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SURGICAL TREATMENT OF URETHRAL STENOSIS. RESULTS OF 100 URETHROPLASTIES.

Jose Luis Lozano Ortega and Carlos Pertusa Peña.

Department of Urology. Cruces Hospital. Baracaldo. Vizcaya. Spain.

Summary.- *OBJECTIVES: We report our results after 100 urethroplasties for the treatment of urethral stricture both at the bulbar and penile urethra, using different techniques.*

METHODS: 100 patients with the diagnosis of anterior urethral stricture, that were submitted for urethroplasty in the period 1997-2007. Of them, 57 treated by end to end urethroplasty. 4 patients underwent augmented free graft anastomotic urethroplasty. Buccal mucosa free graft was used in 16 patients and penile skin onlay flap in 23.

RESULTS: We have obtained 84% good results overall. In patients undergoing end to end urethroplasty we obtained 91.2% success rate. We had 75 % of good re-sults with the free graft anastomosis. In the cases in which we used buccal mucosa patch we obtained 90% success in bulbar urethra and 67 % in penile urethra. When we used onlay flaps good results were 70.6% in penile urethra and 66,7 % in bulbar urethra.

CONCLUSIONS: Open surgery is the best form of treatment for urethral strictures. The anastomotic urethroplasty is the technique that, applied in bulbar urethra, enables better results. For strictures over two centimeters we have other procedures of choice in penile urethra, pediculated skin flaps, except in cases with Lichen Esclerosus, in which the use of buccal mucosa as a graft is preferable, and in the bulbar urethra in which augmented onlay graft urethroplasty or free grafts, mainly buccal mucosa, are preferred. In long and complex strictures, the option that we must contemplate is two-stage surgery. Any type of urethroplasty can fail, and this risk increases as the time passes.

Keywords: *Urethral stenosis. Urethroplasty.*

CORRESPONDENCE

José Luís Lozano
Service of Urology
Hospital of Cruces
Baracaldo. Vizcaya. (Spain).

j.l.lozano@euskalnet.net

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Resumen.- *OBJETIVO: Presentar nuestros resultados tras realizar 100 uretroplastias como tratamiento de estenosis uretral tanto a nivel peneano como bulbar, utilizando distintas técnicas.*

MÉTODOS: 100 pacientes diagnosticados de estenosis uretral, que fueron sometidos a uretroplastia en el período 1997-2007. De ellos, 57 tratados mediante anastómosis término terminal. 4 pacientes en los que se utilizó una técnica de anastómosis ampliada con un injerto libre. En 16 pacientes se realizó un injerto libre de mucosa bucal y en 23 la técnica usada fue el colgajo pediculado.

RESULTADOS: En conjunto hemos obtenido un 84% de buenos resultados en la totalidad de los pacientes. En aquellos a los que realizamos una anástomosis término terminal obtuvimos un 91,2% de buenos resultados. De cuatro pacientes con técnica combinada de anastómosis con injerto libre, tuvimos un 75% de buenos resultados. En los casos en que utilizamos mucosa bucal en forma de parche obtuvimos un 90% en uretra bulbar y un 67% en uretra peneana. Cuando se utilizaron colgajos pediculados los buenos resultados fueron del 70,6% en uretra peneana y del 66,7% en uretra bulbar.

CONCLUSIONES: La cirugía abierta es la mejor forma de tratamiento de la estenosis de uretra. La uretroplastia término terminal es la técnica que, aplicada en uretra bulbar, permite obtener mejores resultados. Para estenosis mayores de dos centímetros disponemos de otros procedimientos, siendo de elección, en uretra peneana, los colgajos pediculados, salvo que exista Liquen Escleroatrófico, en que la preferencia seran los injertos libres extragenitales y en uretra bulbar los injertos libres, preferentemente con mucosa bucal. En estenosis largas y complejas la opción que debemos contemplar es la cirugía en dos tiempos. Cualquier tipo de uretroplastia puede recidivar, y ese riesgo aumenta conforme pasa el tiempo.

