

CENTER FOR RECONSTRUCTIVE URETHRAL SURGERY



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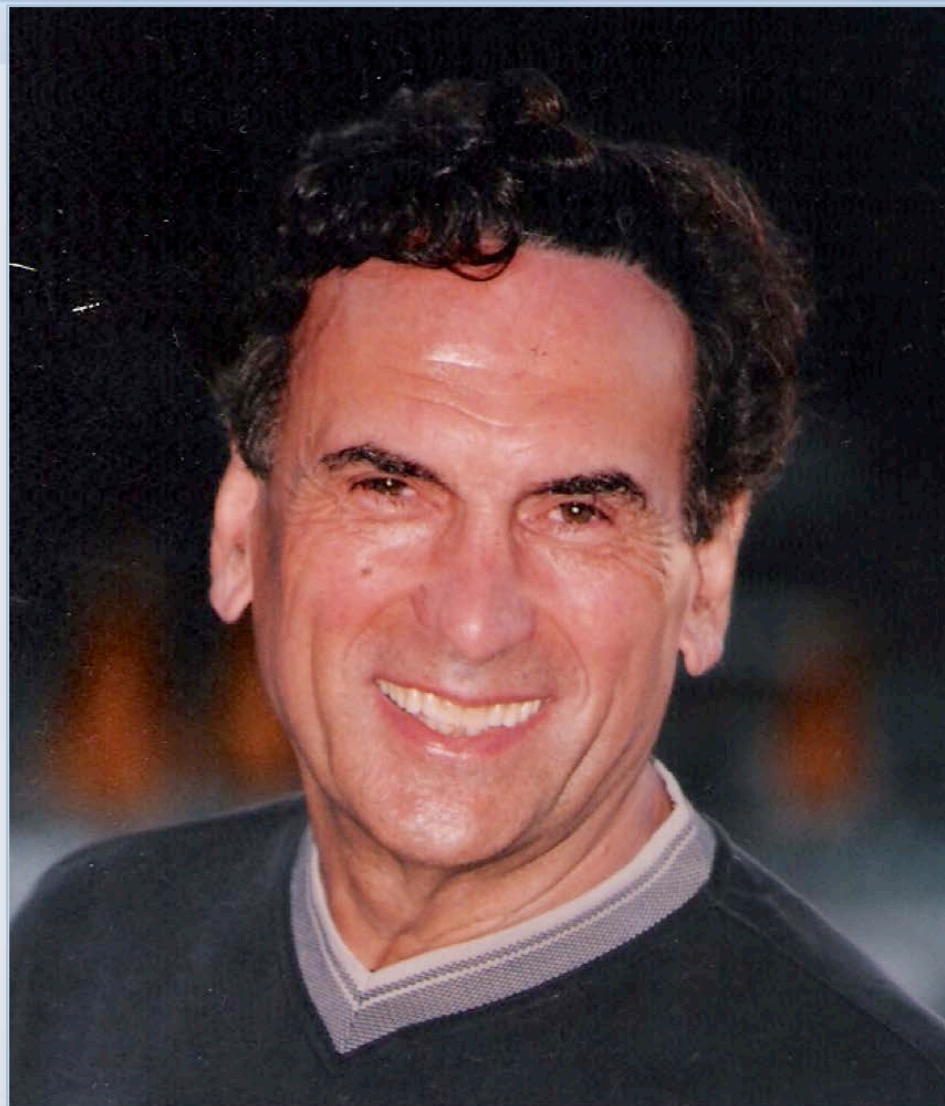
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Complex Penile Urethral Strictures



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Prof. Sava Perovic - Belgrade - Serbia



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The discussion I have prepared for today is on a difficult topic as it is **impossible** to provide definitive guidelines of treatment for complex penile urethral stricture.

In any case, I sincerely hope to provide you with useful information on the problems involved in the treatment of this complex type of stricture and disease.



Review – Reconstructive Urology

What is the Best Technique for Urethroplasty?

*Daniela E. Andrich, Anthony R. Mundy**

Institute of Urology, University College, London, United Kingdom

Eur Urol 2008, 54: 1031-1041



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throstomy may well be a more reliable and satisfactory alternative, particularly in the elderly, who commonly sit down to void anyway [48].

5.1. Penile urethroplasty

For the penile urethra the Orandi technique [49] (Fig. 4) is useful for nonobliterative strictures within the penile shaft that are not due to BXO. One has to be careful to get the width of the flap right, and this is not easy to judge which is why the procedure carries a significant complication rate. Nonetheless this remains the gold standard, albeit *faut de mieux*. A dorsal stricturotomy and buccal mucosal graft inlay may be an alternative, provided the urethral calibre is reasonably well preserved and the spongiosum is not too affected by fibrosis so that the urethral plate literally 'springs open' during dorsal stricturotomy. The same is true for the Asopa technique (transventral dorsal stricturotomy and patch from within the lumen) [50], but such strictures are not very common. The drawbacks of all grafts on the penile shaft are potential graft contracture and penile curvature as consequences. In the absence of

infection this is a technical complication because the graft was sutured onto the corpora under tension. This is a difficult problem to correct short of excising the whole graft and starting again from scratch. For these reasons penile urethral surgery is technically more challenging than bulbar urethral surgery, and the results are less satisfactory.

The treatment of distal penile strictures as a result of lichen sclerosus or following previous hypospadias surgery often needs to be individualised. In severe lichen sclerosus (LS), the meatus and fossa navicularis are almost completely obliterated (Fig. 5). In some cases, marked wood-hard fibrosis extends into the pendulous urethra. In these severe cases the penile shaft skin is often affected by LS as well. The general principle here is to excise the diseased segment and to replace it with BMG, because BMG is the material least likely to be affected by recurrent LS (Fig. 6) [51]. This is generally agreed. However, it can be done in one or two stages depending on the extent of the disease, and this is much more controversial. Indeed the more extensive the disease, the more complicated its surgical treatment, and the more it becomes an area of

Eur Urol 2008, 54: 1031-1041



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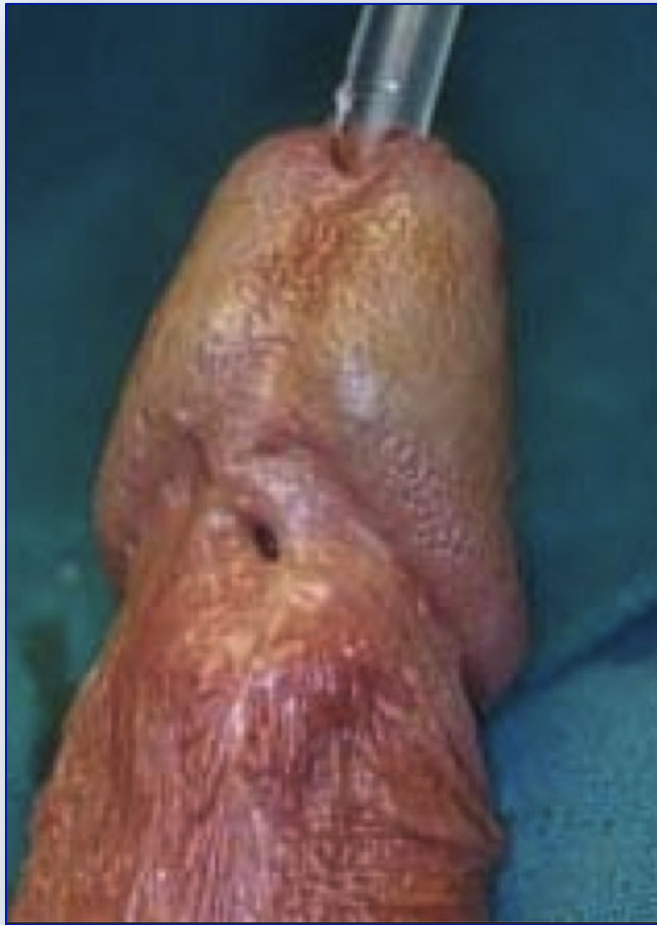
Complications of penile urethroplasty



HEMATOMA



Complications of penile urethroplasty



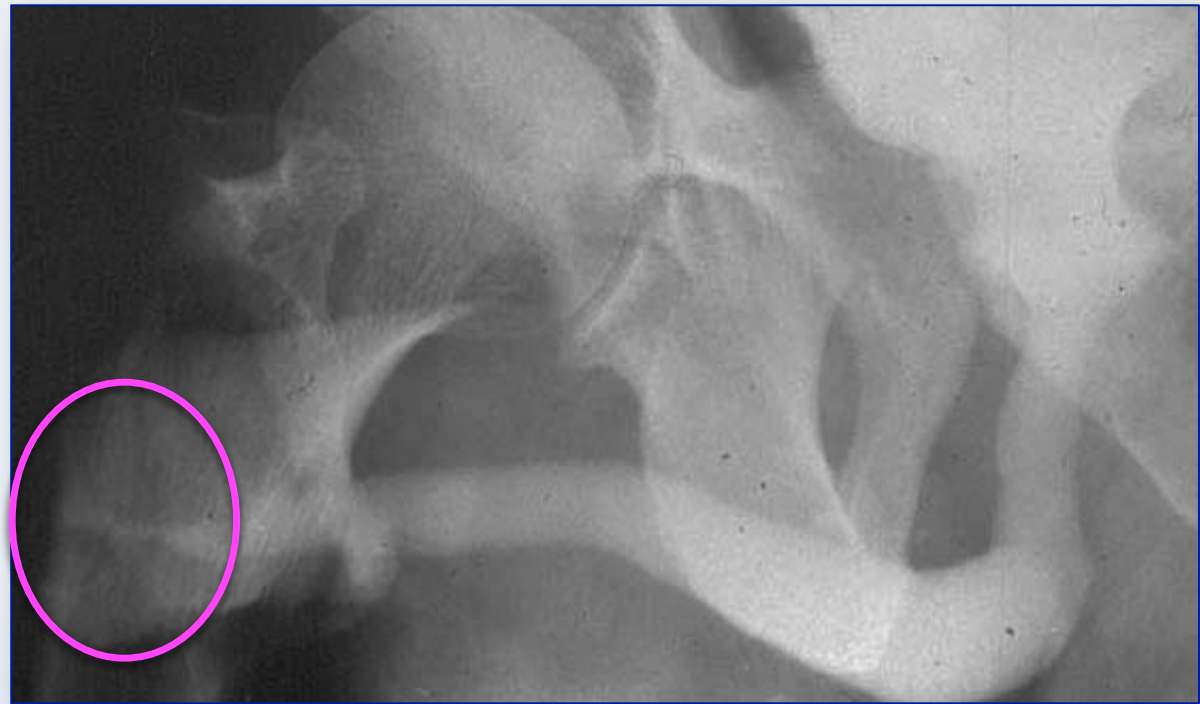
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MEATAL STENOSIS



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Complications of penile urethroplasty



CHORDEE OR TORSION



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Complications of penile urethroplasty



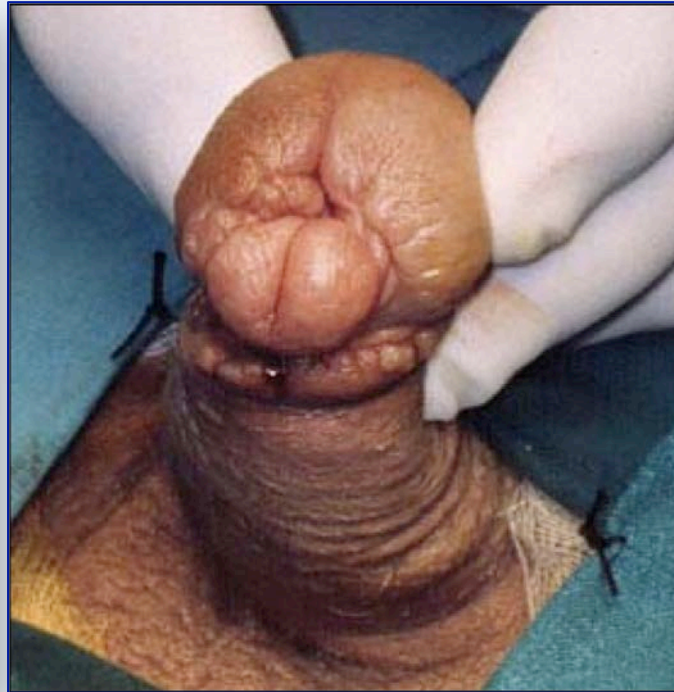
SKIN NECROSIS



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Complications of penile urethroplasty



AESTHETIC DEFECTS



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Complications of penile urethroplasty



DIVERTICUM



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Penile urethral strictures: simple



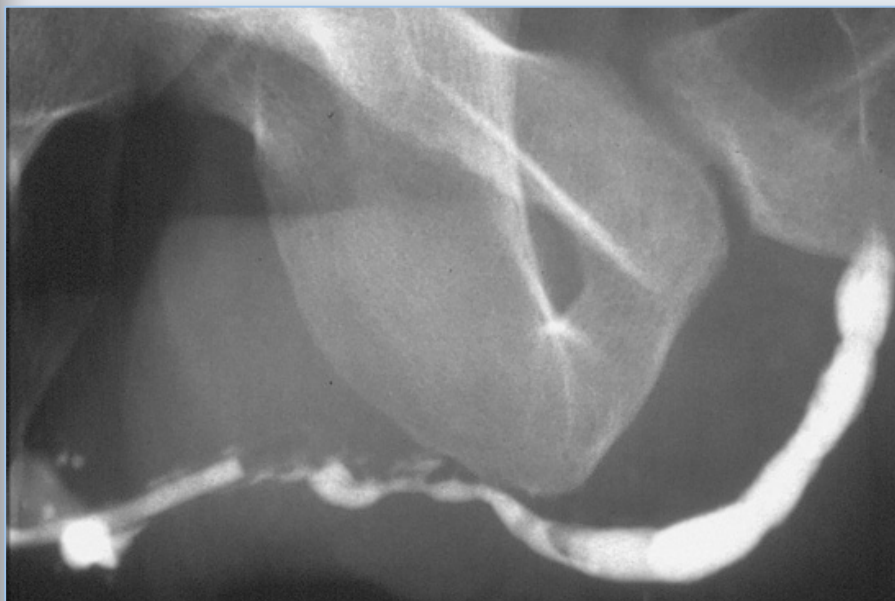
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Penile urethral strictures: complex



Failed hypospadias repair



Lichen sclerosus



Penile urethral strictures: complex

Failed hypospadias repair



Failed hypospadias repair

How often it is?



