

«Χειρουργική θεραπεία  
στενωμάτων οπίσθιας ουρήθρας»

Εισηγητής: **B. Πολίτης**

προστατική		2-5 εκ.	<ol style="list-style-type: none"> <li>1. πίσω από το ηβικό οστό,</li> <li>2. μέσω των ηβοπροστατικών συνδέσμων συμφύεται σε αυτό</li> </ol>
μεμβρανώδης	οπίσθια ουρήθρα <b>Διelaύνει</b> το ουρογεννητικό διάφραγμα	1,5-2 εκ	<ol style="list-style-type: none"> <li>1. αποτελεί το πιο <b>σταθερό</b> τμήμα της ανδρικής ουρήθρας,</li> <li>2. βρίσκεται σε στενή ανατομική σχέση με τον <b>έξω σφιγκτηριακό</b> μηχανισμό.</li> <li>3. μέσω του ουρογεννητικού διαφράγματος, προσφύεται ισχυρά στους <b>ηβοϊσχιακούς</b> κλάδους του ηβικού οστού</li> </ol>
βολβική			
πειϊκή	πρόσθια ουρήθρα		

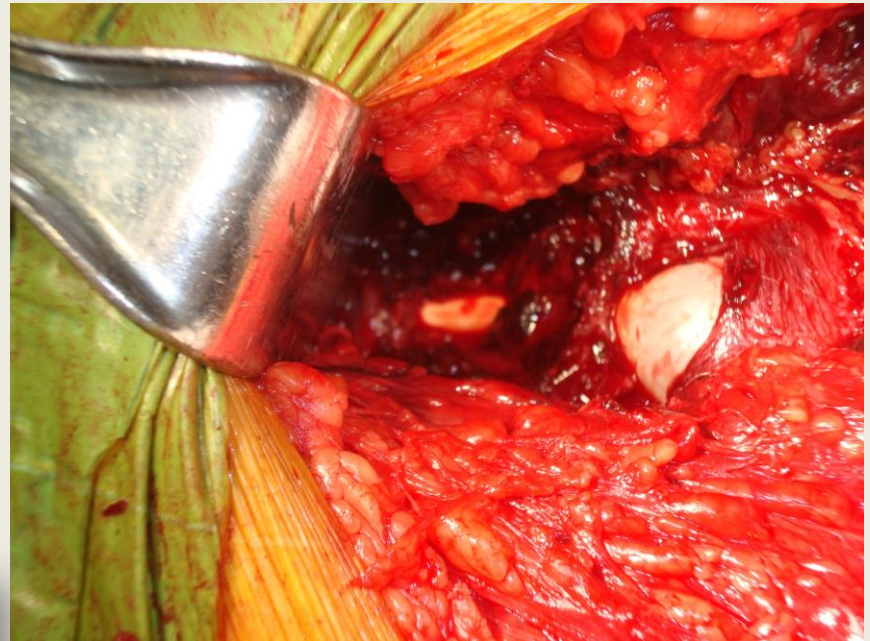
## Οπίσθια ουρήθρα

1. Αμβλείες κακώσεις,
2. # πυέλου

Διατιτραίνοντα τραύματα

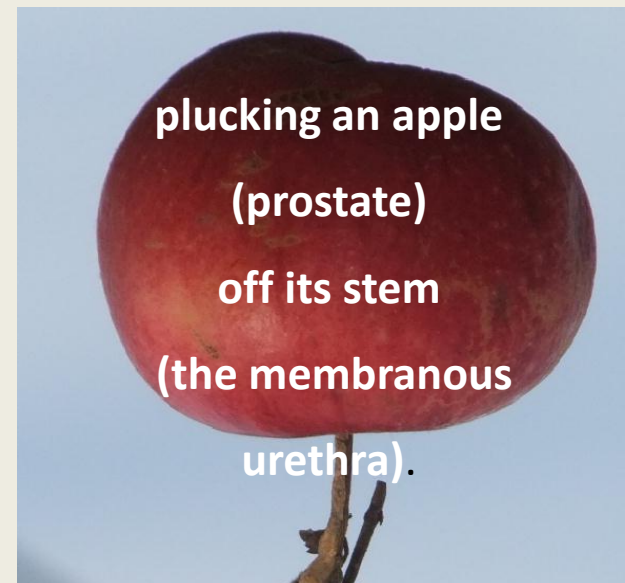
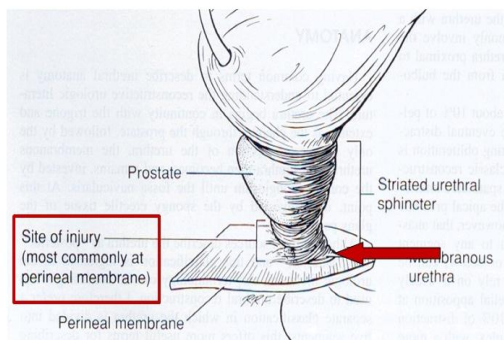
Ιατρογενείς κακώσεις

1. μετά TURP
2. Ριζική προστατεκτομή)



## Anatomy / mechanism of injury

- 70-80% are **distal** to the sphincter (level 3)
- This is different than the standard teaching



## Μηχανισμοί κακώσεων οπισθίας ουρηθρας

1. **μετακίνηση** του ενός ανωνυμου οστου και της ηβικης συμφυσης με αποτελεσματην ρηξη της ουρηθρας
2. πολλαπλα καταγματα των ηβικων οστων με σχηματισμο **ελευθερου οστικου τμηματος** που τοποθετειται οπισθιως και προκαλει ρηξη της ουρηθρας
3. **διασταση** της ηβικης συμφυσης με **ρηξη** του ενός τουλαχιστον ηβοπροστατατικου συνδεσμου
4. αμεση κακωση απο ελευθερη **οστικη παρασχιδα** που μπορει επισης να προκαλεσει και τραυματισμο του προστατου του αυχενα της κυστεως η και ρηξη της κυστεως

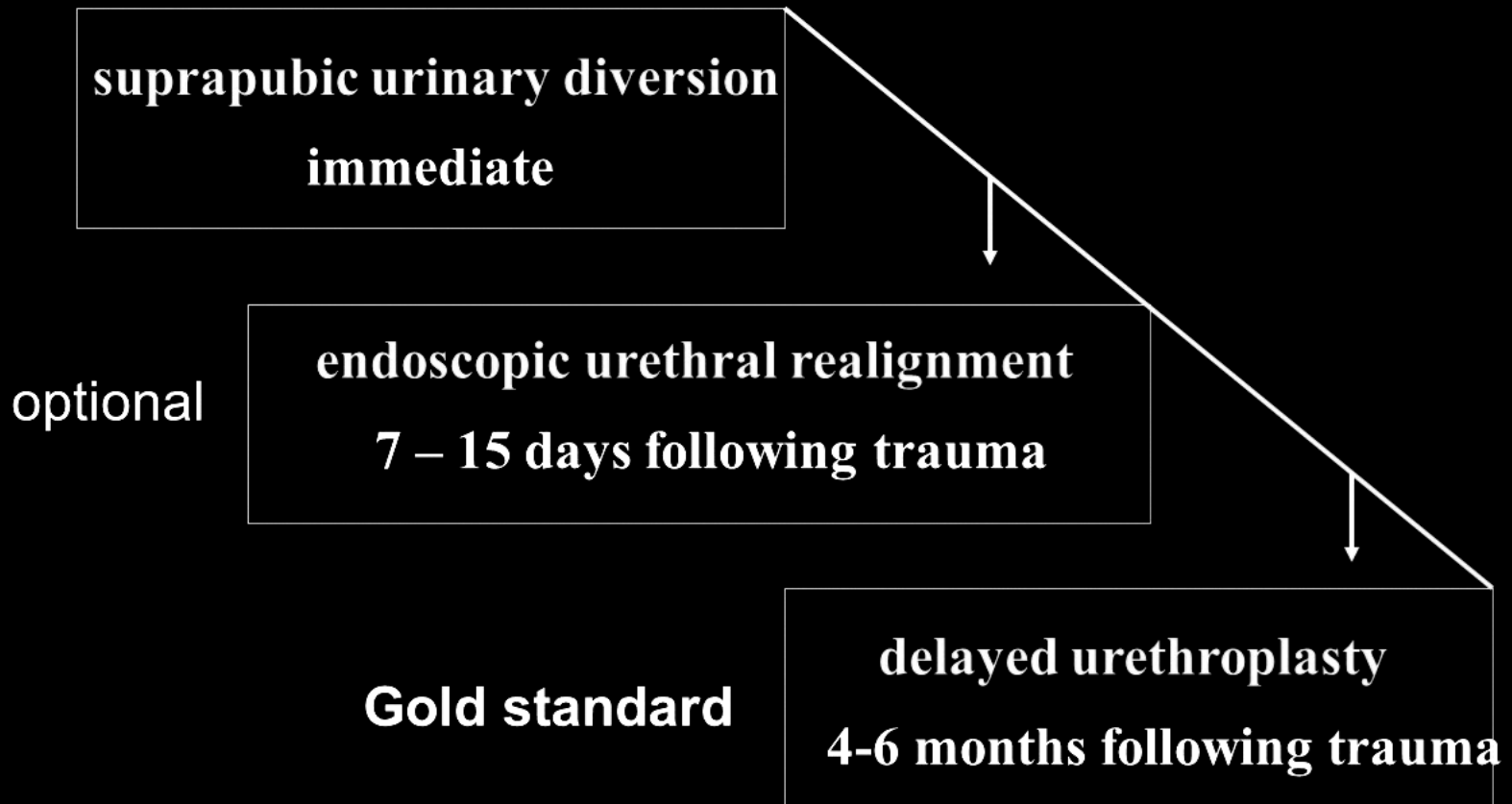
*Η απλη ακτινογραφια μας απεικονιζει παντοτε το αποτελεσμα και ποτε τον μηχανισμο και τις δυναμεις που αναπτυσσονται στην κακωση*

- Pelvic Fracture Urethral Injury (PFUI)
- Pelvic Fracture Urethral Disruption Defect (PFUDD)
  - “urethral distraction defect” is an alternative second tier term
  - “posterior urethral stricture” is a not acceptable

## Disruption Injury - PFUDI

- **Most common cause:**
  - Pelvic fracture
  - (Rarely : gunshot wounds)
- **Most common location:**
  - Distal to external urinary sphincter (!)
- **Complications**
  - Urethral stricture
  - Incontinence
  - Impotence

