A Simplified and Unified Approach to Urethral Stricture

Richard A. Santucci, MD, FACS
Clinical Professor, MSCOM
Specialist-in-Chief, Urology, The Detroit Medical Center
Why Urethroplasty at all?

- Why not just do urethrotomy?

- 47-61% failure rate first urethrotomy
  - 142 patients, bulbar urethral strictures, followed for 5 years, Italy
    Pansadoro and Emiliozzi, J Urol, 1996
  - 210 patients, all locations, followed 4 years, Africa
    Heyns et al., J Urol, 1998
  - 126 patient, all types, followed 2 years, London
    - Failures had 3 more urethrotomy during the short observation period.....ALL FAILED
    - Self cath didn’t seem to keep any of them open (tried in 25%)

- Dilation even worse: 88% failure rate
  Heyns et al., J Urol, 1998

- 100% failure rate second, third urethrotomy in all 3 studies
We found very poor success of first urethrotomy n=100
Success of different urethroplasties

- Buccal mucosa
- Anterior anastomotic
- Posterior anastomotic
- Anastomotic + tissue transfer
- Fasciocutaneous flap
- DVIU
- Dilation

Graph showing success rates over months.
**Urethroplasty: Too many operations**

- **At least 22 operations for urethroplasty**
  - Cecil: Three stage urethroplasty with first stage as Johanson, bury defect in scrotum for second stage, third stage release with scrotal skin coverage.
  - Denis-Browne: second stage is achieved by tying skin over lead bolsters/shot.
  - Devine: one stage distal skin graft urethroplasty
  - Horton-Devine: minimal pull-through of normal urethra after division of fossa navicularis stricture
  - Johanson: staged linear urethroplasty with or without buccal grafts for skin grafts in first stage
  - Jordan: split glans technique of rotational onlay fasciocutaneous flap for the treatment of distal strictures
  - McAninch 1: glans tunnel technique of rotational onlay fasciocutaneous flap for the treatment of distal strictures
  - McAninch 2: circular fasciocutaneous flap for treatment of any location strictures ("preputial island flap")
  - Orandi: longitudinal penile fasciocutaneous flap for use in penis
  - Quartey: Q shaped circular fasciocutaneous flap
  - Schreiter and Noll: Johanson with meshed skin graft in first stage
  - Steward: two stage with exteriorization of normal urethral ends and burying of the stricture in first stage. Second stage, as in second stage Johanson
  - Turner-Warwick 1: roof strip anastomotic with fasciocutaneous onlay
  - Turner-Warwick 2: two stage with scrotal flap in first stage
  - Turner-Warwick 3: perineal "push in" procedure
  - Waterhouse: combined perineal and transpubic approach for posterior urethral strictures
  - Wyland-Leadbeter: Perineal Johanson
  - Zinman: muscle augmented skin graft (bulb)
THESIS: Urethroplasty: Mostly only need “3” major operations

- Ventral Buccal mucosal onlay (Barbagli). Covers 90%+ of all cases. EASY TO LEARN
- First and Second Stage Johanson, usually with buccal graft, for complex cases or lichen sclerosis (8% of referral cases, 1% of primary cases). EASY BUT LOOKS HARD.
- Anastomotic urethroplasty for posterior urethral distraction injury. HARD.
- “Other” for the remaining 1%. Refer these?
Why not standard anterior anastomotic for short bulbar strictures?

- Textbooks say its good
- Many experts do it
- We found it lacking
- Lower success rates and higher complication rates for anastomotic (versus buccal mucosal) urethroplasty have prompted us to largely abandon the anastomotic approach
- We do buccal instead, even for short strictures
Anastomotic v Buccal Results

- **Success:**
  - 93% anastomotic (26/28)
  - 100% buccal (19/19)

- **Late complications**
  - 18% anastomotic (5/28)
  - 0% buccal

- **Chordee** 1/28 (4%)
- **Erectile dysfunction** 4/28 (14%)

- Anastomotic = 26% erectile complications in a McAninch series
BUCCAL
Buccal Mucosal Onlay

- Most strictures are bulbar--ideal
- Excellent performance characteristics
- 86-100% success rate
- Barbagli says “do them ventral if proximal, dorsal if distal”
Buccal harvest easy

2.5 cm wide X 
6-7 cm long
Equipment is ubiquitous
Prefer ventral approach
Nice closure, nice graft bed
# Results buccal urethroplasty