“ Strictures in adults who had a hypospadias repair is a growing industry ”

Andrich DE, Mundy AR, Eur Urol 2008, 54:1031-1041



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**Our experience
showed two different
populations in which
attempts at
hypospadias surgical
correction failed**



Patients showing multiple penile deformities caused by:

- Error in evaluation
- Error in design
- Error in surgical technique
- Error in post-operative care



These patients should be classified as “**complications**” after hypospadias surgery

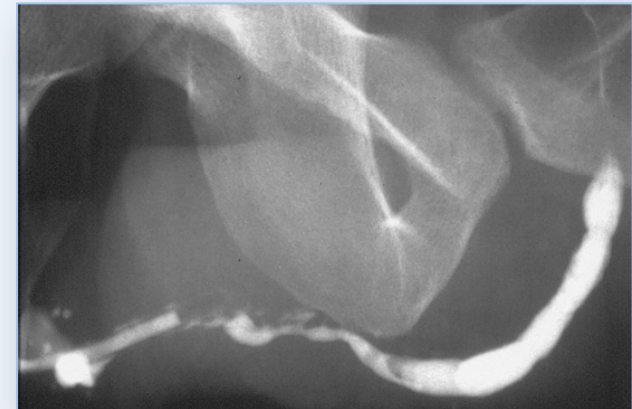


Patients showing a satisfactory final outcome having:



**Satisfactory penile
appearance**

**No evident penile
deformities
such as fistula or
chordee**

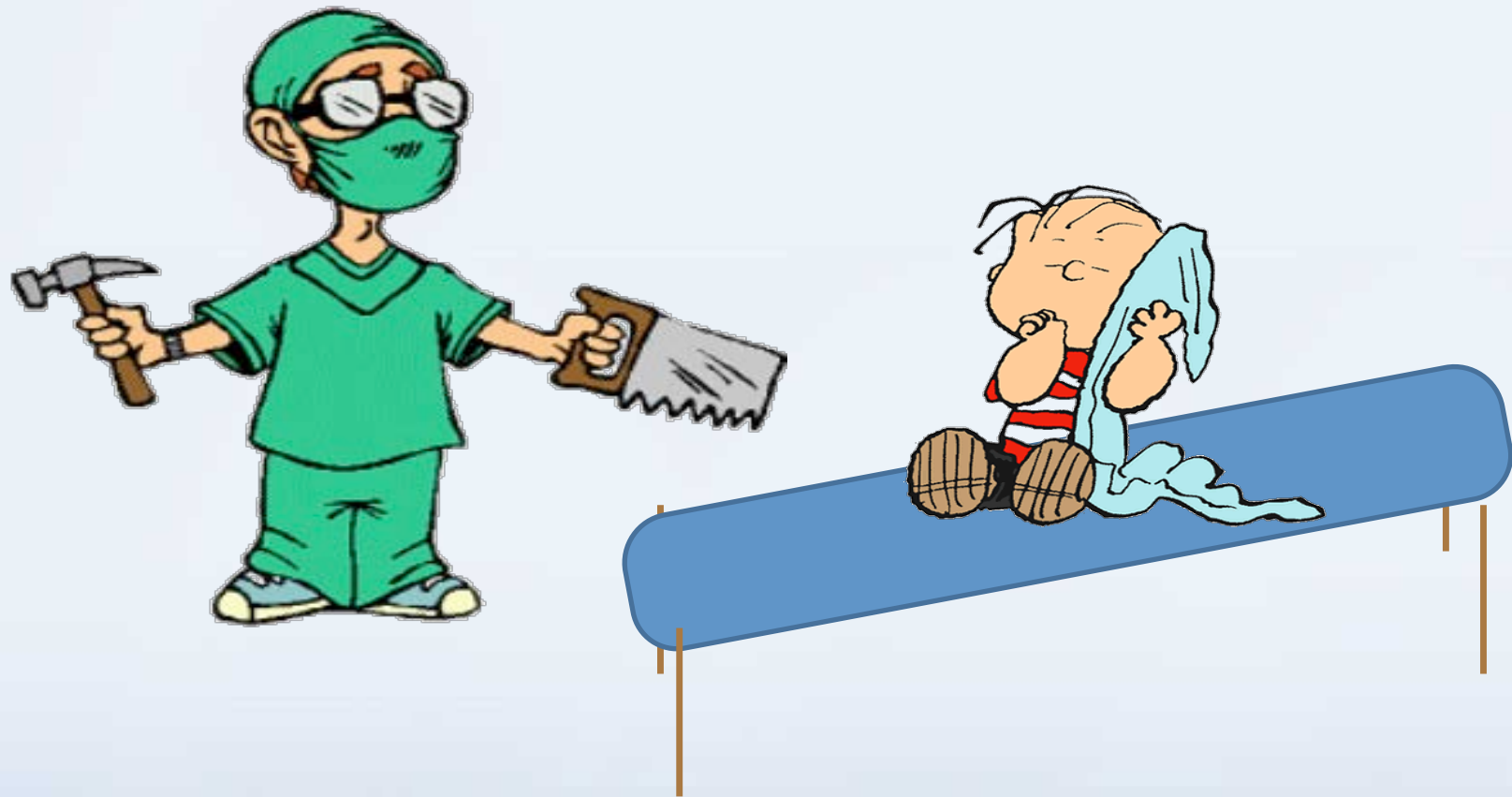


Urethral stricture

**These patients should be classified as “natural evolution”
over time of hypospadias repair**



Why hypospadias repair deteriorate over time?



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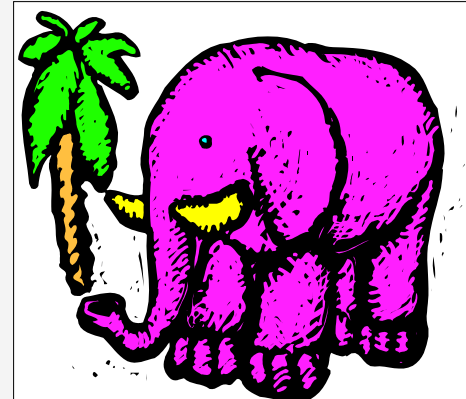
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The pediatric urologist maintains that:

“ The neo-urethra I construct in the child will follow the growth of the penis into adulthood “



Have you ever seen an ant become an elephant ?



18 months old



18 years old

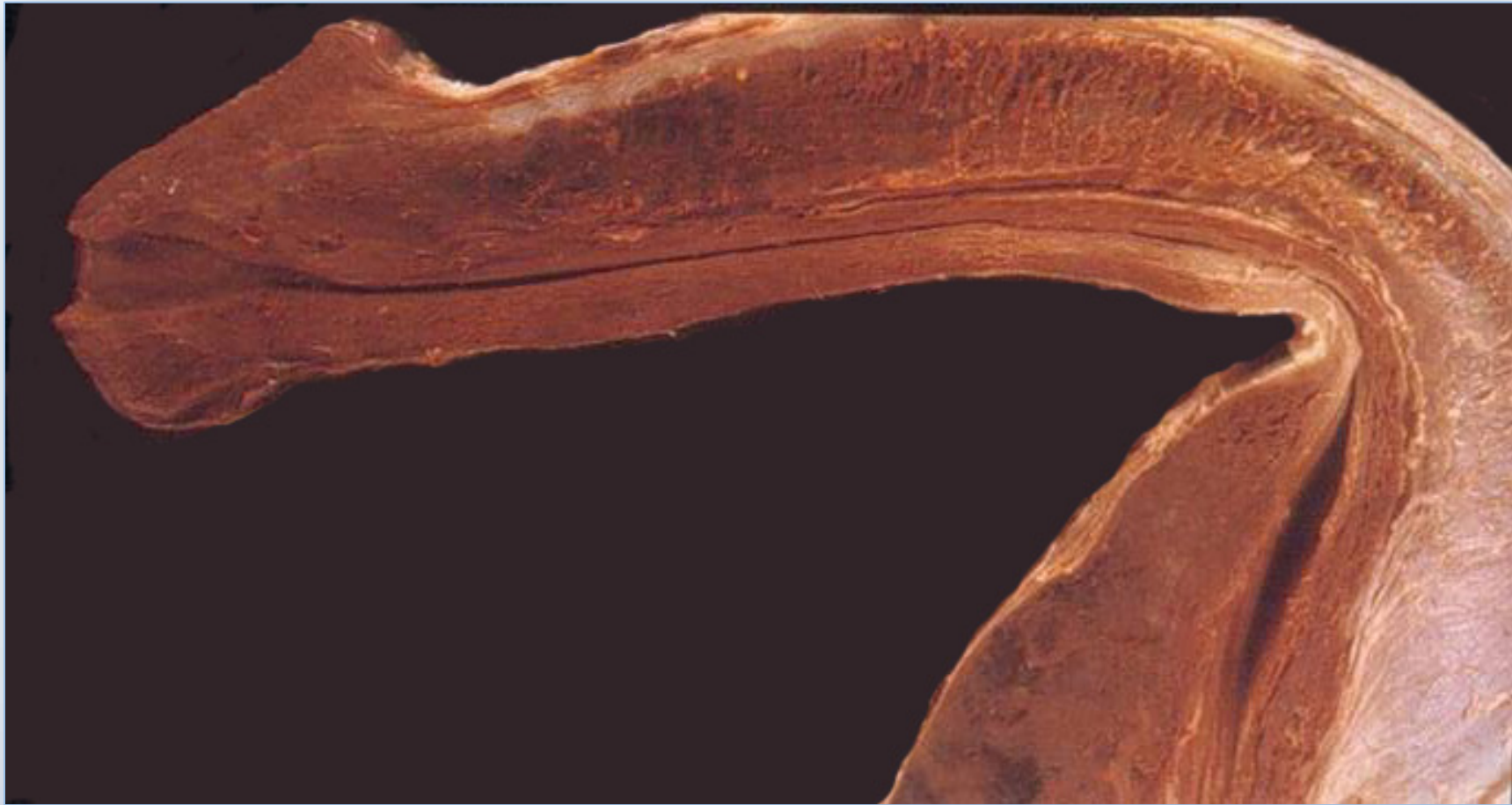


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The normal urethra is

“ spongiosum-made urethra “

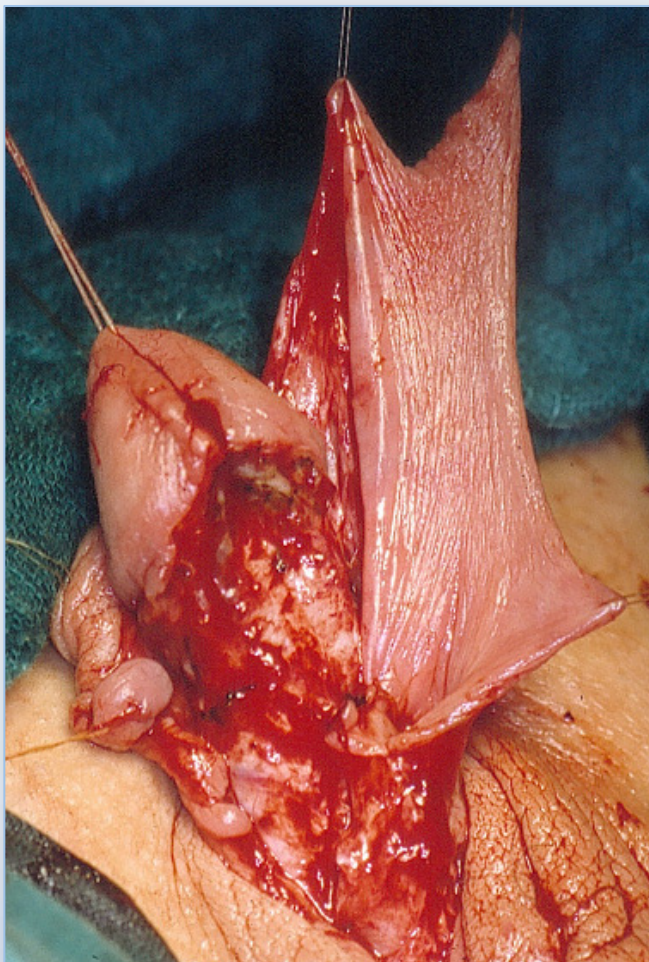


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The urethra after hypospadias reconstruction is

“ skin-made urethra “



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What is the the difference between the
“ spongiosum-made urethra “
and the
“ skin-made urethra “
?



