Journal of Pediatric Urology (2017) xx, 1.e1–1.e6

Pre-incision urethral plate width does not impact short-term Tubularized Incised Plate urethroplasty outcomes

N.C. Bush, W. Snodgrass

PARC Urology, 5680 Frisco Square Blvd., Suite 2300, Frisco, 75033, TX, USA

Correspondence to: N.C. Bush, PARC Urology, 5680 Frisco Square Blvd., Suite 2300, Frisco, 75033, TX, USA, Tel.: +1 214 618 4405

bush@parcurology.com (N.C. Bush)

Keywords
Tubularized incised plate (TIP) hypospadias repair; Urethral plate; Urethroplasty complication risk factors

Received 14 April 2016
Accepted 20 May 2017
Available online xxx

Summary

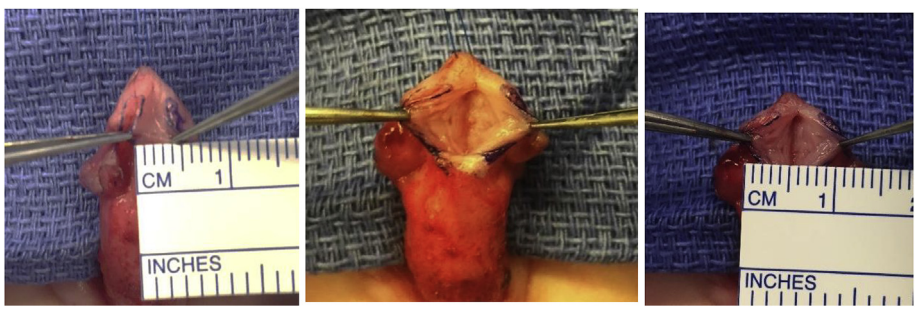
Introduction
Two reports have found that urethral plate (UP) widths <8 mm before tubularized incised plate (TIP) incision increased urethroplasty complications. The present study measured pre-incision UP width in consecutive boys undergoing TIP to determine if it affected outcomes.

Methods
The present study followed the method previously used by Holland and Smith, and Sarhan et al. to measure UP width before creating glans wings or performing midline plate incision in consecutive patients with primary hypospadias and ventral curvature <30°, who all underwent TIP repair (Summary Fig.). Glans width at its widest point was also measured. Multiple logistic regression assessed urethroplasty complications (fistula, glans dehiscence, meatal stenosis/urethral stricture, diverticulum) based on pre-incision UP width, glans width, patient age, and meatal location.

Results
The UP widths were determined in 224 consecutive primary TIP repairs during 2012–2015: 200 distal, 11 midshaft, and 13 proximal. The UP width was <8 mm in 192/224 (86%) patients. Mean pre-incision width was 6.1 mm (SD 1.5, range 2–11), without difference in UP widths according to meatal location ($P = 0.06$). Mean post-incision UP width was 12 mm (SD 2.2, range 10–16). Mean change in width after incision (delta/original UP width) was 116% (SD 63, range 20–250). There was follow-up in 186 patients for a mean of 6 months. Urethroplasty complications (five fistulas, six glans dehiscence) were diagnosed in 11 (6%): 9/165 distal, 1/9 midshaft, and 1/12 proximal repairs. There was no difference in those <8 vs ≥8 mm (11/160 vs 0/26, $P = 0.17$). Similarly, UP width was not different between patients with and without urethroplasty complications. Multiple logistic regression in these 186 patients – including meatal location, UP width, glans width, and age – found only glans width <14 mm was associated with increased odds of urethroplasty complications (OR 19.2, 95% CI 3.5–106, AUC = 0.799).

Discussion
The data show that pre-incision UP width is not an independent risk factor for urethroplasty complications. However, it is possible that technical factors, such as how deeply the dorsal incision is made or size of the urethral stent, might contribute to this finding by other authors. After watching the TIP repair, Smith stated that the plate incision was deeper than he made. Sarhan et al. reported a mean change of 57% in UP width after incision, whereas the present one was double at 116% (i.e. from 6 mm pre-incision to 12 mm post incision), and they used an 8-Fr catheter. While they stated that they incised the plate deeply, the lower percentage increase in width suggests that it was not as deep as was recommended.

Conclusions
The UP width before incision did not increase urethroplasty complications. Surgeons do not need to measure or categorize the UP to determine suitability for TIP repair, as long as the plate incision is made deeply to the corpora.



Summary Figure Pre- and post-urethral plate incision width measurements. A: Stretched urethral plate width, in this case 5 mm. B: Appearance of the plate after deep midline incision. C: Stretched urethral plate width after incision, measuring 11 mm.

http://dx.doi.org/10.1016/j.jpurol.2017.05.020

Introduction

Holland and Smith [1] first reported that a pre-relaxing incision urethral plate width <8 mm predicted increased risk for fistulas after distal tubularized incised plate (TIP) urethroplasty, which all occurred in patients with this plate diameter. Subsequently, Sarhan et al. [2] also found that a pre-incision width <8 mm correlated with increased urethroplasty complications in boys undergoing distal and midshaft TIP. While Holland and Smith cautioned that surgeons might consider alternative techniques to repair the subgroup with a narrow urethral plate, Sarhan et al. more strongly stated that a urethral plate width ≥8 mm is 'essential' for success with TIP. Others have been influenced by these observations to avoid or to modify TIP when the urethral plate measures <8 mm before the relaxing incision is made [3,4].