<table>
<thead>
<tr>
<th>Reference (year)</th>
<th>n</th>
<th>Approach</th>
<th>Mean followup (months)</th>
<th>Early complications (%)</th>
<th>Late complications (%)</th>
<th>Recurrence rate (%)</th>
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<tbody>
<tr>
<td>Kellner et al. (2004)</td>
<td>23</td>
<td>Ventral</td>
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<td>Kane et al. (2002)</td>
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<td>Fichtner et al. (2004)</td>
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<td>Al-Qudah and Santucci(2005)</td>
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<td>Ventral</td>
<td>19</td>
<td>42</td>
<td>37</td>
<td>0</td>
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</table>
Buccal: Previous Urolume

- Avoid Urolume in the first place please
- Just cut Urolume with scissors, pull out the individual wires, lay in buccal graft as in any patient
Buccal tricks: double graft technique

- Combined ventral and dorsal graft
- For long or previously failed strictures
- Buccal ventral, full thickness skin (from hairless flank) dorsally “Snodgraft”
- I’m not sure it works
Post op

• Short surgery and modern anesthetics = possible outpatient surgery
• Local wound infiltration with bupivicaine provides excellent early pain control
• Pain control adjuncts like celebrex (400 mg) in recovery room; ice to face/perineum
• I’m too chicken to use Toradol, but I should
• NO DRAINS
• VCUG in one week if no extenuating circumstances
Johanson
Johanson Uses

- Usually complex cases
  - Inadequate penile skin for fasciocutaneous urethroplasty
  - Too long for buccal
  - Multiple reoperations
  - Fistulas, inflammation
  - PREVIOUS HYPOSPADIAS

- Recommended in balanitis xerotica obliterans (BXO) (lichen sclerosis et atrophicus) strictures, with buccal graft placed in the first stage

Johanson Uses II

• UNDERSTAND that its used to reconstruct the toughest urethral strictures when used as first AND second stage

BUT

• That is can also be used as a bail out: first stage only

• This operation salvages the hideous cases....
Johanson Basics

- Exteriorize urethra in the first stage
- Do not remove urethral plate
- Augment urethral plate if necessary

Johanson Basics II

• Usually followed by second stage, where urethral plate is rolled in to form neourethra.

Hinman, F. Jr.  
Johanson Second Stage

- Measure a 3 cm urethral plate
- Small, watertight stitches
- Multiple layer closure
Johanson Basics III

- Second stage not always used
- First stage may be used as the final treatment
  - Elderly
  - Unwilling
  - Kidney transplant
  - Hopeless urethra (hypospadias “cripple”)
Johanson: Augment or not

- Glans: YES
  - I use buccal
Johanson: Augment or not II

- Glans/Distal Shaft: Usually YES
  - Do I have 3 cm of urethral plate? If not, augment
  - Usually I use buccal
  - Can use skin graft (full thickness donor from hairless flank)
Johanson Case #1: Long Stricture, No Skin
Johanson Case #1 Continued (long stricture, no skin)
Johanson Case II: Probable BXO (lichen sclerosis)
Johanson Case III. Plenty of Penile skin, Desire avoid fasciocutaneous
Johanson Case III cont. Plenty of Penile skin
Johanson Case IV: Failed hypospadias ("Bracka")
Johanson Case V: First Stage Only, Accepts Perineal Urethrostomy ("first stage without a planned second stage")
Bailout Johanson Lessons Learned I

• Do not do “end to side” perineal urethrostomy
Johanson Lessons Learned III

- Proximal bulbar perineal urethrostomy can be difficult

Don’t do this

U flap?

Multiple small stitches
Johanson Lessons Learned IV: Spare the ventral glans if possible
Johanson Lessons Learned V: Ok with Urolume Excision
Lesson Learned VI: Don’t be afraid to use the technique widely

- .357 Magnum handgun gunshot to the glans X TWO
What to expect

- I tell the patients to expect recurrence of stricture
- Recurrence should be treatable by urethrotomy first
- Fistula is a real possibility
- However, usually they do well
Johanson Results: Historic

• About 25% failure in several old series.

• Later studies have lower failure rates in 10-14% range
Johanson Results: Modern

- With meshed graft skin, 80% success, n=20, 1997
  - 10% chorddee
  - 20% ostial stenosis
  (Carr et al., J. Urol., 1997)

- With buccal or posterior auricular skin graft, N=38, 2002
  - 20% revision between first stage and second stage
  (Joseph et al., J. Urol, 2002)
Johanson Results, Modern: With Buccal

- **2002**, with buccal grafts, 93% success, n=24
  (Palminteri et al., J. Urol., 2002)

- **2005**, with buccal grafts in first stage, 82% success, n=17
  (Dubey et al., BJU Int., 2005)

- **2005**, with buccal grafts in first stage, for BXO (lichen sclerosis), 78% success, n=14
  (Dubey et al., J. Urol, 2005)
Johanson Results: For Hypospadias

• 2004, with buccal grafts and removal of the diseased urethral plate, 100% success (except for distal glans dehiscence 20%), n=20
  – 35% complication rate for first and second stage combined
  – 5% fistula

