

Management of Proximal Hypospadias with 2-Stage Repair: 20-Year Experience

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Abbreviations and Acronyms

DSD = detrusor sphincter dyssnergia

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Purpose: We describe our experience with 2-stage proximal hypospadias repair. We report outcomes, and patient and procedure characteristics associated with surgical complications.

Materials and Methods: We retrospectively studied patients with proximal hypospadias who underwent staged repair between January 1993 and December 2012. Demographics, preoperative management and operative technique were reviewed. Complications included glans dehiscence, fistula, meatal stenosis, nonmeatal stricture, urethrocele/diverticula and residual chordee. Cox proportional hazards model was used to evaluate the associations between time to surgery for complications and patient and procedure level factors.

Results: A total of 134 patients were included. Median patient age was 8.8 months at first stage surgery and 17.1 months at second stage surgery, and median time between surgeries was 8 months. Median followup was 3.8 years. Complications were seen in 71 patients (53%), with the most common being fistula (39 patients, 29.1%). Reoperation was performed in 66 patients (49%). Median time from urethroplasty to surgery for complication was 14.9 months. Use of preoperative testosterone decreased risk of undergoing surgery for complication by 27% (HR 0.73, 95% CI 0.55–0.98, $p = 0.04$). In addition, patients identified as Hispanic were at increased risk for undergoing surgery for complications (HR 2.40, 95% CI 1.28–4.53, $p = 0.01$).

Conclusions: We review the largest cohort of patients undergoing 2-stage hypospadias repair at a single institution. Complications and reoperation rates were approximately 50% in the setting of complex genital reconstruction.

Key Words: hypospadias, pediatrics, postoperative complications, urologic surgical procedures

PROXIMAL hypospadias presents a technical challenge regardless of the surgeon and repair technique. Surgeons have explored reconstructive techniques to correct the deformity, varying with the extent of urethral plate maldevelopment and severity of

ventral curvature. Duplay first published his technique of urethral plate tubularization in 1874, describing 3 stages of hypospadias repair, including correction of the ventral chordee, use of penile skin flaps to create the urethra and connection of the neourethra

to the proximal meatus.¹ Retik et al in 1994 described a 2-stage procedure consisting of 1) correction of chordee and rotational advancement of preputial flaps ventrally and distally, thus covering the entire undersurface of the phallus from the glans to the hypospadiac urethral orifice, and 2) creation of a tubularized neourethra from these flaps 6 to 12 months later.² This procedure is thought to deliver reliable functional and cosmetic results.

We retrospectively studied the Retik 2-stage proximal hypospadias repair in 134 patients during a 20-year period. We report the occurrence of surgical complications, and describe patient and procedure characteristics associated with surgery for complications. Our goal was to identify data points that should be collected for prospective study of subsequent patients with proximal hypospadias undergoing surgical repair.

MATERIALS AND METHODS

With institutional review board approval and waiver of informed consent we reviewed institutional billing data to identify all patients at our institution who had a code for hypospadias repair on 2 separate dates from January 1, 1993 to December 31, 2012. Patients were included in the study if they underwent planned staged hypospadias repair, confirmed if the first operative report indicated “first stage repair.” The meatal location had to be penoscrotal, scrotal or perineal as indicated at first surgery to be included in the study. Patients also had to have at least 1 followup visit after the final surgery.

Patients were excluded if procedures were performed elsewhere or if the first surgery was a 1-stage repair and the second surgery was correction of a complication. Patients with distal hypospadias were excluded regardless of degree of chordee.

Patient Data

Patient characteristics, preoperative evaluation, operative techniques and postoperative outcomes were obtained from the medical records. Surgical complications defined by the surgeon and documented in the medical record included glans dehiscence, fistula, meatal stenosis, non-meatal stricture, urethrocele/diverticula and residual chordee. Time to surgery for complication was used as the outcome for our exploratory analysis. Additional urethral surgeries after definitive hypospadias repair were defined as operative procedures that required anesthesia.

Data Analysis

Descriptive statistics were used to characterize the cohort. Cox proportional hazards model was used to explore the association between time to surgery for complications and potentially relevant patient and procedure level factors during followup. Patients who did not undergo surgery to correct complications were considered censored at the time of the last followup on record. Since some of the operations were performed by the same surgeon, the data were not entirely independent. Clustering by surgeon was used in analyses to account for the correlated nature of the data

due to individual surgeon experience/variability. Variables that had significant univariate associations with our outcome and/or clinical relevance were included in the final multivariate model. For continuous variables correct functional form was assessed and variables were transformed when necessary. Proportionality of hazards assumption was satisfied. To address missing information, multiple imputations using Gibbs sampling chained reactions were performed. Results from the analyses of imputed data were consistent with the complete case analysis (reported). Statistical analysis was conducted using SAS®, version 9.3 and packages *base*, *survival* and *mice* of R statistical software (R Project for Statistical Computing, available at www.R-project.org).^{3–5} A p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 134 patients met study inclusion criteria. During the 20-year period there were 14 surgeons involved in performing the 2-stage repair. Patient demographics and characteristics are outlined in table 1.

Table 1. Patient demographics

	No. Pts/ Total No. (%)
Race:	
White	81/134 (60.4)
Black	10/134 (7.5)
Asian	10/134 (7.5)
Hispanic	10/134 (7.5)
Other	7/134 (5.2)
Unknown	16/134 (11.9)
Family history of hypospadias:	
Yes	18/85 (21.2)
No	67/85 (78.8)
Prenatal issues:	
In vitro fertilization	8/127 (6.3)
Prematurity	48/127 (37.8)
None	71/127 (55.9)
Renal or cardiac birth anomalies:	
Yes	36/127 (28.3)
No	91/127 (71.7)
Cryptorchidism:	
Yes:	30/129 (23.3)
Unilat	16/129 (53.3)
Bilat	14/129 (46.7)
No	99/129 (76.7)
Meatal location:	
Penoscrotal/scrotal	114/134 (85)
Perineal	20/134 (15)
DSD diagnosis:	
Yes	19/127 (15)
No	108/127 (85)
Endocrine evaluation:	
Yes	46/134 (34.3)
No	88/134 (65.7)
Voiding cystourethrogram obtained:	
Yes:	42/134 (31.3)
Normal findings	15/134 (35.7)
Abnormal findings*	27/134 (64.3)
No	92/134 (68.7)

* Abnormal findings included prostatic utricle in 18 patients and vesicoureteral reflux in 15.

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