

## **Current Trends in Hypospadias Repair. Where are we Standing?**

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Hypospadias is a common congenital anomaly of male urogenital tract. The incidence of hypospadias is estimated as one affected boy in every 250 male live birth(1) while several reports and evidences indicate increasing rate of hypospadias.(2)

The history of hypospadias is backing to Roman emperor (3, 4) Different aspects of hypospadias such as it's etiology, classification and treatment have been a place of discussion.(5) The choice of surgical technique depends on the surgeon's personal experience and training.(6) Different specialties are involved in hypospadias surgical reconstruction including pediatric surgeons, pediatric urologists, general urologist and plastic surgeons and each group has their own principals and favorite techniques. (7) Several studies and reviews have been published to report the advantages and success rate of each method.(2, 8, 9)

In this study we surveyed different groups of surgeons who are involved in hypospadias reconstruction about their preferences in treatment of various types of hypospadias.

#### **Method and materials:**

We designed a multiple choice questionnaire on google forms in English, including general questions such as name, age, email address, academic rank, duration of practice, estimated hypospadias reconstructive surgeries per month and finally their preferred method of treatment for three hypospadias cases that were introduced providing a brief history and some pictures, which is still available on line using the link: <https://goo.gl/forms/jVRQRjLeqYt0Uqa93>

To determine the validity and reliability of the survey we distributed the printed version of questionnaire among some of audiences during Hypospadias and disorders of sexual development congress (HDSO) 2017 twice at the opening ceremony and gala dinner of congress and also take the expert opinion.

Iranian pediatric surgeons, Iranian Pediatric urologists and Iranian urologists were invited to participate in this survey. Email address list was provided by Iranian society of pediatric surgeons and Iranian urological association contains 97 email address of surgeons in practice at the time of this study.

A comprehensive search was performed in PubMed central, Medline, Scopus, EMBASE, SciELO, Cochrane Database and google scholar from 2010 up to 2018 using combination of MeSH words of 'Hypospadias 'and 'Surgery" and "Pediatrics" Total of 374 articles focusing on hypospadias reconstruction in pediatrics were identified. Email address of corresponding author were available in 313 published articles. 291 Invitation E mails were sent after excluding duplicated addresses. All personal data of participants remained confidential and the study protocol was approved in ethical committee of Mashhad University of medical sciences with the confirmation code of IR.MUMS.MEDICAL.REC.1397.364.

### **Results:**

Mean age of 170 surgeons who took part in this survey was  $47.5 \pm 16.34$  years. 42 professors (24.7%), 43 associate professors (25.3%) and 57 assistant professors (33.5%) participated in this study while the academic rank was not mentioned in 28 feedbacks (16.5%). 51 general urologists (30%), 61 pediatric surgeon (35.9%), 16 plastic surgeons (9.4%) and 42 pediatric urologists (24.7%) enrolled in this study. A high volume surgeon was defined as a surgeon with more than 50 hypospadias surgery per year (Almost 5 cases or more every month)(6) 61 low volume surgeons (35.9%) and 109 high volume surgeons (64.1%) were participated in our survey. Regarding the years of practice, 22 surgeons (12.9%) had less than 5 years surgical experience, 30 surgeons (17.7%) declared 5-10 years of experience and 118 surgeons (69.4%) were in practice for more than 10 years.

36 Iranian surgeons were participated in this survey and we received 18 emails from North America, 8 emails from South America, 48 emails from Europe 41 emails from Asia (apart from Iran), 16 emails from Africa and 3 emails from Australia.

Preferred method of surgery for a simple distal hypospadias was tubularized incised plate hypospadias repair (TIP) in 53.5%, Thiersch-Duplay in 18.8%, meatal advancement and glanduloplasty (MAGPI) in 14.1% and Mathieu procedure in 4.7%.

8.8% of participants suggested not to operate this case until adulthood and waiting for the patient to decide by himself.