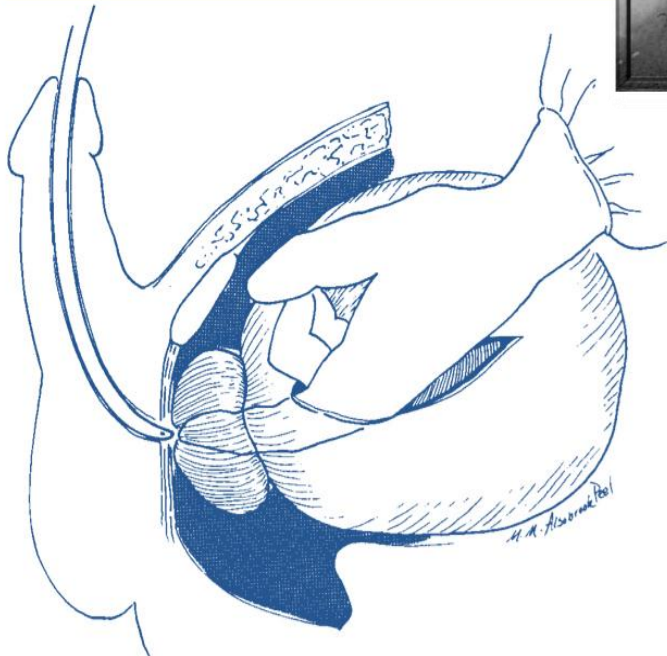
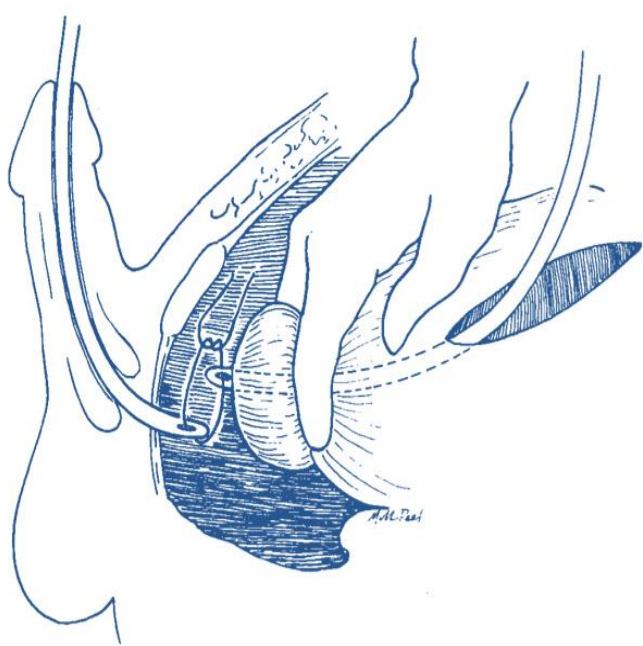
# Emergency treatment of posterior urethral trauma



dilation			
urethrotomy			
stents			
<b>Open Reconstruction</b>			
<b>Primary repair</b>	<ol style="list-style-type: none"> <li>1. Realignment</li> <li><del>2. urethroplasty</del></li> </ol>		
<b>Late Urethroplasty</b>  <ol style="list-style-type: none"> <li>1. Anastomotic</li> <li>2. tissue-transfer techniques</li> </ol>	<b>graft</b>  <ol style="list-style-type: none"> <li>1. Full-thickness skin</li> <li>2. Split-thickness skin :</li> </ol>	<ol style="list-style-type: none"> <li>a. single-stage repair</li> <li>b. Two-stage repair               <ol style="list-style-type: none"> <li>i. First stage</li> <li>ii. Second stage</li> </ol> </li> </ol>	
	<b>Pedicated skin flaps</b>  <ol style="list-style-type: none"> <li>1. Skin island onlay flaps</li> <li>2. Hairless scrotal island flap</li> <li>3. Skin island tubularized flap</li> </ol>		

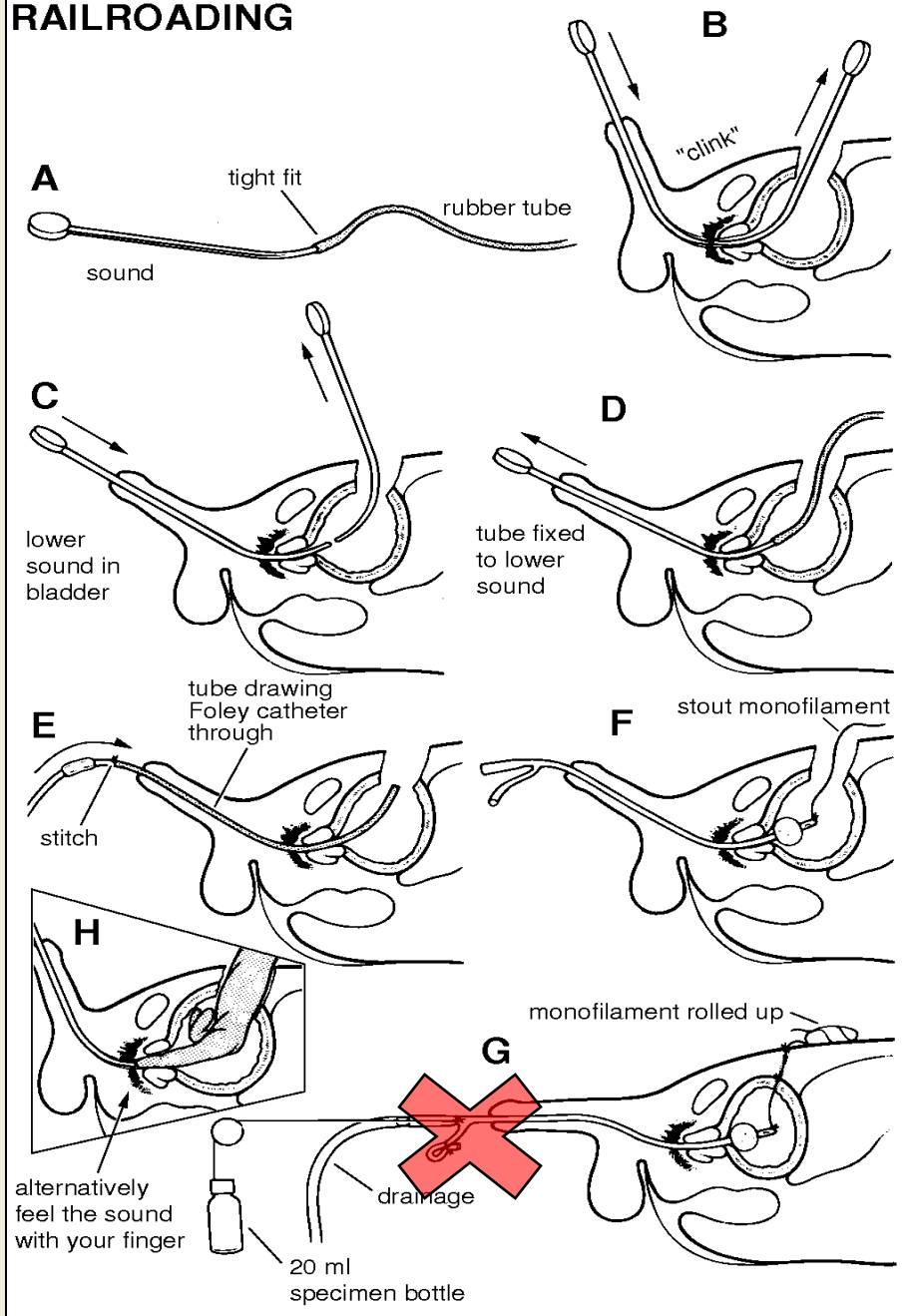
## Immediate open realignment:

- Bladder neck injury
- Rectal injury
- Open orthopedic repair of pelvic injuries





## RAILROADING



## ΕΥΘΕΙΑΣΜΟΣ (REALIGNMENT)

1. γίνεται όταν πρακτικά είναι δυνατόν
2. προτιμότερο σε <απο 72 ώρες
3. μερικές φορές είναι επιτυχές και αργότερα
4. δεν χειροτερεύουν
  - a. στυτική δυσλειτουργία-
  - b. προβλήματα εκσπερματισής
  - c. ακράτεια

**χωρίς ελξη → χειροτερεύει η ακράτεια**

Χειρουργική αντιμετώπιση των κακώσεων της  
οπισθίας ουρηθρας σε 1<sup>ο</sup> χρόνο

**Αυξάνει την**  
στυτική δυσλειτουργία  
την ακράτεια  
τα στενώματα  
απώλεια αιματος

dilation			
urethrotomy			
stents			
<b>Open Reconstruction</b>			
<b>Primary repair</b>	<ol style="list-style-type: none"> <li>1. Realignment</li> <li><del>2. urethroplasty</del></li> </ol>		
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The term

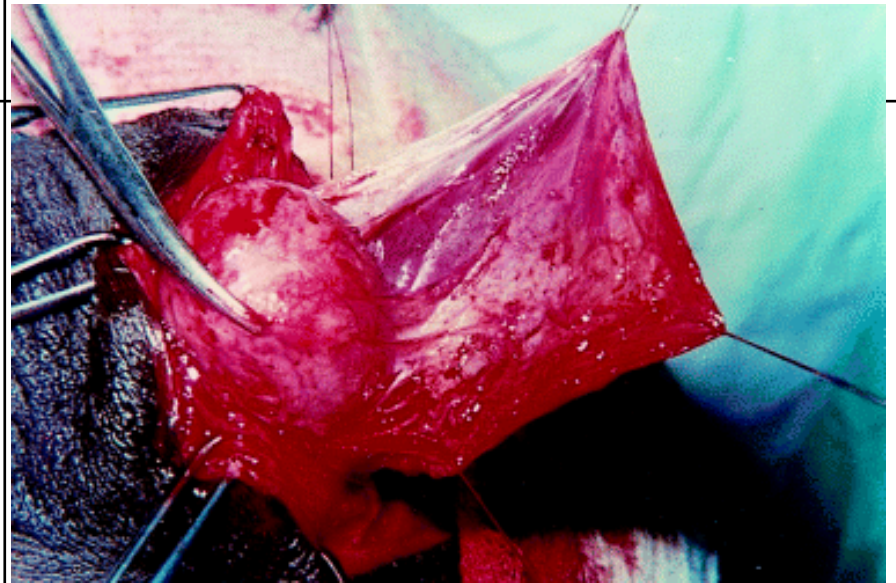
**“graft”**  
refers to.

