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Suture Materials: Do They Affect Fistula and Stricture Rates in Flap Urethroplasties?

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Key Words

Hypospadias · Urethral plate · Suture materials · Fistula/stricture formation

Abstract

Introduction: The effect of suture materials on urethroplasty complications is debated. Indeed, materials with a delayed absorption might either reduce the incidence of fistulas by ensuring a prolonged approximation of neourethral edges or increase the risk of urethral strictures due to a prolonged tissue reaction during suture absorption. We retrospectively evaluated the role of suture materials in the complication rate of urethroplasty procedures performed in our institution over a 10-year period. ***Patients and Methods:*** Three hundred and thirty-six boys undergoing a flap procedure (parameatal based, preputial tube, or onlay preputial flap) for hypospadias repair were considered for this study. The patients were stratified into two groups according to the suture material used for urethroplasty. Polyglactin (Vicryl®), a polyfilament with intermediate absorption, was used in 254 group A patients, whereas polydioxanone (PDS®), a monofilament with prolonged absorption, was used in 82 group B patients. The success of a one-stage repair and stricture and fistula rates were evaluated. ***Results:*** A successful one-stage repair was achieved in 82% of the group A and in 83% of the group B patients (p = 0.97). No statistically significant differences were noted in fistula and/or stricture rates in the two groups, even considering each procedure separately. ***Conclusions:*** This series suggests that suture materials do not affect the complication rate in flap urethroplasty procedures. Appropriate technique, meticulous surgery, and surgeon experience seem to be more crucial factors. A randomized trial is warranted.

Introduction

The management of hypospadias has so drastically improved during these last years that the achievement of a functional result, i.e., a straight urinary flow and coitus, is no longer considered sufficient, but also a normal-looking penis and minimum morbidity are required from surgery [1].

The development of specific expertise, meticulous surgery following the principles of plastic surgery (delicate tissue handling, use of bipolar coagulation, and microsurgical techniques), and advances in surgical techniques (preservation of the urethral plate and multilayer coverage of the urethroplasty) may all have contributed to such an improvement [1, 2].

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The role of suture materials, in contrast, remains controversially debated. Whereas general agreement exists upon the use of absorbable sutures, surgeons are still divided over the use of materials with an early or delayed absorption rate. Indeed, some authors [3] suggested that the use of sutures with a delayed absorption rate might reduce the incidence of fistulas, ensuring a prolonged approximation of the neo-urethral edges; others [4], on the other hand, argued that such sutures inducing a long-standing tissue reaction could increase the rate of urethral strictures.

From 1991 to 1999, we have performed urethroplasty procedures by using polyglactin (Vicryl®), a polyfilament with intermediate absorption, while since 2000 we have switched to polydioxanone (PDS®), a monofilament with prolonged absorption. This choice was based on the fact that polydioxanone is a monofilament and that it could be extruded thinner than polyglactin. Therefore, we reasoned that polydioxanone would be less traumatic to the thin flaps used for urethroplasties.

The present study aimed at evaluating retrospectively how this change in suture materials has affected the complication rates of hypospadias repair in our institution.

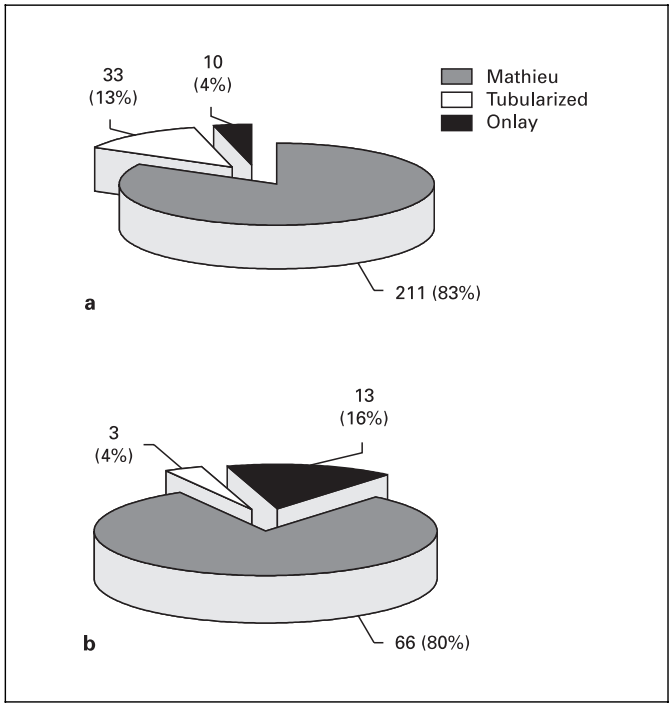

Fig. 1. Techniques used in the different groups and number of procedures performed. **a** Group A: polyglactin (1991–1999). **b** Group B: polydioxanone (2000–2001).