**As far as urinary function is concerned, the
“ skin-made urethra “ is able to work as a
normal “ spongiosum-made urethra “**



**Pediatric surgeons and
parents are very satisfied
with the outcome.....**



....but, unfortunately, the urethra is a part of the penis...



**...and when children reach full sexual maturity,
the problem come ...**



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...and the “ skin-made urethra “ over time will be
KO!



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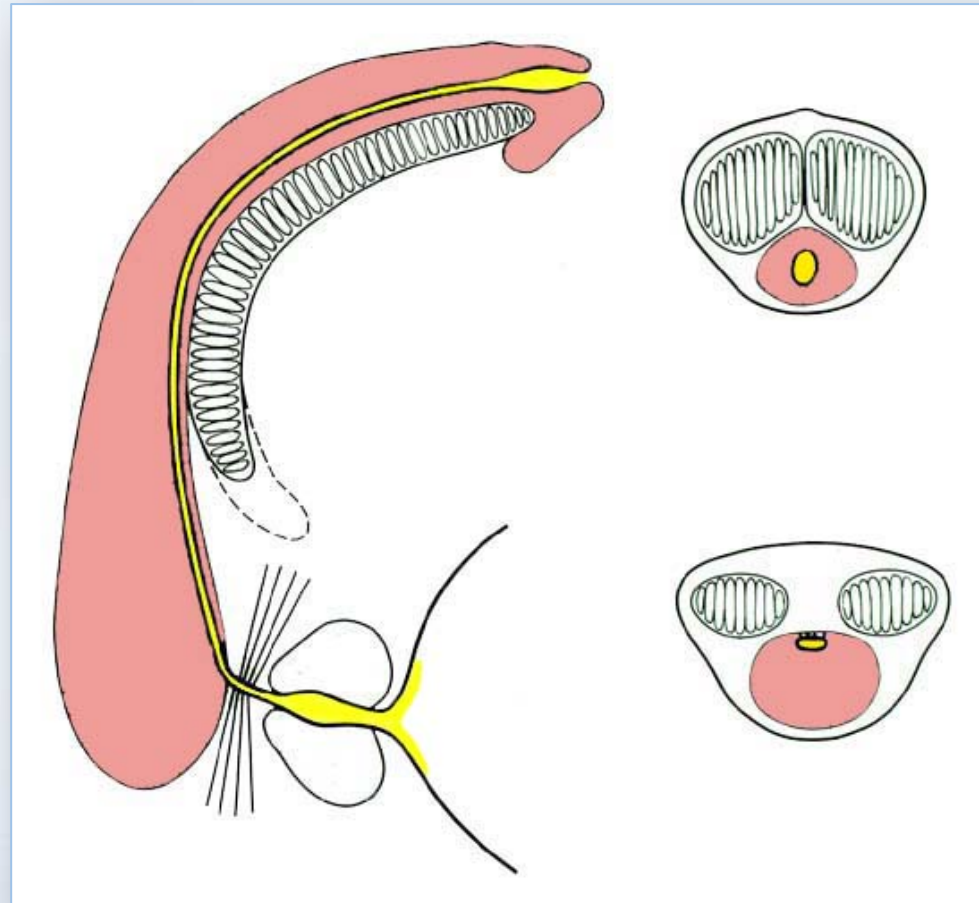
Why ?



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The “ skin-made urethra “ is not surrounded by the soft, well vascularized corpus spongiosum ...



**... and this “ skin-made urethra “ does not tolerate
the repeated mechanical stretch and trauma during
erection and sexual activity**



During sexual activity, the corpus spongiosum is to the urethra what the airbag is to the body during a car accident



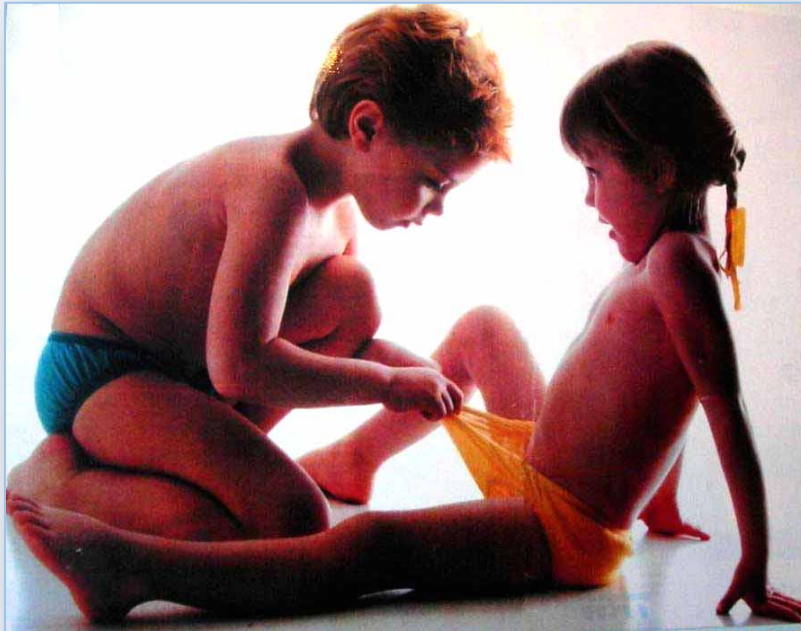
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The lack of spongiosum tissue promotes urethral deterioration over time



Hypospadias surgery is now at its end-point



Pediatric urologists' triumph over the results of hypospadias repair in childhood is not justified



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Hypospadias surgery will have improved only when corpus spongiosum is made available, and a new “spongiosum-made urethra” can be transplanted in the patient.

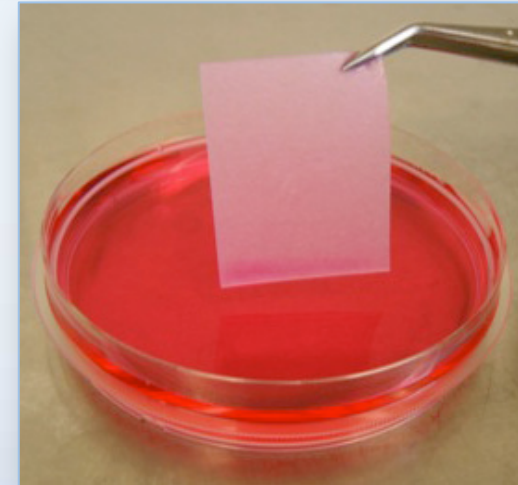
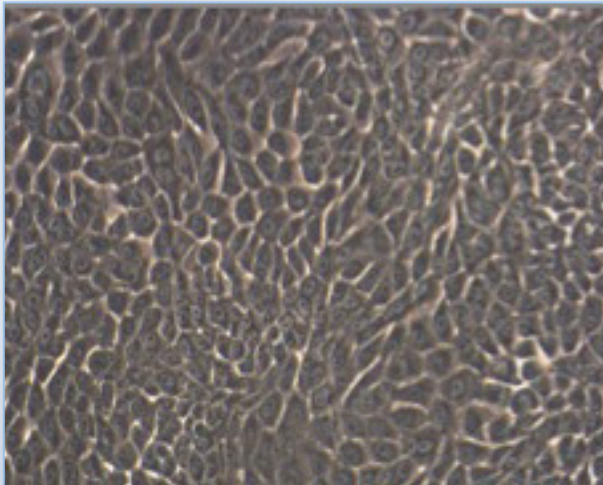
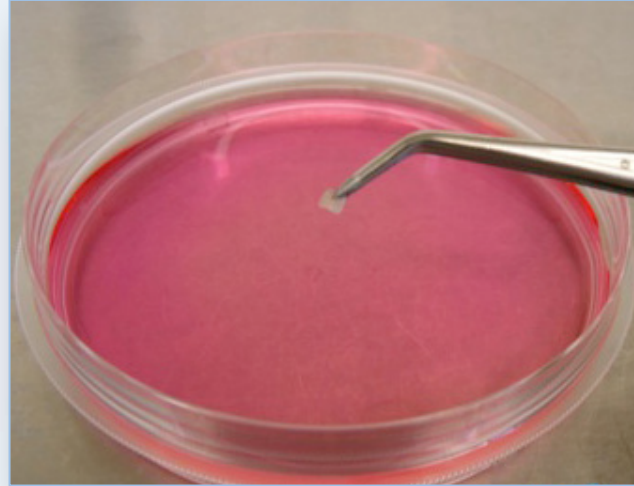
Tissue engineered material

Human urethra transplant

Penis transplant



Tissue engineered material



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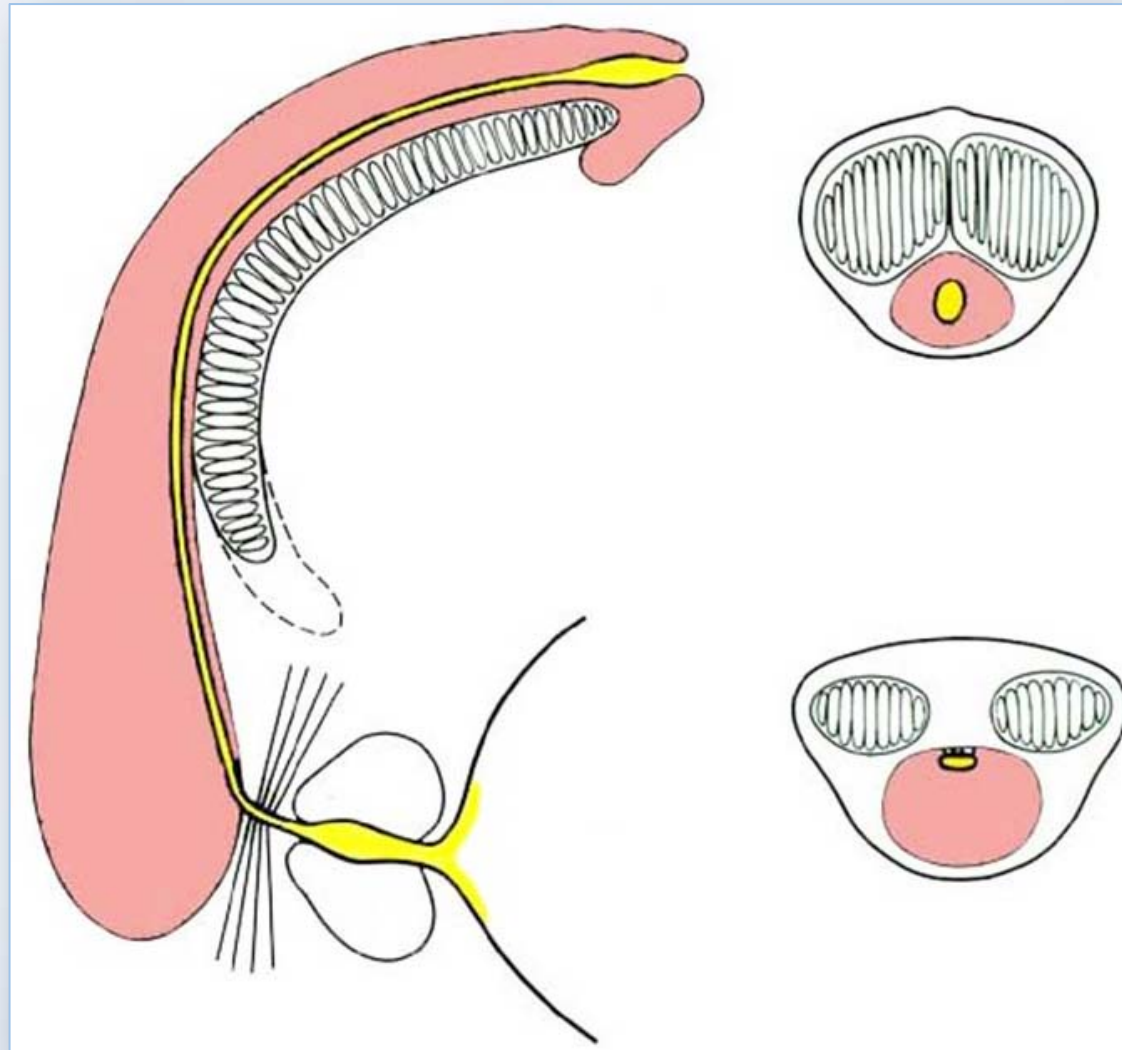
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Tissue engineered material



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Tissue engineered material

Tissue-engineered autologous urethras for patients who need reconstruction: an observational study

Atlantida Raya-Rivera, Diego R Esquiliano, James J Yoo, Esther Lopez-Bayghen, Shay Soker, Anthony Atala



Muscle and epithelial cells from the bladder were expanded and seeded onto tubularized polyglycolic acid scaffold.

