Preputial reconstruction in hypospadias repair

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Summary

Objective

In principle, the prepuce can be reconstructed during hypospadias repair, but the procedure has not gained wide acceptance and preputial reconstruction (PR) is surrounded by several controversies.

Material and methods

A review is provided of the technique for PR, how PR combines with the other steps of hypospadias repair, the risks of complications related to the urethroplasty and specific to PR, and the results of PR with particular regard to the relevance for the patient and his family.

Results

PR can be important for patients requiring hypospadias repair and their parents. It can be performed in almost all patients with distal hypospadias except perhaps those with the most asymmetrical prepuces or severe ventral skin deficiency. PR does not seem to increase urethroplasty complications, but combination of PR with tubulisation of the urethral plate urethroplasty seems to offer the best chance of success. Specific complications occur in around 8% of patients and include partial or complete dehiscence of the prepuce and secondary phimosis. To prevent the latter, the reconstructed prepuce should be easily retractile at the end of surgery. Technical modifications can help to achieve this goal. Cosmetically, reconstructed prepuces are not fully normal, but the abnormality could be less important for a patient and his parents that the complete absence of the prepuce.

Conclusion

On the basis of the evidence summarised above, an algorithm for PR in patients with distal hypospadias is proposed. PR can be offered to the vast majority of distal hypospadias patients, although some modification of the technique for hypospadias repair can be required. Retractility of the reconstructed prepuce at the end of surgery seems paramount for final success.

Beyond cultural preferences and personal bias in favour of the putative medical benefits of circumcision, opponents of preputial reconstruction (PR) maintain that the procedure carries an unacceptable risk of specific complications that add up to those of HR [1]. Moreover, concerns exist that PR might increase urethroplasty complications [1]. Finally, opponents of PR maintain that the skin of hypospadiac prepuces is dysplastic and this, coupled with the abnormal anatomy, makes PR unlikely to achieve the same cosmetic and functional results of an intact prepuce.

On the opposite side, surgeons in favour of PR maintain that a circumcised penis is not the norm in some cultures, a reconstructed prepuce conceals most of the urethral malformation (e.g., in case a simple meatotomy is elected, or if meatal regression occurs after HR), the preputial skin can be of use should secondary surgery be required for urethroplasty.

Introduction

Anatomy of the hypospadic prepuce

Hypospadias is characterised by an underdevelopment of all ventral anatomical structures of the penis. The prepuce presents with a V-shaped ventral gap with the apex sitting below the hypospadic meatus; dorsally the skin is redundant, the prepuce stands like a hood over the glans, and dog-ears are present in more severe variants (Fig. 1A and B).

The controversy: PR versus circumcision

Although the prepuce can be reconstructed during hypospadias repair (HR), the procedure has not gained wide acceptance and is surrounded by several controversies [1].
Figure 1  (A–C) Anatomical features of hypospadias relevant to preputial reconstruction. The prepuce presents with a variable ventral gap (A), and sits like a dorsal hood over the glans (B). Dog-ears (arrows) are present in more asymmetrical cases. (C) A patient with ventral skin deficiency; under these circumstances preputial reconstruction is not advisable as preputial skin is often necessary for penile coverage. (D–F) The effects of preputial reconstruction on ventral skin redistribution. After ventral incision and skin mobilization (D), the skin moves caudally (arrows) (E), and the peno-scrotal junction flattens; however, some degree of preputial asymmetry with a dorsal skin excess almost always persists (F). (G,H) Urethroplasty coverage with the ventral based dartos flap flipped over the neo-urethra can be a viable option in patients elected for preputial reconstruction, if a barrier layer to cover the urethroplasty is deemed appropriate.
Preputial reconstruction in hypospadias repair

complications, and the prepuce is erogenous tissue that can be important for the patient for both acceptance of own body image and future sexual life [1]. For these reasons, some have also proposed isolated PR as a treatment option in minor hypospadias cases (with meatotomy added in 50% of cases) [2].

Still, if PR is elected, it is unclear whether the procedure might be offered to all hypospadias patients or only to selected ones, and the criteria for patient selection [3,4]. Finally, no standard technique exists for PR.

Aim

The present review will focus on the technique for PR and its modifications, how PR combines with the other steps of HR, the risks of complications related to the urethroplasty and specific to PR, and the results of PR with particular regard to the relevance for patients and their families.