1. from one part of the body and transferred to another in order to replace diseased or injured tissue.
2. is **without** its own blood supply and relies on diffusion from its host bed



**“Flap”**  
refers

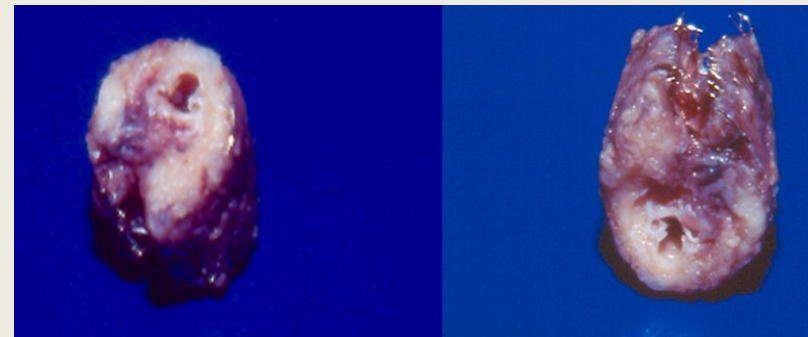
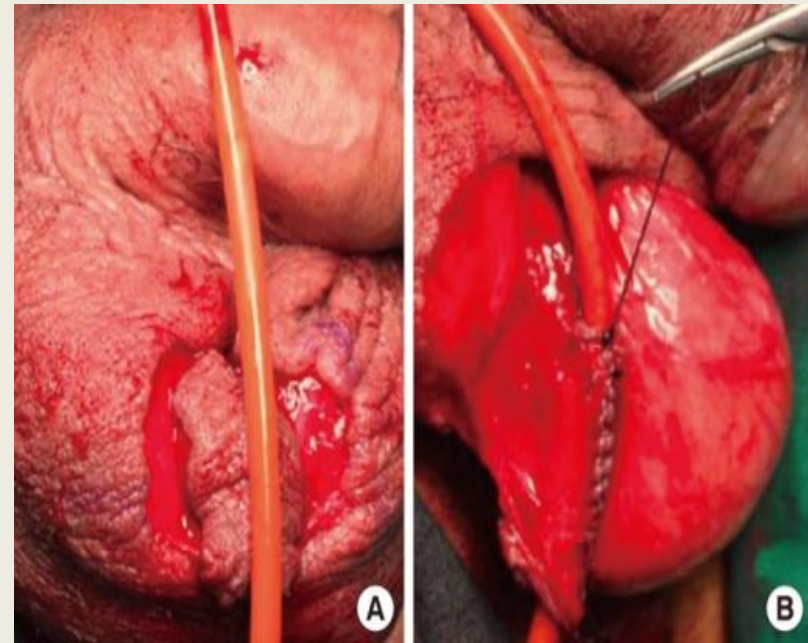
tissue is transferred  
**on a vascular pedicle**  
from one part of the  
body to another



- **Four grafts** that have been successfully used for primary urethral reconstruction are the full-thickness
  1. **skin** graft,
  2. the **bladder** epithelial graft,
  3. the **oral mucosal** graft and
  4. the **rectal mucosal** graft.
- Oral mucosal grafts as mentioned can be taken from
  1. the cheek (buccal),
  2. The lip (labial), and
  3. the undersurface of the tongue (lingual).

Grafts have been most successfully employed in the area of the **bulbous urethra**, where the urethra is invested by the bulk of the ischiocavernosus muscles

<p>“augmented urethroplasty/ urethral reconstruction”</p>	<p>Describes urethral reconstruction with a <b>tissue graft or flap</b></p>
<p>“<b>substitution</b> urethroplasty/ urethral reconstruction”</p>	<p>describes urethral reconstruction with a <b>tubularized</b> tissue graft or flap</p>
<p>“Augmented <b>anastomotic</b> urethroplasty/ urethral reconstruction”</p>	<ol style="list-style-type: none"> <li>1. the stricture is <b>excised</b>,</li> <li>2. a <b>portion</b> of the urethra is <b>anastomosed</b> (either ventrally or dorsally), and</li> <li>3. a graft or flap is placed on the contralateral side to complete the urethroplasty/urethral reconstruction.</li> </ol>



dilation			
urethrotomy			
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<b>Open Reconstruction</b>			
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Ουρηθροπλαστική → 3 μόνο αναγκαίες επεμβάσεις

1. τοποθέτηση στοματικού βλεννογόνου (**Barbagli**)
2. 1<sup>ος</sup> και 2<sup>ος</sup> χρόνος κατά **Johanson** με στοματικό βλεννογόνο
3. **αναστομωτική** ουρηθροπλαστική για οπισθία ουρήθρα

SANTUCCI '07

EUROPEAN UROLOGY 67 (2015) 764–770

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European Association of Urology



Surgery in Motion

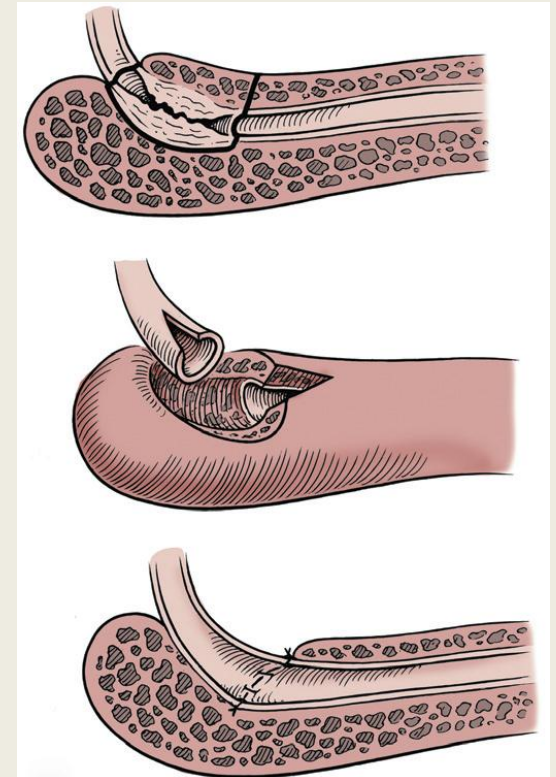
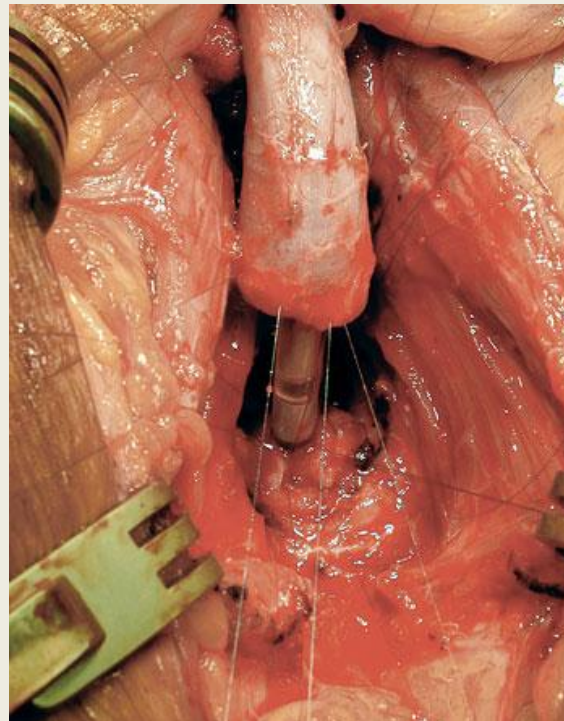
## **Surgical Tips and Tricks During Urethroplasty for Bulbar Urethral Strictures Focusing on Accurate Localisation of the Stricture: Results from a Tertiary Centre**

*Tricia L.C. Kuo \**, *Suresh Venugopal*, *Richard D. Inman*, *Christopher R. Chapple*

*Department of Urology, Royal Hallamshire Hospital, Sheffield Teaching Hospitals NHS Trust, Sheffield, UK*

The **classic reconstruction** consists of a **Spatulated** anastomosis of the **proximal anterior urethra** to the **apical prostatic urethra**.

1. the area of **fibrosis** is **totally** excised
2. the urethral **anastomosis** is **widely** spatulated,
3. a **large ovoid** anastomosis
4. the anastomosis is **tension free**.