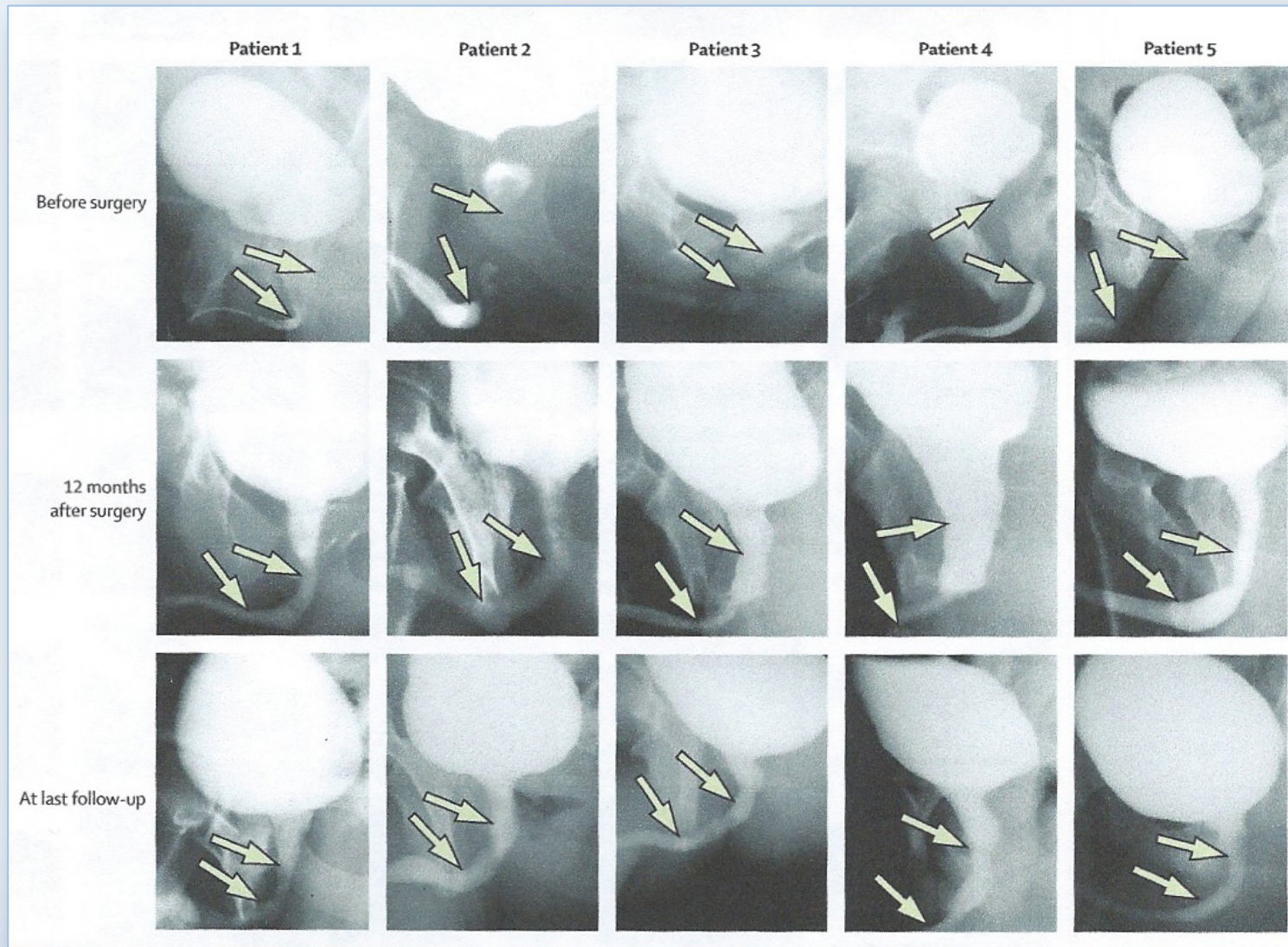
The Lancet 2011, 377: 1175-1182



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Tissue engineered material

Platinum Opinion

Clinical Experience with Urethral Reconstruction Using Tissue-engineered Oral Mucosa: A Quiet Revolution

Guido Barbagli^a, Massimo Lazzeri^{b,}*

^a Centro Chirurgico Toscano, Arezzo, Italy; ^b Department of Urology, Humanitas Clinical and Research Centre, Humanitas University, Rozzano (Milan), Italy

“ However, the realization of these projects represents a very difficult challenge and we must take care to not deceive our patients into thinking that this “quiet revolution” in urethral reconstruction will be available soon for all urethral conditions (congenital or acquired) requiring surgery.”

Eur Urol 2015, 68: 917-918



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Tissue engineered material



**The people workin in the laboratory on tissue engineered material don't know what is a normal urethra, what is urethral pathology, what is urethral surgery !
They don't know what we need !**



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Human urethra transplant

Human urethra transplants

*V Muruamendiáraz, J Cuervo, D Castaño, M Rivas del Fresno,
J M Pello*

The Principality of Asturias, Spain, has the highest rate of organ donors in the country and one of the highest in Europe. Our Tissue Cryopreservation Bank preserves artery, bone, tendon, skin and cardiac valve tissues.¹⁻³ Cadaver urethra extractions were begun in 1994. Histological studies of normal and cryopreserved human urethras revealed practically no differences before and after cryopreservation. After evaluating the results of experimental surgery on sows, the first procedure in a human being was carried out.

The patient was a 49-year-old man with a 1-2 cm bulbar urethral stenosis, who had previously undergone two internal Sachse urethrotomies. A cryopreserved donor urethral patch

was put in place in June, 1996. No complications occurred intraoperatively, nor in the postoperative period. The patient was discharged after 15 days. Three more transplants procedures were done during July and August. A cryopreserved urethral patch was placed in the first two cases, and a complete portion of urethra of about 4-5 cm was grafted in the third patient. All transplants have survived and the patients are urinating normally.

We believe that use of cryopreserved urethra may offer a new treatment for urethral stenosis.

- 1 Hansen TN, Dawson PE, Brockbank KGM. Effects of hypothermia upon endothelial cells: mechanisms and clinical importance. *Cryobiology* 1994; 31: 101-06.
- 2 Boren CH, Roon AJ, Moore WS. Maintenance of viable arterial allografts by cryopreservation. *Surgery* 1978; 83: 382-91.
- 3 Hunt CJ, Song YC, Bateson EAJ, Pegg DE. Fractures in cryopreserved arteries. *Cryobiology* 1994; 31: 506-15.

Department of Urology, Hospital de Cabueñes, Cabueñes, 33204 Gijón, Asturias, Spain (V Muruamendiáraz)

The Lancet 1997, 349: 326



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Penis transplant

Health

South Africans perform first 'successful' penis transplant

By James Gallagher
Health editor, BBC News website

13 March 2015 Health



The world's first successful penis transplant has been reported by a surgical team in South Africa.

The 21-year-old recipient, whose identity is being protected, lost his penis in a botched circumcision.

March 13, 2015



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Penis transplant

Baltimore Doctors to Perform First
Penis Transplant in the U.S. on a
Soldier Injured in Afghanistan

4.9k
SHARES



Surgeons in an Operating Room

OWEN FRANKEN/GETTY

July 12, 2015



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Penis transplant

NEWS : HEALTH SYSTEMS

Johns Hopkins Set to Begin Penis Transplant Program



by Martha Kempner

December 11, 2015 - 2:46 pm

Officials from the Baltimore-based Johns Hopkins University School of Medicine said that within the next year it will begin offering penis transplants, specifically for wounded soldiers. The surgery will use an organ from a deceased donor and doctors believe that within months, the patients should start to regain urinary function, sensation, and ultimately sexual function.