Palabras clave: *Estenosis de uretra. Uretroplastia.*

INTRODUCTION

It seems to be been accepted between that we realize urethroplasties as habitual method of treatment of the urethral strictures, that the highest rate of success (80-90 %) obtains in shorts strictures, minors of 2 centimeters, bulbar, by means of the exéresis of the stricture and anastómosis end to end. In bulbar strictures of major length we apply other techniques, lightly more complex, since they are the end to end urethroplasty combined with a free graft, the onlay grafts or the flaps, the above mentioned with a great variety of techniques. The series published up to the moment do not clarify which of both options, free grafts or penile skin flaps guarantees better results (1, 2), leaving the choice, in general terms to the experience and preferences of the surgeon. Nevertheless, since the resurgence in the use of buccal mucosa as a practice with scanty morbidity and of easy execution, his use like patch avoids the dissection of a vascular pedícle, penile glans torsion, subcutaneous deformity, chordee, etc., this way since it shortens the time of intervention if it is effected between two teams.

When we treat penile urethral strictures, the etiology receives importance at the moment of choosing the technique, so that we have the option of one stage surgery in patiens with a normal penis, with penile skin or foreskin onlay flaps, free grafts of buccal mucosa in case of lichen esclerosus, and staged urethroplasty if the penis has been damaged by previous surgery, plate uretral of poor quality or skin and dartos fascia that do not guarantee the reconstruction in one stage.

We reviewed the results of our group in a retrospective study on 100 patients in whom we have carried out different techniques of urethroplasty adapted to the type of stricture in every case and which common denominator is the diagnosis of stricture and to have be carried out by the same surgeons.

MATERIAL AND METHODS

Of a whole of 230 patients diagnosticaded and treated of urethral strictures in our Service in the period 1997-2007, we select 100 cases in which we have realized end to end urethroplasty in 57 occasions, end to end combined with buccal mucosa urethroplasty in 4, free graft with buccal mucosa in 16 and onlay flap with penile skin or foreskin mucous in 23 cases.

The rest of patients, 130 cases, includes those in which there were in use as treatment repeated dilatations, multiple internal urethrotomies, urethrostomy type Johanson, perineal urethrostomy or staged urethroplasty.

The age ranged between 18 and 79 years, with an average of 41. For the diagnosis we realize in all the cases miccional and retrograde urethrography, and urethroscopy in the majority of they.

The etiology was unknown in 43 patients, of iatrogenic origin in 31 occasions, including long soundings or endoscopic surgery, traumatic in 15 patients, infectious in 5 cases, in 3 paients there was detected Lichen Escleroatrófico, and in 3 occasions it was treating of patients with previous surgery (hypospadias failures) (Table I).

In 77 % of the cases the stricture was in urethra bulbar, and in 23 % in penile urethra.

End to end urethroplasty:

It was realized in all the cases to treat urethral strictures of location bulbar. The etiology was infectious in 4 occasions, for blunt perineal trauma in 11, iatrogenic in 16, and of origin unknown in 26.

The length ranged between 1 and 2,5 cm. In 40 patients an internal urethrotomy had been practi-

sed before. In the rest it was the treatment of the first choice.

The surgical technique was the same in all the cases: perineal incision longitudinal, exéresis of the stenotic segment with a margin of 1 cm, the stumps spatulated and anastómosis without tension with free points of material reabsorbible 5/0. The urethral catheter was left in place for 14 days after which there was realized a urethrography previous for the removed the sound.

In some cases we introduce a catheter ureteral before the beginning the surgery that will use us as guide once opened the urethra.

TABLE I. CHARACTERISTICS OF THE STRICTURES.