# Urethral Pull-through Operation

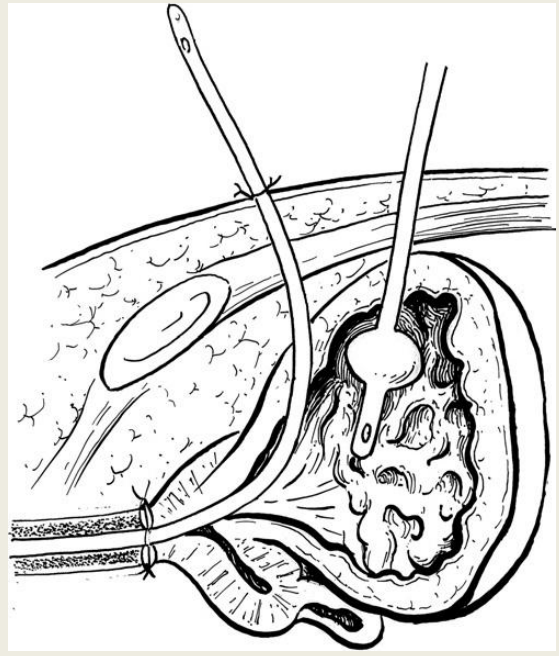
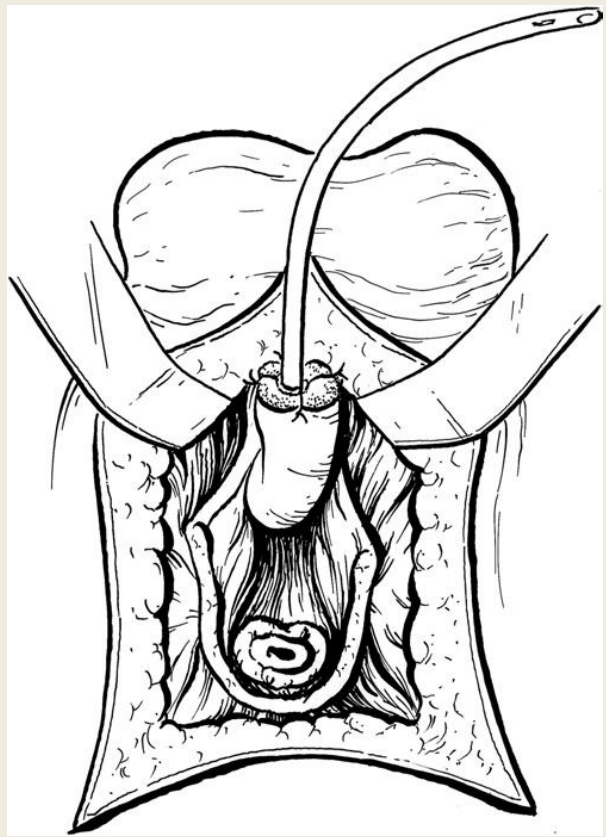
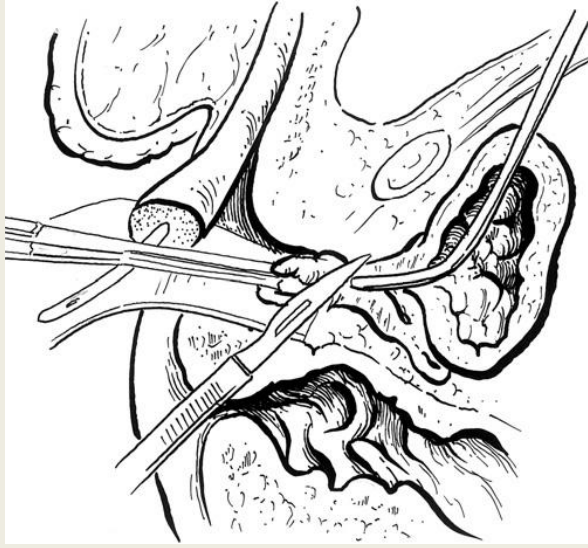
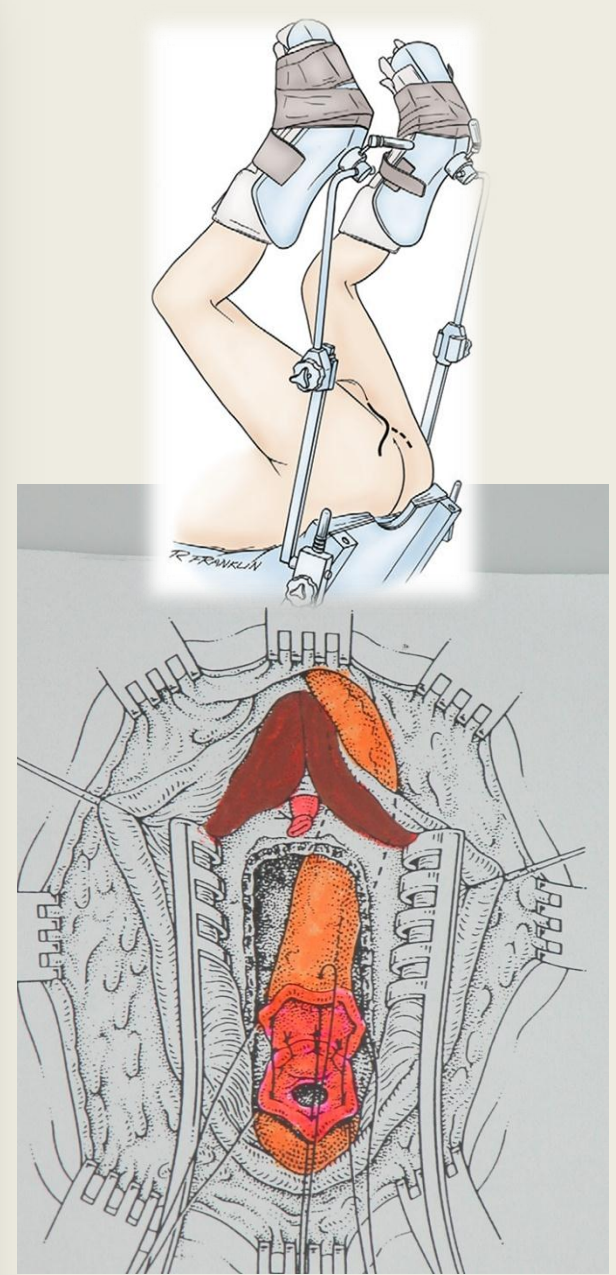
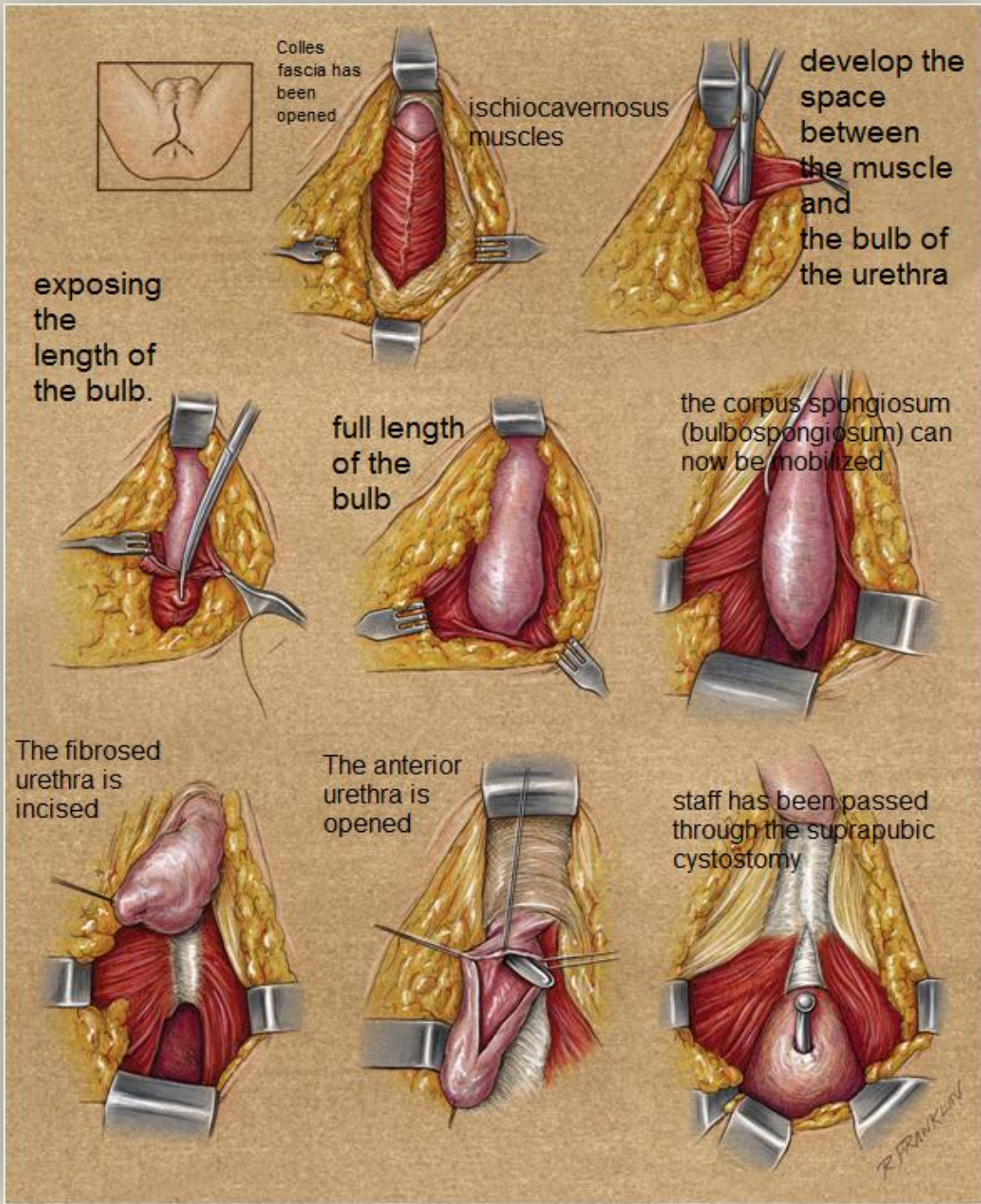


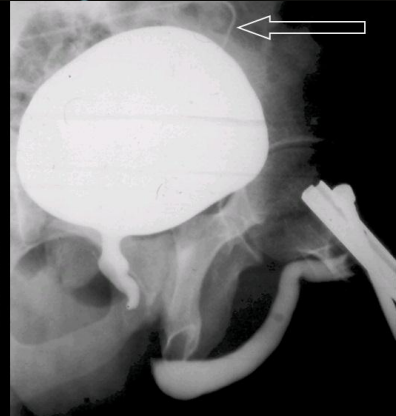
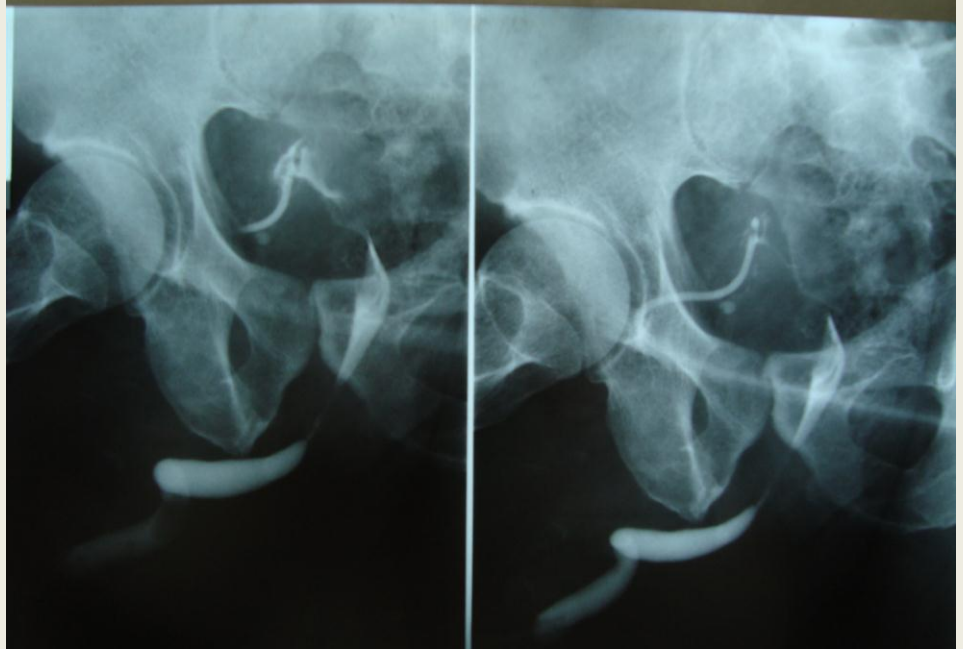
Figure 1.  
The stricture segment with the surrounding fibrous tissue is excised under the guidance of sound in the proximal urethra.

