



EVIDENCE BASED ANALYSIS OF SURGICAL PROCEDURES IN THE MANAGEMENT OF HYPOSPADIAS

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Introduction

Evidence based medicine is defined as the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patients^{5,6,8}. Basic tenets of EBM includes awareness of the need for evidence , formulation of focused and answerable questions to address a clinical problem, the search for and critical appraisal of appropriate studies in the literature and the proper application of the best available evidence to the individual patient.

John Duckett had said "There are many successful methods, no single procedure works for all hypospadias cases, choose a suitable technique for individual case."

Hypospadias is one of the common problems seen by surgeons. Most clinical research has been focused on the technical aspects of Hypospadias surgery, with results assessed and reported by the surgeons. The deficiency is particularly notable for the most complex reconstructive cases, i.e. those involving severe proximal defects and those with failed previous repairs⁴. These patients often require difficult reconstructive procedures relatively high complications rates, yet we know little about surgical outcomes from their perspective.

The purpose of this study was to administer best surgical procedure questionnaire based, evaluation of long term patient reported functional outcomes, cosmetic outcomes and treatment satisfaction among patients who had undergone graft urethroplasty for Hypospadias.

Aims and objectives

1. To analyze aetiopathology of hypospadias.
2. To analyze the different operative techniques for the management of hypospadias
3. To analyze the post operative complications.
4. To analyze the merits and demerits of different operative procedures used.

materials and methods

Data is collected from 50 cases of hypospadias admitted in the age group of 1-19 years and operated in B J Medical College and Sassoon General Hospital Pune during the period of April 2014 to April 2015 (2 years).

All these patients were examined in the outpatient department and their complete clinical evaluation was done. A chart was prepared and complete record of the patient kept. Malnourished and anaemic children were sent to the paediatric department for improvement in their general condition.

Patients were admitted two days prior to the surgery. Complete general examination and specific local examination was done. All cases

were assessed, clinically and radiologically and laboratory workout was done. Intraoperative viability of flap was judged according to colour, dermal bleeding, skin turgor, surface bleeding from edges and capillary refill. Postoperative close monitoring was done to detect and treat complication. Patient follow up was done up to a period of 12 months post operatively. Patients from plastic surgery and general surgery ward of Sassoon General Hospital were taken for study purpose.

Biochemical , Microbiological and Radiological facilities from department of Biochemistry , Microbiology and Radiology respectively were used. A systematic review was performed in accordance with the PRISMA and PICO guidelines, and studies assessed using the Oxford Centre for Evidence-Based Medicine system. MEDLINE, PsycInfo, EMBASE, and CINAHL databases were searched from 1974 to 2014 for clinical studies containing patient perceptions of appearance, deformity, and social embarrassment following hypospadias surgery.

Steps to successful hypospadias repair Orthoplasty (penile straightening)

Urethroplasty
Meatoplasty and glanuloplasty
Scrotoplasty
Skin coverage

Barcat classification of hypospadias according to meatal location after release of chordee

Anterior hypospadias
Glanular
Coronal
Anterior penile
Middle hypospadias
Middle penile
Posterior hypospadias
Posterior penile
Penoscrotal
Scrotal
Perineal

Degree of chordee

Devised by Horton and Devine (1973)

Type I : Urethra is present. Chordee causing tissue derives from analogue of corpus spongiosum, Bucks fascia, Dartos fascia.

Type II : Urethra and corpus spongiosum present. Chordee causing tissues derives from analogue of Bucks fascia, Dartos fascia.

Type III : Urethra, corpus spongiosum and Bucks fascia present. Chordee tissue derives from the analogue of Dartos fascia.

OBSERVATIONS AND RESULTS

TABLE I : AGE AT REPAIR OF HYPOSPADIAS

AGE OF REPAIR	NO.OF CASES	PERCENTAGE
0-3	22	44%
3-5	06	12%
5-12	13	26%
>12	09	18%
TOTAL	50	100%

The youngest patient in the study was 1 year old and the oldest was 19 yrs old.82% of the patients operated belonged to the age group 3-12 years.

