

A Prospective Study of Role of Preoperative Testosterone in Hypospadias Repair

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Abstract

Background: Hypospadias is a congenital anomaly of the male urethra that causes significant morbidity in the paediatric male population. The mainstay of treatment is hypospadias repair surgery. To improve the surgical results, preoperative hormonal stimulation has been recommended since it is believed that it temporarily promotes phallic growth, which makes the correction easier and results in less early and late postoperative complications and better postoperative outcome. Our objectives were to evaluate the effect of preoperative parenteral testosterone on stretched penile length (SPL), circumference of penile shaft, thickness of penile shaft skin and vascularity of penile skin.

Material and Methods: In this study, 25 patients of hypospadias between the ages of 1-12 years were included. All patients received preoperative intramuscular testosterone injection at dose of 2mg/kg body weight and serial penile measurement were taken.

Results: The mean stretched penile length before testosterone injection was 5.2 ± 0.91 and after first dose of testosterone was 5.88 ± 0.78 . The mean circumference of penis before giving testosterone was 4.28 ± 0.54 and after first dose was 4.68 ± 0.95 . On comparison, the difference was statistically significant.

Conclusion: Almost all patients have shown significant increment in stretched penile length and circumference and decreased early and late postoperative complications.

Key words: Stretched penile length, Preoperative, Testosterone, Circumference, Urethrectaneous, Fistula, Vascularity, Postoperative

INTRODUCTION

Hypospadias is one of the most common congenital anomalies of male genitalia. Hypospadias term is derived from the Greek word Hypo means under and spadon means a fissure.^[1] The mainstay of treatment for hypospadias is surgical correction to achieve a straight penis with the urethral opening as close to the ventral tip of

the penis as possible with uninterrupted urinary flow and creating a straightened penis (upon erection) that is similar in appearance to a normal circumcised penis. The general consensus among pediatric surgeons is to perform elective surgery on male genitalia between 6 and 18 months of age as it is believed that a boy will be aware of his genitalia by the age of 18 months.^[2] Hormonal stimulation before hypospadias correction has been accepted as a relatively common practice for few decades.^[3,4] Testosterone use was first reported in 1971^[5] and it has been applied as the hormone of choice for the preoperative hormonal stimulation in hypospadias repair. Our objectives were to evaluate the effect of preoperative parenteral testosterone on stretched penile length (SPL), penile circumference and thickness of penile skin, and vasculature of penile shaft skin.

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MATERIALS AND METHODS

In this study, 25 patients of hypospadias between the ages of 1 and 12 years were included in the study. All patients received preoperative intramuscular testosterone injection at dose of 2 mg/kg body weight. All patients received 1–2 intramuscular testosterone injection at 1–3 weeks interval. When patient came for follow-up in outpatient department after first dose we clinically assessed the patients and took measurements of penile length and circumference with the help of measuring tape or vernier calipers. If the length and circumference were found adequate the surgery was planned. If the size of the penis was still small and inadequate for hypospadias repair, we gave second dose of testosterone injection. We can give up to three doses of testosterone. In this study, most of the patients received two doses of testosterone. Various surgical techniques were used in hypospadias repair but the most common was Snodgrass procedure. Basic steps for a successful hypospadias outcome: (a) orthoplasty (straightening), (b) urethroplasty, (c) meatoplasty and glanuloplasty, and (d) skin coverage. Postoperative follow-up after 7–10 days then at 1, 3, and 6 months.

OBSERVATIONS AND RESULTS

Twenty-five patients of hypospadias were included in this study. All patients received 1–2 doses of preoperative intramuscular testosterone injection and followed up timely.

Age distribution		Type of hypospadias		Type of surgery	
Age (years)	Frequency (%)	Type	Frequency (%)	Type	Frequency (%)
<2	16	Distal penile	68	Snodgrass	56
2–5	56	Mid penile	16	Snodgrass with chordee correction	24
>5	28	Proximal penile	8	2 stage urethroplasty	12
		Penoscrotal	8	Meatal advancement surgery	8
Total	100		100		100

In this study, most of the children belonged to the age group of 2–5 years and most common type of hypospadias is distal penile 68%.

Penile measurements	SPL (cm)				Circumference of the penis (cm)			
	n	Mean	SD	P-value	n	Mean	SD	P-value
Before testosterone	25	5.20	0.91	<0.0001	25	4.28	0.54	0.001
After first dose	25	5.88	0.78		25	4.68	0.95	

SPL: Stretched penile length

Most common surgery performed is tubularized incised plate (TIP) or Snodgrass urethroplasty in 80% of cases, out of which 24% cases also needed chordee correction.

Out of 25 patients, only nine patients presented with chordee rest 16 patients were presented with without chordee.

Effect of Testosterone on SPL and Circumference after First Dose

Paired *t*-test is applied for SPL. The mean SPL before testosterone injection was 5.2 ± 0.91 and after first dose of testosterone was 5.88 ± 0.78 . The mean circumference of the penis before giving testosterone was 4.28 ± 0.54 and after first dose was 4.68 ± 0.95 . On comparison, the difference was statistically significant.

Effect of testosterone on SPL after two doses

Repeated measure ANOVA Test for SPL was applied to only those patients who received repeated dose (at least two doses) of testosterone injection.

