Original article

Objective Scoring Evaluation and Uroflowmetry Assessment of Two-Stage Hypospadias Repair: Single Center Experience

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Abstract

Background: Hypospadias is a common congenital anomaly affecting the penis, two-stage repair becoming more interesting in era of tubularized –incised urethral plate (TIP). Functional outcome of hypospadias repair either single or two stage is as important as cosmetic outcome. In contemporary series , structured scoring systems (Hypospadias Objective Scoring Evaluation-HOSE and Pediatric Penile Perception Scoring -PPPS), evaluation of photographs and uroflowmetry, were used to assess results of hypospadias repair. ***Objectives:*** We have assessed outcomes of two-stage hypospadias repair using Hypospadias Objective Scoring Evaluation(HOSE) and uroflowmetry. ***Material and Methods:*** Over a period of eight years, from January 1997 to December 2004, One hundred and twenty six hypospadias patients were treated, ninety of them had two-stage repair and36 single-stage repairs. The HOSE questionnaire and uroflowmetry were obtained to evaluate the long term outcome of two –stage hypospadias repair. ***Results:*** The age at time of assessment ranged from 8 to 23 year-old, with mean follow up of 39.78months. Thrifty five patients had proximal hypospadias and 20 had distal varieties of hypospadias. Operations performed were 37 Bracka?s and 18 Byar?s procedures. Of the 55 patients had complete two stage hypospadias repair and agree to participate in the study , Nineteen patients had acceptable HOSE and 36 had non-acceptable score. Uroflow rates of 43 subjects were below the fifth centile in three patients ,equivocal (between 5^{th} and 25^{th} centile) in four patients and above 25^{th} centile in 36 subjects. ***Conclusion:*** Two –stage repair is a suitable technique for all types of hypospadias with versatile outcomes. HOSE and uroflowmetry are simple, easy, non invasive and non expensive tools to assess long term outcomes objectively.

Key words: Hypospadias in Malaysia , objective assessment of hypospadias repair, two-stage hypospadias repair.

Introduction

Hypospadias is a common congenital anomaly affecting the penis, that either treated or untreated can have functional, cosmetic and psychosexual consequences extending into adulthood[1, 2].

Indeed the current concept of hypospadias repair have been change, two-stage repair was widely used for hypospadias repair; although excellent outcome of single stage repair have been reported[3].

Assessment of result of hypospadias repair is still an issue of discussion, as the published studies have shown that a significant difference might be existing between patients and operating surgeon judgments[4]. Classically, outcomes of hypospadias repair have been assessed by reoperation rate secondary to fistula, stenosis, diverticulum and residual penile curvature[5].

Recently attempts have been made to assess outcomes objectively using structured scoring systems (HOSE and PPPS), evaluation of photographs and uroflowmetry to assess voiding[5, 6, 7].

In this study, we have assessed outcomes of two-stage hypospadias repair using Hypospadias Objective Scoring Evaluation (HOSE) and

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Appendix (1)
HOSE: Hypospadias objective scoring evaluation

1	Meatal Location	Score
1.1	Distal glanular	4
1.2	Proximal glanular	3
1.3	Coronal	2
1.4	Penile shaft	1
2	Meatal shape	
2.1	Vertical slit	2
2.2	Circular	1
3	Urinary stream	
3.1	Single stream	2
3.2	Spray	1
4	Erection	
4.1	straight	4
4.2	Mild angulation(<10)	3
4.3	Moderate angulation (>10 but <45)	2
4.4	Severe angulation (>45)	1
5	Fistula	
5.1	None	4
5.2	Single-subcoronal	3
5.3	Proximal-subcoronal	2
5.4	Multiple or complex	1
	Total score	/16

Tables
Table 1 a: Patients Characteristic

Characteristics	Number/MeanSD/%	Race
Malay	53	96.4
Chinese	1	1.8
Siamese	1	1.8
Age		
At the time of the study	14.89 years (8-23 year-old)	3.936
When first seen	9.165 years (1 month-17 year-old)	4.512
Type of hypospadias		
Distal hypospadias	20	36.4
Glannular	1	1.8
Subcoronal	7	12.7
Distal penile	12	21.8
Proximal hypospadias	35	63.6
Proximal penile	12	21.8
Penoscrotal	23	41.8
Previous unsuccessful repair Or circumcision before correction		
Unsuccessful repair	3	5.5
Circumcised	4	7.3
Total associated anomalies	10	18.2
Undescended testis	3	5.4
Retractile testis	1	1.8
Bifid scrotum	2	3.6
Inguinal hernia	3	5.4
Hydrocele	1	1.8

uroflowmetry .
HOSE is underused, although the use of such a system is recommended by others[6, 8, 9].
The HOSE is a validated scoring system that incorporates evaluation of meatal location and shape, urinary stream, straightness of erection , presence and complexity of urethral fistula[6].

