POST CIRCUMCISION AND HYPOSPADIAS REPAIR URETHROCUTANEOUS FISTULA : TWO VS THREE LAYERS REPAIR

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ABSTRACT

Persistent urethrocutaneous fistula following hypospadias repair and circumcision presents a surgical challenge with a high rate of recurrence. The present series evaluates the value of reinforcement of the repair by interpositioning of a vascularized flap. 24 boys suffering from urethral fistula (4 following circumcision and 20 following hypospadias surgery) were equally divided into two groups. The 1st group were managed by modified two layers closure with skin flap coverage and the 2nd group were managed by 3 layers closure with interpositioned flap. Cases were followed up for 6-20 months. The success rate in 1st group was 66.6% versus 91% in the 2nd group (raised to 75% versus 100% after spontaneous closure of one fistula in each group).

The present series shows that addition of interposition flap to the repair of urethrocutaneous fistula appears to reduce the incidence of fistula recurrence significantly.

Key words : Urethral fistula - hypospadias-circumcision.

INTRODUCTION

Despite the great advances in surgical technique of hypospadias repair, still, urethrocutaneous fistula presents the most common and most frustrating complication and constitutes a main factor to judge the success of repair (Duckett, 1990). Its incidence varies according to the procedure used and it is estimated to be from 5% up to 50% (Devine and Horton, 1977). Inadequate technique, tissue ischemia and overlapping of suture lines are the main causative factors (Devine et al., 1978).

Circumcision, although it is the most common operation in males, is rarly become complicated by urethrocutaneous fistula (Niku et al., 1995). This fistula, which almost located in a subglanular position, may results from marked pull on the foreskin before crushing by clamps or from attempts at haemostasis with deep suturing (Lau and Ong, 1981).

Several surgical procedures have been advocated for repair of persistent and mature urethrocutaneous fistula following circumcision and hypospadias repair. These include simple two layers closure (Duckett et al., 1982) and modified two layers closure with covering of the repaired urethra by local or distant skin flap (Roberts, 1982 and Sahai & Shukla, 1987). Others reinforced the repair using a third layer in the form of interpositioned subcutaneous local flap (Hayashi et al., 1998).

In distal fistulas, specially with thin distal skin and/or meatal stenosis, the meatus and the fistula are connected and the defect is repaired utilizing MAGPI procedure (Mahfouz et al., 1989), King (1970) repair ± Snodgrass incision (Guralnick et al., 2000).

The aim of this work is to compaire modified two layers closure with skin flap coverage versus three layers closure with flap interposition in repairing urethrocutaneous fistulas following hypospadias surgery and circumcision.

PATIENTS AND METHODS

Between March, 1999 and April 2002, 24 boys (mean age 3.8 years, range 18 month to 12 years) were referred for surgical repair of persistent and mature urethrocutaneous fistula(s). In 4 patients the fistulas were related to circumcision and in 20 ones the fistulas were complicating hypospadias repair. Cases were evaluated by complet history and through general and local examination. Urine analysis was performed in all cases to exclude and to manage urinary tract infection. Associated urethral stricture was assessed by urethral catheterization and ascending urethrogram in positive cases. Surgical repair was performed at least 6 months from the last operation or attempt at repair.

Patients were randomly divided into 2 equal groups (2 cases post circumcision fistulas and 10 cases post hypospadias repair fistulas). Tables (1, 2) shows the descriptive data of

the two groups.

Patients in group 1 were managed by modified two layers closure. The fistula was circumscribed and dissected out, the urethra was closed with interrupted subcuticular transverse sutures (6/0 polyglactine) and the skin defect was closed using advancement flap or rotation flap. Very distal fistulas with thin distal skin were repaired by King repair after connecting the meatus and the fistula (± Snodgrass incision when indicated). In case of multiple fistulas, near fistulas were connected to each other and were converted to a large single fistula before proceeding with the repair. If there is meatal stenosis, dorsal meatoplasty was performed as described by Hinman, (1994). In case of associated urethral stricture, the stricture was incised and the defect was covered by a small skin perimeatal flap as described by Mc Dougal, (1989).

Patients in group 2 were repaired by a 3 layers closure with interposition flap. The fistula was circumscribed. dissected out, and closed with interrupted subcuticular transverse sutures (6/0 polyglactine). The lateral skin edges were wideiy undermined superficial to the dartos layer, then a vascularized lateral flap is elevated from the dartos fascia with its base near the urethra. The flap was mobilized medially to completly cover the suture line of the repaired urethra and was fixed by 6/0 polyglactine interrupted sutures. The skin was then closed by 6/0 interrupted polyglactine sutures. In very proximal fistulas, the interposition flap was taken from the fascial coverings of the testis. In distal fistulas with thin distal skin, King repair was perforemd with the addition of the interposition flap after connecting the meatus with the fistula (± Snodgrass incision when indicated).

