

**Risk factors for wound dehiscence after
limited posterior sagittal anorectoplasty in
female patients with low and intermediate
anorectal anomalies**

A Thesis

Submitted for partial fulfillment of
The M.D. degree in **Pediatric Surgery**

By

Ayman Mostafa Allam

M.Sc., M.B, B.CH.

Under supervision of

Prof.Dr. Ayman Ahmad Albaghdady

Professor of Pediatric Surgery

Faculty of Medicine, Ain Shams University

Dr. Ihab Abd El Aziz El Shafei

Assistant Professor of Pediatric Surgery

Faculty of Medicine, Ain Shams University

Dr. Amr Abdelhameed Zaki

Assistant Professor of Pediatric Surgery

Faculty of Medicine, Ain Shams University

Dr. Wael Ahmad Ghanem

Lecturer of Pediatric Surgery

Faculty of Medicine, Ain Shams University

Faculty of Medicine

Ain Shams University

2014



Acknowledgement

First, thanks are all due to **Allah** for Blessing this work until it has reached its end, as a part of his generous help throughout our

My profound thanks and deep appreciation to **Prof. Dr. Ayman Ahmad Albaghdady**, Professor of Pediatric Surgery, Faculty of Medicine, Ain Shams University for his great support and advice, his valuable remarks that gave me the confidence and encouragement to fulfill this work,

I am deeply grateful to **Assistant Prof. Dr. Ihab Abd El Aziz El Shafei**, Assistant Professor of Pediatric Surgery, Faculty of Medicine, Ain Shams University for adding a lot to this work by his surgical experience and for his keen supervision.

I am also thankful to **Assistant Prof. Dr. Amr Abdelhameed Zaki**, Assistant Professor of Pediatric Surgery, Faculty of Medicine, Ain Shams University for his valuable supervision, co-operation and direction that extended throughout this work,

I would like to direct my special thanks to **Dr. Wael Ahmad Ghanem**, Lecturer of Pediatric Surgery, Faculty of Medicine, Ain Shams University, for his invaluable help, fruitful advice, continuous support offered to me and guidance step by step till this thesis finished.

I am extremely sincere to **myfamily** who stood beside me throughout this work giving me their support.

Words fail to express my love, respect and appreciation to **my wife** for her unlimited help and support.



Ayman Mostafa Allam

List of Contents

	Page
List of Abbreviations	i
List of Figures	iii
List of Tables	v
Introduction.....	1
Aim of the Work	5
Review of Literature	6
Chapter 1: Anatomy and embryology.....	6
Chapter 2: Incidence and classifications.....	14
Chapter 3: Associated anomalies	21
Chapter 4: Diagnosis	26
Chapter 5: Management	39
Chapter 6: Post-operative complications	57
Patients and Methods	69
Results	74
Discussion	94
Summary and Conclusion.....	104
Recommendations	106
References	107
Arabic Summary	--

List of Abbreviations

ADA	: Anterior displacement of the anus
AM	: Anterior meningocele
ARMs	: Anorectal malformations
ASARP	: Anterior sagittal anorectoplasty approach
ASD	: Atrial septal defect
CM	: Cloacal membrane
CS	: Currarino syndrome
EAS	: External anal sphincter
EMG	: Electromyography
HSD	: Hirschsprung's disease
IAS	: Internal anal sphincter
IV	: Intravenous fluids
MCU	: Micturating cystourethrogram
NPO	: Nil per os
PC	: Pubococcygeal distance
PDA	: Patent ductus arteriosus
PFO	: Patent foramen ovale

List of Abbreviations (Cont.)

PRS	: Posterior rectal shelf
PS	: Pulmonary stenosis
PSARP	: Posterior sagittal anorectoplasty
SSIs	: Surgical site infections
TOF	: Tetralogy of Fallot
VACTERL	: Vertebral, anal, cardiac, tracheoesophageal, renal and limb anomalies
VSD	: Ventricular septal defect
VUR	: Vesicoureteric reflux