Figure 2.  
**The distal urethral end is fixed on a catheter**, with sutures placed through the catheter wall and the urethral spongiosum, and **0.5 cm away from the border of urethral end.**

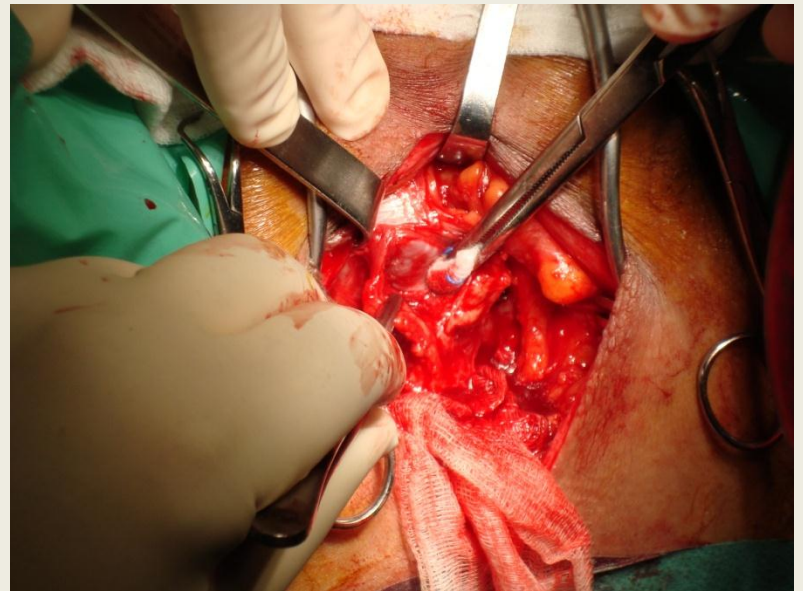
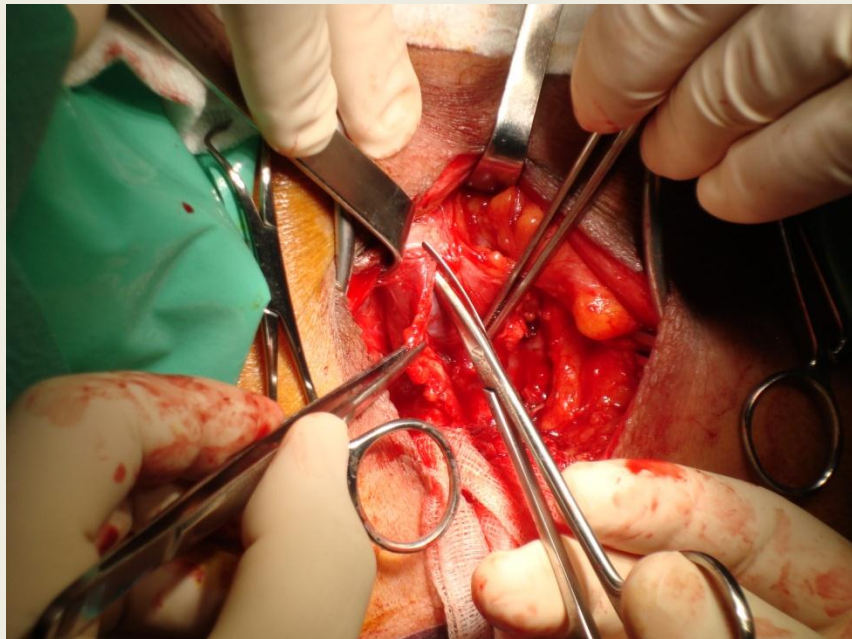
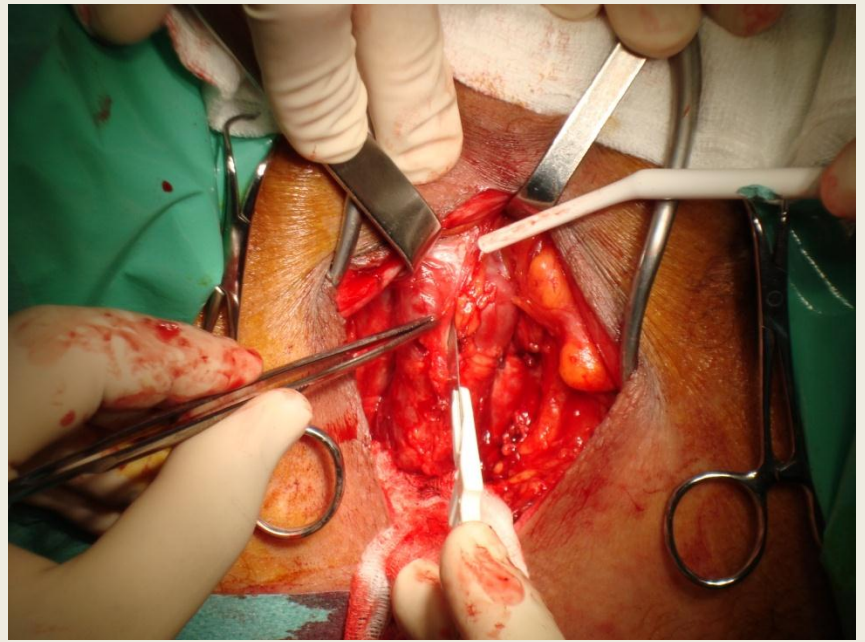
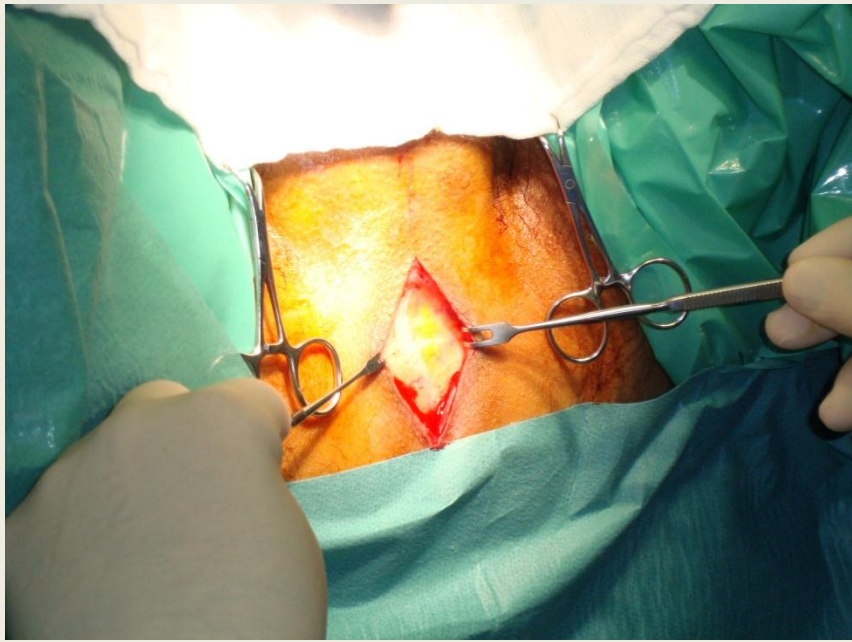
Figure 3.  
The catheter is fixed in place on the abdominal wall with a stitch to allow the approximation of the 2 urethral ends without tension and interposition of periurethral tissue.

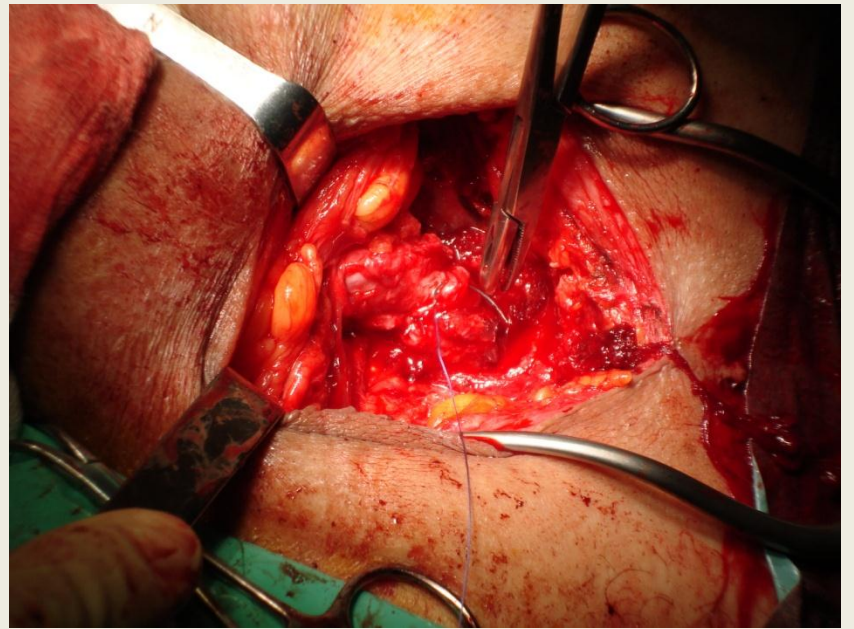
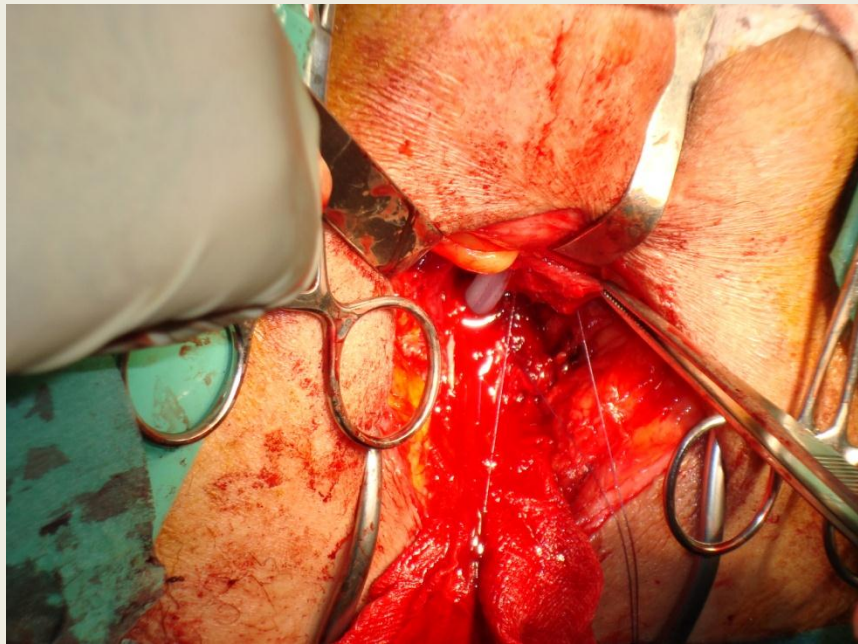
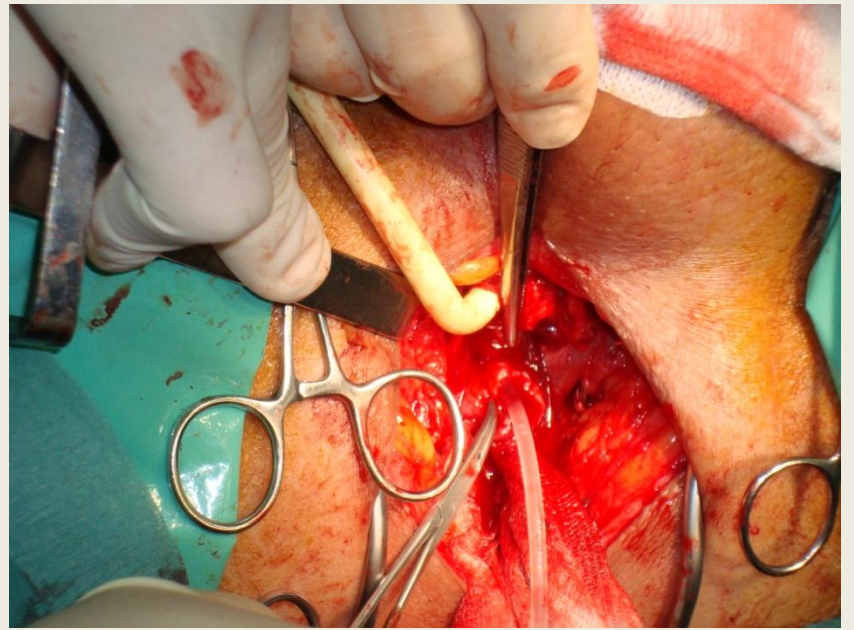
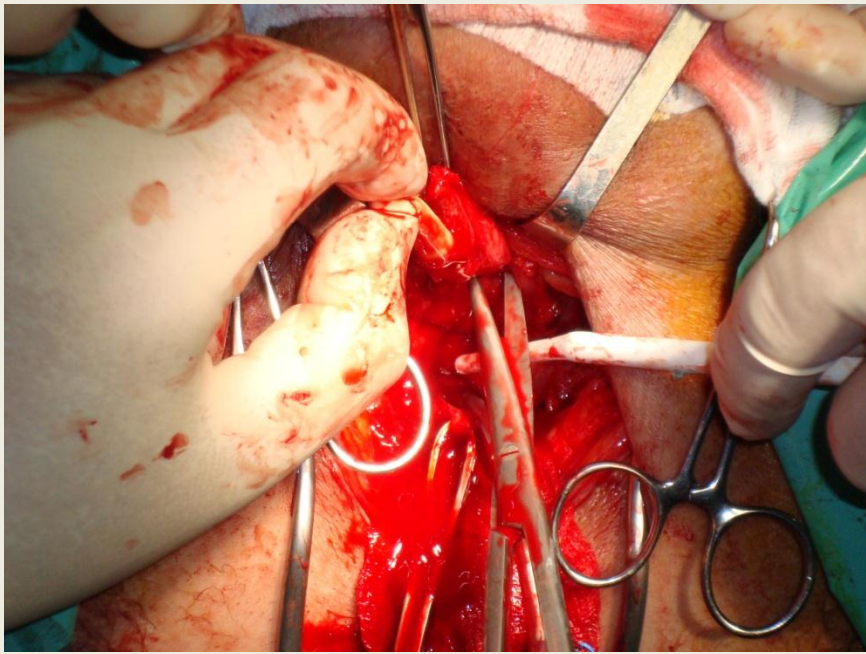