rhrc.us/1mflNml

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December 11, 2015



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Penis transplant

Canadian Man Receives The First Successful Horse Penis Transplant



POSTED BY: NOW8NEWS JANUARY 4, 2016

January 4, 2016



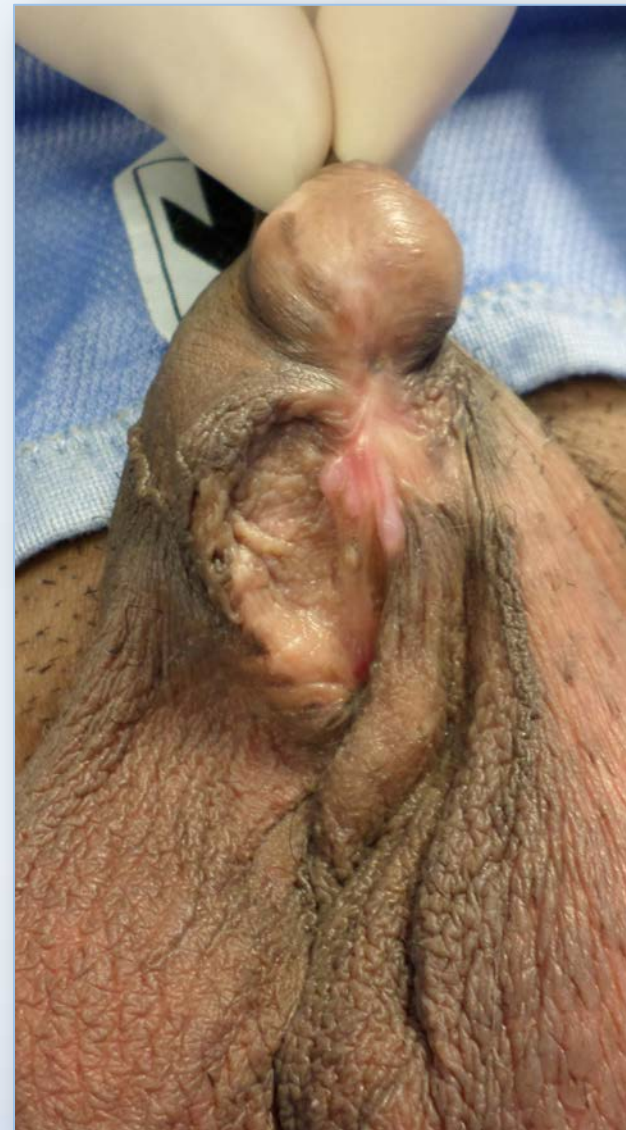
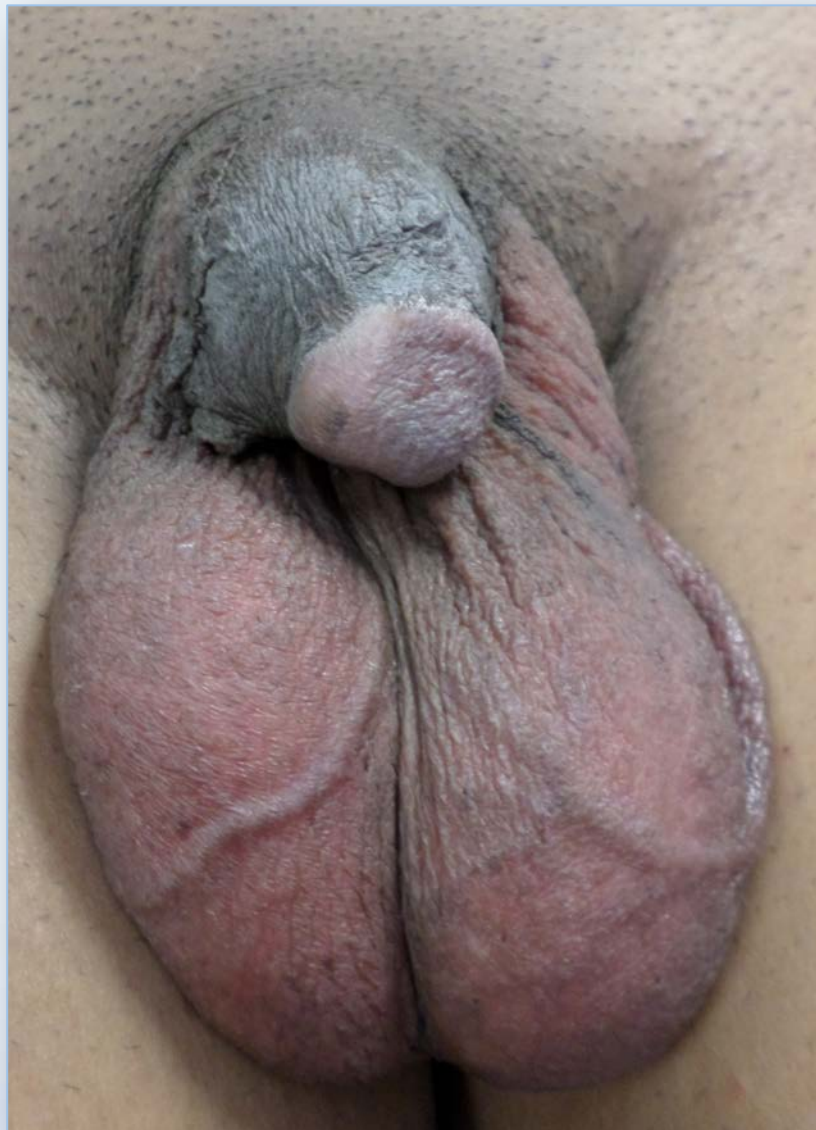
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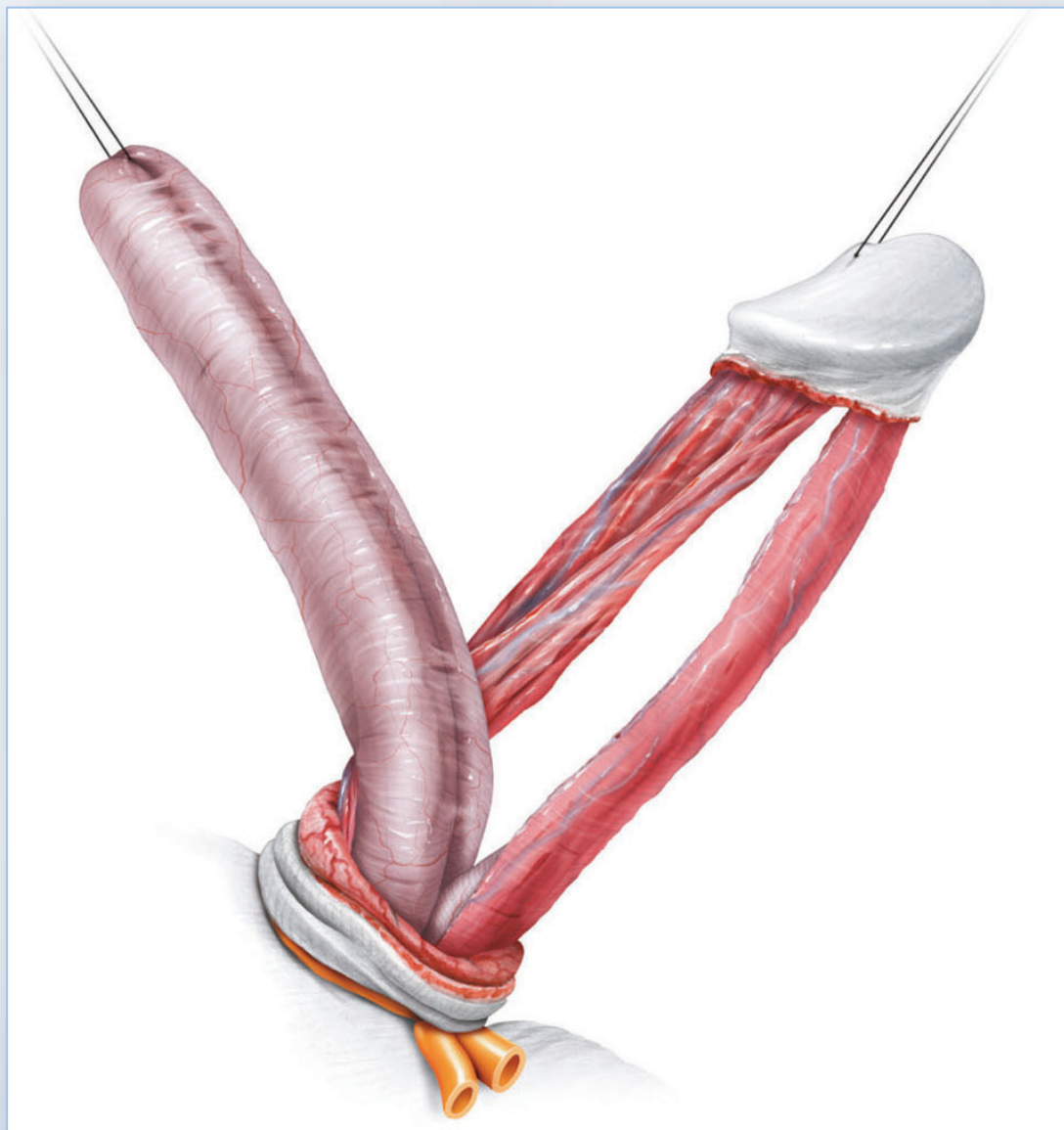
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Penile urethral strictures: complex

Lichen sclerosus disease



GUIDELINES

Evidence-based (S3) Guideline on (anogenital) Lichen sclerosis

G. Kirtschig,^{1,2,*} K. Becker,³ A. Günthert,⁴ D. Jasaitiene,⁵ S. Cooper,⁶ C.-C. Chi,^{7,8} A. Kreuter,⁹ K.K. Rall,¹⁰ W. Aberer,¹¹ S. Riechardt,¹² F. Casabona,¹³ J. Powell,¹⁴ F. Brackenbury,¹⁵ R. Erdmann,¹⁶ M. Lazzeri,¹⁷ G. Barbagli,¹⁷ F. Wojnarowska¹⁸

Journal of the European Academy of Dermatology and Venereology
2015; 29: e1-e43



Introduction

“ Lichen sclerosus (LS) is an **inflammatory skin disease** that usually involves the anogenital area where it causes itching and soreness, sexual dysfunction, urinary dysfunction in men and is associated with genital cancer, however, it may be asymptomatic.

The course of LS is usually **chronic**.

Treatment remains unsatisfactory, ... as disabling scar formation is common despite treatment.

Lichen sclerosus is probably **underdiagnosed.**”



Lichen sclerosis and Urethral stricture

- ❖ **Lichen sclerosis** is increasing in all Centres specialized in treatment of urethral and genitalia diseases
- ❖ Involvement of the urethra in genital **lichen sclerosis** appears to be much more common than previously reported
- ❖ Prior to diagnosis, many patients had symptoms for years, thus encouraging the disease's progression over time
- ❖ In our experience, when the urethra is involved in the disease, 41% of patients showed panurethral stricture

Urol Int 2004; 73: 1-5

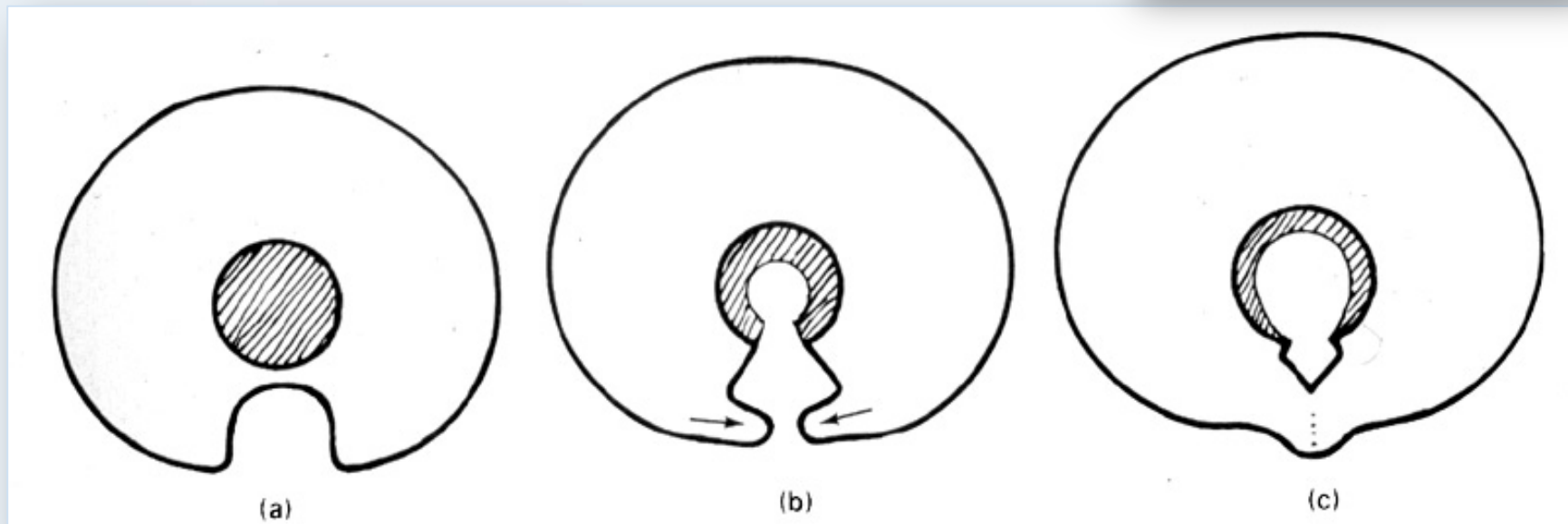


Lichen sclerosis and Urethral stricture

Pathogenesis

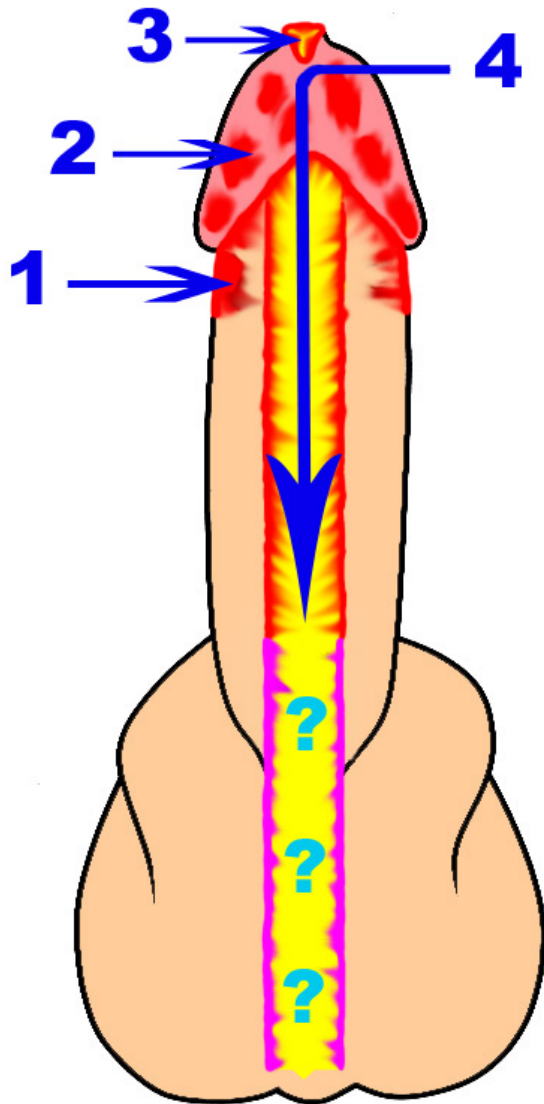


The embryology of the glans may explain the involvement of the external urinary meatus and navicularis tract in **lichen sclerosis**



The developing glanural urethra involves the preputial folds that fuse to genital folds





1 foreskin

2 glans

3 meatus

4 penile urethra

? bulbar urethra



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Histological Evidence of Urethral Involvement in Male Patients With Genital Lichen Sclerosus: A Preliminary Report

Guido Barbagli, Francesco Mirri, Michele Gallucci, Salvatore Sansalone, Giuseppe Romano and Massimo Lazzeri*

From the Center for Reconstructive Urethral Surgery (GB), Arezzo, Sezione di Anatomia Patologica, Ospedale Santa Maria alla Gruccia (FM), Monteverdici, Department of Urology, Istituto Nazionale Tumori "Regina Margherita" (MG) and Department of Urology, Tor Vergata University (SS), Rome, and Departments of Urology, San Donato Hospital (GR), Arezzo and Istituto Fiorentino di Cura e Assistenza S. P. A., Gruppo GIOI (ML), Florence, Italy