Technique for PR

PR was initially described by Righini [5] in 1969 and the principle of the procedure has remained consistent since. It involves midline approximation of the divergent edges of the ventral V defect after separation of the inner and outer preputial layers. Video tutorials are available nowadays [2]. The reconstruction can be performed in two or three layers. The intermediate layer is a thin layer of dartos in between the inner and outer prepuce. Some surgeons find this layer too inconsistent to warrant reconstruction, whereas others maintain that it is an important sliding surface for the inner and outer layers. No comparative studies do exist comparing two- versus three-layer reconstructions. Similarly, very few comparative data are available to determine the ideal suture materials and suturing techniques. Antao et al. [6] have reported an increased risk of complications using suture materials with quick reabsorption time and a subcuticular suturing technique. In our opinion, one key technical point is that the skin edges should be accurately everted, as any infolding skin tissue can impair proper healing and cause formation of a preputial fistulas or preputial dehiscence. Additionally, the everted skin edges mimic a median raphe.

In terms of surgical modifications, Hayashi et al. [7] have suggested extending the ventral approximation in the midline only as long as preputial retractility can be confirmed, performing instead a transverse adaptation between the inner and outer preputial layer distally. In our opinion, the same result can be achieved combining the PR with a dorsal prepubiotioplasty (vertical incision and longitudinal closure or Y-V prepubiotioplasty, unpublished data), which has also the advantage of transferring a greater amount of preputial tissue ventrally. Of course, these modifications might leave or increase preputial asymmetry.

PR and hypospadias repair

PR cannot be considered a self-standing step of HR; it must be considered from the outset and in the context of the whole HR as its feasibility strictly depends on the manoeuvres required for penile straightening, the type of urethroplasty performed, and the possible use of an additional flap as barrier layer to cover the urethroplasty.

PR and penile straightening

In a case considered suitable for PR, the initial incision should be performed along the free margins of the prepuce and below the hypospadiac meatus (Fig. 1D) and not be extended dorsally. Indeed, circumferential degloving can cause massive swelling of the prepuce leading to failure of PR [8]. Accordingly, PR should be limited to cases where penile straightening can be achieved by ventral dissection alone. Nevertheless, Shimada et al. [9] have described a partial dorsal longitudinal incision to get access to the dorsum of the penis and make PR feasible in association with dorsal plication. They performed this procedure in 10 out of 42 (24%) cases undergoing a tubularised incised plate (TIP) repair and reported adequate straightening and no complications related to the procedure.

Another important factor related to penile straightening that can limit the feasibility of PR is the need to transfer dorsal skin to the ventrum in order to address a ventral skin deficiency (Fig. 1C). The latter is sometimes an important component of curvature, which can become apparent only after ventral dissection and relocation of the scrotum in a more caudal position. Under these circumstances, Byar’s flaps or a dorsal pedicled skin flap, may be required. Leclair et al. [10] have reported that curvature impaired PR in 12 out of 162 (8%) patients with distal hypospadias. It should be noted, however, that PR also determines a redistribution of ventral skin to some extent (Fig. 1D and E).

PR and urethroplasty

One obvious prerequisite to make PR feasible is that the prepuce is not used for the urethroplasty. This can be an issue in cases of proximal hypospadias or hypospadias associated with severe ventral curvatures requiring urethral plate transection, whereas it is seldom an issue in distal hypospadias, which are also seldom associated with severe curvature. Under these circumstances, the TIP repair is currently the most commonly performed procedure, and this technique leaves the prepuce intact. Similarly, PR could be considered an option also in proximal hypospadias cases amenable to a TIP repair [7,9,11,12]. Nevertheless, such cases accounted for less than 10% of cases undergoing PR in the series we identify (Table 1) and Kallamalapiti et al. [12] have noted that proximal meatal location increases the risk to end up with a non-retractile prepuce (OR 3.01, 95% CI 1.29—7.04). The need for more extensive skin mobilisation and relocation to fill a wider ventral skin gap might account for this.

PR and urethroplasty coverage

Coverage of the urethroplasty with a waterproof barrier layer is generally considered key for the success of HR, and the dorsal dartos flap was suggested to be the layer of choice [2]. Unfortunately, such a flap is not compatible...
with PR because it contains the vessels that provide the blood supply to the prepuce and its mobilisation requires circumferential dissection of the penile skin. Alternative barrier layers can however be used. A dartos flap can be mobilised laterally [22] or ventrally [4]. In the latter, the flap is based on the hipospadic meatus and is flipped over the urethroplasty (Fig. 1 G and H). To make dartos flaps thick enough, it is important the initial dissection is quite superficial, immediately under the skin to leave a good amount of dartos tissue attached to the penile shaft [4].