List of Figures

Fig.	Title	Page
1	Normal embryology of the hind gut.	7
2	Muscles of the anal canal.	12
3	Scheme of measurement of the API for females.	28
4	Perineal fistula in females.	28
5	Perineal fistula in a female patient.	28
6	Vestibular fistula in females.	32
7	Vestibular fistula in a female patient.	32
8	Mid-sagittal slice of the pelvis demonstrates the hypothesis for the pathogenesis of constipation in children with anteriorly displaced anus.	35
9	A , Diagram of an ideal descending colostomy. B , Picture of patient with ideal descending colostomy.	43
10	Repair of vestibular fistula.	47
11	Repair of vestibular fistula.	48
12	Repair of vestibular fistula.	48
13	Repair of vestibular fistula.	49
14A	Exposure of the posterior wall of rectum.	53
14B	Exposed posterior wall of rectum. Complete mobilization of the rectum is vital till the rectal and vaginal wall are separated.	53
14C	Perineal body reconstruction.	53
14D	After complete reconstruction.	53
15	Showing superficial dehiscence of the wound without retraction of the neoanus after ASARP for vestibular fistulae.	57
16	Showing complete dehiscence of the wound with retraction of the neoanus after ASARP for vestibular fistulae.	58

List of Figures (Cont.)

Fig.	Title	Page
17	A, Megasisigmoid. B, Colorectal anastomosis after sigmoid resection.	65
18	Grade of recto-sigmoid dilatation in children with or without major dehiscence.	80
19	Incidence of surgery-related injuries in patients with or without major dehiscence.	82
20	Relation between performing protective colostomy and the incidence of wound dehiscence	84
21	Incidence of major dehiscence and dehiscence of any grade in children undergoing standard or extended mobilization.	89
22	Kaplan-Meier curves for the time to wound dehiscence of any grade in children undergoing standard or extended mobilization.	91
23	Kaplan-Meier curves for the time to major wound dehiscence in children undergoing standard or extended mobilization.	93

List of Tables

Table	Title	Page
1	Wingspread Conference classification.	18
2	Peña's classification.	19
3	Size of anal dilators according to age.	55
4	Characteristics of patients with or without major dehiscence.	79
5	Incidence of surgery-related injury in patients with or without major dehiscence.	81
6	Relation between performing protective colostomy and the incidence of wound dehiscence.	83
7	Characteristics of children undergoing standard or extended mobilization.	86
8	Incidence and timing of wound dehiscence in children undergoing standard or extended mobilization.	88
9	Kaplan-Meier analysis for the time to wound dehiscence of any grade.	90
10	Kaplan-Meier analysis for the time to majorwound dehiscence.	92

Introduction

Anorectal malformations (ARMs) are congenital anomalies that occur in approximately 1 in 5000 live births. ARMs comprise a wide spectrum of diseases, which can affect boys and girls, and involve the distal anus and rectum as well as the urinary and genital tracts. Defects range from the very minor and easily treated with an excellent functional prognosis, to those that are complex, difficult to manage, are often associated with other anomalies, and have a poor functional prognosis (**Levitt and Peña, 2007**).

The Krickbeck conference, participants came to the following conclusions. The international Wingspread classification is still useful in the choice of the surgical approach (This classification distinguished between high, intermediate, and low anomalies in the male and female, with special groups established for cloacal and rare anomalies).However, to develop a system for comparable follow-up studies, a modification of the classification of Peña according to the type of the fistula and including rare/regional variants was proposed. The major clinical groups were classified as perineal (cutaneous) fistulas, rectourethral fistulas (prostatic and bulbar), rectovesical

fistulas, vestibular fistulas, cloacal anomalies, patients with no fistula, and anal stenosis. Rare/regional variants were subclassified as pouch colon, rectal atresia/stenosis, rectovaginal fistulas, H-type fistulas and others. This new international classification enables the different operative procedures to be more comparable to each other than with the Wingspread classification (**Peña, 1995**).

Most of the literature concerning management of ARMs is centered on the treatment and outcome of high anomalies. The management of low anomalies has been considered significantly less challenging than high anomalies. Also, the outcome of low anomalies has traditionally been considered good. However, recent more critical long-term follow up reports show a different picture. Many patients with low anomalies suffer from long-term anorectal functional problems, especially constipation but also soiling that occurs in a significant percentage of patients (**Pakarinen and Rintala, 2010**).

Vestibular fistula is the most common form of ARMs in female children and is associated with the best prognosis. It is estimated that 93% of patients with vestibular fistula will develop voluntary bowel movements by the age of 3 years (**Peña and Hong, 2000**).

Also one of the most common ARMs seen in female children is the perineal fistula, which is an anterior opening of the rectum on the perineum. We use the term fistula because the opening is not completely surrounded by sphincter muscle. It is usually narrower than the normal anus, and there is no true anal canal with a pectinate line (**Peña, 2004**).