**Doctor
Francesco
Mirri**



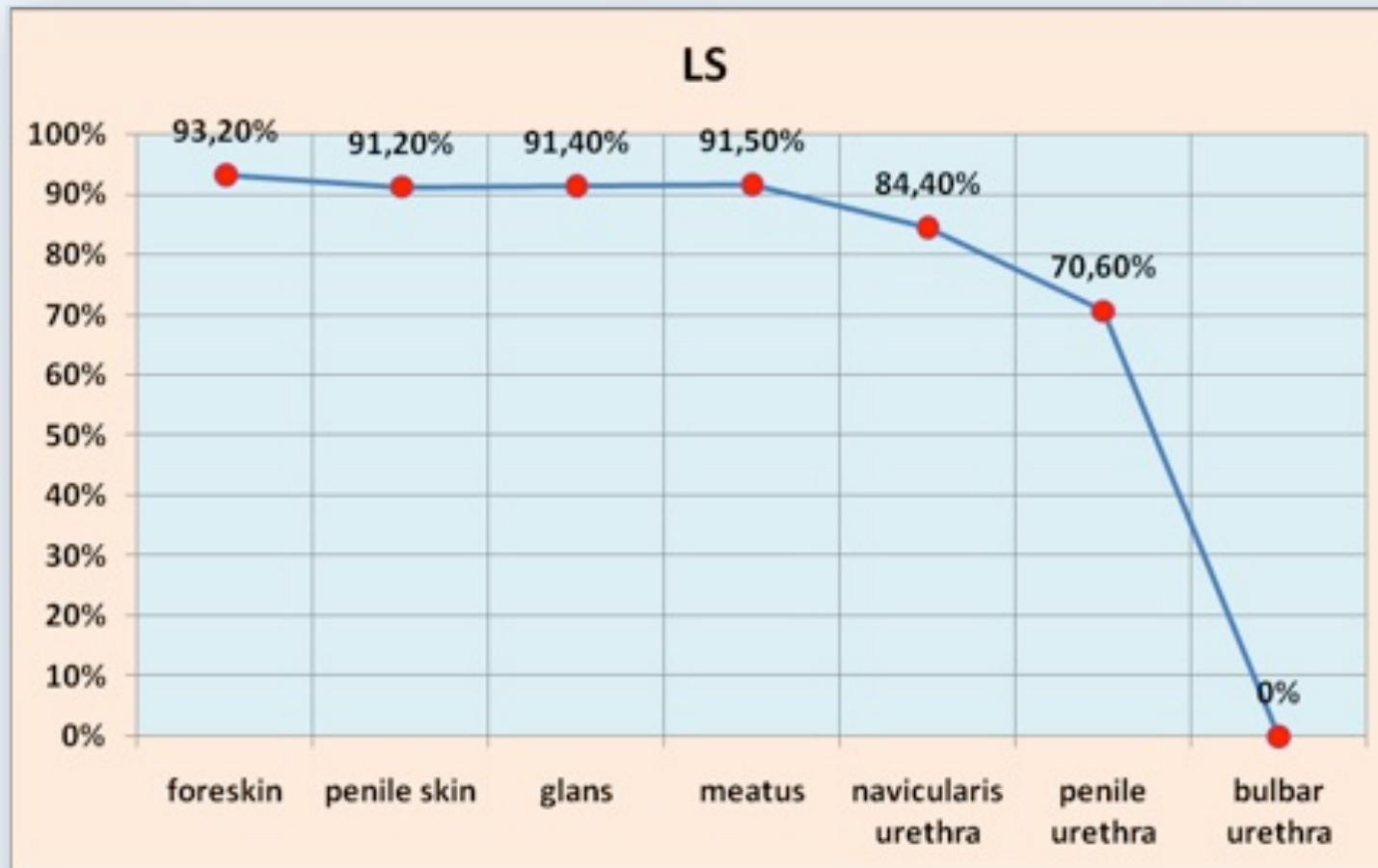
J Urol 2011; 185: 2171-2176



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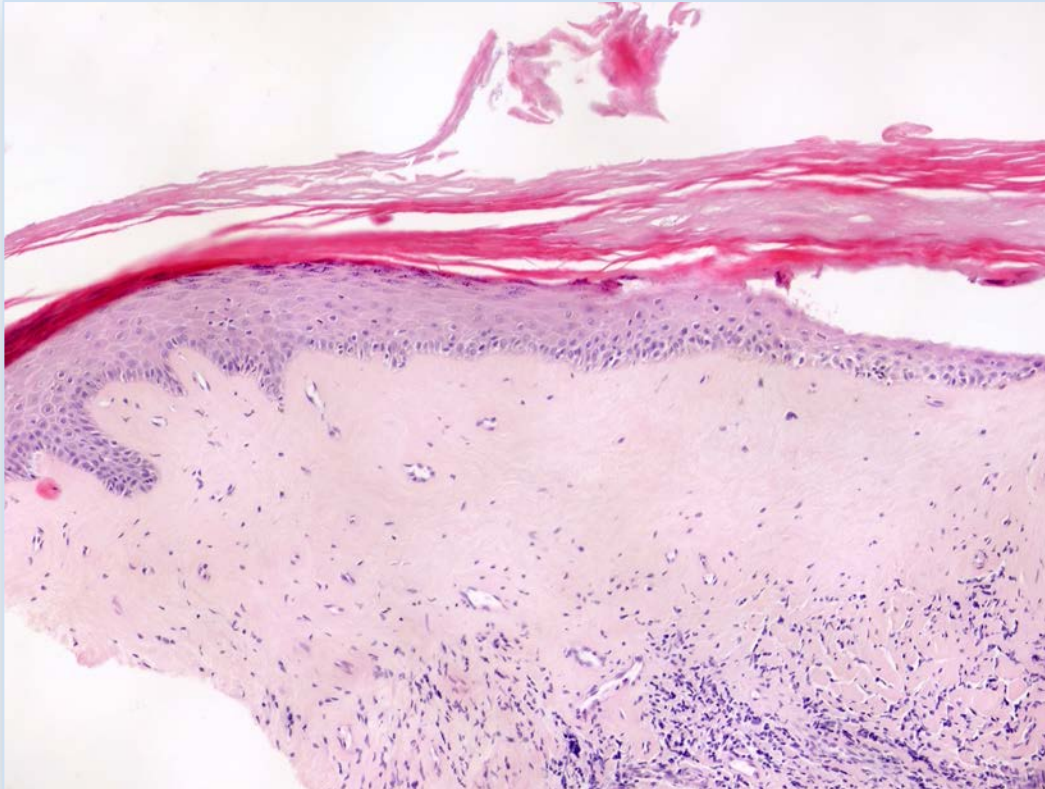
Lichen sclerosus and Urethral stricture



**99 patients (mean age 46 years)
274 biopsies for LS**



Lichen sclerosus and Urethral stricture



**Navicularis
urethral
mucosa**

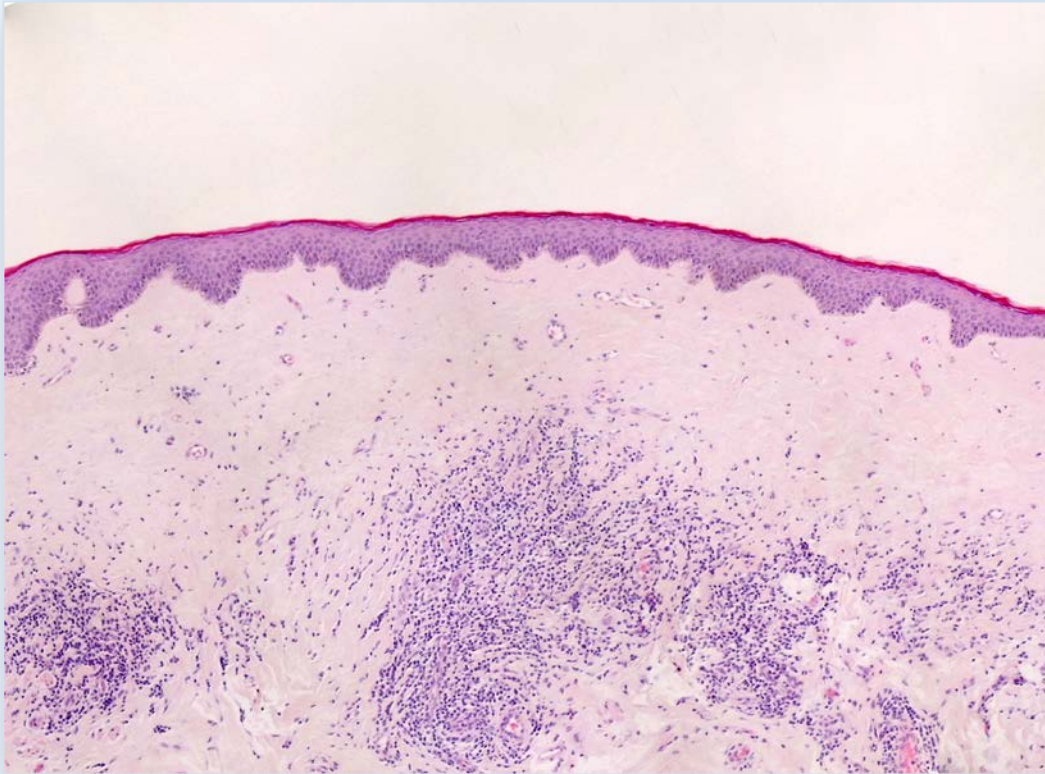
**Epidermized navicularis urethral mucosa.
LS similar to cutaneous counterpart**



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Lichen sclerosus and Urethral stricture