Some authors have attempted to perform HR without the interposition of any barrier layer [18,23]. Indeed, in distal hypospadias, the urethroplasty is almost completely covered by the glansplasty, and spongioplasty can provide additional urethroplasty coverage in TIP repairs [24].

**PR and urethroplasty complication**

The ultimate question is whether PR increases the complication rate of HR. The issue can be subdivided into two

### Table 1 Summary of results in major available series of PR.

<table>
<thead>
<tr>
<th>Reference</th>
<th>No. patients undergoing PR/reference population (%)</th>
<th>Hypospadias severity (meatal location)</th>
<th>Hypospadias repair</th>
<th>PR technique</th>
<th>PR complication</th>
<th>Preputial dehiscence</th>
<th>Preputial surgery for phimosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klijn et al. [13]</td>
<td>77/700 (11%)</td>
<td>All distal</td>
<td>Flip-flap procedure or TIPU</td>
<td>3- or 4-layer</td>
<td>23 (30%)</td>
<td>23 (30%) (12 partial, 11 complete)</td>
<td>0</td>
</tr>
<tr>
<td>Erdenetsetseg et al. [3]</td>
<td>51/223 (23%)</td>
<td>All distal</td>
<td>MAGPI 22 Mathieu 2 TPU 2 Meatotomy 1 Nothing 24</td>
<td>2-layer</td>
<td>3 (6%)</td>
<td>2 (4%) both partial</td>
<td>0</td>
</tr>
<tr>
<td>Cimador et al. [14]</td>
<td>159/186 (85%)</td>
<td>All distal</td>
<td>MAGPI 22 Mathieu 2</td>
<td>2-layer</td>
<td>16 (9.9%)</td>
<td>6 (3.7%)</td>
<td>10 (6.2%)</td>
</tr>
<tr>
<td>Gray and Boston [15]</td>
<td>205</td>
<td>All distal</td>
<td>All GRAP All TIPU 4-layer</td>
<td>4-layer</td>
<td>8 (6%)</td>
<td>6 (4.4%)</td>
<td>2 (1.5%)</td>
</tr>
<tr>
<td>Leclair et al. [10]</td>
<td>136/162 (84%)</td>
<td>All distal</td>
<td>All TIPU MAGPI 191 TPU 171 Flip-flap procedure 37</td>
<td>2-layer</td>
<td>42 (10%)</td>
<td>39 (9.5%)</td>
<td>0</td>
</tr>
<tr>
<td>Antao et al. [6]</td>
<td>408</td>
<td>All distal</td>
<td>All Mathieu Flip-flap procedure or TIPU</td>
<td>3-layer</td>
<td>6 (3.3%)</td>
<td>2 (2.5%)</td>
<td>1 (1.2%)</td>
</tr>
<tr>
<td>Papouis et al. [16]</td>
<td>78</td>
<td>All distal</td>
<td>All Mathieu Flip-flap procedure or TIPU</td>
<td>3-layer</td>
<td>5 (6.3%)</td>
<td>2 (2.5%)</td>
<td>1 (1.2%)</td>
</tr>
<tr>
<td>Bhatti et al. [17]</td>
<td>35</td>
<td>All distal</td>
<td>All Mathieu Flip-flap procedure or TIPU</td>
<td>3-layer</td>
<td>4 (11.5%)</td>
<td>4 (11.5%)</td>
<td>0</td>
</tr>
<tr>
<td>Shimada et al. [9]</td>
<td>42/111 (38%)</td>
<td>13 distal 29 proximal</td>
<td>All TIPU 3-layer</td>
<td>2-layer</td>
<td>2 (5%)</td>
<td>2 (5%)</td>
<td>0</td>
</tr>
<tr>
<td>Suouub et al. [18]</td>
<td>25/215 (12%)</td>
<td>All distal</td>
<td>All TIPU 2-layer</td>
<td>2-layer</td>
<td>2 (8%)</td>
<td>1 (4%)</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Korvald et al. [19]</td>
<td>100/122 (82%)</td>
<td>116 distal 6 proximal</td>
<td>All TIPU 3-layer</td>
<td>3-layer</td>
<td>18 (15%)</td>
<td>11 (9%)</td>
<td>7 (6%)</td>
</tr>
<tr>
<td>Hayashi et al. [7]</td>
<td>9</td>
<td>All distal</td>
<td>All TIPU 2-layer</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bhat et al. [11]</td>
<td>27</td>
<td>All proximal</td>
<td>All TIPU 3-layer</td>
<td>1 (4%)</td>
<td>1 (4%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Moslemi et al. [20]</td>
<td>43</td>
<td>All distal</td>
<td>All flip-flap procedures All TIPU 3-layer</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fasching et al. [21]</td>
<td>33/64 (51%)</td>
<td>Not specified 170 distal 37 proximal</td>
<td>&quot;Anatomical reconstruction&quot; 3-layer</td>
<td>6 (6.3%)</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Kallampallil et al. [12]</td>
<td>218/278 (78%)</td>
<td>All distal</td>
<td>All TIPU 3-layer</td>
<td>2 (2.3%)</td>
<td>0</td>
<td>1 (1.6%, due to BXO)</td>
<td>0 (0.2%)</td>
</tr>
<tr>
<td>Snodgrass et al. [4]</td>
<td>85/428 (20%)</td>
<td>All distal</td>
<td>All TIPU 3-layer</td>
<td>2 (2.3%)</td>
<td>17 (4.7%)</td>
<td>16 (4.5%)</td>
<td>1 (3%, due to BXO)</td>
</tr>
<tr>
<td>Esposito et al. [22]</td>
<td>354/445 (79%)</td>
<td>All distal</td>
<td>TIPU 233 MAGPI 121 17 Meatotomy 17 Nothing 13</td>
<td>3-layer</td>
<td>2 (6%)</td>
<td>1 (3%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Zimmermann and Woodward [2]</td>
<td>30</td>
<td>All distal</td>
<td>TIPU 233 MAGPI 121 17 Meatotomy 17 Nothing 13</td>
<td>3-layer</td>
<td>6 (3.7%)</td>
<td>121 (5.7%)</td>
<td>35 (1.6%)</td>
</tr>
</tbody>
</table>

