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Factors affecting the post-operative testicular position & atrophy after open orchiopexy done for cases with palpable maldescended testis in the pediatric age group

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Abstract

Objective: Several factors can affect post orchiopexy testicular position & atrophy. Our interventional study aimed at examining the effect of such factors on the outcome of open orchiopexy.

Methodology: The age, weight, site & side of the operated testis, surgical duration, feasibility of hernia sac ligation and retroperitoneal dissection were reported. Post-operative follow up of testicular position & atrophy were recorded by clinical examination and by ultrasound scan at the end of the 1st post-operative week and every three months for one post-operative year.

Results: Our study included 357 patients with 400 palpable maldescended testes (43 patients presented bilaterally). About 306 patients (76.5%) had a postoperative normal testis and only 7 patients (1.8%) had an atrophic testis on follow up. A normal position was affected significantly by low body weight, pre-operative inguinal location of testis as well as intra-operative feasible hernia sac ligation ($p< 0.001$, MCp=0.003 & MCp=0.006 respectively). Post-operative testicular atrophy was affected significantly by preoperative extra-inguinal site of testis (FEp= 0.043).

Conclusion: Low body weight, pre-operative inguinal position & feasible herniotomy can result into normal post-operative testicular scrotal position. Also a pre-operative inguinal testicular position have a lower incidence of having post-operative testicular atrophy.

Keywords: Palpable maldescended; Testicular position; Atrophy.

Introduction

Palpable variety of maldescended testis is present in 80% of those patients in whom the testis is found clinically along the inguino-scrotal way. However, the remaining 20% have an impalpable presentation [1]. The optimum treatment of maldescended testis is surgery (orchiopexy) which is characterized usually by a high success rate (95%) and minimal complication rate (1%), this procedure is better done 12 to 18 months old. Hormonal therapy in such condition is not recommended with a low success rate (only 15-20%) and a higher long term complication rate as regard its effect on spermatogenesis [2].

Orchiopexy was described successfully for the first time in 1879 by Annandale T [3], after that the procedure was recommended as a routine one in 1950s and early 1960s [4]. The classical approach of orchiopexy is the inguinal one with insertion of the testis in the subdartos pouch. The fibrosis developed between the everted tunica vagialis and the surrounding tissues is the main fixing power of the operated testis. An important point is the retroperitoneal dissection which adds a lot for the success of this operation [4]. A modification was described in 1989 by Bianchi A et al. using a single high scrotal approach for those testes located distal to the external inguinal ring [5].

The success of orchiopexy is measured by allocation of the testis in the bottom of the scrotum relaxed without any tension together with absence of testicular atrophy [6]. However, factors affecting this success was not assessed in the literature so the aim of our work was to assess these factors.

Aim of the work

The aim of our work is to evaluate the factors affecting the post-operative position and/or atrophy of the testis following open inguinal orchiopexy for the treatment of palpable maldescended testis in the pediatric age group.

Material & methods

Our interventional study included all patients admitted to Elshatby University Hospital during two year duration from January 2019 to January 2021 presented with palpable maldescended testis. The age and weight of the studied patients were recorded. The pre-operative side and site of the operated testis whether inguinal, peeping or extra-inguinal were also recorded by clinical examination. All of the studied patients had been subjected to one stage conventional open orchiopexy through an inguinal incision. Patients with bilateral maldescended testis have been operated on two sessions with three months interval. Intra-operative observations including the operative duration, feasibility of herniotomy and retroperitoneal dissection were reported.

Post-operative follow up including the position of the operated testis (pubic tubercle, high scrotal or normal low- scrotal position) as well as testicular atrophy were recorded by clinical examination and by ultrasound scan at the end of the 1st post-operative week and every three months for one post-operative year. Testicular atrophy was reported when testicular volume was less than 12 mL as defined by the European Society of Urogenital Radiology [7].

