cases with meatal regression	Type of hypospadias			Hormonal stimulation	Chordee requiring corporeoplasty
					Posterior	Perineal	Cripple		
Koyanagi	21	16 (76%)	12 (57%)	7 (33%)	14	7	4	3	2
Duckett	3	3	3	0	2	1	0	1	1
Duckett Onlay	1	0	0	0	1	0	0	0	0
Augmented Duckett	1	1	1	0	1	0	0	0	0
Tubularised plate	1	1	1	0	0	1	0	0	1

hypospadias with the urethral opening at or proximal to the peno-scrotal junction, proximal division of the spongiosum and severe chordee.

Apart from the severity of the hypospadias, other factors also intervene in the choice of an adequate technique, like presence or absence of foreskin for example. In our population, some children had been previously ritually circumcised. This not only condemns the use of foreskin but has often left scar tissue around the penis. Age at surgery[13] and previous stimulation are also factors which influence tissue fibrosis and healing.[14] Furthermore, in the setting of our missions, the operating conditions and, more so even, the hospitalisation conditions lack the standard of hygiene we are used to in our European hospitals. The postoperative care and to some extent the surgery itself take place in a far from sterile environment. Moreover, we perform our missions twice a year for one week. This means that between missions we are unable to treat any complications. Obviously fistulas can wait but if the child develops a stenosis, he will, in most cases, have to wait 6 months before anything can be done about it. There are local paediatric surgeons who could manage acute complications but these children tend to wait until the next mission before reappearing.

All these reasons, anatomic and environmental, have brought us to favour for most of our cases a modified version of the Koyanagi procedure. We do not favour a two-stage technique because we consider that using a one-stage technique, even if it has a high failure rate will avoid some second operations. As mentioned by Castagnetti and El-Ghoneimi in their recent review of the literature, no urethroplasty appears definitely superior, and though a staged approach seems to have a lower complication rate it commits patients to a second procedure.[15] We do not consider having to repair a fistula as a failure but rather as transforming a one-stage into a two-stage technique. We believe that what matters is how to obtain a satisfactory result in the end and how many operations in total this requires; whether they are called complications of the first operation or second stage of a two-stage surgery is irrelevant to the patient, for as long as they are not deleterious to the patient. This is true obviously in cases of fistulas or meatal regression, strictures on the other hand are a true complication since they can have dire consequences.

There is practically always enough tissue for the neourethra as the distance from the meatus around the shaft to the dorsal preputial midline is nearly always longer than the distance from the meatus to the glans. It is to be noted that in one case, when the penis was completely straightened, the distance from the meatus to the glans was longer than the length of the flap, and the repair was performed leaving the neo-meatus in a sub-coronal position [Figure 1]. If there has been a previous circumcision, the flap is harvested from penile skin and not preputial tissue. The use of parameatal flaps reduces the degree of tissue mobilisation, and it avoids the need for a circumferential anastomosis between the neo-urethra and the urethra which is at risk of anastomotic stricture, even if the anastomosis is spatulated.[16,17] This is why we prefer this technique to the classic Duckett urethroplasty. We also believe an important part of the ventral curvature in severe hypospadias is linked to the urethral plate [Figure 2]. This is why we do not often find that the onlay urethroplasty or the TIP repairs are adequate for these patients. In the series recently reported by Snodgrass[18] who is a fervent advocate of urethral plate conservation, in cases of proximal hypospadias, 36% of patients required plate transection, and 8.5% of those who did not have plate transection developed residual chordee. In our series, we found that straightening of the penis required transection and

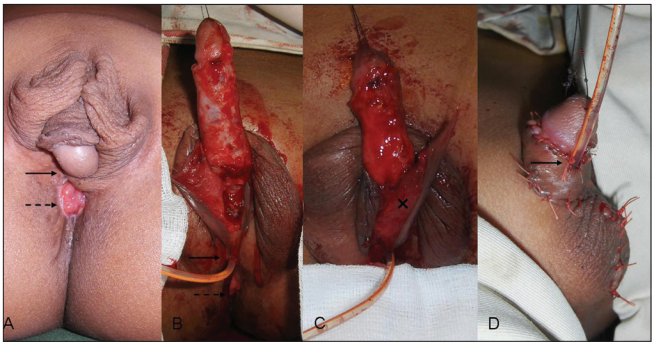


Figure 1: Modified Koyanagi procedure for a perineal hypospadias with severe chordee, A: Preoperative aspect. Arrow = urethral meatus. Dotted line arrow = anus, B: Per-operative aspect after total penile degloving, trans-section and proximal mobilisation of the urethral plate. Arrow = urethral meatus with catheter. Dotted line arrow = anus, C: Per-operative aspect of the parameatal flap (x), D: Postoperative aspect. Arrow= the now sub-coronal urethral meatus