contrast-enhanced  
**urethrography**  
**more than**  
**one projection**  
may be necessary to  
visualize the stricture

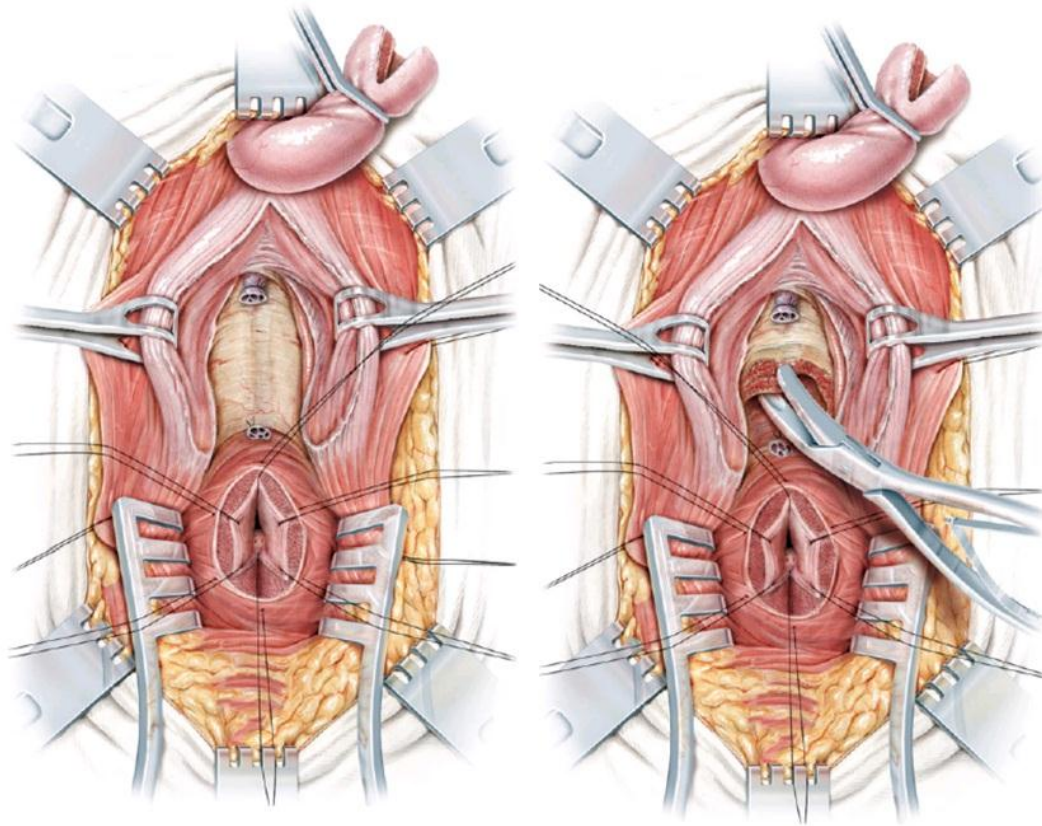


RBG 986059





# Inferior pubectomy

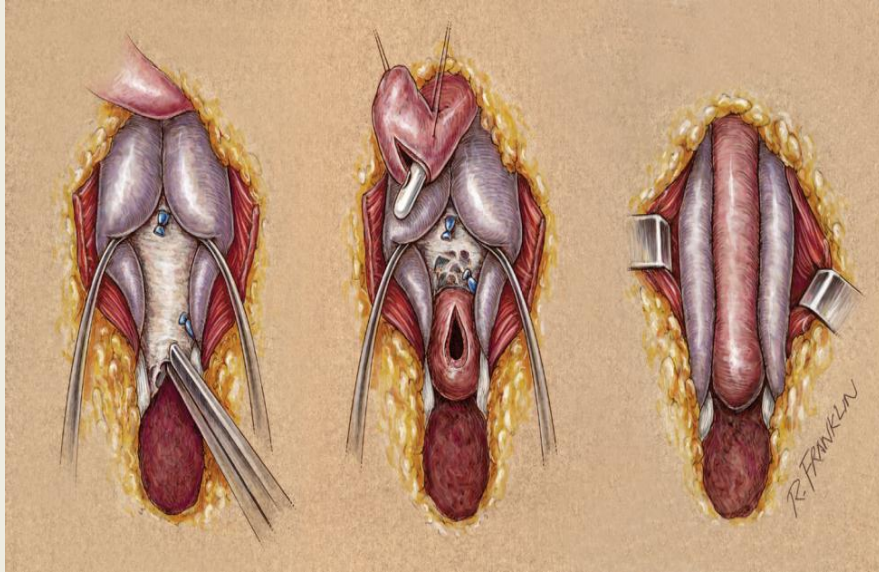


a



b

# Infrapubectomy

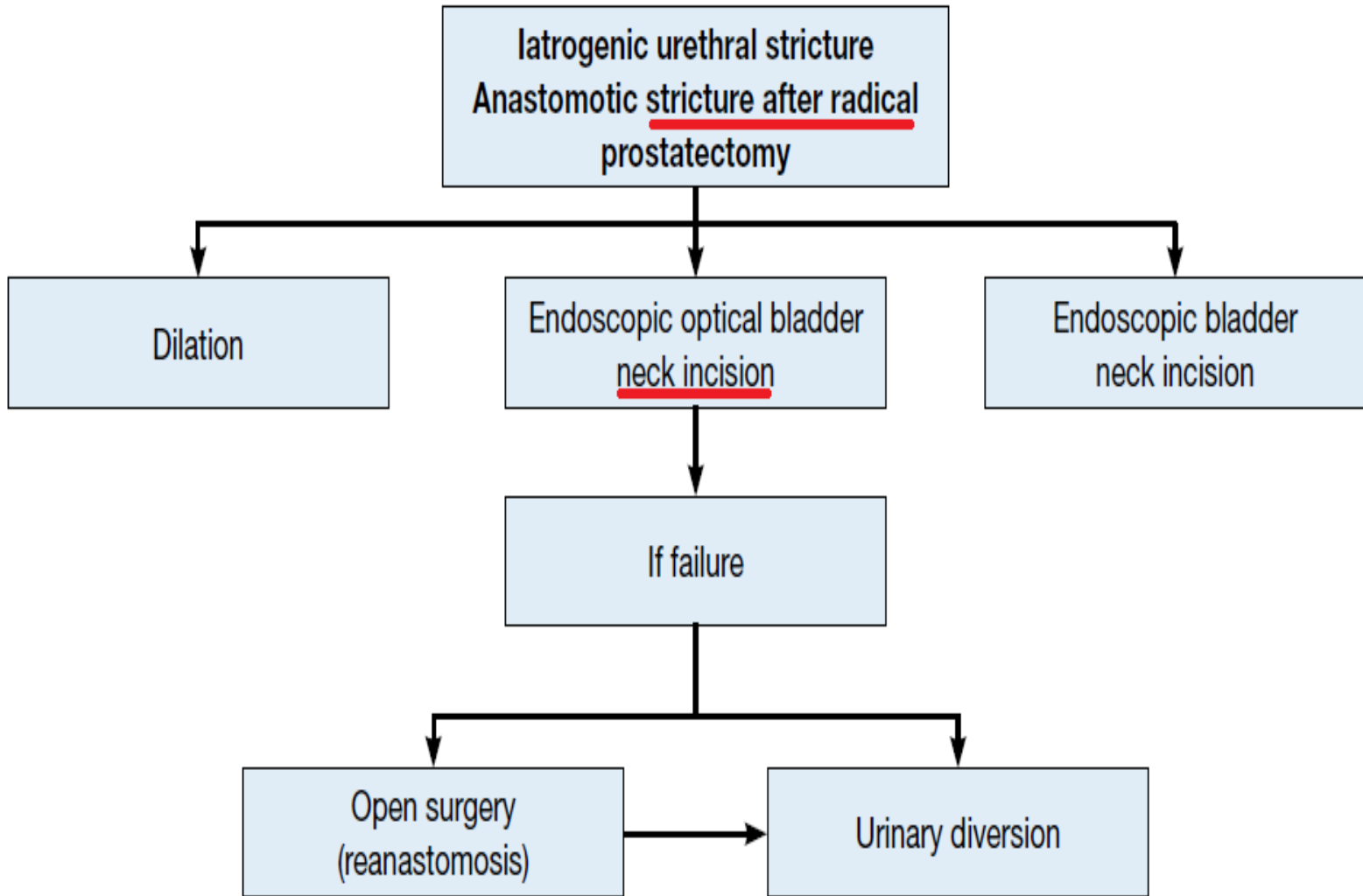


1. the **prostate is elevated** behind the symphysis pubis
2. the inferior aspect of the **symphysis is resected** with a Kerrison rongeur. As much of the bone can be removed as necessary
3. to afford a **simple approximation** of the ends of the urethra

**pubectomy** → long-term sequelae

1. shortening of the **penis**,
2. destabilization of **erection**, and
3. destabilization of the **pelvis**
4. **chronic pain syndrome** with exercise

Figure 4.4.4: Treatment for stricture after radical prostatectomy





# Anastomotic strictures in 2800 patients after laparoscopic and robotic-assisted laparoscopic radical prostatectomy

Marcel Hruza<sup>1</sup>, Jan Klein<sup>1</sup>, Ali Goezen<sup>1</sup>, Justo Lorenzo Bermejo<sup>2</sup>, Michael Schulze<sup>1</sup>, Jens Rassweiler<sup>1</sup>

<sup>1</sup>Department of Urology, SLK-Kliniken Heilbronn, University of Heidelberg, Germany

<sup>2</sup>Heidelberg University, Institute of Medical Biometry and Informatics, Heidelberg, Germany



Abstract  
Nr.  
963

## Objectives:

The formation of strictures of the vesicourethral anastomosis is described in most series of LRP and RALP. The aim of this study is to analyze when anastomotic strictures appear within the long-term follow-up and to identify parameters with significant influence on stricture formation.