TABLE II : Incidence of degree of Hypospadias

Grades	Types	No.of cases	Percentage
I	Glanular	14	28%
	coronal	10	20%
	subcoronal	4	8%
II	Distal penile	9	18%
	Mid-penile	4	8%
	Proximal penile	3	6%
III	Penoscortical	2	4%
	Scrotal	1	2%
	Perineal	1	2%
IV	Chordee without hypospadias	2	4%
	TOTAL	50	100%

Degree of hypospadias has been divided in to various types according to the portion of meatus and presence or absence of chordee. In 92% of the cases meatus was situated on glans.

TABLE III : Age of repair of hypospadias with technique

Age in years	MAGPI	Devine-Horton flip flap	Hodgson II preputial island flap	Devine Horton graft	Snod grass repair
0-3	0	1	0	0	0
3-5	13	3	1	6	5
5-12	3	0	3	2	3
>12	2	2	0	2	2

The youngest patient operated with free graft and flip flap graft repair were 3 & 2.5 years respectively whereas older patients operated with this technique were 19 years old.

TABLE IV : Degree of chordee

Type	No. of cases	%
Mild	32	64%
Moderate	5	10%
Severe	5	10%
Hypospadias without chordee	6	12%
Chordee without hypospadias	2	4%
Total	50	100%

TABLE V : Antenatal exposure to various factors

Factors	No. Of cases	%
H/o oral contraceptives taking in first one and half months	2	4%
H/o drugs for threatened abortion	4	8%
H/o taking abortifacients	4	8%
Total	10/50	20%

TABLE VI: Associated anomalies

System	Anomaly	No. of cases	%
Genito urinary	Cryptorchidism	8	16%
	Bifid scortum	3	6%
	P-U-Valves	0	0%
	Single kidney	0	0%
	Malrotation of kidney	0	0%
ENT	Absent pinna	0	0%
	Bat ear	0	0%
Musculoskeletal	Spina bifida	0	0%
	Hemivertebra	0	0%
Miscellaneous	Inguinal hernia	2	4%
	Total	13	26%

In this study associated abnormalities were Cryptorchidism(16%) bi-fid scortum (3%) inguinal hernia(3%).

TABLE VII: Operative techniques

Operation	No. of cases	%
MAGPI	18	36%
Devine-Horton flip flap	6	12%
Devine-Horton free graft repair	10	20%
Hodgson II preputial island flap repair	4	8%
Snod grass repair	10	20%
Chordee correction	2	4%
Total	50	100%

TABLE VIII: Horton & Devine Free graft repairs

Degree of Hypospadias	No. of cases	Degree of chordee		
		Mild	Moderate	Severe
Distal penile	3	2	0	1
Mid shaft	3	0	2	1
Proximal penile	3	3	0	0
Penoscortical	1	0	0	1

TABLE IX: Horton & Devine flip flap repair

Degree of Hypospadias	No. of cases	Degree of chordee		
		Mild	Moderate	Severe
Subcoronal	2	1	0	1
Distal penile	3	1	2	0
Mid penile	1	1	0	0

TABLE X: Hodgsons preputial island flap technique

Degree of Hypospadias	No. of cases	Degree of chordee		
		Mild	Moderate	Severe
Proximal penile	0	0	0	0
Mid shaft	4	2	0	2

TABLE XI: Snod Grass (tubularised incised urethral plate repair)

Degree of Hypospadias	No. of cases	Degree of chordee		
		Mild	Moderate	Severe
Distal penile	9	5	4	0
Mid penile	1	0	1	0

TABLE XII: MAGPI (Meatal advancement and granulo- plasty)

Degree of Hypospadias	No. of cases	Degree of chordee		
		Mild	Moderate	Severe
Glandular	6	3	0	3
Coronal	9	5	3	1
Subcoronal	3	2	1	0
Distal penile	0	0	0	0

Two cases were of mild chordee without hypospadias.

