

One stage laparoscopic Fowler- Stephens orchiopexy in Pre-School Age Children

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surgery*

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Contents

	Page
List of Abbreviations	i
List of Tables	iii
List of Figures	iv
Introduction	1
Aim of the Work	4
Review of Literature.....	5
Patients and Methods	55
Results	62
Discussion	72
Summary and Conclusion	92
References	94
Arabic Summary	--

List of Abbreviations

AD	spermatogonia: Adult dark spermatogonia
AER	: Apical ectodermal ridge
AMH	: Anti-Mullerian hormone
AP	spermatogonia: Adult pale spermatogonia
BTB	: Blood-testis barrier
CAIS	: Complete androgen insensitivity syndrome
CGRP	: Calcitonin gene-related peptide
CIS	: Carcinoma in situ
CSL	: Cranial suspens
FSLO	: Fowler Stephens laparoscopic operation
FSO	: Fowler Stephens operation
GC/T	: Total germ cells per tubule
GFN	: Genitofemoral nerve
GnRH	: Gonadotrophin-releasing hormone
hCG	: Human chorionic gonadotrophin
IAT	: Intrabdominal testes
LAO	: Laparoscopic assisted orchiopexy
LHRH	: Luteinizing hormone-releasing hormone
MDT	: Mean diameter of seminiferous tubules
MIS	: Mullerian inhibiting substance
Mo	: Month
N	: Number
N/A	: Not applicable
NS	: Not significant
Postop. Comp:	Postoperative complications
PV	: Processus vaginalis
RCT	: Randomised controlled trial
RI	: Resistive index

List of Abbreviations (Cont.)

SLTO	:	Staged laparoscopic traction-orchiopexy
TDS	:	Testicular dysgenesis syndrome
TFM	:	Testicular feminized mice
UDT	:	Undescended testes
US	:	Ultrasound
VILO	:	Vessel-intact laparoscopic orchiopexy
Yr	:	Year

List of Figures

<i>Table</i>	<i>Title</i>	<i>Page</i>
1	Schematic diagram of the two phases of testicular descent	10
2	Type I-IV impalpable testis	27
3	Updated Ain Shams classification of impalpable undescended testes	30
4	Type III IAT according to the “Updated Ain Shams classification of impalpable undescended testes”	29
5	Type IV IAT according to the “Updated Ain Shams classification of impalpable undescended testes”	29
6	Schema showing germ cell development in the postnatal testis	31
7	Spectra from intratesticular arteries in children.	54
8	Relationship between testicular viability at 1 mo F/P and that at 6 mo F/P	64
9	Relationship between testicular position at 1 mo F/P to that at the 6 mo F/P	65

List of Tables

<i>Table</i>	<i>Title</i>	<i>Page</i>
1	Relationship between testicular viability at 1 mo F/P to that at the 6 mo F/P	65
2	Relationship between testicular blood flow RI measured at 6 mo F/P and testicular viability	68
3	Relationship between the ages of cases and testicular viability measured at 6 mo F/P	69
4	Relationship between the ages of cases and testicular position at 6 mo F/P	69
5	Relationship between unilateral IAT group and bilateral IAT group in testicular viability at 6 mo F/P	70
6	Relationship between unilateral IAT group and bilateral IAT group in testicular position at 6 mo F/P	71

Introduction

Congenital undescended or cryptorchid testes are described as those that fail to migrate into the base of the scrotum and instead occupy a position either in the groin or within the abdominal cavity (**Scorer CG, 1964**).

Failure of one or both testes to descend into the scrotum affects about 3% of full-term newborns and up to 30% of preterm infants. Two thirds of the undescended testes will descend spontaneously within the first few months of life. By the age of 6 months, the prevalence of undescended testes is 1-2% and unilateral cryptorchism accounts for about 85% of all cases (**Berkowitz et al., 1993**). Approximately 20% of undescended testes are nonpalpable, and in 20% to 50% of children with nonpalpable testis, the testis is absent (**Smolko, 1983**).

Cryptorchidism is associated with infertility and testicular neoplasms. Cryptorchid boys have been shown to lack germ cells from age 15-18 months (**Hadziselimovic et al., 1987**) and the lifetime risk of testicular neoplasia in maldescended testes is increased 5-10 fold (**Swerdlow et al., 1997**). To avoid ongoing testicular degenerative changes many recommend is to perform surgery before the age of

12 months or upon diagnosis if that occurs later (**Ritzen et al., 2007**). Furthermore, prepubertal orchidopexy for cryptorchidism may lower the risk of testicular cancer (**Walsh et al., 2007**).