Material And Methods

Over a period of eight years, from January 1997 to December 2004, a total of 126 patients underwent hypospadias repair in our surgical department, ninety of them had two-stage repair and 36 single-stage repair.

After obtaining approval from ethical committee in our university, either phone call or invitation letter sent to 76 patients (84.4%) whom completed two-stage repair hypospadias and their medical records contained relevant data needed for the study; However only 55 children and their parents agreed to participate in the study.

Table I a and b shows the demographic data of subjects include race, age at time of study, age when first seen in specialized clinic, type of hypospadias, associated anomalies and operative notes.

On arrival at the outpatient clinic, each patient was supplied with copious amount of diluted juice. At the same time, patient and/or parents were interviewed and at this stage subjects examined were based on the HOSE questionnaire.
After appropriate time , patients (do not have fistula and they can void voluntary) were asked to do uroflowmetry in privacy (Urocap-11 Flow Analyzer Version V 5.02).

Parameters being measured included peak flow, voiding time, flow time, time to peak flow and voided volume. The peak flow (Q-max) and voided volume (vv) were considered; the results were expressed as percentiles and interpreted according to Kajbaafzadeh nomogram (fig:1)[10].

The Q-max and voided volume were considered to be normal if > 25th percentile, equivocal if between 5-25 th percentile range and obstructed if <5 th percentile.

Table 1 b: Operative data

Data	Number/Mean (N=55)	%/SD
Operative technique		
Bracka's	37	67.3
Byar's	18	32.7
Post-operative urinary catheter		
Continuous bladder drainage	37	67.3
Suprapubic catheter/urethral stent	18	32.7
Length of urethral catheter/stent		
First –stage	5.75 (4-10days)	1.336
Second –stage	6.15	1.508 (3-9days)
Length of hospital stay		
First-stage	7.25 (5-29 days)	3.351
Second-stage	7.93 (4-18days)	2.300
Age at time of repair		
First –stage	10.15 years	3.768 (3-17year-old)
Second-stage	11.36years	3.776 (4-18year-old)
Duration of time bet.first and second-stage	14.55 months	4.682 (7-29 months)
Redo(revision)surgery		
Re-do first and second –stage Bracka's repair (penoscrotal ,wound breakdown with fistula)	1	1.8
Revision surgery (wide meatal opening at coronal)	1	1.8
Post-operative follow-up	39.78months	19.057 (8-80months)

Results

Fifty three Malay, one Chinese and one Siamese with different types of hypospadias underwent 37 Bracka? s and 18 Byar?s procedures, performed by three surgeons in similar way to originally described. The mean of follow up was 39.78months (range of 8-80months)[11, 12].

The mean age at first stage repair was 10.12 years (range 3-17 year-old) and for second stage 11.36 years (range 4-18 year-old). Age at time of assessment was ranged from 8 to 23 year-old.

The mean of duration between first and second stage repair is 14.55 months (range 7-29) months. 35 patients had proximal hypospadias and 20 had distal varieties of hypospadias. of the 55 patients had complete two stage hypospadias repair , 13 had single and 4 had multiple urethrocutaneous fistula , meatal stenosis two patient , urethral stricture one patient and wide meatal opening one patient.

The HOSE outcome data were obtained for all subjects (55), 19 patients had acceptable score and 36 had non-acceptable score. (Table 2)

Uroflow rates were obtained on 43 subjects (78.2%) who either did not have primary fistula (38) or underwent successful fistula repair (6) and could void volitionally.

However, there was one patient, 8 year-old who did not have any fistula but was not able to void.

Table 3 a and b shows the characteristic of uroflowmetry pattern in patients with distal and proximal hypospadias who completed two–stage repair. Three patients (7%) showed obstructed pattern, 4 patients (9.3%) equivocal and 36 patients (83.7%) were considered normal.Of the obstructed patients, one had urethral stricture and two had meatal stenosis. Those with equivocal uroflowmetry needed further workup to clarify the cause

Discussion

The last decade have witness on increasing the incidence of hypospadias worldwide demanding increasing in hypospadias surgery.