BXO = balanitis xerotica obliterans; GRAP = glanular reconstruction and preputioplasty; MAGPI = meatal advancement and glanduloplasty; PR = preputial reconstruction; T(I)PU = tubularised (incised) plate urethroplasty.
parts: one is the risk of skin complications specific to PR, which will be addressed later, the other is the risk of urethroplasty complications. Regarding the latter, an early series by Klijn et al. [13] reported a higher urethroplasty complication rate in patients with distal hypospadias undergoing PR. However, more recent studies including two prospective case–control series and two randomised clinical trials reported comparable complication rates irrespective of preputial management (Table 2). Consistently, a recent meta-analysis using the Mantel–Haenszel and fixed effect methods showed no increased risk of urethral fistula formation associated with PR (OR 1.25, 95% CI 0.80–1.97) [25].

Also of note, the technique used for urethroplasty could influence the success of PR. Antao et al. [6] reported a much higher rate of urethroplasty complications after PR performed in combination with the flip-flap technique (similar to the series by Klijn et al. [13]) than with meatal advancement or TIP repairs.

**PR and duration of urethroplasty repair**

Although the duration of surgery is a secondary outcome, the two series evaluating this outcome consistently reported that circumcision makes HR significantly longer [18,23].

**Selection of suitable patients**

Beyond the technical aspects outlined above, namely limiting the procedure only to distal hypospadias when the prepuce or its pedicle are not incorporated in the repair, patient selection was suggested to be key for an uncomplicated, and cosmetically and functionally satisfactory PR [3]. Reportedly, the rate of PR in series of HR ranges between 11% and 85% of the reference population (Table 1), but it is difficult to determine whether these rates follow a true selection process or patient/surgeon preferences.

Erdenetsetseg and Dewan [3] proposed as single criterion to select cases eligible for PR the ability to retract the prepuce after apposition of the free skin edges of the prepuce during the outpatient visit and the beginning of surgery. This manoeuvre would allow verifying preputial retractility at the end of reconstruction while sharing with the parents the potential risk for complications. In the series by Cimador et al. [14], circumcision was chosen for a too asymmetric prepuce in 27 out of 186 (14.5%) distal hypospadias. Other series, however, reported successful PR in unselected patients where the decision about PR or not was based only on parental preference [4,10].

**Specific complications PR**

PR carries the risk of two specific complications, namely preputial dehiscence and secondary phimosis. According to the literature, the prevalence of such complications ranges between 0% and 30% and the cumulative prevalence was 7.7% (Table 1). Several factors might account for such
variability including the length of follow-up, the criteria for patient selection, and the technique used for PR.