Patients and Methods

Between 1991 and 2001, 535 cases of hypospadias were managed in our institution by a single experienced surgeon (E.D.G.). Twenty-three patients having a peniscrotal hypospadias underwent various complex, non-standardized procedures and were, therefore, excluded from the study. One hundred and seventy-six patients with a glanular meatus undergoing MAGPI (meatoplasty/glanuloplasty) repair [5] were excluded as well, since in our opinion, and in agreement with Mouriquand et al. [2], this technique is more a glanular reshaping than a meatal advancement.

A flap procedure was used in the remaining 336 cases considered for this study. A parameatal-based flipped flap (Mathieu technique) [6, 7] was selected in 277 patients with a subcoronal or distal shaft meatus. On the other hand, a transverse preputial flap, either tubularized [8] or onlay [9], was used in 59 patients having a midshaft or proximal hypospadias.

The urethroplasty was always performed using a continuous subcuticular suture. Suture material was 6/0 polyglactin in those cases managed between 1991 and 1999 (group a, n = 254) and 7/0 polydioxanone in those managed in 2000 and 2001 (group b, n = 82). Details about suture material and technique of procedures are shown in figure 1.

Glanuloplasty was always performed with the same suture material as used for the urethroplasty. The skin was always sutured with 6/0 polyglactin. A second layer, covering the urethroplasty, was used only after Mathieu procedures and consisted of a midline approximation of dartos fascia mobilized from the shaft on each side of the urethral plate.

Postoperative care was uniform in all cases in terms of dressing (mildly compressive), antibiotic prophylaxis (amoxicillin and clavulanic acid, 50 mg/kg, single dose), and use of medications after the procedures. An indwelling catheter (8 Fr) was left in all cases: for 3 days after Mathieu repair and for 7 days in case of preputial flap.

Complications considered were strictures and fistulas, whereas urethrocele was not considered, this being a specific complication of preputial tube flaps, mostly unrelated to suture materials [10–12]. All urethroplasties requiring additional procedures, namely urethral dilatations or re-operations, were considered failures.

For statistical analyses, the patients were stratified according to the suture material selected for urethroplasty: polyglactin in group A and polydioxanone in group B. In each group, the patients were further subdivided according to the technique used: Mathieu, preputial tube, or onlay preputial flap. The two study groups were matched for age. A chi-square test was used for comparison within groups, and Fisher's exact test was used whenever the numbers in the groups were small. Statistical significance was considered for $p < 0.05$.

Results

Comparing groups A and B, the only significant difference was a change in the tubularized to onlay preputial flap ratio. It was 3.3:1 in group A, while it decreased to 0.23:1 in group B, since we have progressively preferred

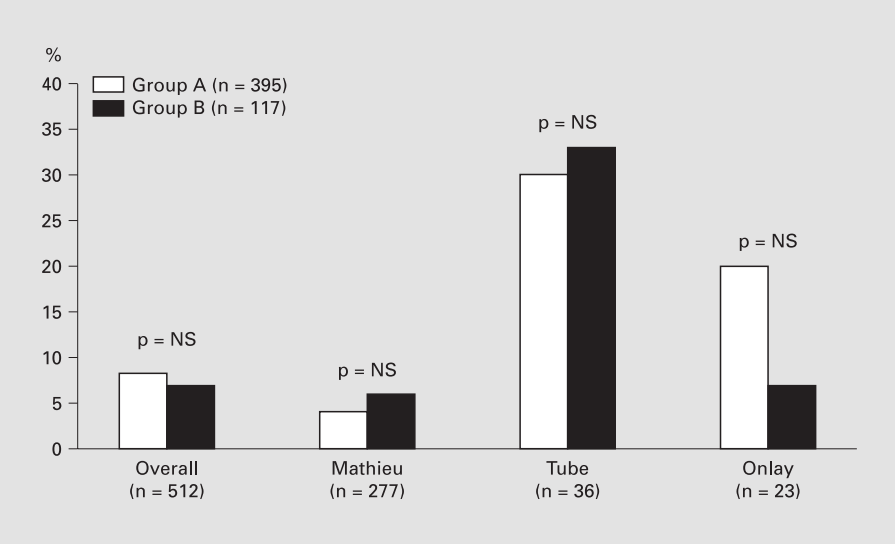

Fig. 2. Failure rates of urethroplasties, overall and according to each single technique. Statistical analysis showed no differences in the failure rates considering either each group overall or the single types of repair.

Table 1. Number and rates of fistulas and strictures in the two groups according to the different types of hypospadias repair

	Group A		Group B		p
	n	%	n	%	
Mathieu					
Fistulas	8/211	3.8	4/66	6	0.66 (NS)
Strictures	7/211	2.8	1/66	1.5	0.74 (NS)
Tube					
Fistulas	7/33	21.8	1/3	33.3	0.54 (NS)
Strictures	5/33	15.6	0/3		1.0 (NS)
Onlay					
Fistulas	2/10	20	1/13	7.6	0.56 (NS)
Strictures	0/10		1/13	7.6	1.0 (NS)

the use of the preputial flap as an onlay during the study period (fig. 1).