SPL (cm)	n	Mean	SD	P-value
Before giving testosterone	19	5.11	0.99	<0.0001
After first dose	19	5.84	0.90	
After second dose	19	6.26	0.73	

SPL: Stretched penile length

The mean length of the penis before giving testosterone was 5.11 ± 0.99 and after first dose was 5.84 ± 0.90 . Mean difference in SPL was -0.737 . That is mean increment in SPL is 0.73 cm. On comparison, the difference was found to be statistically significant. The mean length of the penis after first dose 5.84 ± 0.90 and the mean length after second dose 6.26 ± 0.73 and mean difference is -0.421 , the difference is found to be significant with $P = 0.006$. We observed that the penile length significantly increased after testosterone injection and also that, increment in penile length is more after first dose as compare to increment after second dose of testosterone injection.

Effect of Testosterone on Circumference after Two Doses

Circumference of the penis (cm)	n	Mean	SD	P-value
Before testosterone	19	4.32	0.58	<0.0001
After first dose	19	4.79	0.98	
After second dose	19	5.11	0.99	

Mean circumference of the penis before giving testosterone was 4.32 ± 0.58 and mean circumference after first dose was 4.79 ± 0.98 and mean difference was -0.474 . On comparison, the difference was found to be statistically significant with $P < 0.002$. The mean circumference of the penis in centimeter after first dose 4.79 ± 0.98 and the mean circumference after second dose 5.11 ± 0.99 and mean

difference is -0.316 , the difference is found to be significant with $P = 0.030$. We can see that the penile circumference significantly increased after testosterone injection and we also observed that, increment in circumference is more after first dose as compare to increment after second dose of testosterone injection. We had also observed clinically that the thickness of penile skin and the vascularity of the penile shaft is also increased in all patients who have received preoperative testosterone injection. We did not find any adverse effects such as gynecomastia, the appearance of pubic hairs, and growth spurt.

Postoperative Complications

Early complications	Frequency	Late complications	Frequency
Edema	16	Urethrocuteaneous fistula	20
Bleeding, hematoma	16	Meatal stenosis	4
Urinary retention	12		
Superficial skin blackening	8		
Wound dehiscence	4		
local infection	4		

Meatal stenosis as a late complication was observed in one patient which was corrected with the help of urethral dilator.

Final Outcome

Out of 25, urethrocuteaneous fistula developed in 20% of patients and 80% of patients had successful outcome.

DISCUSSION

Hypospadias is a common pediatric congenital anomaly but it is challenging problem due to wide variation in local anatomical factors. Hormone therapy preceding surgical correction of hypospadias has been proposed to obtain better surgical conditions, such as a bigger penis, and to reduce surgical complications.^[6] Testosterone has been widely used for penile enlargement before hypospadias reconstructive surgery.

Teckchandani and Bajpai observed that mean SPL at 2–3 years of age was approximately $5.01 \pm 2SD$ and at 4–5 year was approximately $5.82 \pm 2SD$, in the Asian population. In our study $>50\%$ of patients belong to age between 2 and 5 years with mean SPL is 5.2 ± 0.91 which is similar to results of above mentioned study.^[7]

Nuininga *et al.*^[8] noted a 54% long-term complication rate in 126 patients who underwent primary hypospadias repair. In our study, 20% of patients developed urethral fistula and meatal stenosis was seen in 4% of cases as a long-term complications. Aisuodionoe-Shadrach *et al.*^[9] reported

urethrocuteaneous fistula as the most common complication in 37.5% followed by meatal stenosis in 12.5% of cases. In our study, urethrocuteaneous fistula was the most common late complication seen in 20% of patients and meatal stenosis in 4 % of cases. Barakoti *et al.*^[10] noted that urethrocuteaneous fistula occurred in 15 (33.33%) patients which are slightly higher than our study. Khan *et al.*^[11] noted the most common chronic complication was UCF which was initially observed in 38.8% of cases, meatal stenosis observed in 5.6% of patients. These complications are slightly higher than this study. Nema and Varia^[12] observed in their study, 25% of patients developed wound infection, 16% developed edema, urethral fistula developed in 15% of patients, 34% developed skin necrosis. In our study, we noted wound infection in only 4% of patients, edema developed in 16% of patients, urethral fistula developed in 20% of patients, skin blackening developed in 8% of patients.

Paiva *et al.*^[13] in their study observed a significant increase in penile length, the diameter of the penis and glans were observed after 30 days in those using 1% testosterone propionate. The most frequent side effects were appearance of pubic hair and darkening of the genital skin. Asgari *et al.*^[14] observed in his study an increase in penile length (from 28.1 ± 2.2 mm to 38.5 ± 2.6 mm) ($P = 0.001$) and penile circumference (from 35.1 ± 1.6 mm to 45.5 ± 2.2 mm) ($P = 0.001$) were noticed in all but four children in the testosterone group, the TIP urethroplasty was performed with an overall complication rate of 9.34%. In our study, we observed that SPL and circumference significantly increased after first dose of testosterone injection with $P < 0.0001$ and <0.002 , respectively, and there was no side effect of testosterone observed.

CONCLUSION

In this study, all patients responded well to preoperative intramuscular testosterone injection, we found that the preoperative testosterone therapy is effective in achieving our primary and secondary objectives. Some previous studies reported that there were some transient side effects of testosterone but there were no side effects of testosterone injection seen in our study. From this study, we can conclude that the intramuscular injection of testosterone significantly increases penile length and circumference in prepubertal boys, thereby provide better conditions for operative procedure and reducing the postoperative early and late complications, thus we can get better post-operative outcome and reduces the requirement for reoperation. Apart from increment in penile length and circumference, vascularity of penile shaft and thickness of penile skin also increase. Nevertheless, there is still a

large scope for improving our knowledge about the use of hormonal treatment before surgery, which will require further studies with large study group and longer follow-up.

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