The ultimate question is whether PR increases the overall reoperation rate of HR. Korvald and Stubbendorf [19] observed that avoiding PR significantly predicts freedom from any complication (OR 4.1, p = 0.034). Nevertheless, two recent case-control studies also reported no differences in the overall reoperation rate between patients undergoing PR and circumcision, as the latter may require revision skin surgery [4,18]. On meta-analysis, the risk of reoperation in patients undergoing PR was OR 1.27, 95% CI 0.45–3.58 (Mantel-Haenszel and random effects methods) [25].

Preputial dehiscence after PR

Preputial dehiscence can be complete or partial. The latter, if it occurs between a proximal and distal preputial segment that has healed properly, can lead to the formation of a preputial fistula..Reportedly, preputial dehiscence occurs between 0 and 30% of cases, and the cumulative prevalence in the series analysed was 5.7% (Table 2). The recommended management of preputial dehiscence varies. Non-operative management has been reported in patients with partial dehiscence of the distal portion of the reconstruction [10,13,22]. Successful closure of a preputial fistula or redo-PR has been reported in patients with a preputial fistula or complete dehiscence [10,13,16]. Redo surgery, however, exposes the patient to the risk of a new dehiscence; therefore, parents must be extremely motivated to preserve the prepuce, otherwise circumcision seems safer [14].

Preputial retractility and secondary phimosis after PR

A normal prepuce in an adult must be retractile. Nevertheless, although data on preputial dehiscence can easily be extrapolated from the literature, data on the risk of phimosis are much more elusive. For instance, Leclair et al. [10] have reported that a phimosis was observed during follow-up in 13 out of 136 (9.5%) cases undergoing PR, but only two (1.5%) eventually required additional surgery for persistent phimosis. Similarly, Esposito et al. [22] reported a phimosis in 54 out of 354 (15%) cases undergoing PR, but only one (0.2%) eventually required additional surgery for persistent phimosis. Several reasons may account for this discrepancy between a non-retractile prepuce and the need for surgery. To begin with, postoperative oedema may impair retractility in 50–100% of patients undergoing PR [20–23]. Oedema generally improves spontaneously within 2 weeks of surgery, but may require weeks to subside. Besides, preputial retractility can improve following maturation of the ventral scar (for which reason some recommend delaying the first retraction until 12 months postoperatively) [1]. Finally, as in children with a physiological phimosis, the prepuce can become fully retractile only at puberty when it widens under the effect of androgens.

Kalampallil et al. [12] have reported the only series on preputial retractility after PR associated with HR. After a median follow-up of 2.2 (range 1.1–4.6) years, the prepuce was retractile in 159 out of 194 (82%) patients, 27 (14%) were under observation for a tight prepuce, and eight (4%) had circumcision for a secondary phimosis. Patients with non-retractile prepuces tended to be younger than those where the prepuce was retractile. Risk factors for a non-retractile prepuce included a proximal meatal location and, more importantly, the presence of a non-retractile prepuce at the end of surgery (OR 5.97, 95% CI 2.74–13.02). This underscores once more the importance of creating a wide prepuce during surgery.

As in prepubertal children with primary phimosis, use of topical steroids has been proposed in patients with secondary phimosis after PR. Leclair [10] has reported successful treatment with steroid cream (betametasone 0.1%, duration and timing not specified) in 11 out of 13 patients. Esposito et al. [22] have reported successful topical steroids treatment (no details provided) in 53 out of 54 cases with a non-retractile prepuce. Finally, Snodgrass et al. [4] have successfully prescribed betamethasone 0.05% twice daily for 6 weeks to five out of 85 patients undergoing PR whose prepuce was non-retractile 6 months after surgery. Overall, these data are quite inconsistent. Many series do not detail the type of steroids used, the treatment scheme, and the timing of administration in relation to PR. Moreover, no series includes controls treated observationally to rule out spontaneous improvement, which has been reported to occur years after surgery [6,9].

To our knowledge, there are no data currently available about the influence of pubertal development on the resolution of phimosis after PR.

Cosmetic results of PR

The cosmetic results of PR are a matter of concern for many surgeons. Reconstructed prepuces remain asymmetrical after surgery (Fig. 1F), and manoeuvres to ensure retractility, such as partial ventral closure or dorsal incisions, may increase the chance of ending up with an asymmetrical prepuce. Few data are available on the cosmetic results of PR in general, and there are no comparative data with circumcision. Moreover, it is intuitive that results cannot be considered outside the cultural environment or individual preferences. Differences can exist in the perception of results among the surgeon, the parents, and the patient, the latter being the most important.