Table 2: Outcome of hypospadias repair according to HOSE

HOSE variable	(HOSE) Score	Number of patients(%) (n=55)
Meatal location		
Tip of glans	4	17(30.9)
Proximal glans	3	16(29.1)
Coronal	2	20(36.4)
Penile shaft	1	2(3.6)
Meatal shape		
Vertical slit	2	12(21.8)
Circular	1	43(78.2)
Urinary stream		
Single stream	2	55(90.9)
Spray	1	5(9.1)
Erection		
Straight	4	20(36.4)
Mild angulation	3	29(52.7)
Moderate angulation	2	6(10.9)
Severe angulation	1	0(0)
Fistula		
None	4	44*(80)
single proximal	3	2(3.6)
single distal	2	8(14.5)
Multiple or complex	1	1(1.8)

*38 patients have no primary fistula,6 patients have successful fistula repair

Generally Bracka?s and Byar?s operation are the most common operations performed in our departments, as both operations can be used to treat all types of hypospadias, from subcoronal to penoscrotal in agreement with others[13, 14].

Today, the repairs are performed during first year of life; although some advised assessment throughout of puberty ,as pubertal growth can change the final cosmetic and functional aspect of corrected penis[15].

In this retrospective study, majority of our patients presented between 10 and 15 year-old , in agreement with other local studies where the age of patient first seen ranged from neonate to 26 years[14].

Thus the age at surgery mostly depends on the age when first seen at surgical outpatient clinic. If they were referred early, the first- stage repair was performed at age of 3 to 4years, when they were toilet trained, not wearing diapers and the phallus is of acceptable size to make the surgery more feasible in the agreement with Arshad A.R.[14].

The second –staged repair was usually performed 6-12 months later, thus they complete two-stage repair and any subsequent surgery before the school age.

The published data showed there are more than 300 surgical techniques to correct hypospadias resulting in various outcome measures.

The HOSE questionnaire is a validated objective outcome assessment with a very low inter-observer error and good inter-observer correlation.

Nineteen patients (34.5%) of our subjects had an acceptable HOSE with a total score of 14 to 16 and 36 patients (65.5%) had unacceptable outcome with total score of thirteen and below, It is difficult to compare our HOSE score with others as the majority of published studies using this method to assess the outcome of anterior hypospadias repair.

The meatal location, shape and fistula are easy to be assessed objectively by assessor, However the main drawback of HOSE for us, arises when the straightness of penis and evaluating of urinary

Table 3 a: Characteristics of the uroflowmetry pattern in patients with distal hypospadias who completed two-stage repair (15 patients)

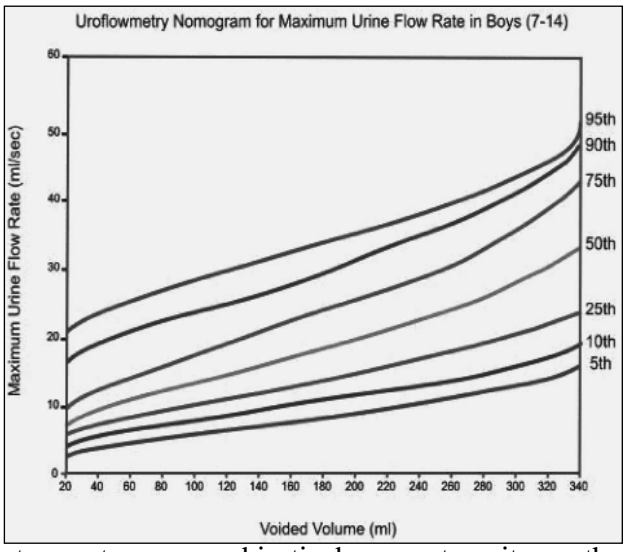
Patients	Age (year)	voided volume (ml)	Q-max (ml/s)	Percentile (result)a
1	15	21	719	>25
2	18	248	21	>25
3	15	182	18	>25
4	10	119	11	>25
5	18	304	16	10-25(E)
6	15	219	21	>25
7	21	414	16	>25
8	19	327	25	>25
9	19	188	6	**<5(O)**
10	19	272	17	>25
11	14	167	17	>25
12	14	185	18	>25
13	22	278	9	**<5(O)**
14	12	130	14	>25
15	12	118	11	>25

N.B. (a) >25 th percentile, normal flow; 5-25 th percentile, equivocal obstruction (E); <5 th percentile, obstructed flow (O).

