

Hypospadias-Repair with Histoacrylic Tissue Adhesive and without Indwelling Catheter Drainage

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Summary. In 46 animals experiments and in 16 patients various modifications of pasting of the skin after surgical correction of hypospadias or urethral fistulas were tested. "Bridging adhesion" by the use of histoacrylic-N-blue has been of the greatest advantage. Even if no urethral catheter and no traction sutures are used wound infection, fistulas and wound dehiscence are usually not to be expected. The sur-

gical technique presented means a technical simplification and a better prognosis for the patient as far as the well known complications of hypospadias repairs go. It also means an easier operation and post operative course for patient and surgeon.

Key words: Hypospadias-repair, histoacrylic bridging adhesion, no traction sutures, no catheter.

Numerous operative techniques for hypospadias repair have been described, but no technique has been found that will avoid typical complications like infection, fistulas and wound-dehiscence with greater safety than others. Frequently the cause of these difficulties is edema and contamination. If a urethral catheter is used infection cannot be avoided in spite of the use of antibiotics. Even if the urine is diverted by a suprapubic or perineal catheter the free flow of wound secretions from the newly formed urethra is not guaranteed. The same is true for the passage of contaminated urine when a suprapubic tube does not function properly because of incrustation or when in the case of perineal drainage a small catheter must be used.

To avoid these difficulties we have used in animal experiments and finally in patients a hypospadias repair without double-stop-suture-lines and without catheter drainage but with the use of tissue-adhesive techniques and intensive prophylactic treatment of wound edema (Vahlensieck et al. 1969, Wessel and Vahlensieck 1970, Vahlensieck 1971).

Material and Methods

I. 46 male dogs and Combelen-Nembutal anesthesia were used. Initially the foreskin was incised in the middle of the ventral side of the penis with straight scissors. Subsequently the urethra was incised including the glans, the corpus cavernosum of the penis and the penile skin down to the basis

of the penis. Bleeding was controlled by ligatures or running sutures of 3-0 chromic Catgut. These experimental hypospadias were then closed in different manners:

1. "Adaptive pasting" alone (28 animals)

The margins of the wound are dried by short manual compression and spongeing. A thin layer of histoacrylic-N-blue adhesive¹ is applied (18 cases). In 10 animals a mixture of gelatine, resorcin and formalin according to Braunwald and co-authors is used. The margins of the wound are adapted immediately and kept in position manually for 3-4 min with acrylic adhesive and for 1-2 min when the Braunwald adhesive is used.

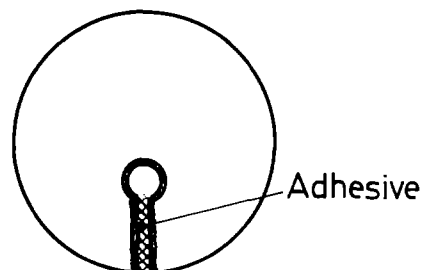


Fig. 1. "Adaptive Adhesion" of subcutaneous tissue and skin without sutures.

¹ B. Braun, Comp., Melsungen, W.-Germany

2. "Gap-bridging adhesion" alone (18 animals)

The margins of the wound are dried by a short manual compression and spongeing. Manual adaptation of the margins. Histoacrylic-N-blue (8 cases) or Braunwald adhesive (10 cases) was applied on both sides of the wound. The wound was overbridged by a free skin transplant (1 case) by collagen foil (6 cases) or by a simple layer of gauze (11 cases).