In their series of 354 distal HR, Esposito et al. [22] have reported that the preputial appearance was considered excellent by the parents of 310 patients (87.5%); only in nine cases were the parents unpleased with the results of PR, because the skin was asymmetrical, tight, and with persistent prominent “dog-ears”. These subjective results were consistent with a more objective assessment obtained by two independent assessors using a modification of the validated Hypospadias Objective Penile Evaluation (HOPE) score [22]. Different results were reported by Fasching et al. [21], who compared cosmetic results of HR combined with either circumcision or PR using the validated methodology.
Paediatric Penile Perception Score (PPPS). The PPPS was significantly better in patients undergoing PR when cases were assessed by the surgeon, whereas no difference was observed in the scores given by the parents [21].

To our knowledge, Grey and Boston [15] have provided the only data about long-term patient perception of PR. The authors sent a non-validated questionnaire to a consecutive cohort of 63 patients with follow-up longer than 10 years after HR. Forty-five (71%) replied, and their mean age was 14.3 (10.25–20.75) years. Thirty-six boys (82%) thought the appearance of their penis was normal and none felt it was very different. Forty (93%) declared they never avoided communal situations. These results were not statistically different from those in an age-matched group of boys who had undergone appendicectomy.

Relevance of PR for parents and patients

In cultures where an uncircumcised penis is considered the norm, PR can be important both for parents and the child. Kljin et al. [13] have reported that, in their experience in the Netherlands, 15% of parents specifically elected for PR during HR, even though circumcision was the primary recommendation and parents were warned that PR carried an increased complication risk. These authors also commented that the percentage of parents wanting PR seemed to be growing [13]. Although controversial, the desire to avoid circumcision was suggested to be one major reason causing regret in parents of hypospadias patients regarding their decision to elect for hypospadias repair in their sons [26,27].

The prepuce can also be important for adults undergoing HR in childhood. Long-term studies have shown that the absence of the prepuce is one of the features that remind patients of the surgery they underwent as children [28]. Örtqvist et al. [29] have reported that one-third of Swedish adults who had undergone HR in combination with circumcision in childhood declared they wished they had the foreskin intact.

Conclusions

PR can be important for patients requiring HR and for their parents. It can be performed in almost all patients with distal hypospadias except perhaps those with the most asymmetrical prepuces. PR does not seem to increase urethroplasty complications, but combination with tubularisation of the urethral plate urethroplasty seems to offer the best chance of success. Specific complications include partial or complete dehiscence of the prepuce and secondary phimosis. These occur in around 8% of patients. To prevent secondary phimosis, the reconstructed prepuce should be wide enough to be easily retractile at the end of surgery. Technical modifications can help achieve this goal. Cosmetically, reconstructed prepuces are not fully normal, but the abnormality could be less important for a patient and his parents than the complete absence of the prepuce. An algorithm for PR in patients with distal hypospadias is proposed (Fig. 2).

Conflict of interest statement

None.

Funding

None.

MCQ without answers

1. Can preputial reconstruction be performed irrespective of penile curvature?
   a. yes
   b. need for penile skin degloving is a relative contraindication for preputial reconstruction
   c. preputial reconstruction should be avoided in patients with evidence of ventral skin deficiency
   d. b + c are correct

2. What is the most common complication of preputial reconstruction?
   a. urethral fistula
   b. secondary phimosis
   c. partial or complete preputial dehiscence
   d. urethral stricture

3. Which one among the following is not a reason for improvement of preputial retractility during follow-up after preputial reconstruction?
   a. Resolution of oedema
   b. Maturation of ventral scar
   c. Effect of androgens
   d. Increase in penile size

4. Can preputial reconstruction achieve a cosmetically normal prepuce?
   a. Always
   b. Never
   c. Minor deformities are frequent, but might not be important for the patient

![Figure 2](https://example.com/fig2.png)

Figure 2 Algorithm for preputial reconstruction in patients with distal hypospadias. In suitable patients, a ventral incision is performed and ventral dissection carried out. If this manoeuvre is sufficient for penile straightening, then preputial reconstruction is carried out. At the end of surgery, retractility is confirmed, otherwise dorsal releasing incision or circumcision is performed.
d. Minor deformities are rare and not important for the patient

References