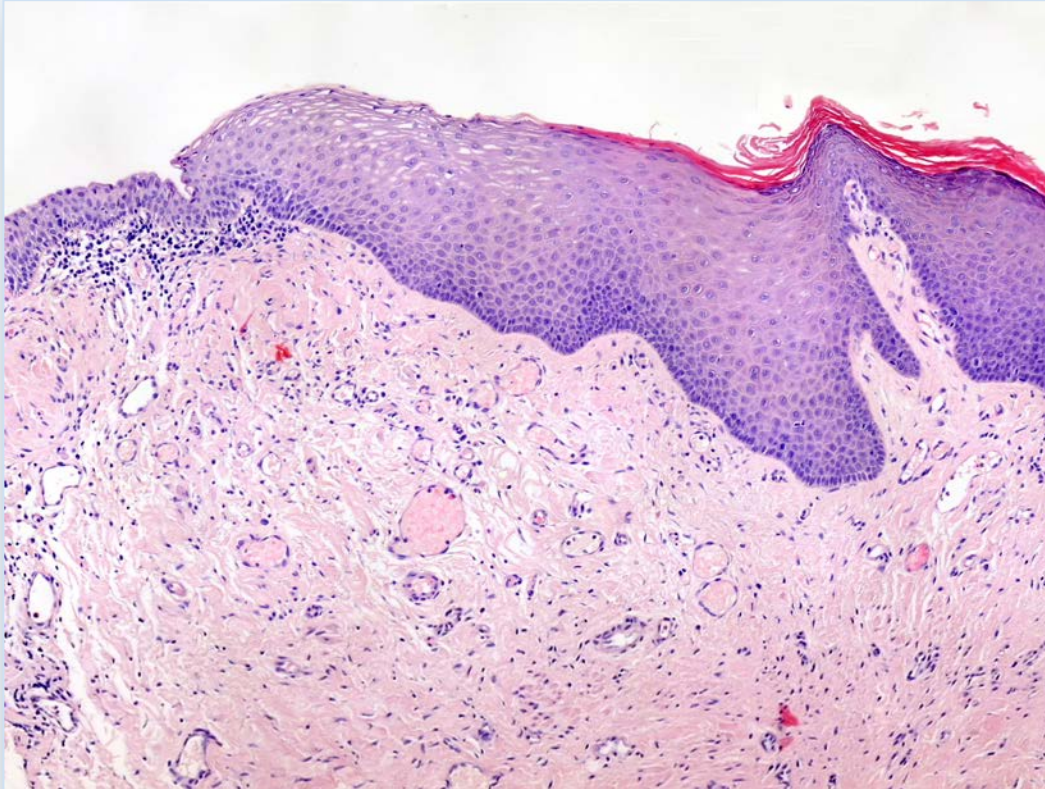


**Penile
urethral
mucosa**

**Epidermized penile urethral mucosa.
LS similar to cutaneous counterpart**



Lichen sclerosus and Urethral stricture

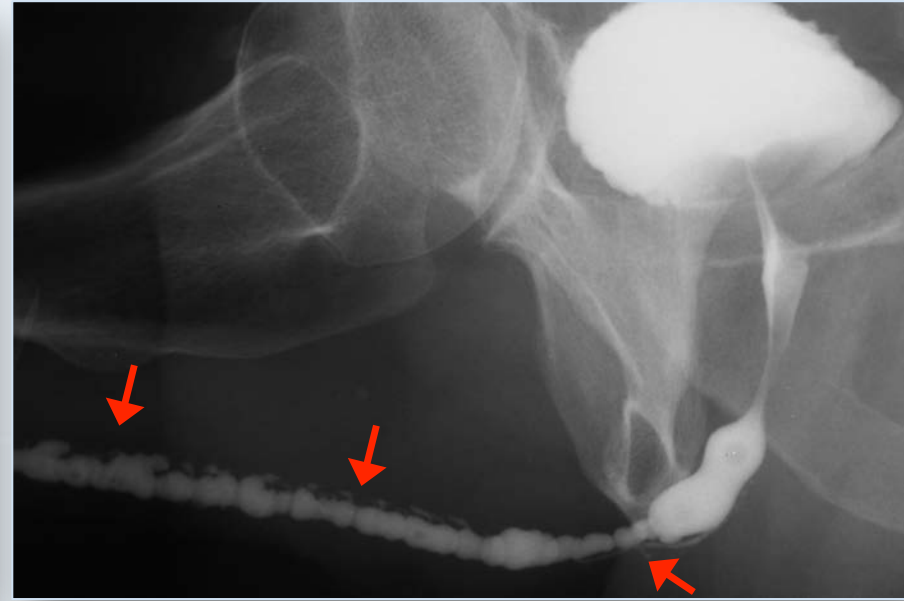
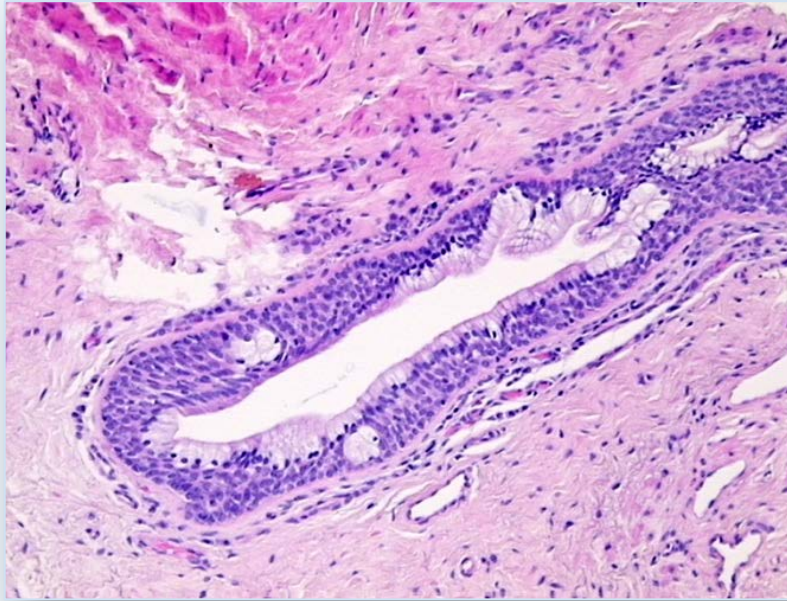


**Bulbar
urethral
mucosa**

Transition from normal stratified cylindrical epithelium (left) through squamous nonkeratinizing metaplastic epithelium to keratinizing squamous metaplastic hyperplasia (right)



Lichen sclerosus and Urethral stricture



Squamous metaplasia involves the ductus of the periurethral glands, which becomes rigid and wide open. Thus the retrograde urethrography is able to depict the periurethral glands.



Lichen sclerosis and Urethral stricture

- Involvement of external urinary meatus is a prognostic factor for spread **Lichen sclerosis** through the navicularis and penile tracts.
- More than 10 years are required to **Lichen sclerosis** progress.
- It is possible to document **Lichen sclerosis** in navicularis and penile urethral mucosa by histology.
- It is not possible do document **Lichen sclerosis** in bulbar urethral mucosa.

J Urol 2011; 185: 2171-2176



Lichen sclerosis and Urethral stricture

- Lichen sclerosis (LS) is a chronic, inflammatory disease and the (medical) treatment remains unsatisfactory.



- Until an effective medical therapy of the disease will be available, the surgical treatment of LS-urethral strictures is bound to be a failure, and represents only a temporary palliative adjustment to relieve the obstructive symptoms.



Complex Penile Urethral Strictures

Surgical approach



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Failed hypospadias repair



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Lichen sclerosus



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Reconstructive Urology

Failed Hypospadias Repair Presenting in Adults

Guido Barbagli^a, Michele De Angelis^b, Enzo Palminteri^a, Massimo Lazzeri^{c,}*

^a Center for Urethral and Genitalia Reconstructive Surgery, Arezzo, Italy

^b U.O. Urologia, Ospedale San Donato, Arezzo, Italy

^c Department of Urology, Santa Chiara-Firenze, Florence, Italy

Eur Urol 2006, 49: 887-895



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cosmetically acceptable glandular meatus after completion of all secondary procedures. The necessity of meatal or urethral dilation and the presence of complications or a poor aesthetic result requiring revision were considered failures. All patients were evaluated at the end point of the surgical itinerary.

No formal statistical analysis was performed because of the small sample size, which was observed over a long period, from 1995 to 2004.

penile skin, showing a higher success rate: 82% versus 50%. Only 61% of the patients who underwent multistage techniques required two surgical steps before the final urethral reconstruction and 39% of the cases required more than two surgical steps before the final urethral reconstruction.

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THE PROBLEMS OF PENILE URETHROPLASTY WITH PARTICULAR REFERENCE TO 2-STAGE RECONSTRUCTIONS

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CONCLUSIONS

Although 2-stage reconstruction of complex penile urethral strictures (mainly after hypospadias and lichen sclerosus related) seems to reduce the re-stricture rate significantly compared with 1-stage tubed repairs, it does so at the ex-

pense of a significant revision rate. In practice this means that about 50% of patients will undergo a 3-stage rather than 2-stage procedure to reduce the re-stricture rate (short-term followup) from about 18%, as it might have been had they undergone a 1-stage repair, to 4%.

The 3 principal reasons for this revision rate appear to be early postoperative erections, lichen sclerosus as the underlying cause and shallowing out of the glans cleft. These are all problems that mainly affect the penile urethra. As a result

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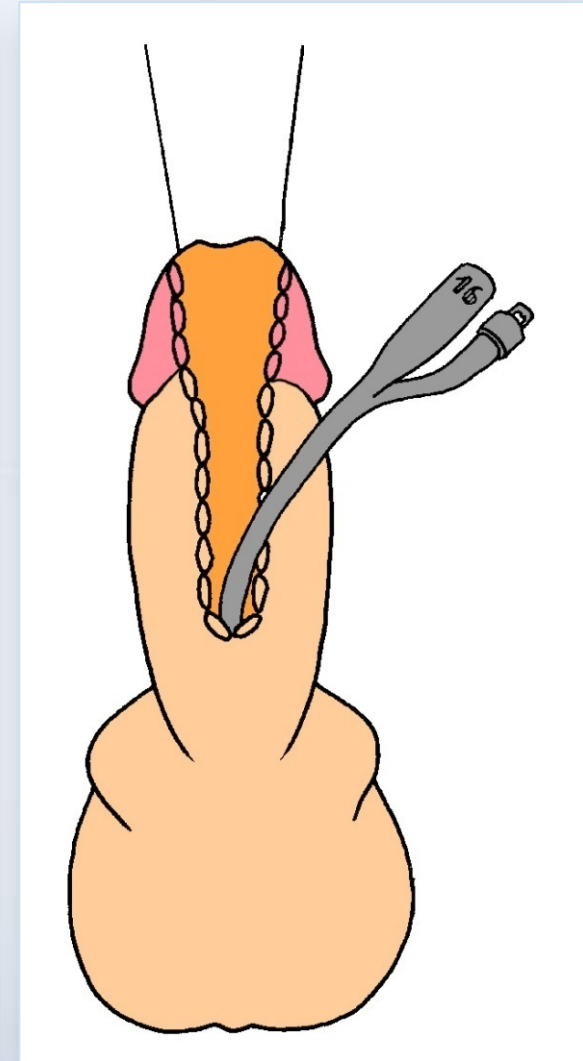
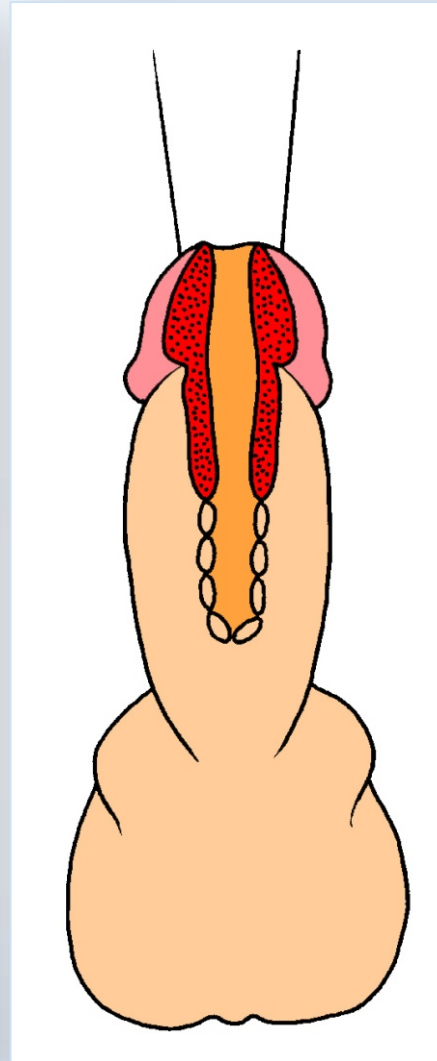
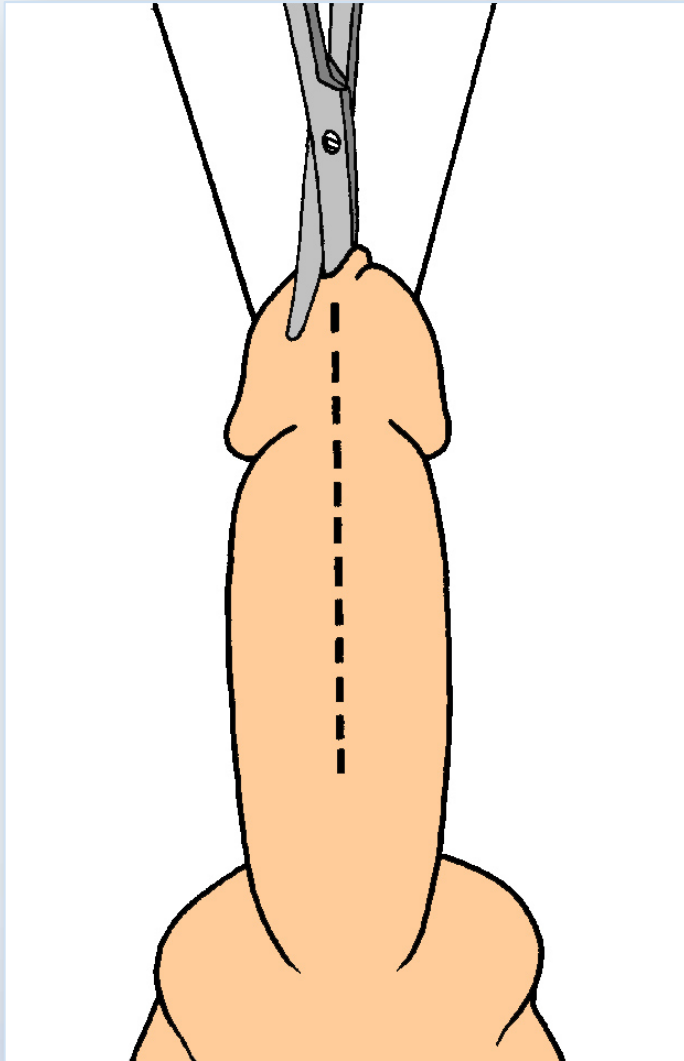