Table 3 b: Characteristics of the uroflowmetry pattern in patients with proximal hypospadias who completed two-stage repair (28 patients)

Patients	Age (year)	voided volume (ml)	Q-max (ml/s)	Percentile (result)a
1	15	192	19	>25
2	9	97	13	>25
3	8	82	11	>25
4	17	215	15	5-25(E)
5	9	106	12	>25
6	16	184	18	>25
7	16	225	14	5-25(E)
8	11	113	12	>25
9	9	94	11	>25
10	18	164	26	>25
11	11	106	12	>25
12	15	174	16	>25
13	18	236	20	>25
14	15	213	27	>25
15	15	186	17	>25
16	18	176	18	>25
17	9	98	12	>25
18	22	156	23	>25
19	23	179	7	**<5(O)**
20	17	259	30	>25
21	10	116	11	>25
22	14	131	1	>25
23	16	256	21	>25
24	13	164	15	>25
25	10	101	12	>25
26	12	133	11	5-25(E)
27	10	89	10	>25
28	10	114	13	>25

N.B.(a). >25 th percentile, normal flow;5-25 th percentile, equivocal obstruction(E);<5 th percentile; obstructed flow (O).



stream to assess objectively , as to witness the child or adult voiding or to induce erection is out of Asian norm especially in our culture, even though Holland et al stated that erection was gauged after an erection witnessed by assessor or based on parental evaluation.

The studies investigated micturition of repaired urethral are few, those that did not generally studied the micturition after straightforward distal hypospadias repair[16].

The urethral stricture is a well recognized complication of urethral reconstruction with unknown long-term consequences of asymptomatic stenosis after hypospadias repair[17].

The measures available to assess the reconstructed urethra include direct observation of urinary stream, voiding cystourethrogram and uroflowmetry[18].

Rynja et al showed that there was a discrepancy between subjective and objective parameters of urinary function both in hypospadias patients and in control group[15].

The average flow rate and Q max in hypospadias patient need to be interpreted by a nomogram as they are increase with age of patient and volume of the bladder[10].

Hypospadias surgery is still a demanding procedure; there are many factors that may influence the outcome of hypospadias repair, type of hypospadias, age at repair, duration of time between first and second stage, technique of repair and personal experiences with cumulative success rate ranging from 37% to 77%, with greater than 95% after third revision[19, 20].

The reported overall complication rate from

hypospadias surgery is 5-40%, wound infection, haematuria, penile skin blister, and suprapubic catheter, all of them are minor and can be treated conservatively, furthermore fistula, meatal stenosis, wide meatal opening and urethral stricture[20, 21]. Overall 19 (34.5%) of our subjects had an acceptable score and 36 patients (83.7%) of them had Q max more than 25th centile on Kajbaafzadeh nomogram and Q max below 5 th centile in three patients (one urethral stricture and two meatal stenosis).

Limitations of The Study

Small non randomized sample size and disappointing overall result , probably reflects the learning curve associated with the severe type of hypospadias in our study.

Conclusion

Two –stage hypospadias repair is a suitable technique for all types of hypospadias with versatile outcomes . HOSE and uroflowmetry are simple, non-invasive, and non- expensive and easy to assess long term outcomes objectively.

References

1. Wilcox D.T and Ransley P.G. Medicolegal aspect of Hypospadias. *BJU Int* 2000;**86**(3): 327-31.http://dx.doi.org/10.1046/j.1464-410x.2000.00102.xPMid:10930941

2. Duckett J.W.,Baskin L.S. Hypospadias, In O Neill JA, Row MI, Grosfeld JL, Fonklsrud EW, Coran AG, editors . Pediatric surgery .5 th edn. Philadelphia : Mosby Year Book Inc.; 1998 :1761-81.

3. Springer A,Krios W,Horcher E. Trends in hypospadias surgery : results of worldwide survey .*Euro Urol*. In press DOI:10.1016/jeururo.2011.08.031.