In incidence of multiple fistulas, meatal stenosis or urethral stricture, the same principles of management applied in group one were also used. In both groups urinary diversion was achieved by urethral catheter for 5 days and standard compression dressing was applied. Cases were followed for a minimum of 6 months and complications were recorded.

RESULTS

As shown in table (3), 2 cases belonging to group one were repaird using King repair, with Snodgrass incision in one case, whiie the other 10 cases were repaired using the 2

layers repair and the skin was closed in the form of advancement flap in 6 cases and in the from of rotation flap in 4 cases. One case needed dorsal meatoplasty and 3 cases needed urethroplasty for the associated stricture. The mean operative time was 75 min. (range 60-90 min). Cases were followed up for a minimum of 6 months and maximum of 18 months. Fistula recurrence occured in 4 cases (33%), (one fistula with King repair and 3 fistulas with modified 2 layers closure method) with spontaneous closure in one case within 3 months.

In the second group, 2 cases were repaired using King repair, with interposition flap and Snodgrass incision in both, while the other 10 cases were managed by 3 layers repair. Dorsal meatoplasty was performed in 2 cases and urethroplasty for stricture was needed in other 4 cases. The mean operative time was 90 min. (range 70-100 min). Cases were followed up for a minimum of 6 months and a maximum of 20 months. Fistula recurrence occured only in one case (8.3%) with spontaneous closure within 2 months.

Cases with recurrent fistula in group 1 were managed by 3 layers closure later with no recurrence.

Table (1): Descriptive data of group 1

No.	Age (Y)	Associated anomalies	Origin of fistula	Previous attempts of repair	Number of fistula(s)	Location of fistulas	Diameter of fistulas (mm)	Associated meatal stenosis	Associated urethral stricture	Main stream of urin comes from
1	1.5	-	P.C	2	1	Coronal	3	-	-	Fistula
2	1.5	-	P.C	1	1	Coronal	3	-	-	Fistula
3	2	Inguinal hernia	H.R	-	1	Distal penile	2	-	+ just distal to fistula	Meatus
4	3	-	H.R	2	1	Mid penile	3	-	-	Fistula
5	2	-	H.R	-	1	Coronal	<1	+	-	Meatus
6	1.5	Undescended testis	H.R	-	2	Distal penile	2,2	-	-	Fistula
7	2.5	-	H.R	1	1	Mid penile	3	-	-	Fistula
8	4	-	H.R	-	1	Penoscrotal	1	-	+ just distal to fistula	Meatus
9	6	-	H.R	3	1	Mid penile	2	-	-	Meatus
10	10	-	H.R	-	2	Penoscrotal	1,2	-	+ just distal to fistula	Meatus
11	6	-	H.R	-	1	Mid penile	2	+	-	Fistula
12	3	-	H.R	1	1	Coronal	2	-	-	Meatus

P.C = Post circumcision H.R. = Hypospadias repair.

Table (2): Descriptive data of group 2

No.	Age (Y)	Associated anomalies	Origin of fistula	Previous attempts of repair	Number of fistula(s)	Location of fistula	Diameter of fistulas (mm)	Associated meatal stenosis	Associated urethral stricture	Main stream of urin comes from
1	3	-	P.C	-	1	Coronal	3	-	-	Fistula
2	4	-	P.C	1	1	Coronal	3	-	-	Fistula
3	2	-	H.R	-	1	Coronal	2	-	-	Meatus
4	1.5	-	H.R	-	2	Distal penile	1.2	-	-	Meatus
5	5	-	H.R	2	1	Mid penile	2	-	+ just distal to fistula	Fistula
6	3	-	H.R	-	1	Mid penile	3	+	-	Fistula
7	2	Undes. testis	H.R	-	1	Coronal	2	-	-	Meatus
8	1.5	-	H.R	2	1	Distal penile	1	-	+ just distal to fistula	Meatus
9	10	-	H.R	-	1	Mid penile	2	+	-	Meatus
10	1.5	-	H.R	1	2	Penoscrotal	3.1	-	-	Fistula
11	12	-	H.R	3	1	Penoscrotal	2	-	+ just distal to fistula	Fistula
12	3	-	H.R	-	1	Penoscrotal	1	-	+ just distal to fistula	Meatus

P.C = Post circumcision H.R. = Hypospadias repair.