Nº Patients:	100	
Age:	18-79 yr	
Location:		
	Penile	22
	Bulbar	78
Etiology:		
	Unknown	42
	Iatrogenic	31
	Trauma	15
	Infection	6
	Lichen Escl.	3
	Hypospadias repair	3
Length :		
End to end		1-2,5 cm
End to end augmented		2,5-3,5 cm
Buccal Mucosa:		
	Penile	1-4 cm
	Bulbar	2-5 cm
Flap:		
	Penile	2-5 cm
	Bulbar	3-6 cm

Augmented anastomotic urethroplasty:

It is a question of combining a dorsal or ventral end to end anastomosis with a free graft of buccal mucosa in the shape of patch, which it completes reconstruction urethral. Only we have 4 cases for being a technique that we apply recently. The length of the stricture was 2,5, 3, 3 and 3,5 cm respectively, and allowed us to guarantee an anastomosis without tensions. The location was bulbar in all the cases and the etiology was traumatic in an occasion and of origin unknown in 3.

The technique consisted of placing the graft of buccal mucosa in dorsal situation in two cases and ventral in other two. The urethral catheter was left in place for three weeks.

Urethroplasty with buccal mucosa:

We have 16 cases, provided that we begin to use the technique in 2004. In 6 patients the graft was placed in penile urethra and the etiology was a Lichen Esclerosus in three patients and hypospadias failure surgery in three. In 10 cases it placed in bulbar urethra. Two were of traumatic etiology, three of iatrogenic etiology and five of unknown etiology.

In penile urethra the length ranged between 1-4 cm. In bulbar urethra between 2-5 cm. The graft was obtained of the internal face of the cheek in all the cases and placed in ventral position in 14 occasions and dorsal in 2 after valuing the corpus spongiosum shortage available. We supported the urethral catheter for three weeks.

Urethroplasty with onlay flap:

It was in use in 17 patients in penile urethra, of infectious etiology in a case, iatrogenic in 9 and idiopathic in 7.

In six occasions the stricture was situated in bulbar urethra, of iatrogenic etiology in 3, traumatic in 1 and idiopathic in 2.

The length, in penile urethra ranged between 2 and 5 centimeters and in bulbar urethra between 3 and 6 centimeters

To realize the onlay flap we apply the McAninch circular fasciocutaneous skin flap, the transverse flap of Jordan, or Orandi's technique. In three occasions we use a flap of scrotal skin. All the flaps were sutured in the shape of patch, preserving the roof urethral. In case of Orandi's procedure we use in some cases a modification that consists of placing the flap in dorsal position after having liberated the urethra and to turn it 180º and that has contributed his good results.

Postoperatory follow-up:

We realize It a month, to the three and to six months of the intervention, and later with an annual periodicity. All the controls are carried out with uroflowmetry and measurement of residue postmiccional. In case the flow diminishes of significant form and / or the patient recounts clinic miccional obstructive we do an miccional and retrograde urethrography.

We consider as good result that has not needed opened reintervention or endoscópic instrumentation along the follow-up, and he presents a flow miccional equally or top to 14 ml/seg. in the realized controls.

RESULTS

Follow-up ranged from 5 to 125 months. We have obtained, globally, 84 good results and consider the unsuccessful technique in 16 cases (Figure 1).

TABLE II. COMPLICATIONS REGISTERED IN 100 CASES.

Technique	Nº	Complications	Nº
End to End	57	Re-stricture	5
		Perineal pain	2
		Shortening penis	1
		Haematoma	1
		Erectil disfunction	3
End to end augm.	4	Re-stricture	1
		Erectil disfunction	3
Buccal Mucosa	16	Re-stricture:	
		Penile	2
		Bulbar	1
		Penile curvature	1
Flap	23	Re-stricture:	
		Penile	6
		Bulbar	3
		Divertículum	6
		Erectil disfunction	1

Of 57 patients in whom we realize end to end urethroplasty , 52 cases are considered successes (91,2 %), and in 5 occasions the result has been as failures for having presented recurrence of the stricture. Other complications have been: Perineal pain of long duration in two cases, shortening penis in an occasion, haematoma perineoescrotal in a patient and erectile dysfunction in three cases.