Statistical analysis

Data were coded, reviewed and analyzed using the SPSS version 25.0 (Armonk, NY: IBM Corp). Quantitative data were expressed as median and range. Qualitative data were expressed as frequency and percentage. One-way ANOVA test was used to detect any statistically significant differences between three or more independent normally distributed groups. Pairwise comparison was conducted among significant groups. Monte Carlo and Fischer exact probability were used to test the association between two or more categorical variables or to detect difference between two or more proportions. Logistic regression was used to predict the relationship between one dependent binary variable and independent variables by estimating probabilities.

Results

Our study included 357 patients with 400 palpable maldescended testes as there were 43 patients presented bilaterally (86 testes) and 314 patients presented unilaterally. The mean age of the studied patients was 21.0 ± 10.38 months, while the mean weight of them was 16.78 ± 8.56 Kg (Table 1). Pre-operative clinical examination of the studied patients revealed that most of them had unilateral palpable maldescended testis (88%) and most of their testes were in the inguinal region (94.7%). The surgical duration varied between 15 min to 35 min (median = 20) with a mean of 20.43 ± 5.62 min. Operative records revealed that dissection and transfixion-ligation of the associated hernia sac was done easily in 355 patients (99.4%) with retroperitoneal dissection in all patients (Table 2). The post-operative follow up of the operated testes showed that more than three quarters of them had a normal postoperative low scrotal position (76.5%) and only 1.8% developed postoperative testicular atrophy (Table 3).

Statistical analysis of the factors affecting the post-operative testicular position revealed that the body weight ($p< 0.001$), the pre-operative presence of the testis in inguinal region (MCp= 0.003) as well as an easily done herniotomy (MCp= 0.006) affected significantly the surgical outcome. Patients with lower body weight, a pre-operative inguinal testis and an easily done intra-operative herniotomy have a significantly higher incidence of having a normal low post-operative testicular position (Table 4 & 5).

Neither the age at operation nor the body weight affected the development of post-operative testicular atrophy significantly as seen in table 6. The median of surgical duration (20 min) was the same in those who developed testicular atrophy and in those who did not show this complication (Table 6).

Table 7 illustrates that the postoperative atrophy had no significant difference as regards side of orchiopexy and sac ligation. On the other hand; development of such complication had a significant difference as regard the pre-operative site of the maldescended testis ($^{FE}p= 0.043$) as atrophic testis had a higher percentage of being pre-operatively in the extra-inguinal location.

Logistic regression analysis of the variables predicting the postoperative site outcome (abnormal site= 1, low scrotal= 0) of the study sample as a dependent variable. Four variables were used to build the logistic regression model namely age, weight, preoperative site of mal-descended testis (inguinal versus extra-inguinal) and sac ligation. The final model revealed that two

variables significantly affect postoperative site outcome. The first factor is weight of the child as patients with postoperative abnormal site were 1.1 times more likely to be overweight compared to patients with postoperative low scrotal site (OR= 1.074, CI= 1.045 – 1.104). The second factor is preoperative site of mal-descended testis as patients with postoperative abnormal site were three times more likely to have extra inguinal testis preoperatively compared to patients with postoperative low scrotal site (OR= 3.084, CI= 1.181 – 8.295). The overall model percentage 76.8%, R^2= 0.111, p< 0.001 (Table 8).

Table 1: Demographic data of the studied patients.

Variables	Mean ± SD	Median (Min – Max)
Age (months)	21.0 ± 10.38	24.0 (2 – 60)
Weight (kg)	16.81 ± 8.69	14.0 (6.5 – 55.0)

Table 2: Pre-operative clinical examination of the studied patients.

Variables	Frequency (N= 357)	%
Side of orchiopexy:		
Right	182	51.0
Left	132	37.0
Bilateral	43	12.0
Site:		
Inguinal	338	94.7
Extra inguinal: Peeping Perineal	**19** 12 7	**6.3** 63.2 36.8

Table 3: Postoperative follow up of the operated testes.