Table (3): Operative details and results in group 1

	Operative procedure	Operative time (min)	Additional procedures	Follow up period (months)	Fistula recurrence	Other complications
1	2 layers + advancement flap	60	-	12	1	-
2	2 layers + advancement flap	90	-	6	+	Wound infection
3	2 layers + rotation flap	90	Urethroplasty for stricture	18	-	Small hematoma
4	2 layers + advancement flap	75	-	6	-	-
5	King repair	50	Snodgrass incision	15	+ (spontaneous closure)	Oedema
6	2 layers + rotation flap	80	-	15	+	-
7	2 layers + advancement flap	60	-	10	-	-
8	2 layers + advancement flap	90	Urethroplasty for stricture	6	-	-
9	2 layers + rotation flap	70	-	18	-	Oedema
10	2 layers + advancement flap	90	Urethroplasty for stricture	6	-	-
11	2 layers + rotation flap	75	Dorsal meatoplasty	8	-	-
12	King repair	60		10	+	-

Table (4): Operative details and results in group 2

	Operative procedure	Operative time (min)	Additional procedures	Follow up period (months)	Fstiula recurrence	Other complications
1	3 layers repair	90	-	15	-	-
2	3 layers repair	100	-	12	-	-
3	King repair + interposition flap	80	Snodgrass incision	8	-	Odema
4	3 layers repair	70	-	6	+ (Closed spontaneously)	-
5	3 layers repair	100	Urethroplasty for stricture	15	-	Odema
6	3 layers repair	90	Dorsal meatoplasty	18	-	-
7	King repair + interposition flap	80	Snodgrass incision	20	-	-
8	3 layers repair	100	Urethroplasty for stricture	15	-	Wound infection
9	3 layers repair	90	Dorsal meatoplasty	8	-	-
10	3 layers repair	70	-	10	-	Odema
11	3 layers repair	100	Urethroplasty for stricture	6	-	-
12	3 layers repair	100	Urethroplasty for stricture	6	-	-

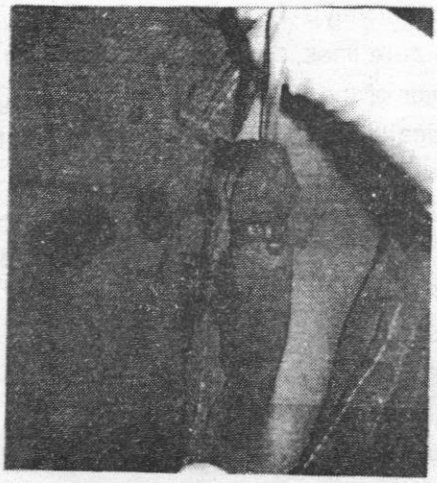

Fig. (1) : Post circumcision urethral fistula

Fig. (2) : Successfully repaired post circumcision urethral fistula using the 3 layers procedure

DISCUSSION

Hypospadias is one of the commonest congenital anomalies with an incidence of 1 per 125 to 1 per 200 live births (Sheldon and Duckett, 1987). Urethrocutaneous fistula is the most common complication of hypospadias repair (Duckett, 1990). The incidence of fistula varies according to the procedure used, its rate for MAGPI procedure is 0.5% to 10% (Duckett, 1991) 4% to 33% for island pedicle tubed repair (Duckett, 1981) and 15 to 50% for free graft tubed repair (Devine and Horton, 1977).

The main factors causing fistula in hypospadias repair are poor technique, tissue devitalization and using opposing suture lines. Other contributing factors include infection, tension created by oedema or haemorrhage, tight dressing and occlusion of diverting catheters (Devine et al., 1978).

On the other hand, urethral fistula

is a rare complication following circumcision. It may result from too far distal advancement of the foreskin, pulling on the urethra, thus exposing part of the urethra (usually at the corona) to be crushed or excised during application of clamps. This specially occurs with pliable periurethral tissues (Sherman et al., 1996). It also may occur at attempts of haemostasis with taking deep sutures at the frenulum of the glans leading to strangulation and necrosis of part of the urethral wall (Lau and Ong, 1981).

Repair of these fistulas is often a difficult problem, since the surrounding fibrosis, unreliable blood supply of tissues and for many patients have a history of multiple operations. Many techniques have been advocated for repair of urethral fistula with varying rates of success.

Davis (1940) used the transurethral pulley stitch to invert the urethral epithelium after the urethral fistula had been dissected out, but results were disapponting. The same poor results were obtained with Turnur-Warwick, (1976) who tried electric fulgration of the fistula hoping that the tract would seal off after the epithelial layer had been distroyed. Duckett et al. (1982) described simple 2 layers closure but due to overlapping of suture lines, the failure rate was high, [46% and 41% with Mahfouz et al. (1989) and Audry et al. (1989) respectively]. To avoid overlapping of suture lines, the skin defect, after repair of the urethra, was closed using local flaps as simple advancement flap (Lau and Ong, 1981), Y-V advancement flap (Saad et al., 1980), rotation flap (Roberts, 1982) and Rhombic flap (Singh and Chandra, 1985) or using distant flap as groin flap (Sahai and Shukla, 1987). the success rate using these techniques ranged from 80% to 100%. In present series the same principle was used in 10 cases of the 1st group but the sucess rate was only 70% raised to 80% after one of the fistulas closed spontaneously.