In four patients a technique was realized of anastómosis and free graft with buccal mucosa, of that a patient presented a recurrence of the stricture, which supposes 75 % of good results. Nevertheless, in this group, three patients were recounting erectile dysfunction after the intervention.

In 16 patients a free graft was in use of buccal mucosa. 10 cases in bulbar urethra, with an rate of good results of 90 % and a recurrence. In penile urethra obtained 67 % of good results on 6 patients and two recurrences. We do not observe any complication derived from the obtaining of the graft, and only a patient presented penile curvature.

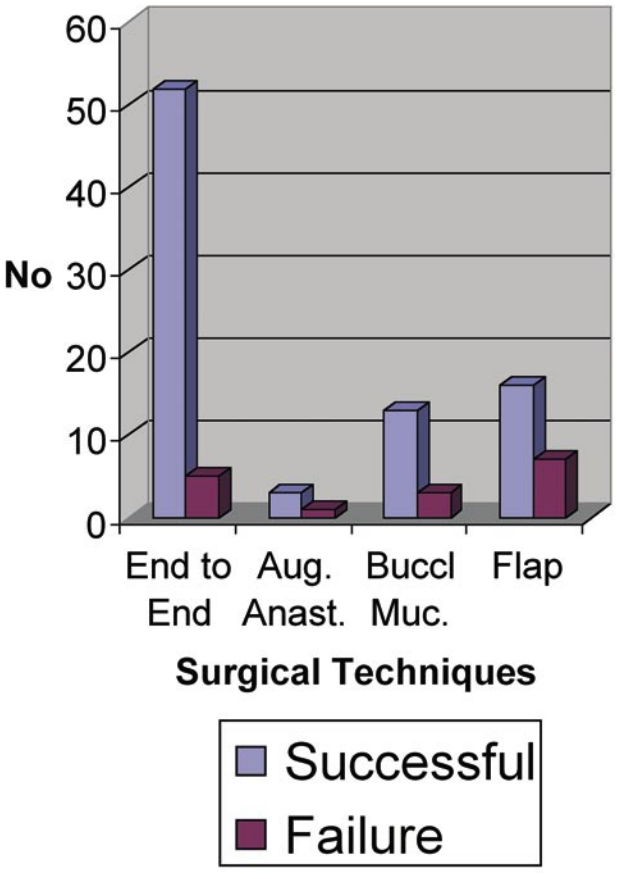

FIGURE 1. Global results.

Of a whole of 23 patients in whom we use onlay flaps, 17 were presenting an penile urethral stricture. Of these, 5 had a recurrence that in four occasions determined the formation of a divertículum. Therefore it supposes 70,6 % of good results in penile urethra. 6 patients with bulbar urethral stricture were controlled by this technique of that two presented a recurrence, appearing a divertículum in both cases. It is to say 66,7 % of successes in bulbar urethra. A patient with erectile dysfunction.

DISCUSSION

It was about 1869 when the german surgeon K. Thiersch designed a skin flap to treat an epispadias. To him they him were still Th. Anger in 1874 in the treatment of hypospadias, S. Duplay, Denis Browne and great others to the present day. In all this time numerous reconstructive surgical techniques have been designed for the treatment of urethral stricture diseases and all tissues has been in use for substituting to the urethra: ureter, vein safena, appendix, vaginal testicular, bladder mucosa, skin in the shape of flap and of free graft, urethra cryopreservated, buccal mucosa, very used at present, lingual mucosal, which use has begun recently (3) and everything what the genetic engineering is contributing with the passage of time.

On the other hand the urethroplasty is a technique that not all the urologists use. In 2007 a report was published about the methods of evaluation and treatment of the urethral strictures between 431 urólogists in the United States. According to the above mentioned study 57,8 % does not realize urethroplastys, and only 4,2 % uses the buccal mucosa (4). We do not know if this information is extrapolables to our country since a similar study does not exist in the matter.

In our group we use the urethroplasty as habitual method of treatment of the urethral stricture, without damage of the endoscopic procedures in those cases in which it is indicated as better option.