Overall, 29 complications occurred in 21 out of the 254 group A patients and 8 complications in 6 out of the 82 group B patients. Therefore, a one-stage repair was successful in 82% of the group A patients and in 83% of the group B patients, the difference being not statistically significant (p = 0.97). The failure rate of the one-stage repair in the two groups was not statistically significant also considering each procedure separately (fig. 2).

Table 1 lists the stricture and fistula rates in groups A and B in relation to each technique. No statistically significant difference was noted between the two groups, either considering the cases overall or each technique separately.

Discussion

This study aimed at investigating how the changes in suture materials over the last 10 years have affected the postoperative morbidity of hypospadias surgery in our institution. We divided our study patients into two groups: group A in which the urethroplasties were performed using polyglactin, a polyfilament suture material with an intermediate absorption time, and group B in which polydioxanone, a monofilament suture material with a prolonged absorption time, was used. A similar comparison has been already carried out by Ulman et al. [3], studying Mathieu urethroplasties. These authors found a significantly lower fistula rate (but no difference in stricture rate) using polydioxanone. However, their study groups differed not only in suture material, but also in suturing technique: subcuticular in the group in which polydioxanone was used, full thickness in the group in which polyglactin was employed. Therefore, Ulman et al. [3] concluded that the use of a subcuticular suture and polydioxanone improved the outcomes, but were unable to differentiate the contribution of each one.

Comparing the complication rate in the subgroup with distal hypospadias (Mathieu) in the present series, we did not find any difference between the two materials. Since a

subcuticular suture was used in both our groups, in our opinion, this should be considered the major factor in both our groups as well as in the series presented by Ulman et al. [3].

Di Sandro and Palmer [4], on the other hand, compared polydioxanone with polyglycolic acid (Dexon®; a polyfilament with an intermediate absorption time). Differing from Ulman et al. [3], they studied the effect of the suture material also according to the surgical technique selected for urethroplasty. These authors concluded that the use of sutures with a very delayed absorption rate could increase tissue reaction and stricture formation. However, they did not find any difference in complication rate in distal hypospadias repair, but a higher incidence of neo-urethral strictures in preputial tube flaps sutured with polydioxanone. According to Castañon et al. [11] neo-urethral strictures may be considered a specific complication of the preputial tube technique, as they rarely occur using an onlay flap. Unfortunately the series of Di Sandro and Palmer [4] did not include any case of onlay urethroplasty performed with polydioxanone.

Notably, Di Sandro and Palmer [4] did not mention the size of the suture materials employed. Both Ulman et al. [3] and ourselves compared a 6/0 polyglactin with a 7/0 polydioxanone suture, since a longer absorption time is partially balanced by a thinner suture. Indeed, the absorption rate depends both on suture material and suture size. Polydioxanone allows using thinner and, therefore, less traumatic sutures, maintaining the same absorption time of thicker polyglactin or polyglycolic acid sutures. We believe this could be advocated as a major advantage of polydioxanone.

Regrettably, we were not able to select a uniform sample of graft procedures in our study population, so this field should still be investigated. The use of suture materials with a delayed absorption time could be advantageous working on poorly vascularized tissues.

This series does not include also any case of tubularized incised plate urethroplasty [13], but, in our opinion, it is of note that three relatively recent papers on this technique reported similar results, although the urethroplasties were performed with catgut [13], polyglactin [14], and polydioxanone [15], respectively.

Our results suggest that the suture materials are not a crucial factor for the success of hypospadias repair procedures. Some evidence is in keeping with such a conclusion. Uygur et al. [16], analyzing the parameters associated with the rate of fistula development in patients operated on in their institution during three successive time intervals, showed that both a monofilament suture and the use of thin suture materials were associated with a significantly lower incidence of fistulas when each time interval was analyzed separately. Nevertheless, only the effect of time intervals remained significant in a multivariate analysis including type of suture material and suturing technique as well as the presence of a history of previous operations, length of flap, the presence of chordee or torsion, circumcision, and time intervals [16]. In a further study [17], the same authors showed that the institutional experience in selecting an appropriate technique and performing meticulous surgery are probably the major factors affecting the postoperative complication rate. Indeed, the effect of suture materials could be only apparent, as many studies compared two subsequent time intervals, introducing, therefore, a learning effect. Also in the present study two subsequent time intervals were considered, but all the procedures were carried out by the same surgeon with a specific experience in the field. Still, significantly the widest gap in the complication rate, although not statistically significant ($p = 0.56$), was noticed with the onlay technique (fig. 2) which was the last procedure to be introduced to our armamentarium.

The current series suggests that suture materials do not affect the complication rate related to urethroplasty, when a flap is used. In our opinion, the selection of the appropriate technique, meticulous surgery, and surgical experience are more relevant factors. A randomized trial is warranted.

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