(Snodgrass and Elmore, J Urol, 2004)
Posterior Urethral “Stricture” aka Pelvic Fracture Urethral Distraction Defect (PFUDD)
Pelvic Fracture Urethral Distraction Defect (PFUDD)
Pelvic Fracture Urethral Distraction Defect (PFUDD) location

- ...aren’t always posterior at all!
- Cadaver study: 80% distal to urethra
- Commonly seen on urethrograms as distal
- Urodynamically 55% are provably distal
- Cystoscopically: 65% are provably distal
- Functionally: 85% are provably distal
- At the time of surgery: often stump is obviously distal to sphincter
PFUDD: Get up-downogram
PFUDD: example barely canalized
The hardest easy operation you’ll ever do...

Fig. 1. Full mobilization the bulbar urethra (the urethra was clamped with a vascular clamp to prevent unnecessary blood loss).
Can be difficult
Positioning Important

Consider Jordan retractor for Bookwalter Retractor system (expensive)
Custom equipment is nice

- Fine, long needle driver: 9” Debakey
- Fine, long Debakey forceps X 3
- Andrews “pediatric” sucker
Free up urethra adequately to reach without tension
Use Male Sound placed into suprapubic tract to delineate posterior urethra.
Remove all scar tissue
Consider splitting corpora if too short (only rarely needed)
Inferior pubectomy an option (almost never needed)
Pubectomy

- Rarely required
- Very long strictures
- Recurrent strictures (although most experts advocate another perineal approach)
- Very complex strictures (urethro-rectal fistulae, etc.)
Pubectomy complicated by orthopedic hardware
Pubectomy: 8 cm defect after radical prostatectomy
# Results of PFUDD repair

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<tr>
<td>Mundy (1996)²</td>
<td>82</td>
<td>Perineal*</td>
<td>60</td>
<td>Urgency 66</td>
<td>Stress Incontinence 37</td>
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<td>Impotence 26</td>
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<td>Morey and McAninch (1997)²</td>
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<td>&gt;12 mo</td>
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<td>Flynn (2003)²</td>
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<td>Perineal*</td>
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<td>9</td>
<td>Perineal</td>
<td>26</td>
<td>56</td>
<td>44</td>
<td>0</td>
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Stricture Finesse requires several corollary surgeries

- **Bulbar**
  - MAIN: Ventral Buccal onlay
    - Alternatively Consider: Penile fasciocutaneous
    - Alternatively Consider: Dorsal buccal onlay through perineal approach (Kulkarni)

- **Penoscrotal or panurethral (but no hypospadias)**
  - Main: Kulkarni
Finesse I: The Penis

- Penile
  - Hypospadias
    - DO Johanson (Bracka) and only this (like I just got done telling you)
  - No hypospadias
    - Consider Johanson, or alternatively ventral penile fasciocutaneous like Orandi
Orandi details: fasciocutaneous

Stolen from European urology
Orandi details II
Finesse II: Bulbar

- Bulbar
  - Longer than 1.5 cm but shorter than 5 cm
    - DO ventral buccal onlay (like I just got done telling you)
  - Shorter than 1.5 cm
    - Standard Anastomotic or Mundy nontransecting anastomotic urethroplasty
Bulbar details: short-standard anastomotic
Bulbar II details: (short) Mundy nontransecting anastomotic (close Heineke-Mikulicz)

Stolen from European urology
What do you do if you planned a Mundy nontransecting “anastomotic” urethroplasty and its too damned long? (convert to a buccal dorsal onlay)
Finesse III: Long Penile, Penile-scrotal or Panurethral: dorsal onlay buccal through a perineal incision (Kulkarni)

- Bulbar longer than 5 cm
  - Consider dorsal buccal onlay (Kulkarni)

- Long, penile-scrotal, or panurethral
  - Consider dorsal onlay buccal (Kulkarni)

- WHY? Scrotum is a bad location for stricture
  - NOT good for Johanson
  - NOT perfect for ventral onlay (sponge too thin)
Kulkarni

A technical problem. If you have a narrow urethra say 8 french, this will cut open into a 8 mm wide plate. HOW attach this to a 2 cm dorsal buccal graft?

- Answer: Sew the tunica of the spongiosum to the graft and hope it fills in with urethral mucosa
- Seems to work
For everything else (last 1%)

• Failed previous buccal
  – Retry ventral buccal?
  – Dorsal buccal?
  – Double buccal/FTSG?
  – Fasciocutaneous?
  – Johanson?
  – Short anastomotic?

• Falls off the algorithm........

• Refer or swim....
Out of Africa....
Financial disclosures

- None*

*Who would pay for such a thing?