Surgical procedure of choice for the proximal hypospadias without cordee was tubularized incised plate hypospadias repair (TIP) in 39.4%, two stage Urethroplasty in 24.7%, Island Onlay Flap in 21.2%, Tubularized Prepubital Island Flap in 10%, Sleeve Advanced Urethroplasty in 3.5% and Asopa Procedure 1.2%.

Suggested technique of reconstruction in proximal hypospadias surgery with severe cordee was Two-stage Bracka in 59.4%, Two-stage Durham Smith in 24.7%, Modified Asopa (Hodson) procedure in 8.8%, One-stage Duckett procedure in 5.9% and Koyanagi Nonomura one-stage repair in 1.2%.

Comparing the technique of choice regarding the specialty of surgeons, operation load and geographic patterns was done and summarized in table 1.

Surgical approach to distal hypospadias and proximal hypospadias without cordee were significantly different between high volume and low volume surgeons. The most popular technique in distal hypospadias was TIP in both groups but MAGPI was more popular among low volume surgeons. Proximal hypospadias without cordee was mostly corrected by TIP in low volume surgeons while TIP, onley island flap and two stage urethroplasty were suggested with almost the same rate in high volume surgeons. Onley island flap had popularity among high volume surgeons but it was not suggested commonly with low volume surgeons.

Trends in proximal hypospadias with severe cordee repair was almost the same in both low and high volume surgeons and two stage Bracka or Durham smith were more accepted techniques.

Comparison of surgical approach to hypospadias among different is summarized in table 3.

Mathieu procedure was suggested by 13.9% Iranian surgeons for distal hypospadias repair while it was uncommon in other countries. MAGPI procedure was also more common among Iranian compare to other countries. American surgeons were more interested in two stage repair to reconstruct different type of proximal hypospadias. European surgeons suggested Koyanagi repair and were not interested in Durham smith for severe proximal hypospadias repair while other surgeons suggested two stage Bracka or Durham mainly.

### **Discussion:**

In this international internet base survey on hypospadias reconstruction we assessed and compare recent trends among surgeons who are involved in hypospadias repair in different specialties and countries to inspect any consensus on hypospadias surgery to date. Previous surveys revealed growing trends to TIP for distal hypospadias and two stage repair for proximal hypospadias reconstruction(6, 8)

TIP was also the most common reconstructive method for distal hypospadias among all specialties. Surgical approaches were quiet the same in pediatric surgeons and pediatric urologists while adult surgeons recommended watchful waiting and Mathieu technique.

Different specialties had almost similar approach to proximal hypospadias although island flap was not popular among urologists and plastic surgeons. Growing tendency to TIP in treatment of proximal hypospadias without cordee was notable compare to previous reports.(6, 8)

Tendency to postpone hypospadias reconstruction to preschool age in plastic surgeons was also reported in other surveys(6) while several published literatures recommended the second 6-months of life as the ideal timing of hypospadias repair.(7) Experts believed that complications increase above this optimal age of operation.(2)

The most common approach to distal hypospadias among both high and low volume surgeons was TIP but low volume surgeons were more interested to minimal interventions while high volume surgeons were mostly believed on optimal correction of distal hypospadias. Both high and low volume surgeons suggested TIP for Proximal hypospadias without cordee. Low volume surgeons that may represented by the new generation of surgeons were not interested in Onley island flap compare to their high volume colleagues. Other previous international surveys were also reported a growing trend toward two stage repair for reconstruction of proximal hypospadias. (6, 10)

A uniform surgical approach was seen in proximal hypospadias with severe cordee and both low and high volume surgeons suggested two stage repair. (Bracka or Durham smith)

We studied the geographic pattern of surgical options in hypospadias repair. The results showed notable popularity of TIP and Thiersch-Duplay procedure in distal hypospadias repair while MAGPI and Mathieu techniques are less commonly used but Iranian surgeons were still interested in these methods. literature reported favorable outcome of TIP repair in distal hypospadias(9) although there is some concerns about meatal stenosis and abnormal uroflowmetry pattern after TIP repair(11) but a consensus is evolving on the approach to distal hypospadias worldwide and recent recommendations are in favor of correction of distal hypospadias versus watchful waiting.(12)

TIP is commonly used for correction of proximal hypospadias without cordee in Asia while various techniques were suggested in our survey from Europe.