Variables	Frequency (N= 400)	%
Testicular position		
Normal position	306	76.5
High scrotal	90	22.5
Pubic tubercle	4	1.0
Testicular atrophy		
Present	7	1.8
Absent	393	98.3

Table 4: Effect of demographic factors on the postoperative testicular position.

Variables	Postoperative site outcomes			Test of significance (p value)
	Normal position (n= 306)	High scrotal (n= 90)	Pubic tubercle (n= 4)	
Age (Months):				H= 0.356 p= 0.583
Mean ± SD	21.09 ± 10.36	20.53 ± 10.7	24.75 ± 2.5	
Median (Min – Max)	24 (2 – 60)	24 (2 – 60)	26 (21 – 26)	
Weight (Kg):				H= 41.587 p< 0.001*
Mean ± SD	15.34 ± 7.05	21.44 ± 11.06	25.05 ± 19.98	
Median (Min – Max)	14 (6.5 – 55)	15 (9 – 55)	15.6 (14 – 55)	
Significance between gps.	p1< 0.001, p2= 0.409, p3=1.0			
Surgical duration (minutes):				H= 5.841 p= 0.054
Mean ± SD	20.28 ± 5.68	20.61 ± 5.70	18.75 ± 4.79	
Median (Min – Max)	20 (15 – 35)	20 (15 – 35)	17.5 (15 – 25)	

H; Kruskal Wallis test
p; p value between the three postoperative site outcomes
p1; p value between normal position and high scrotal
p2; p value between normal position and pubic tubercle
p3; p value between high scrotal and pubic tubercle
SD; Standard deviation

Table 5: Effect of pre-operative testicular location & intra-operative findings on the postoperative testicular position.

Variables	Postoperative site outcome						Test of significance (p value)
	Normal position (n= 306)		High scrotal (n= 90)		Pubic tubercle (n= 4)		
	No	%	No	%	No	%	
Side of orchiopexy:							
Unilateral	242	79.1	70	77.8	2	50.0	^{MC}p= 0.390
Bilateral	64	20.9	20	22.2	2	50.0	
Site:							
Inguinal	295_a	96.4	83_a	92.2	2_b	50.0	^{MC}p= 0.003*
Extra-inguinal	11_a	3.6	7_a	7.8	2_b	50.0	
Sac ligation:							
Done easily	305_a	99.7	88_a	97.8	3_b	75.0	^{MC}p= 0.006*
Done difficulty	1_a	0.3	2_a	2.2	1_b	25.0	

^{MC}p; Monte Carlo exact probability * Significant (p< 0.05)

$_{a, b, c;}$ Different letters indicate significant difference between column proportion

Table 6: Comparison of postoperative atrophy as regards the sociodemographic characteristics.

Variables	Postoperative atrophy				Test of significance (p value)
	Present (n= 7)		Absent (n= 393)		
	No	%	No	%	
Side of orchiopexy:					
Unilateral	5	71.4	309	78.6	^{FE}p= 0.646
Bilateral	2	28.6	84	21.4	
Site:					
Inguinal	5	71.4	375	95.4	^{FE}p= 0.043*
Extra-inguinal	2	28.6	18	4.6	
Sac ligation:					
Done easily	7	100.0	389	99.0	^{FE}p= 1.00
Done difficulty	0	0.0	4	1.0	

^{FE}p; Fischer Exact probability

* Significant (p< 0.05)

Table 7: Comparison of postoperative atrophy as regards the operative details.

Variables	Postoperative atrophy				Test of significance (p value)
	Present (n= 7)		Absent (n= 393)		
	No	%	No	%	
Side of orchiopexy					
Unilateral	5	71.4	309	78.6	^{FE}p= 0.646
Bilateral	2	28.6	84	21.4	
Site					
Inguinal	5	71.4	375	95.4	^{FE}p= 0.043*
Extra-inguinal	2	28.6	18	4.6	
Sac ligation					
Done easily	7	100.0	389	99.0	^{FE}p= 1.00
Done difficulty	0	0.0	4	1.0	

^{FE}p; Fischer Exact probability

* Significant (p< 0.05)

Table 8: Logistic regression analysis of postoperative site outcomes.