4. Mureau MA, Slijper FM, Slob AK, Verhulst FC, Nijman RJ. Satisfaction with penile appearance after hypospadias surgery : the patient and surgeon view. *J Urol* 1996;**155**:703-6. http://dx.doi.org/10. 1016/S0022-5347(01)66504-2

5. Baskin L.Hypospadias : a critical analysis of cosmetic outcomes using photography. *BJU* 2001;**87**:534-39.http://dx.doi.org/10.1046/j.1464-410X.2001.00092.x

6. . Holland A.J.A, Smith G.H.H. ,Ross F.I. and Cass D.T.HOSE: an objective scoring system for evaluating the result of hypospadias surgery. *BJU Int*. 2001;**88**:255-8 . http://dx.doi.org/10.1046/j.1464-410x.2001.02280.x

7. Weber DM, Schonbucher VB, Landolt MA, Gobet R. The pediatric penile perception score: an instrument for patient self assessment and surgeon evaluation after hypospadias repair. *J Urol* 2008;**180**:1080-4. http://dx.doi.org/10.1016/j.juro.2008.05.060 PMid:18639292

6. Bracka A.:A long –term view of hypospadias. *Br J Plast Surg*.1989;**42**:251. http://dx.doi. org/10.1016/0007-1226(89)90140-9

8. Snodgrass WT.Assessing outcomes of hypospadias surgery. *J Urol* 2005;**174**:816-7. http://dx.doi.org/10.1097/01.ju.0000175046.69696.5bPMid:16093960

9. Reid LA,Curnier AP and Stevenson JH . Objective outcome assessment of the modified Bretteville Technique. *JPRAS* 2010;**63**:398-403.

10. Kajbaafzadeh A.M., Yazdi C.A.,Rouhi O., Tajik P. and Mohseni P.Uroflowmetry nomogram in Iranain children aged 7 to 14 years . *BMC Urol* 2005;**5**:2490-8. http://dx.doi. org/10.1186/1471-2490-5-3 PMid:15771771 PMCid:1079892

11. Bracka A. A versatile two-stage hypospadias repair. *Br J Plast Surg* 1995;**48**:345-52. http://dx.doi.org/10.1016/S0007-1226(95)90023-3

12. Byars LT.A technique for consistently satisfactory repair of hypospadias. *Sur Gynecol Obstet*

1955;**100**:184-90. PMid:13238174

13. Ramanathan C. Three-year experience of hypospadias surgery: Bracka's method. *Indian J Plast Surg* 2006;**39**:130-5 http://dx.doi.org/10.4103/0970-0358.29540

14. Arshad A.R. Hypospadias repair :Byar?s two stage operation revisited . *BJPS* 2005;**58**:481-6 . PMid:15897031

15. Rynja SP, de Jong TPVM, Bosch JLHR and de Kort LMO . Functional,cosmetic and psychosexual results in adult men who underwent hypospadias correction in childhood . *JPUrol* 2011;**7**: 504-15 .

16. Vandendriessche S, Baeynens D, Van Hoecke E, Indekeu A, Hoebeke P. Body image and sexuality in adolescents after hypospadias surgery. *J Pediatr Urol* 2010;**6**:54-9.http://dx.doi.org/10.1016/j.jpurol.2009.04.009PMid:19477689

17. Barry P. D, Julia S. B. and Ricardo G. Management of urethral stricture after hypospadias repair. *J Urol* 1998; **160**:170-1.http://dx.doi.org/10.1016/S0022-5347(01)63083-0

18. Garibay JT., Reid C.,Gonzalez R. functional evaluation of the result of hypospadias surgery with uroflowmetry. *J Urol* 1995;**154**:835-6. http://dx.doi.org/10.1016/S00225347(01)67178-7

19. Jan IA.,Mirza F.,Yaqoot, Ali M., Arian A., Saleem N.and Ahmad et al. Factors influencing the results of surgery for hypospadias: experience at NICH. *JPMA* 2004;**54**:577.

20. Marrocco G.,Vallasciani S.,Fiocca G. and Calisti A. Hypospadias surgery : a 10 year review. *Pediatr Surg Int*. 2004;**20**:200-3. http://dx.doi.org/10.1007/s00383-004-1147-1 PMid:15083330

21. Synder CL, Evangelidis A, Hansen G, Peter SD, Ostlie DJ, Gatti JM. et al. Management of complications after hypospadias repair . *Urol* 2005; **65**: 782-5 . http://dx.doi.org/10.1016/j.urology.2004.11.037 PMid:15833528