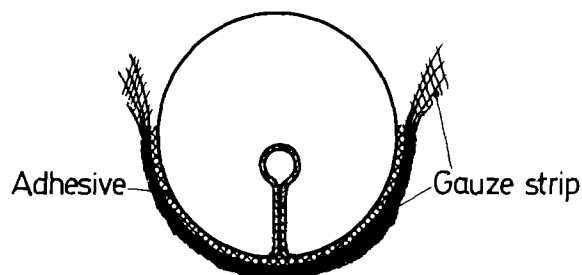


Fig. 2. "Bridging Adhesion" without suturing subcutaneous tissue and skin

II. In 16 patients urethral reconstructions after previous excision of a chordee and closures of fistulas after previous Denis-Browne urethroplasties were carried out. Dissection according to the Denis-Browne technique. The further steps were as follows:

1. Closure by suturing in layers and by "gap-bridging adhesion".

Suture of the subcutaneous tissue above the buried epithelial strip or of the dissected and closed fistula respectively with atraumatic 4-0 or 2-0 plain catgut sutures. Subsequently the same technique is used for skin suturing. Histoacrylic-N-blue adhesive is then applied to the penile skin on both sides of the wound margins. A single layer of gauze is then applied with pressure. More adhesive is added from the outside, the gauze is then modelled properly until the adhesive polymerizes. The wound itself is kept entirely free of adhesive, it is covered by gauze only.

III. Standardized post-operative treatment.

1. Postoperatively animals as well as patients void spontaneously. No diversion of urine by transurethral indwelling catheter, perineal urethrostomy or suprapubic tube is used.

2. In the animals a protective dressing and a neck brace for fixation were used. In the patients no dressing was used except for the overbridging gauze. The bedsheets were kept away from the wound area by a tunnel.

3. Intensive treatment of wound edema. The animals were treated with 1 ampule of Reparil² (equal 5mg of Aescin) daily given intravenously.

The patients received post operatively for three days 3 times daily one ampule of Reparil intravenously, and from the fourth postoperative day on 3 times daily 2 dragees of the same drug p. o. (1 dragee contains 20 mg of resorbable Aescin).

4. The animals were treated with an injection of Hydracillin forte³ on the day of operation and on the fourth post operative day (3 500 000 I. U. Sodium Penicillin G and 500 000 I. U. Procain Penicillin G, 40 mg Lidocainhydrochloride).

The patients did not receive antibiotics.

Results

After "adaptive pasting" with Histoacrylic-N-blue in 18 animals wound-healing was uncomplicated in 7 animals. In 3 dogs a partial dehiscence of the peripheral 1-2 cm occurred 1-5 days after surgery. Healing was otherwise uncomplicated. In 8 cases complete wound dehiscence occurred postoperatively.

Histologically, during a period of observation of 120 days transient white blood-cell infiltration was found which decreased from the fifth postoperative day on and finally disappeared (Wessel and Vahlensieck 1970).

In contrast, uncomplicated wound healing was seen in all 8 animals after "gap-bridging adhesion" and the use of collagen-foil or a strip of gauze.

In 16 patients spontaneous voiding after "gap-bridging adhesion" was undisturbed.

2 Madaus Comp., Cologne, W.-Germany

3 Dauelsberg & Co. Penicillin-Gesellschaft, Göttingen

Table 1. Pasting with histoacrylic-N-blue

Acrylic Adhesive Experimental Protocol	No. of Experiments	Partial Dehiscence	Total Dehiscence	No. of Successful Ops.
"Adaptive Adhesion"	18	3	8	7
"Bridging Adhesion"				
a) Animals	8	-	-	8
b) Patients	16	-	1	15



Fig. 3. Spontaneous voiding 3 days after "Bridging Adhesion" in a case of hypospadias with suture of subcutaneous tissue and skin but without traction sutures and without urethral catheter