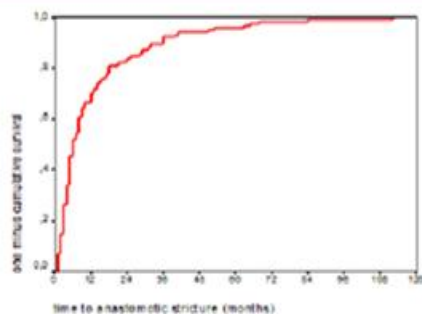


Fig. 1: Time to occurrence of the first anastomotic stricture in 117 patients with anastomotic strictures during long-term follow-up

## Materials und methods:

The first 2800 consecutive patients operated at our institution between 1999 and 2011 were included. Median follow-up was 92 months (15-171, interquartile range 62-121). 2521 patients (90 %) underwent LRP, 279 (10 %) RALP. Univariate and multivariate logistic regression models were used to investigate relationships between parameters and stricture formation.

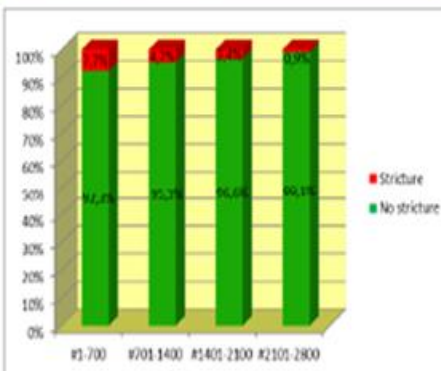


Fig. 2: The incidence of anastomotic strictures decreased significantly within our series:  $p < 0.0001$ .

Parameter	Level	Anastomotic strictures		Univariate		Multivariate	
		n	%	OR	p	OR	p
Age	≤ 65 years	59/1567	3.8	1.26	0.22	-	-
	> 65 years	58/1233	4.7				
BMI	Normal	88/2289	3.8	4.38	0.000*	12.75	0.000*
	Obesity 2-3*	7147	14.9				
PSA pre	≤ 10 ng/ml	88/1934	4.6	0.71	0.11	-	-
	> 10 ng/ml	28/862	3.2				
Surgeon	1 <sup>st</sup> generation	53/1728	3.1	2.59	0.000*	0.94	0.04*
	2 <sup>nd</sup> generation	30/396	7.6				
	3 <sup>rd</sup> generation	34/676	5.0				
OR time	≤ 4 hours	76/2065	3.7	1.52	0.03*	1.26	0.56
	> 4 hours	41/743	5.5				
Robot	Pure LRP	117/2521	4.6	0.0	-	-	-
	Da Vinci	9/279	0.0				
Anastomosis	Interrupted	72/1059	6.8	0.36	0.0001*	0.39	0.06
	Running	45/1741	2.6				
Nerve sparing	Non-vs	77/1281	6.0	0.68	0.0001*	1.05	0.69
	Unilateral ns	12/289	4.2				
	Bilateral ns	28/1225	2.3				
Rocco	Non-Rocco	109/2091	5.2	0.19	0.0001*	1.16	0.78
	Rocco	7/687	1.0				
Bladder neck	None	17/341	5.0	0.60	0.15	-	-
	BN sparing	49/1614	3.0				
Prev. TURP	No prev. TURP	108/2685	4.0	2.03	0.00*	1.68	0.42
	Prev. TURP	9/115	7.8				
Weight specimen	≤ 40 grams	54/1626	4.2	1.01	0.95	-	-
	> 40 grams	53/1250	4.2				
pT	pT2	84/1637	5.1	0.54	0.000*	0.26	0.001*
	pT3 / pT4	33/1160	2.8				
	Catheter time	Normal	51/1846				
Catheter time	Prolonged	66 / 526	7.1	2.70	0.0001*	1.70	0.10
	Urine loss ratio	≤ 5 %	36 / 1418				
Urine loss ratio	> 5 %	43 / 725	5.9	2.42	0.0001*	2.15	0.02*

## Results:

Anastomotic strictures occurred in 117 of 2800 patients (4.2 %). The incidence of strictures declined from 7.7 % within the first 700 cases to 0.9 % within the last 700. 52 % of all strictures were seen within the first 6 months after surgery, 75 % within the first 15 months, 92 % within the first 36 months. 4.3 % of the strictures arose later than after 5 years. All anastomotic strictures were treated with urethrotomy using the Holmium-YAG-laser. Recurrent strictures were seen in 32 of 117 cases (27.4 %): 12 patients (10.3 %) needed more 2 urethrotomies (3-5). A multivariate analysis showed body mass index, pathological tumor stage, degree of incontinence early after catheter removal, surgeon and non-use of the robot as independent predictors of stricture formation.

**Conclusions:** Most strictures of the vesicourethral anastomosis occur early after LRP, the rate of late strictures (> 5 years after LRP) is low. We could demonstrate a significant decrease in the rates of anastomotic strictures after LRP / RALP within our series. The experience of the surgeon and the use of the robot showed significant influence on stricture formation in multivariate analysis, whereas other operative parameters as the technique of suturing the vesicourethral anastomosis, bladder neck sparing, nerve sparing, or the Rocco stitch did not reach significance in multivariate analysis.

# Anastomotic strictures in 2800 patients after laparoscopic and robotic-assisted laparoscopic radical prostatectomy

Marcel Hruza<sup>1</sup>, Jan Klein<sup>1</sup>, Ali Goezen<sup>1</sup>, Justo Lorenzo Bermejo<sup>2</sup>, Michael Schulze<sup>1</sup>, Jens Rassweiler<sup>1</sup>

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<sup>2</sup>Heidelberg University, Institute of Medical Biometry and Informatics, Heidelberg, Germany



Abstract  
Nr.  
**963**

## Objectives:

The formation of vesicourethral strictures after LRP and RALP. To analyze the incidence of strictures after LRP and RALP in the long-term follow-up. Parameters influencing the formation of strictures.

## Material

The first 2800 patients operated at SLK-Kliniken Heilbronn between 1999 and 2019. Median follow-up (15-171, interquartile range 121). 2521 patients underwent LRP, 279 patients underwent RALP. Univariate and multivariate regression analysis was used to investigate the influence of parameters and stricture formation.



Parameter	Level	Anastomotic strictures	Univariate	Multivariate

2800 → 117	4,2 % (7,7 → 0.9)
1° 6μηνο	52%
1° 15μηνο	75%
Holmium –Yag laser	
Υποτροπή 117 → 32	27,4%

Fig. 2: The incidence of anastomotic strictures decreased significantly within our series:  $p < 0.0001$ .

	Prolonged	66 / 52%	7.1				
Urine loss ratio	≤ 5 %	36 / 1418	2.5				
	> 5 %	43 / 726	5.9	2.42	0.0001*	2.15	0.02*

## Results:

Anastomotic strictures occurred in 117 of 2800 patients (4.2 %). The incidence of strictures declined from 7.7 % within the first 700 cases to 0.9 % within the last 700. 52 % of all strictures were seen within the first 6 months after surgery, 75 % within the first 15 months, 92 % within the first 36 months. 4.3 % of the strictures arose later than after 5 years. All anastomotic strictures were treated with urethrotomy using the Holmium-YAG-laser. Recurrent strictures were seen in 32 of 117 cases (27.4 %): 12 patients (10.3 %) needed more 2 urethrotomies (3-5). A multivariate analysis showed body mass index, pathological tumor stage, degree of incontinence early after catheter removal, surgeon and non-use of the robot as independent predictors of stricture formation.

**Conclusions:** Most strictures of the vesicourethral anastomosis occur early after LRP, the rate of late strictures (> 5 years after LRP) is low. We could demonstrate a significant decrease in the rates of anastomotic strictures after LRP / RALP within our series. The experience of the surgeon and the use of the robot showed significant influence on stricture formation in multivariate analysis, whereas other operative parameters as the technique of suturing the vesicourethral anastomosis, bladder neck sparing, nerve sparing, or the Rocco stitch did not reach significance in multivariate analysis.



# PERINEAL URETHROSTOMY: A DEFINITIVE CURE FOR ADVANCED URETHRAL STRICTURE DISEASE



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## Introduction

While perineal urethrostomy (PU) has proven to be a highly successful option for patients with complex urethral stricture disease, it is often utilized as a last resort. The perceived disadvantages of this procedure include the loss of normal anatomy, need to sit to urinate, and concerns about potency and sexual function. We aim to describe our contemporary series of patients treated with perineal urethrostomy.

## Materials and Methods

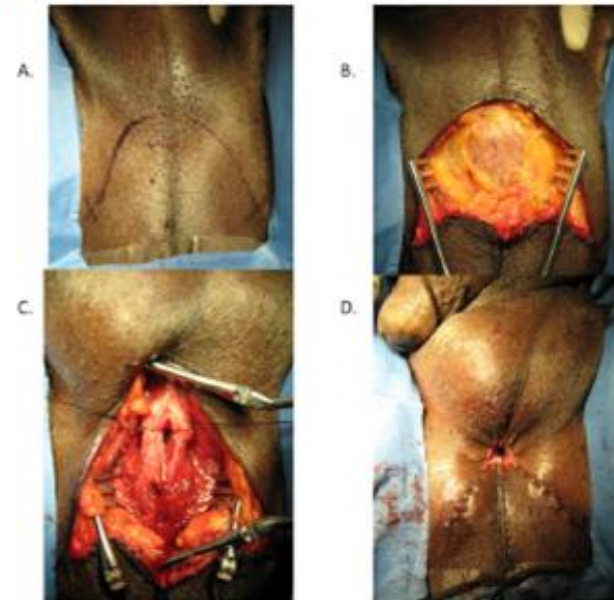
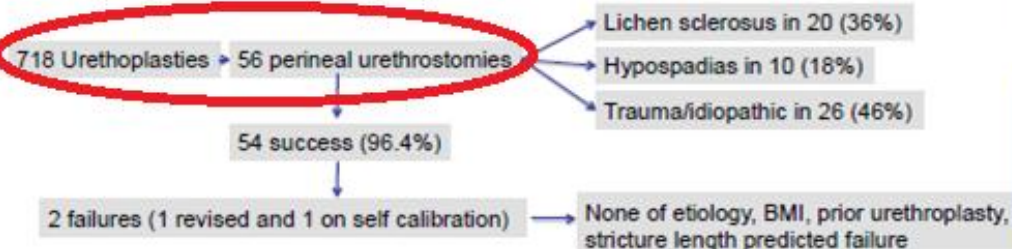
We conducted an IRB approved, retrospective review of all patients who underwent PU at Duke from 1998 to 2012. Inclusion criteria were age > 18 and male gender. Patients with a temporary PU as part of a staged repair were excluded. Data extracted included patient demographics, stricture etiology, comorbidities, previous therapies, and need for subsequent interventions. All patients who received PU as definitive management were included in the analysis. PU was considered successful if there was no need for subsequent interventions including dilations, self-calibration or surgical revision.