In contrast, the present institution reported using only TIP to repair 551 consecutive patients during 2000—2008, reporting 4% urethroplasty complications and no apparent contraindication to the repair for distal hypospadias [5]. However, it did not measure urethral plate width, and so could not determine if these few complications occurred more often in those with a more narrow plate.

To answer this question, pre-relaxing incision urethral plate width was measured in consecutive prepubertal patients undergoing primary distal, midshaft and proximal TIP repair. Glans width was also measured at its widest point. The primary outcome was urethroplasty complications, and their association with these measurements.

Materials and methods

Beginning in 2012, the present institution measured the stretched width of the urethral plate at its midpoint within the glans (Fig. 1) at the beginning of the procedure, before creating glans wings or making the relaxing incision of the plate, replicating the methods of Holland and Smith, and Sarhan et al. glans width at its widest point was also determined using calipers, as previously described [6]. Inclusion criteria were all consecutive Tanner 1 patients with primary distal, midshaft or proximal hypospadias, and curvature <30°, characterized by meatal location and artificial erection after degloving and dartos dissection; TIP was the only repair utilized in these cases. Boys with proximal hypospadias found to have ventral curvature >30° after degloving and dartos dissection resulting in urethral plate excision and two-stage repair were excluded, as were reoperations, patients Tanner 2 or greater, and two patients who had received exogenous testosterone.

Both authors performed the operations, using the same technique, sutures, bandages, and postoperative management and assessment. It was recently reported that the TIP outcomes were the same for each surgeon [6].

After degloving, the visible junctions of the glans to the lateral borders of the urethral plate were marked, infiltrated with 1:100,000 epinephrine, and incised (Fig. 2A,B). No adjustment was made that were related to the measured urethral plate diameter; specifically: glans tissue was not incorporated into the urethral plate to increase its width.

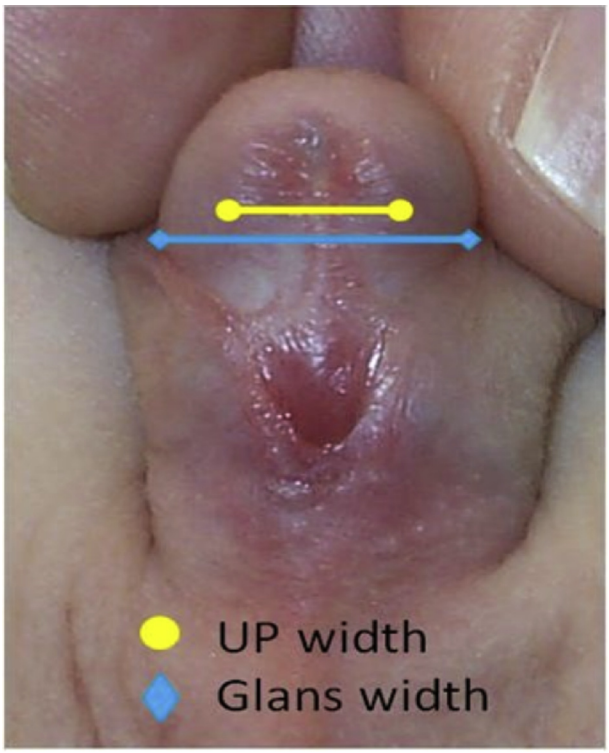


Figure 1 Urethral plate (UP) and glans widths. Lines indicate the location that measurements were taken.

The urethral plate relaxing incision was made using tenotomy scissors while the surgeon and assistant retracted the edges laterally to delineate the midline of the plate. This incision extended from within the meatus to the visible end of the plate and reached deeply to, but not into, the underlying corpora cavernosa (Fig. 2C,D). The relative need for plate incision varied only by its natural groove (i.e. a flat plate required a deeper dissection to reach the corpora than did a deeply grooved plate that already extended to near the corpora) and was made in all patients. Post-incision stretched plate width was then measured before urethroplasty.

Technical surgical details of urethroplasty and glansplasty were similar in all patients, varying only between distal and midshaft/proximal cases. All distal urethroplasties had two-layer subepithelial plate tubularization using 7-0 polyglactin, with coverage by a dartos flap. Glansplasty was performed with three interrupted subepithelial 6-0 polyglactin sutures approximating the glans wings without stitching them to the urethral opening. A 6-Fr silastic stent was used for 5—7 days.

Midshaft and proximal repairs had two-layer subepithelial urethroplasty that used interrupted 7-0 polyglactin followed by continuous 7-0 polydiaxanone. Tunica vaginalis flaps were used to cover the neourethra. Glansplasty was performed as for distal repairs, and a 6-Fr stent provided urinary diversion for 10—14 days.

Routine follow-up for all patients included assessment at 6 weeks and then 6 months later (8 months postoperatively). Patients with proximal repairs had additional evaluations 1 year later and annually. Neourethral calibration was performed in non-toilet trained boys at the 8-

Please cite this article in press as: Bush NC, Snodgrass W, Pre-incision urethral plate width does not impact short-term Tubularized Incised Plate urethroplasty outcomes, Journal of Pediatric Urology (2017), http://dx.doi.org/10.1016/j.jpurol.2017.05.020