TABLE XIII: Comparative results of operative procedures

	MAGPI (18)	Flip-flap (6)	Free graft (10)	preputial island flap (4)	Snod Grass (10)	% complications
Complications						
Fistula	3	1	1	1	1	15.5%
Flap necrosis	0	2	1	1	1	4.1%
Infection/ Disruption	1	0	0	0	0	2.1%
Meatal Retraction	1	0	0	0	0	2.1%
Residual chordee	0	1	1	1	1	8.3%
Location of meatus						
Glans	18	5	9	3	8	
Corona	0	1	1	1	2	
Shaft	0	0	0	0	0	
Stream of urine						
(N) spiral with force	16	3	8	3	8	
Deviated & spraying	2	3	2	1	2	
Weak stream	0	0	0	0	0	

TABLE XIV: MAGPI (COMPLICATIONS)

COMPLICATIONS	NO. OF CASES	%
Fistula formation	3	16.6
Flap necrosis	0	0
Infections	1	5.5
Meatal retraction	1	5.5
Residual chordee	0	0

TABLE XV: Horton & Devine flip flap repair (complications)

COMPLICATIONS	NO. OF CASES	%
Fistula formation	1	16.6
Flap necrosis	0	0
Infections	0	0
Meatal retraction	0	0
Residual chordee	1	16.6

TABLE XVI: Horton & Devine Free Graft repair (complications)

COMPLICATIONS	NO. OF CASES	%
Fistula formation	1	10
Flap necrosis	1	10
Infections	0	0
Meatal retraction	0	0
Residual chordee	1	10

TABLE XVII: Hodgsons preputial island flap technique (complications)

COMPLICATIONS	NO. OF CASES	%
Fistula formation	1	25
Flap necrosis	0	0
Infections	0	0
Meatal retraction	0	0
Residual chordee	1	25

TABLE XVIII: Snod Grass repair (complications)

COMPLICATIONS	NO. OF CASES	%
Fistula formation	1	10
Flap necrosis	1	10
Infections	0	0
Meatal retraction	0	0
Residual chordee	1	10

Fifty new cases of hypospadias in the age group of 1 to 19 years have been studied in a period of 2 years at Sassoon General Hospital, Pune to evaluate the various techniques of hypospadias.

The age of repair varied from 1 to 19 years with maximum cases 56% were between 2 to 5 years of age 14/18 cases who underwent MAGPI procedure were under 5 years of age.

The distal hypospadias (glandular, coronal, Subcoronal and distal penile) constituted 72% while 28% cases presented with proximal hypospadias in our study.

32 cases (64%) had mild chordee while only 20% cases had moderate or severe chordee.

Associated anomalies were seen in 26% of cases cryptorchidism was present in 16% cases.

Antenatal exposure to various factors was seen in 20% cases.

All the cases were operated with one stage repairs. The various techniques used are,

MAGPI (Meatal Advancement and Glanuloplasty) 18 cases

Horton and Devines flip flap repair, 6 cases.

Horton and Devines free graft repair, 10 cases.

Hodgsons preputial island flap technique, 4 cases.

Snodgrass TIP repair 10 cases.

The overall complication rate was 30% (15/50). The commonest complication seen was fistula-7, flap necrosis-5, wound infection and disruption with retraction -2.

Of the operative techniques, MAGPI showed the best results (90% success rate). The procedure was highly successful in glandular, coronal and Subcoronal hypospadias. For distal hypospadias Snodgrass repair was best and flip flap and free graft repair gave very good result for midpenile hypospadias. Hodgson II repair gave equally good results but it involves a careful meticulous dissection and requires a surgeon with high skill who routinely operates on cases of hypospadias. Snodgrass repair, flip flap repairs and free graft repairs are not sufficient to repair all types of primary hypospadias.

Discussion

The goals of hypospadias surgery remains the creation of a straight , cosmetically acceptable phallus consisting of an orthotopic slit like urethral meatus and conically shaped glans and adequate skin coverage with an appropriate mucosal collar. Numerous techniques have been described to realize these goals , however, this is the study to evaluate which techniques are currently used by surgeons for various degrees of hypospadias.

However, it is also clear that evidence based summaries and reviews are only as good as the underlying studies that supports their conclusions. Age of presentation (mean age 5 years) to the hospital in the developing countries is higher than in the western part of world because of ignorance, illiteracy, and unaffordability, so patients may be operated whenever the child is brought to the hospital after the age of 4 years¹⁵.