The posterior sagittal anorectoplasty (PSARP), devised by **Peña and deVries (1982)**, has revolutionized the management of ARMs by providing complete exposure of the anatomy of the anorectal region during surgery. This is the most widely used method and provides exact visualization of the fistula between the rectum and the female genital tract and place the rectum within the confines of the striated muscle complex giving best chance to achieve continence (**DeVries and Peña, 1982**).

LowARM, despite its simplicity, is also likely to have the highest chances of failure leading to severe sequelae if proper reconstruction is not done at the first attempt. The perceived disadvantages of primary repair include wound infection and wound dehiscence. This makes secondary repair difficult because of fibrosis, which further decreases the chances of normal continence. A colostomy is therefore

traditionally advised so as to get the best results (**Peña and Hong, 2000**).

It must be taken into account, however, that colostomies have complications. Besides the extra operation that is needed for colostomy closure (as well as creating one), there are complications such as prolapse, skin excoriation, and the burden for parents in dealing with the colostomy. The question is whether these disadvantages outweigh the protective effect of a colostomy on wound healing after anal reconstruction (**Chandramouli, et al., 2004**).

Aim of the Work

The aim of this study was to identify the risk factors for wound dehiscence after limited posterior sagittal anorectoplasty in female patients with low and intermediate anorectal anomalies in Ain Shams University hospitals.

Anatomy and Embryology

Embryology of the hindgut:

The normal embryology of the hindgut always has been a matter of debate. Two major theories exist to explain the differentiation of the hindgut into the urogenital (ventral) and anorectal (dorsal) part: The theory of the septation of the cloaca; and the theory of the migration of the rectum (**Kluth, 2010**).

The “Anorectal Septum” of the Hindgut:

In very young embryos, the hindgut is a simple structure. Cranially, it is in continuity with the midgut; caudally, it is in direct contact with the ectoderm, thus forming the “cloacal membrane.” When development progresses, the caudal part of the hindgut, the “cloaca,” differentiates into two separate organ systems— the urogenital tract and the anorectal tract (**Kluth, 2010**).

Since the work of Tourneux (**Tourneux, 1888**) and Retterer (**Retterer, 1890**) at the end of the nineteenth century, it has been generally accepted that the normal development of these tracts depends upon the proper subdivision of the cloaca by a septum, the so-called urorectal septum. According to this theory, abnormal septal

development should always result in abnormal cloacal development. However, there is no agreement among investigators about the nature of this septum and the way it develops (Kluth, 2010).

However, it was noted that neither lateral ridges nor signs of fusing lateral wall components could be discerned. Therefore, clear proof of this process of septation is still missing. It is more likely that a normal-looking septum is the result of normal cloacal development rather than its cause (Kluth, 2010).

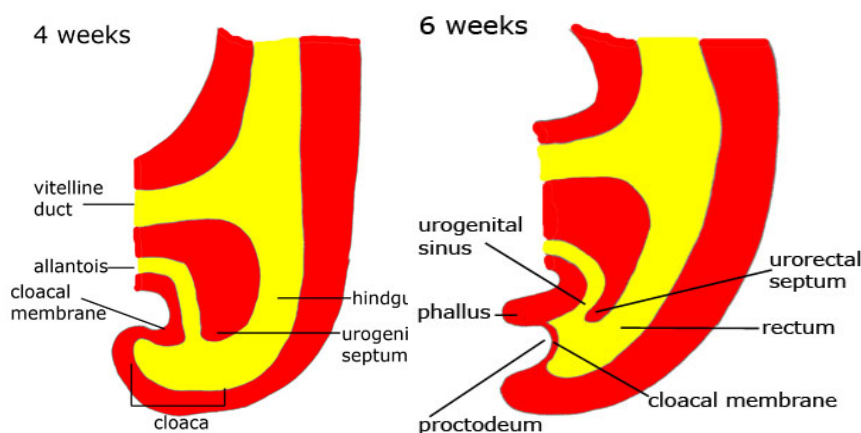


Fig. (1):Normal embryology of the hind gut (Sadler, 2012)

The “migration” of the rectum:

Studying the morphology of anorectal malformations (ARMs) in human newborns, **Bill and Johnson in 1958** and later **Gans and Friedman in 1961** stated that in most forms of ARM the fistula may present an “ectopic” anal