To gain a more secure and water tight closure of the fistula, a vascularized tissue layer was introduced between the repaired urethra and the skin. This layer may be a deepithelialized skin taken from the penile shaft as with Lau and Ong (1982), who had a success rate of 87%, or from scrotal skin as in Lee et al. (1990) series with a sucess rate of 81%. This vascularized flap may be taken from dartos

fascia of penis as in Audry et al. (1989) and Hayashi et al. (1998) series, where the success rate was 91% and 92% respectively. Also the tunica vaginalis or the fascial coverings of the testis can be used as a source of this layer (Snow et al., 1995). In the present series with the use of this interposition flap the success rate was 91% raised to 100% after spontaneous closure of the solitary recurrent fistula.

In fistulas at a distal position, specially with a thin distal skin or meatal stenosis, the meatus and the fistula are connected resulting in a single defect that can be repaired by MAGPI procedure (Mahfouz et al., 1989) or king repair (± Snodgrass incision) (Guralinick et al., 2000). Although Mahfouz and his associates (1989) reported a success of 100%, it seems that this procedure is not a correct choice since MAGPI procedure needs a pliable perimeatal tissue that is not available with scarring following penile surgery. In present series king repair was applied in 4 cases, two in 1st group and other 2 in 2nd group. Snodgrass incision was needed in one of the two cases in 1st group and both had recurrent fistulas with spontaneous closure in one case. In the 2nd group, both cases needed Snodgrass incision and an interposition flap was added and the repair succeded in both.

Multiple fistulas, when they lie near to each other, are better connected and converted into a single large fistula. Johanson (1953) performed this as a 1st stage of a 2 stage procedure. In present series this procedure was performed as a step in one stage operation and in 4 patients. Two cases had recurrent fistulas, the one belonging to the 2nd group closed spontaneously.

To ensure non recurrence of the fistula, an adequate caliber of the urethra must be assured. In present series 4 cases had meatal stenosis, 3 of them were corrected by dorsal meatoplasty and in one case the repair was incorporated in king repair with the addition of Snodgrass incision. Seven cases had a short distance urethral stricture. This stricture was located at or just distal to the fistula. This was managed by incising of the stricture to ensure good patency of the urethra. The urethral defect was then coverd by a small skin flap baced on the proximal edge of the fistula. Non of the 7 patients, in both

groups, had a recurrent fistula.

On conclusion, repair of urethrocutaneous fistula following hypospadias repair or circumcision is a difficult problem and should not be underestimated. The principles of fistula closure are the same of hypospadias repair including use of delicate instruments, delicate sutures, magnification, incorportion of well vascularized tissues without tension and urinary diversion. Use of a vascularized, pedicled flap as an additional layer interposed between the repaired urethra and the covering skin achieves two main goals which are non crossing suture lines and maximum vascularity. This method had proved to be highly effective in prevention of fistula recurrence in all types of fistula whatever its location, size, number, number of previous repairs and even if it is associated with urethral stricture.

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ناسور قناة مجرى البول الخارجية مابعد الختان واصلاح الإحليل السفلى : دراسة مقارنة بين العلاج باستخدام طبقتين وثلاث طبقات

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من وحدة جراحة الأطفال - كلية الطب - جامعة المنصورة

يمثل ناسور قناة مجرى البول الخارجية بعد الختان أو اصلاح الإحليل السفلى مشكلة جراحية بسبب نسب الإخفاق العالية. تهدف هذه الدراسة لتقييم دور دعم اصلاح الناسور بإضافة طبقة ثالثة بين قناة مجرى البول والجلد. وتم إختيار ٢٤ حالة ناسور بولى للدراسة (٤ مابعد الختان و ٢٠ مابعد اصلاح الإحليل السفلى) وتم تقسيم الحالات الى مجموعتين متساويتين. وتم اصلاح الناسور فى المجموعة الأولى باستخدام طبقتين مع وضع الجلد على صورة شريحة موضعية كغطاء لقناة مجرى البول، أما فى المجموعة الثانية فقد تم اضافة طبقة ثالثة بين قناة مجرى البول والجلد على هيئة شريحة موضعية من الأنسجة المحيطة وقد تم متابعة الحالات لمدد تراوحت بين ٦ - ٢٠ شهراً وقد كانت نسبة النجاح فى المجموعة الأولى ٦ر٦٦٪ مقارنة ب ٩١٪ فى المجموعة الثانية (ارتفعت الى ٧٥٪ مقارنة ب ١٠٠٪ بعد التآم تلقائى لحاله ناسور فى كلتا المجموعتين) .

وقد أظهرت هذه الدراسة أن اضافة طبقة ثالثة لعلاج ناسور مجرى البول الخارجى قد حقق إنخفاض كبير جداً فى نسب إرتجاع الناسور .