The treatment of anterior hypospadias is dependent on the cultural preference of child's family. many patients with anterior hypospadias do not have a functional defect of significance penile curvature and will be able to stand and void with straight stream. Therefore the goal of placing the meatus in its normal position within the glans is essentially cosmetic. The technique chosen will be depend on the anatomy of the hypospadiac penis. The most common accepted procedures are the meatal advancement and glanuloplasty (MAGPI)^{10,11}, The Mathieu or flip-flap and Snodgrass modification⁷ or tabularised incised plate urethroplasty¹⁰.

Primary tubularisation, also known as Thiersch-Duplay procedure⁷, can be applied to patients with a deep groove and wide urethral plate for both distal and proximal penile shaft hypospadias.

The timing of surgery is chosen after considering milestones of development, size of penis, child response to surgery, anesthesia risk, and toilet training. The infant develops good tolerance to surgery and anesthesia by the age of 6 months. The penile length at 1 year is on an average 0.8 cm less than at preschool age. The child is well aware about his genitalia and toilet training by the age of 18 months. So the most suitable age for operation of hypospadias is between 6 and 18 months. Another opportunity is at 3-4 years if the previous optimal age is missed¹⁴.

Recently, the concept of incision in the urethral plate with subsequent tubularisation and secondary healing introduced by Snodgrass has revolutionized the hypospadias surgery. Short term results have been excellent and this procedure is enjoying extensive popularity^{4,12}.

Our results clearly illustrate that the TIP repair has become indispensable for distal hypospadias repair. The fact that, it is a consistent and easily reproducible technique that produces acceptable cosmetic and functional results in a timely manner in a testament to its simplicity. These features in turns have resulted in its wide spread use and acceptance. Further more large series have consistently had good outcomes with complication rate similar to or lower than other techniques. Further maturation this data will likely indicate durable outcomes. Mureau et al. identified eight features of importance in judging the outcome of hypospadias surgery:

Surgically correctable: • meatal position • glans shape • scars • scrotum • general appearance.

Uncorrectable: • volume of the glans • penile size • penile thickness. Much disagreement among surgeons and patients centres on the uncorrectable features¹⁶.

Proximal hypospadias remains a challenging and controversial problem for the surgeon. Unlike distal and mild shaft repairs numerous techniques are reported for the proximal hypospadias, which translates to the fact that no single repairs has clearly demonstrated superiority with respect to complication rate, cosmesis, long term outcome. Our results reflects this disparity. While TVIF technique remains the repair of choice for approximately 50% respondents regardless of the degree of chordee. Plastic surgeons by their very nature are usually inclined to focus on esthetic aspects of surgery. Adult urologists are traditionally more function orientated while pediatric surgeons have usually signed their patients off in childhood, long before they reach the age when they are at their most concerned with genital appearance¹³.

In a time period of two years 50 cases of hypospadias of all kinds were studied. Different kinds of surgical repairs were done on the various hypospadias cases. MAGPI was the most common surgical repair done. One stage surgeries were preferred to the two stage repair. Only the cases with a severe degree of chordee were done in a two stage repair. One stage repair involved only one setting and had less psychological trauma than the two stage repair.

Summary and conclusion

Hypospadias reconstruction remains one of the most challenging filed of surgery. The modern era of hypospadias surgery has seen major technical advances. In the future, anatomical studies, basic science research and surgical innovations will continue to improve the outlook for all patients with hypospadias.

According to our findings, the MAGPI procedure has become the most commonly used technique for repair of glanular, coronal and Subcoronal hypospadias whereas Snodgrass procedure as has become the most commonly used technique for the repair of distal and midshaft hypospadias. Most proximal defects with or without associated chordee, continue to be repaired with various number of 1 and 2 stage technique. Personal preference based on experience and training is the most important factor for the surgeon for repairing proximal hypospadias. We believe that well designed prospective comparative trials are necessary to determine which technique or techniques, procedure, the ideal outcome while minimising complications and long term sequelae⁹.

However the findings of this study suggests that more efforts are needed to raise the awareness for EBM in the surgeons to enhance the understanding of EBM related term and promote implementation of evidence dated standard of care.

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