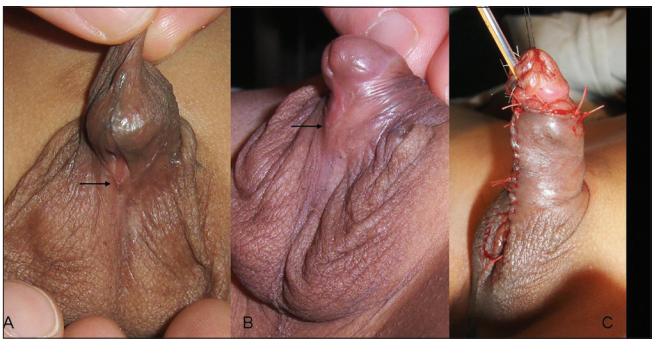


Figure 2: Modified Koyanagi procedure for a severe posterior hypospadias A-B: Preoperative aspect: Urethral opening proximal to the peno-scrotal junction (arrow) and severe chordee, C: Postoperative aspect

proximal mobilisation of the urethral plate in all but two cases. Proximal mobilisation of the urethral plate allowed for complete straightening in all but two of our modified Koyanagi cases, for whom we performed an additional dorsal plication. This is in agreement with the series reported by Catti *et al.*, where they remarked that division and proximal mobilisation of the plate allowed them to achieve complete penile straightening in 89% of cases.[19] Finally, when complications do occur following the modified Koyanagi repair, there is always sufficient tissue available on the ventral aspect for the redo-operation.

The actual technique we use is, as mentioned previously, a modification of the original technique described by Koyanagi. There are in the literature quite a few modified versions of the Koyanagi repair. In its original description, Koyanagi described a parameatal-based skin flap extending around the coronal margin and which was divided in the dorsal midline.[7] Vascular nourishment of the neourethral flaps depended on parameatal tissue alone. This poor vascularisation was incriminated in the high complication rate associated with this technique. In 1994, Snow and Cartwright described what they called the Yoke hypospadias repair,[20] in which the incision lines are similar to the Koyanagi repair, although they use the parameatal flap as an island flap preserving the underlying vascular supply to the flaps. This appears to be the same modification as described a few years later by Emir *et al*.[21] They also describe keeping the loop shape of the flap without the dorsal division of the original Koyanagi description.[7] The glans is drawn dorsally through a button-hole in the dartos pedicle bringing the neourethra ventrally. These two modifications, the island flap and loop shape, are the modifications described later by Hayashi *et al*.[9] In the report by Snow and Cartwright the neourethra is drawn through the tip of the glans whilst in the Hayashi description the glans is split.[20] In this regard the technique we use corresponds to the latter technique. In cases when the child has been previously circumcised, we outline the same flap, except that it is totally based on skin, since there is no inner preputial tissue left.

Our complication rate in this series is high. The high rate of previous circumcisions means the vascularisation of the parameatal flaps might be partially compromised. However we believe that the population specifics (age at surgery, number of previous circumcisions, hormonal stimulation)[13,22] and more so even the postoperative conditions of hygiene play an important role in this complication rate. To illustrate this, our complication rate "at home" is 31% for severe proximal hypospadias (unpublished series). Complication rates for the Koyanagi procedure in other series vary from 20 to 60% even in expert hands.[7,9,15,19-21] But again, even if the complication rate is high, these are benign complications; we have not observed any strictures or residual chordee. This technique always allows for sufficient ventral tissue for the secondary operation if necessary. It could almost be considered as a two-stage operation in which some patients do not need the second operation. A further point is the question of the position of the meatus. Whereas straightening of the penis is essential, a sub-coronal meatus is sufficient for appropriate penile function. Many complications, whether meatal regression or fistulas are directly related to the glanuloplasty, either because the plasty fails or because there is a functional stricture at the level of the glans which itself leads to a proximal fistula. It is difficult, in this series, to determine how many complications would have been avoided had we decided to place the meatus in a sub-coronal position. Not only would we have avoided certain meatal regressions, but probably certain fistulas also. Nowadays, we tend to open the glans on the midline, and anastomose the neourethra to the open glans without closing the glans wings, thus creating a large meatoplasty, which we hope will decrease our complication rate.

As noted by Johal *et al*.,[1] every hypospadiologist needs "a comprehensive armamentarium to deal with the wide variety of primary or revisional hypospadias he or she will encounter"; this is especially true for posterior hypospadias. Indeed, although the TIP is suitable for the majority of anterior hypospadias, we fear there might never be the "one" technique for posterior hypospadias, in which case knowing various techniques, and being able to take advantage of their qualities and faults is essential.

We believe that in this particular setting, the one-stage parameatal-based flap technique is appropriate.

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