Two stage repair was the method of choice for severe proximal hypospadias with cordee in most of the feedbacks. There is technical variations among different surgeons and more challenges and complications should be expected in this field.(13)

This study was based on self-declaration and this was a limitation because some variables such as case load could be over-estimated by participants.

**Conclusion:**

- Some adult surgeons are still in favor of delayed or no intervention.
- TIP is the most popular option for and distal proximal hypospadias without cordee hypospadias reconstruction
- Most of surgeons suggested two stage repair for proximal hypospadias with severe cordee.

Accepted

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**Table 1: Procedure of choice for various hypospadias scenarios regarding surgeons' specialty and work load and geographic pattern**

	Specialty	Proximal hypospadias with cordee (%)				Proximal hypospadias without cordee (%)						Distal hypospadias (%)					
		Modified Asopa (Hodson)	One stage Koyanagi	Two-stage Durham Smith	Two-stage Bracka	One-stage Duckett	Two-Stage Urethroplasty	Asopa Procedure	Sleeve Advanced	Tubularized Preputial Flap	Island Onlay flap	TIP	TIP	Thiersch-Duplay	MAGPI	Mathieu	Watch and wait
<b>Surgeon's specialty</b>	<b>General Urologist</b>	15.7	11.8	7.8	13.7	51	37.3	19.6	13.7	2	2	25.5	5.9	62.7	3.9	25.5	2
	<b>Pediatric surgeon</b>	3.3	13.1	1.6	21.3	60.7	47.5	24.6	8.2	0	0	16.4	6.6	59	14.8	18	1.6
	<b>Pediatric urologist</b>	4.8	16.7	2.4	23.8	52.4	35.7	21.4	4.8	2.4	2.4	31	4.8	57.1	7.1	31	0
	<b>Plastic surgeon</b>	18.8	18.8	12.2	12.5	37.5	25	12.5	18.8	6.3	0	37.5	6.3	56.3	7.1	31.3	0
	<b>P Value</b>			0.184					0.653						0.824		
<b>Patient volume</b>	<b>Low volume</b>	16.4	23	8.2	8.2	44.3	59	11.5	9.8	1.6	1.6	16.4	3.3	60.7	6.6	27.9	1.6
	<b>High volume</b>	4.6	9.2	2.8	24.8	58.7	28.4	26.6	10.1	4.6	0.9	29.4	7.3	58.7	10.1	22.9	0.9
	<b>P Value</b>			0.001					0.04						0.693		
<b>geographic pattern</b>	<b>America</b>	3.8	7.7	0	38.5	50	34.6	19.2	0	0	46.2	0	53.8	42.3	0	0	3.8
	<b>Europe</b>	10.4	14.6	4.2	25	45.8	29.2	33.3	6.3	2.1	20.8	12.5	66.7	2.1	2.1	18.8	0
	<b>Asia</b>	9.1	9.1	2.3	9.1	70.5	29.2	33.3	6.3	2.1	20.8	12.5	66.7	2.1	2.1	18.8	0
	<b>Africa</b>	9.1	9.1	2.3	9.1	70.5	56.8	9.1	6.8	0	0	27.3	2.3	65.9	22.7	6.8	2.3
	<b>Iran</b>	13.9	25	13.9	2.8	44.4	44.4	19.4	16.7	0	0	16.7	5.6	52.8	38.9	2.8	0
	<b>P Value</b>			0.004					0.001						0.002		