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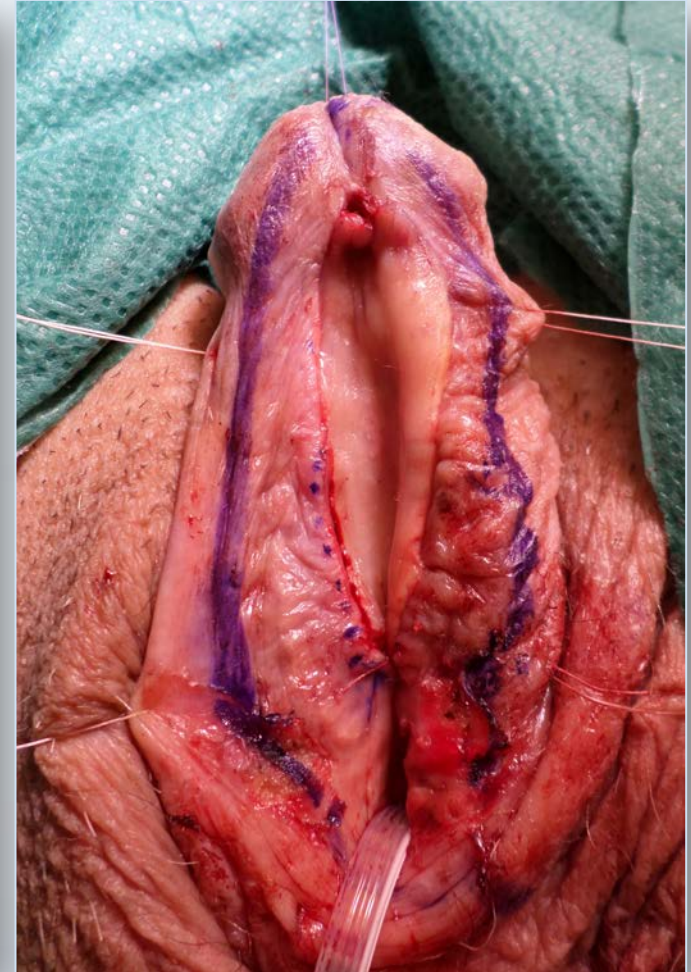
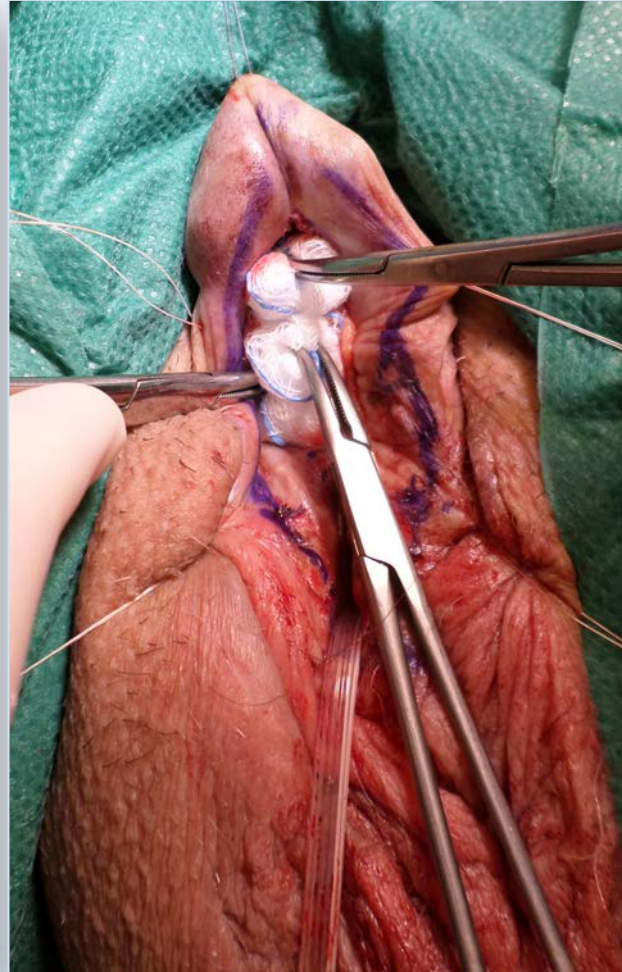
First stage – Johanson's urethroplasty





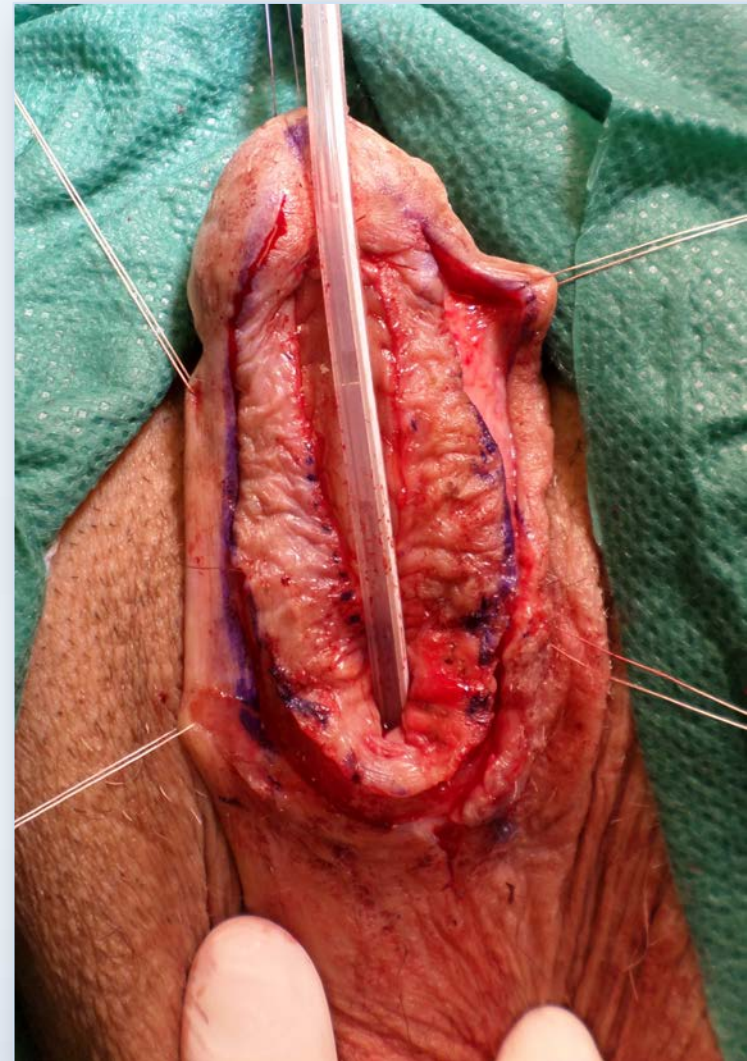
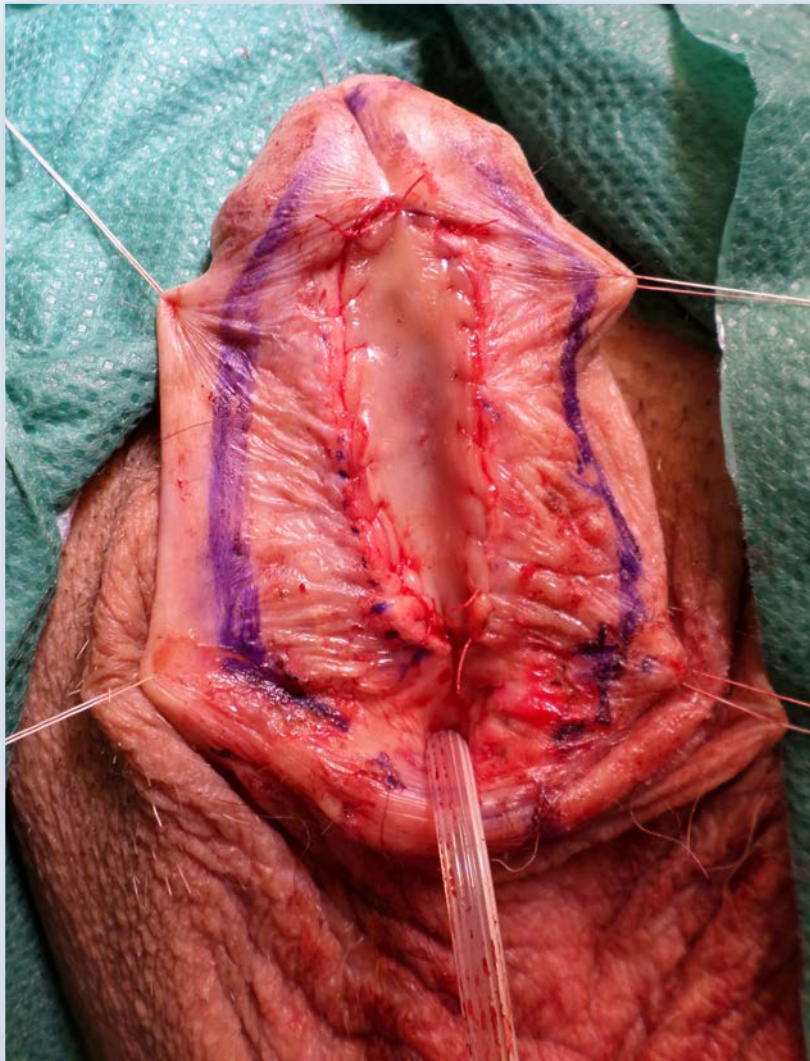
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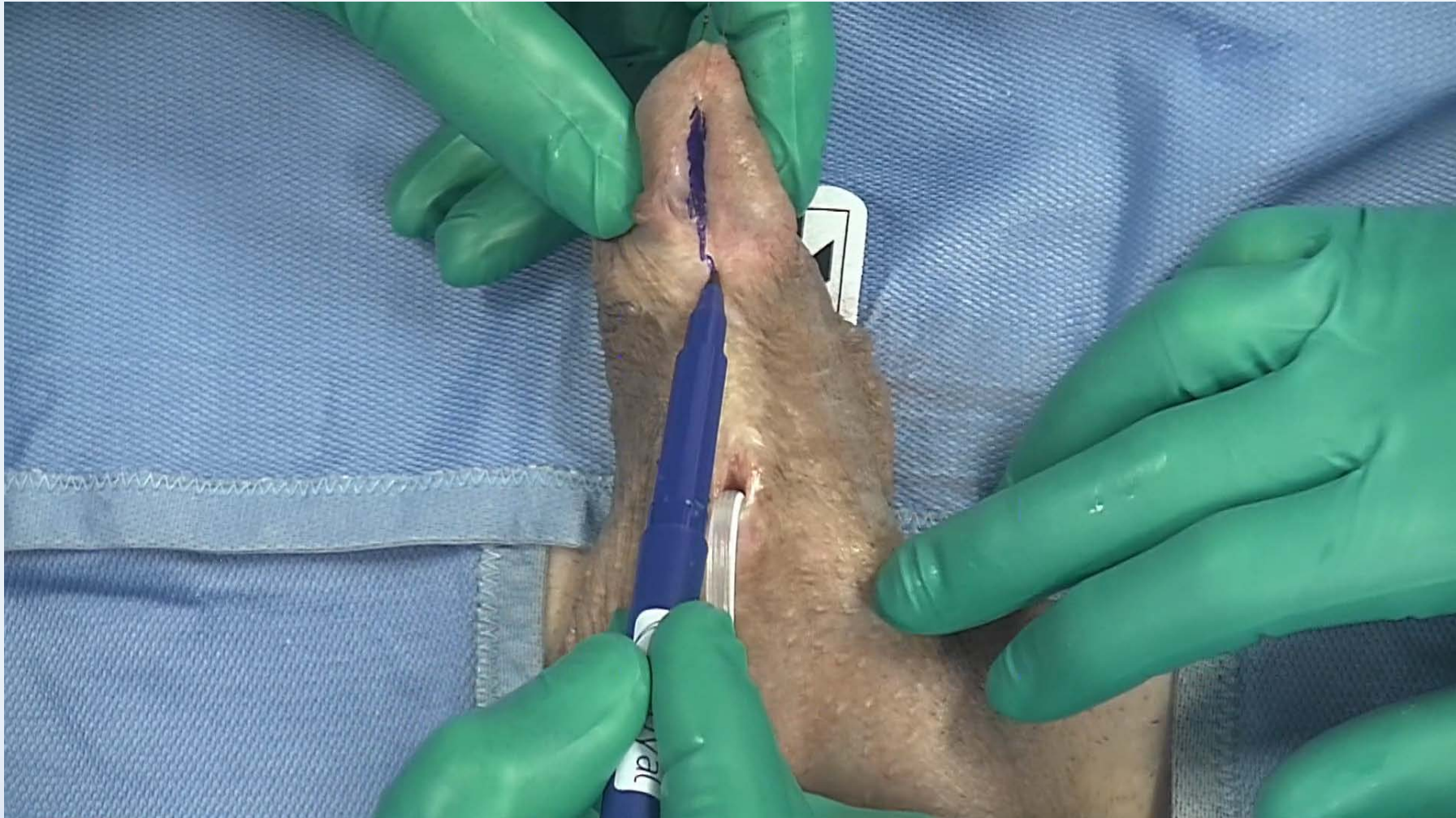
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Second-stage penile urethroplasty with oral graft and a new glue (Glubran 2)



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**It is more difficult to
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