Laparoscopy has been long used for the diagnosis and management of intraabdominal testes; and is especially useful in dissection and ligation of the spermatic vessels during Fowler-Stephens orchiopexy. Laparoscopy has replaced many open procedures because it is a minimally invasive procedure and seems to have fewer complications (**Banieghbal & Davies, 2003**).

The management of high intra-abdominal testis may be challenging in the presence of a short spermatic cord. The goal of the Fowler-Stephens manoeuvre during orchiopexy is to allow for more extensive mobilization of the testis by dividing the spermatic cord vessels, which was originally done in a single stage. However, since the description of the two stage FSO procedure in 1984, there has been discussion about which of these techniques carries better results. Testicular atrophy is a potential complication of this procedure (**Elder JS, 1992**).

Most authors who perform a two stage FSO believe that preserving an intact peritoneum around the internal ring of the inguinal canal will allow the development of collateral blood supply to the testis (**Koff & Sethi, 1996**). Avoiding dissection of the medial aspect of the peritoneum at the level of the internal ring during the second stage will also preserve the cremasteric artery, which is believed to contribute to the testicular blood supply (**Sampaio et al., 1999**). Although the ideal level of ligation of the spermatic vessels is controversial, high ligature of the spermatic vessels theoretically preserves the collateral vessels existing between the testicular and deferential arteries (**Koff & Sethi, 1996**).

On the contrary, it has been proposed that a single stage FSO is more favourable as it avoids repeat anaesthesia, the potentially difficult dissection associated with re-operation, the further waiting period of a 3-6 months for the second stage and the further cost of a second laparoscopy (**Lindgren et al., 1999**).

In a large recent metaanalysis, the pooled estimate of success rates was 80% for single stage FSO (95% CI 75 - 86) and 85% for two stage FSO (95% CI 81 - 90). The pooled odds ratio of single stage versus two stage FSO was 2.0 (95%

CI 1.1 - 3.9) favouring the two stage FSO. There was no difference in the success rate between laparoscopic and open techniques in either single or two stage FSO. However, it was concluded that the level of evidence of the study was low, and a study of a more robust design should be performed (*Elyas et al., 2010*).

Aim of the Work

This clinical study was done in Ain Shams University Children's Hospital to evaluate 'one stage' laparoscopic Fowler Stephens orchiopexy for IAT with short spermatic vessels in pre-school age children.

Our results will be compared to our previous results of the 'two stage' laparoscopic FSO in a similar subgroup of patients, in both Ain Shams University Children's Hospital and "Benha Specialised Children's Hospital".

Definition of Cryptorchidism

Cryptorchidism (from the Greek ‘kryptos’ meaning ‘hidden’ and ‘orchis’ meaning ‘testis’) refers to the absence of the testis from the scrotum and is a term that is used interchangeably with the term undescended testis (UDT) (*Burgu et al., 2009*).

Isolated cryptorchidism is the most common congenital abnormality of the male genitalia identified at birth and occurs in 1-4% of full-term and 15-30% of premature male infants (*Acerini et al., 2009*). The incidence is age dependent, and unilateral cryptorchidism is more than twice as common as bilateral cryptorchidism; the right side is affected more often than the left (70% compared with 30%, respectively) (*Burgu et al., 2009*). Approximately 70% of cryptorchid testes will spontaneously descend, usually by 3 mo of age (*Wenzler et al., 2004*).

Gonadal differentiation

At 3 weeks of gestational age, germ cells migrate from the yolk sac to the urogenital ridges, which are bilateral paramidline structures extending from the T6 through S2 vertebral levels of the developing embryo. The urogenital

ridge is morphologically identical in males and females up to 8 weeks gestation. Before gonadal differentiation, the undetermined gonad lies in a perirenal position and is loosely fixated by the cranial suspensory ligament dorsally and the genitoinguinal ligament ventrally, which will develop into the gubernaculum. Adjacent to the undifferentiated gonad are both mesonephric derivatives of the Wolffian and Müllerian ducts (**Scorer CG, 1964**). See in table (1).

Sexual differentiation begins during the 4th week of embryogenesis. The default gonadal developmental pathway occurs in females: in the absence of androgens, the cranial suspensory ligament continues to develop, maintaining the gonads close to the kidney, while the genitoinguinal ligament and the Wolffian ducts involute. In males, sexual differentiation begins with the testis-determining gene on the Y chromosome by unknown mechanisms, although multiple hormonal influences are postulated. Under these influences, germ cells at the urogenital ridge coalesce to form the primordial testis (**Hutson et al., 1997**).

At approximately 8 weeks gestational age, the Leydig cells begin to secrete testosterone-inducing differentiation of the mesonephric (Wolffian) ducts into the epididymis, vas