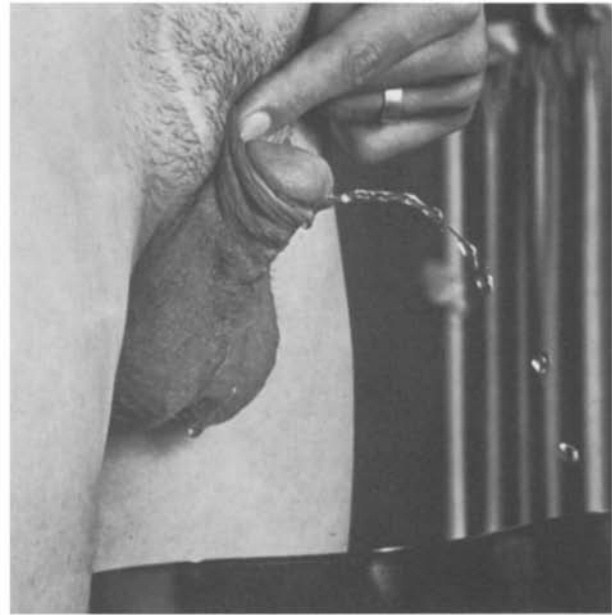


Fig. 4. Well healed scar and undisturbed voiding 11 days after "Bridging Adhesion" in a case of hypospadias

The gauze-strip came off between the 8th and 12th post-operative day and except for one case a well healed scar was seen.

The case treated unsuccessfully had a previous Denis-Browne urethroplasty. The penis was extremely small and surgery was done for a urethral fistula. The bridging gauze-strip came off after 8 days of a regular post-operative course with spontaneous voiding and the fistula recurred.

In all other cases further treatment was not necessary.

In all 20 animals who were treated by adaptive adhesion or by "gap-bridging adhesion" respectively total wound dehiscence occurred about 8 days after surgery.

Histologically an extensive purulent necrosis of the wound margins with extension of purulent in

flammation into the periurethral fatty tissue was seen in those animals treated by adaptive adhesion.

Discussion

The high rate of complications in hypospadias repair by infection, fistulas and wound dehiscence led us to attempt primary closure of fistulas and of the newly created urethra without the use of traction sutures and urinary diversion by catheter drainage. Instead tissue adhesives and anti-edematous treatment were used to achieve uncomplicated healing.

Basically this may be done by "adaptive adhesion" meaning direct pasting of all layers of the wound as well as by "bridging adhesion", where subcutaneous tissue and skin are sutured with interrupted 4-0 or

Table 2. Pasting with Braunwald adhesive

Gelatine-Resorcine- Formalin adhesive (Braunwald) Experimental Protocol	No. of Experiments	Partial Dehiscence	Total Dehiscence	No. of Successful Ops.
"Adaptive Adhesion"	10	-	10	-
"Bridging Adhesion"	10	-	10	-

2-0 plain catgut sutures and only the skin is pasted with some material bridging the skin defect.

Our results show the superiority of the latter technique using histoacrylic-N-blue adhesive. The lesser reliability of "adaptive pasting" may be explained by the fact that subcutaneous tissue and skin are not sutured at all. But it may also be possible that the adhesive when brought into the wound itself causes inflammatory changes which interfere with normal healing. This is especially true for the Gelatine-Resorcine-Formaline mixture called Braunwald adhesive. This disadvantage cannot be neutralized by the well known hemostatic and antibacterial effects of both adhesives. In addition the open question of carcinogenetic action of the adhesives requires more consideration when the adhesive is put into the open wound. However, the poor results with the Braunwald adhesive in "bridging adhesion" seem to be due to a much stronger skin reaction than with acrylic adhesive.

A layer of gauze should be used as bridging material in "bridging adhesion" rather than a free skin transplant or collagen foil. Gauze can be modelled well to the penis and also the wound remains air-dry through the meshes while the adhesive is applied strictly to the skin initially. Later on more adhesive can be used and will be held in place by the meshes of the gauze strip.

In case wound edema develops the lower circumference of the penis is protected by the bridging gauze strip and no tension will occur. If at all, edema will only occur on the ventral side of the penis. By regular use of the aescin-preparation Repairil edema of the wound was rare as previously reported by Albrecht.

The failure in one patient with urethral fistula after several previous Denis-Browne urethroplasties is due to highly adverse anatomical and surgical

circumstances. It does not change our impression that "bridging adhesion" in urethroplasties without catheter drainage means a simplification of the operation, a better prognosis and an easier course for patient and surgeon.

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