Independent variables	Coefficient B	p value	Odds Ratio	95% confidence interval
Age	0.005	0.685	1.005	0.981 – 1.030
Weight	0.071	<0.001*	1.074	1.045 – 1.104
Site of mal-descended testis	1.141	0.022*	3.129	1.181 – 8.295
Sac ligation	0.927	0.496	2.527	0.176 – 36.348
Constant	**-4.802**	**0.001***		

Discussion

Success of orchiopexy depends mostly on the pre-operative site of the maldescended testis, age of patient at operation as well as the type of surgical procedure. Successful orchiopexy is usually defined as the presence of intra-scrotal, non-atrophied testis as detected by regular follow up in the form of clinical examination as well as by US [8].

Early orchiopexy at 6-12 months or earlier than 18 months affects greatly the outcome of such procedure. A histological increase in the number of germ cells in each seminiferous tubule as well as the presence of Leydig cells could be achieved in case of early orchiopexy. Also a reduction of risk of testicular cancer, improved fertility & testicular growth in association with lower rate of post-operative complications (Recurrence, scrotal hematoma, wound infection and vasal injury) were documented in the literature in case of early orchiopexy [9]. On the other hand the age of the studied patients in our research neither affected the post-operative location nor atrophy of the operated testis significantly. However, the body weight affected the post-operative testicular position significantly as patients with smaller body weight have a higher percentage of having normally positioned testis after open orchiopexy.

Regarding the effect of pre-operative site of maldescended testis on post-operative successful outcome, Docimo SG [10] reported a success rate of 74% for abdominal testis, and 82–87% for inguinal testes. On the other hand, the type of the procedure affected the success rate of orchiopexy in the same study as following; 89% for inguinal, 67% for Fowler Steevens, 77% for staged Fowler Steevens and 84% for microvascular orchiopexy. Our study revealed also that patients with maldescended testis at the inguinal region have a significantly higher success rate of post-operative position at normal level.

Many studies in the literature reported that ligation of the sac in case of orchiopexy is not mandatory in prevention of post-operative development of inguinal hernia and / or recurrence of maldescended testis [11]. A significantly better post-operative results (normal position) was observed in patients in whom the peritoneal sac was dissected and ligated easily. As patients with well-formed sac were observed to have testes with long vas and vessels Post-operative testicular atrophy was reported in 1.8% of our studied patients with patients having their testes detected pre-operative in the inguinal region have a lower incidence of post-operative testicular atrophy. The age and weight

at operation did not affect the post-operative testicular atrophy significantly; Carson JS et al. in 2014 reached the same conclusion in their study [12]. Tseng C-S et al in 2019 concluded in their study that neither laterality nor prematurity affected post-operative testicular atrophy with a higher incidence of this complication in patients with primary higher pre-operative locations and younger age group [9].

Collective examination of all the factors predicting the post-operative outcome revealed that lower body weight and the pre-operative presence of the testis in the inguinal region can predict significantly a normal low scrotal position of the operated testis.

Conclusion

Patients with palpable mailmaldescended testis in the inguinal region, having low body weight and/or having an easily dissected and ligated hernia sac have a higher incidence of successful orchiopexy with a normal low scrotal position. Also patients with a pre-operative inguinal position have a lower incidence of having post-operative testicular atrophy. Surgeons can predict a normal low post-operative scrotal position of the operated testis in patients with low body weight and in those who have preoperative inguinal testis.

Declarations

Conflict of interest statement: Our study has no conflict of interest to declare.

Funding source: This study did not receive any fund.

Ethical approval: Our study complied with the policy of the journal regarding ethical consent as a written consent with clear explanation of the procedure was signed by the parents or care givers. Also, the ethical committee of our institute approved it.

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