## Results

A total of 718 patients underwent urethral reconstruction during the studied time period. Of these, 56 received a PU (7.8%). Etiology was lichen sclerosis in 20 (36%), hypospadias in 10 (18%), and trauma or idiopathic in 26 (46%).

Mean follow-up was 21 months. All cases consisted of creation of a posteriorly based flap PU as described by Barbagli (1). Eight out of 56 patients received a PU after electing not to proceed with a planned second stage urethroplasty. Twenty-eight of the 48 patients who intended to have a definitive PU (58%) had failed at least one previous urethroplasty compared with 2 of 8 (25%) patients intending to have a staged repair (p=0.1).

Of the 56 patients, two (3.6%) developed stenosis of the PU. One patient underwent a successful revision of the perineal urethrostomy and the other was placed on a self-dilation protocol. Prior radiation, stricture etiology, BMI, diabetes, prior urethroplasty, and stricture length were not predictive of failure.



## Discussion

Perineal urethrostomy is a highly successful technique for severe urethral stricture disease that arrests the need for further interventions in the vast majority of cases with a very low complication rate.

## Conclusions

We utilize perineal urethrostomy for the treatment of severe urethral stricture disease at Duke University.



Figure 4.4.2: Management of posterior urethral injuries in men

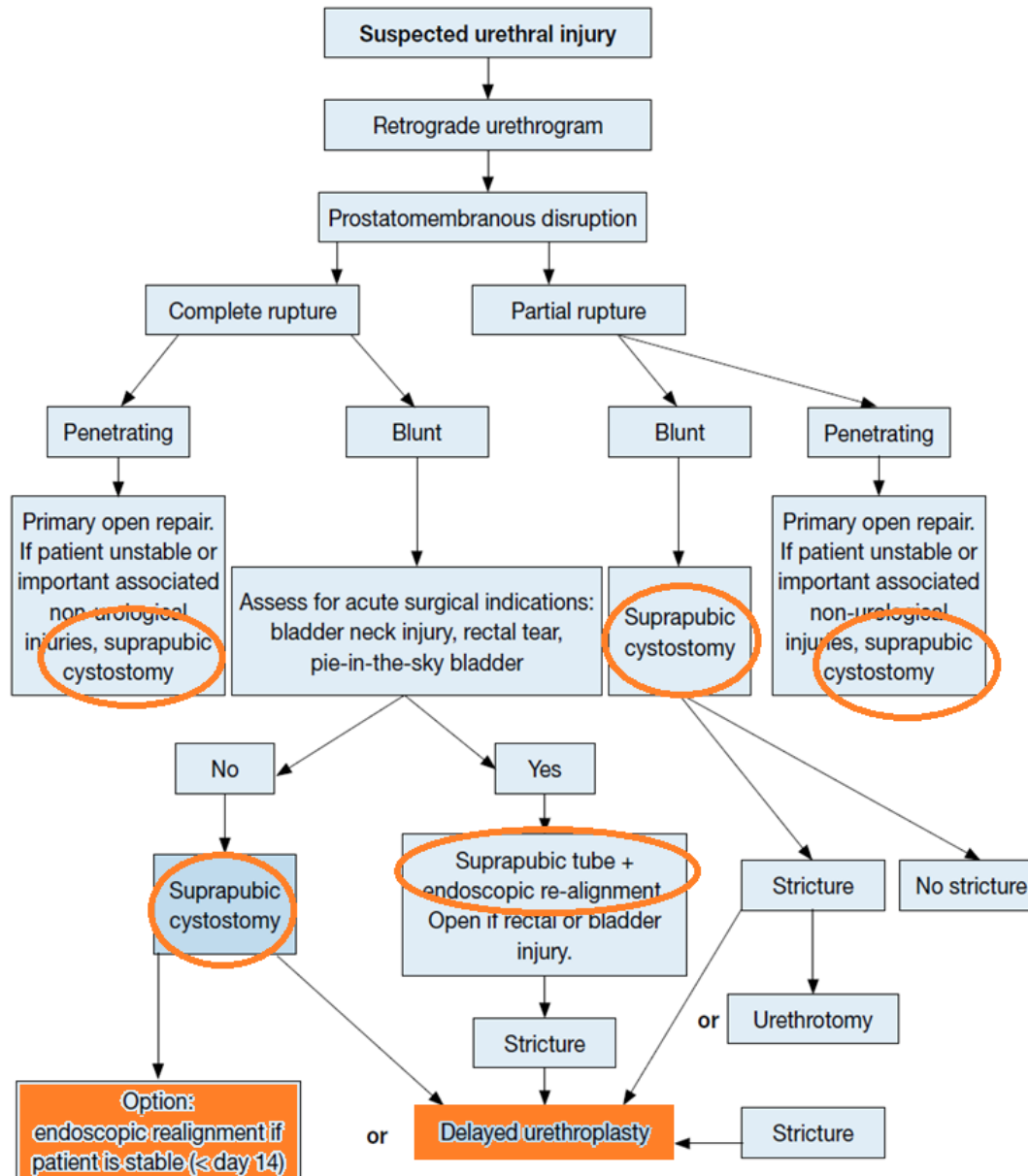
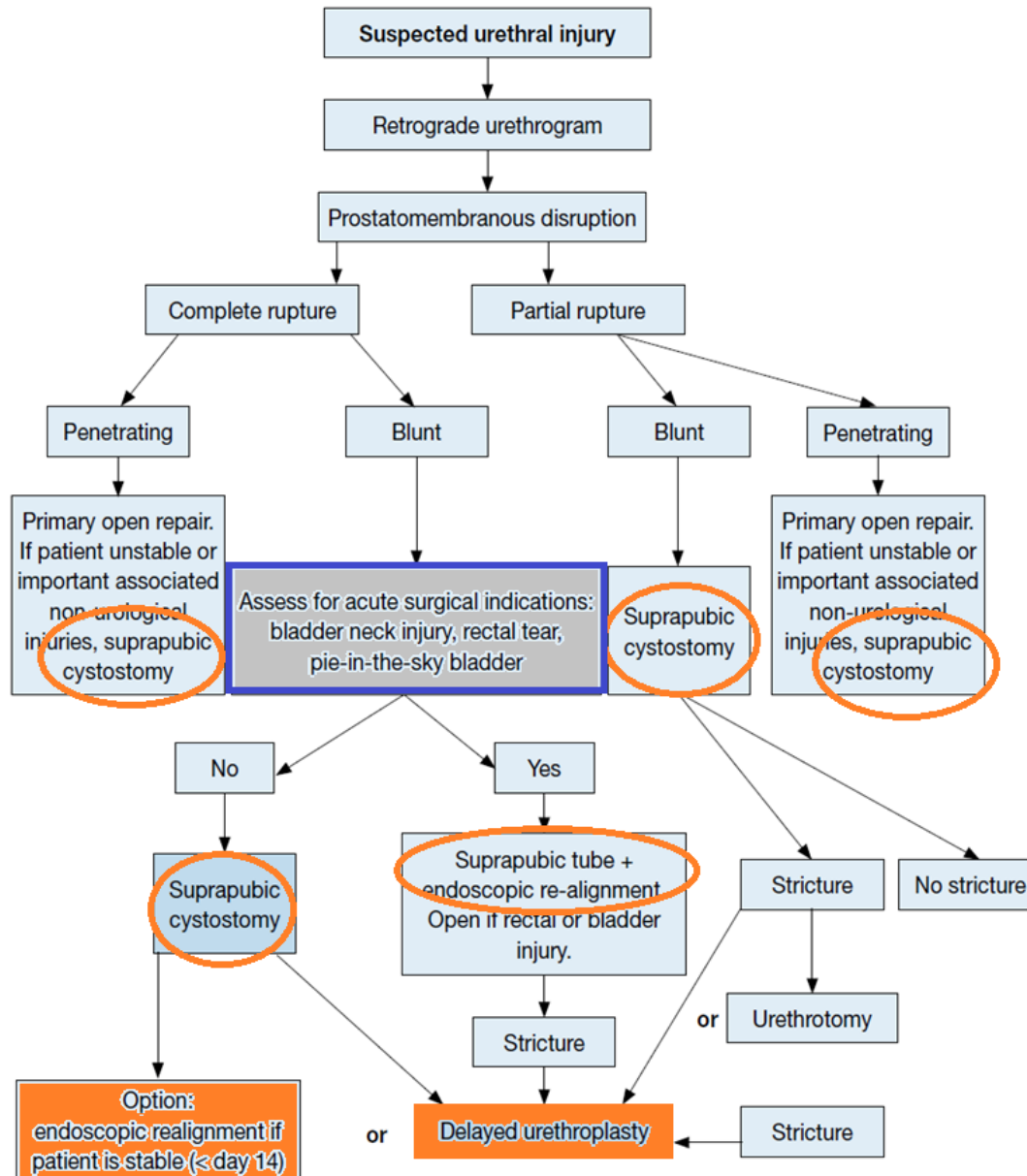


Figure 4.4.2: Management of posterior urethral injuries in men



## Take home messages

- PFUDI represents one of the most challenging clinical problems for urologists
- Acute management consists of
  - Early immediate endoscopic realignment
  - Suprapubic tube cystostomy
  - Immediate open repair is **NOT** recommended

## Take home messages

- Delayed anastomotic repair is fully standardized and reproducible.
- Success rates of both realignment and anastomotic repair are excellent.
- Erectile dysfunction is mostly related to the trauma itself.
- Incontinence is uncommon and mostly associated with bladder neck involvement.

ΕΥΧΑΡΙΣΤΩ ΠΟΛΥ  
ΓΙΑ ΤΗΝ  
ΠΡΟΣΟΧΗ ΣΑΣ