When the stricture places in penile urethra, it is the etiology and the anatomical characteristics what is going to orientate us in the treatment that we are going to choose. If the penis presents a normal aspect, previous surgery has not existed and there is no lichen sclerosus we use a surgery in one stage with foreskin or penile skin in a pedicled flap.

Lately we come using the technique of placing the flap in dorsal position, on the cavernous bodies, after the urethra rotating 180 º and the results that we are obtaining are satisfactory and they us avoid the problem of the psudodiverticulum (5) If the patient already has been operated previously, since it happens in patients operated on of hypospadias in the infancy, and the tissues present a poor vascularización, scars, fistula, divertículum, we prefer a surgery in two stage, realizing a Johanson in the first instance, being able combine in addition the opening urethral with a free graft of buccal mucosa that substitutes the urethral plate, if this one is not available, and later, in five or six months, closing of the urethra, with major guarantees, in the second time. If we are before a Lichen Esclerosus it is mandatory to use a free graft of buccal mucosa, to minimize the risk of recurrence of the cutaneous injury.

In bulbar urethra, the length is going to be very determinant to choose one or another technique, without being for it less important the etiology, the previous treatments, the degree of spongiofibrosis and certainly the preferences of the surgeon. If it is equal or minor of two centimeters the indicated is an end to end urethroplasty, technique that it has demonstrated allows to obtain a few results that, according to the consulted series, range between 84 % and 98 % (6-9).

Between two and four centimeters we can choose for a end to end urethroplasty extended or combined with a free graft of skin or buccal mucosa, avoiding sutures that can stay to tension at the risk of ischaemia and recurnce. This technique was described by Turner Warwick (10) and later modified by Webster in 2001, with 93 % of good results (11) Also directly we can place a free graft in position ventral or dorsal (Barbagli 1996), though the latter needs a major elaboration, having the advantage of avoiding the formation of pseudodivertículum. We have used it in cases of corpus spongiosum deficiently or muscle bulbocavernosum of bad quality. The results with this technique place between 83 and 98 % (12, 13,14) According to the series consulted, that is to say very near the obtained ones with techniques of anastómosis.

If the stricture has more than six centimeters or in those calls panurethrals, involving both penile and bulbar urethra, we can use a free graft, or a flap, but it is predictable in this surgery the appearance of complications before urethras that, in many occasions they are functionally unviable, and for it we believe that there is more suitable a perineal urethrostomy that can be or not definitive depending on the evolution and the prefer of the patient.

Moreover the recurrences, other complications that we have registered are the appearance of

pseudodivertículum (6 %) and the erectile dysfunction. In the first case, to avoid the saculations is precise to carve adequately the flap or the graft and to look for a good support to the neourethra (15). In case of the erectile dysfunction, that has been imputed to the injury of the nerves erectores, one is working in techniques of preservation that avoid his injury.

It is difficult to establish a doctrine of treatment of the urethral stricture reading the abundant literature that exists in the matter. Every author presents his series, his results, but it is impossible to establish comparisons because there are standardized neither the groups of patients, nor the techniques, nor the follow-up.

CONCLUSIONS

The opened surgery is the best treatment that we can offer patient these. The anastomotic repair is the technique that offers the best results, though it is limited by the length of the stricture. The techniques of substitution are of choice in any of his modalities, flaps or grafts depending on several factors as the etiology, the anatomical characteristics and the length of the stricture and, certainly, the experience of the surgeon. Finally it is necessary to inform the patients of that any type of surgery practised in the urethra, it can recur to short, average or long term.

The group of Mundy, which is the one that more has affected in this topic affirms that at the age of 5, 10 and 15 years, the rate of recurrence after an anastomotic repair is 12 %, 13 % and 14 %, whereas in case of a substitution with a flap or graft is 21 %, 31 % and 58 % (16).

There will be necessary to wait for the results and the long-term follow-up, of the new techniques at which one is employed to obtain between all that the current results improve.

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