THE ROLE OF ELECTRO-DIAGNOSIS AND THERAPY IN MANAGEMENT OF FECAL INCONTINENCE SECONDARY TO ANORECTAL CONGENITAL ANOMALIES

Thesis
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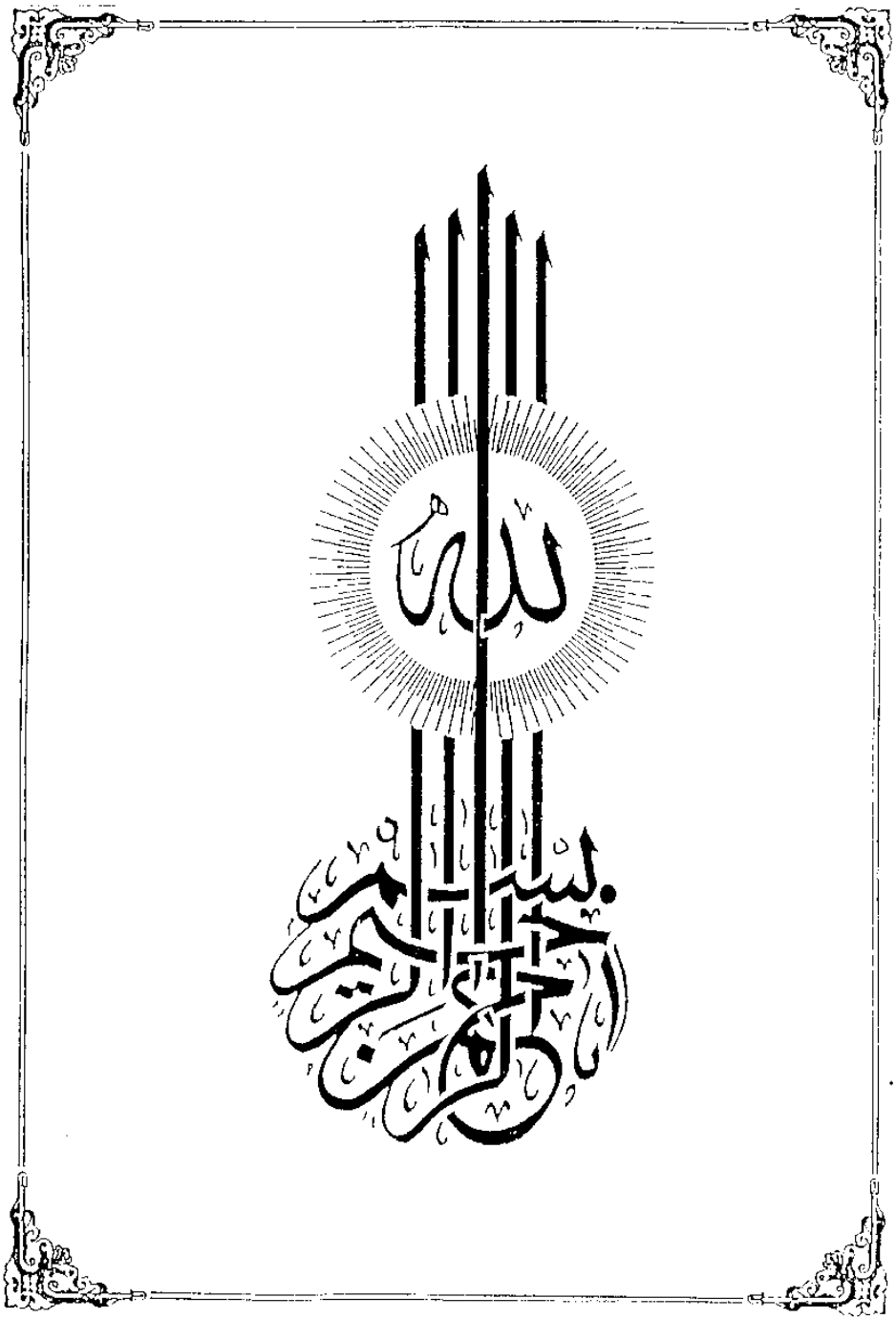
بسم الله الرحمن الرحيم .

﴿ سُبحَانكَ لاعِلمَ لَنآ إلاّ مَاعَلّمتَنآ
إنّكَ أَنتَ العَلِيمُ الحَكِيمُ . ﴾

(سورة البقرة آيه ٣٢)



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CONTENTS

LIST OF ABBREVIATIONS

EAS	:	External anal sphincter.
EMG	:	Electromyography.
ES	:	Electrical stimulation.
HS	:	Highly significant
IP	:	Interference pattern.
LA	:	Levator ani.
M	:	Mean amplitude per turn.
MUAPs	:	Motor unit actin potentials.
NS	:	Not significant
P	:	Probability
Post-op.	:	Post-operative.
PR	:	Puborectalis.
Pre-op.	:	Pre-operative.
PSARP	:	Posterior sagittal anorectoplasty.
r	:	Correlation coefficient
S	:	Significant
Sign.	:	Significance
T	:	Number of turns per second.
t	:	Student's "t" test

INTRODUCTION

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Malformations of the anorectum are relatively common congenital anomalies. Their reported incidence ranges from 1 in 3500 to 1 in 5000 live births **(Grosfeld, 1991)**.

As development of the neuromuscular structures essential to fecal continence parallels the embryologic development of the rectum and anus **(Templeton and O'Neill, 1986)**, many patient with congenital anorectal anomalies have problems with continence. There is great variability in the presence of striated muscle from patient to patient. Some patients have weak musculature, whereas some have nearly normal muscle. The presence or lack of underlying sacral and neurologic abnormalities also plays a role in the success or failure in development of continence **(Grosfeld, 1991)**.

Surgical management of anorectal anomalies depends on the child's sex and the precise diagnosis of the level of the lesion. A low lesion can be treated in the newborn period with some type of anoplasty without the need for a colostomy; all other lesions require an initial diverting colostomy prior to surgical correction **(Skandalakis et al., 1994)**.

The results in treating patients are graded according to the level of continence achieved **(Skandalakis et al., 1994)**. A number of methods to assess continence have been developed and include subjective (e.g. good, fair, poor), numerical [e.g. the Kelly score based on fecal leakage,

rectal sensation, and normal levator indentation on contrast enema studies **(Kelly, 1972)]**, and a variety of physiologic evaluations.

Many authors have stressed the importance of electromyography (EMG) and perineal electro-stimulation in physiologic assessment of patients **(Taylor et al., 1973)**. Also, EMG sphincter muscle mapping can accurately determine the site and activity of the external anal sphincter muscle and locate the central muscle complex to house the anoplasty **(Schouten and Gordon, 1992)**.

Other investigators have studied the role of electric stimulation in the control of fecal incontinence. **Pescatori et al. (1991)** stated that transanal electrostimulation is accepted by the patients, and is followed by positive emotional response and improvement in the striated sphincter function. Interferential therapy has been used extensively in the treatment of stress incontinence, as it is possible by placing the electrodes on the lower abdomen and inner thigh to produce a good strong contraction of the pelvic floor **(Forster and Palastanga, 1988)**.

However, up to our knowledge, the role of preoperative electric stimulation in strengthening the existing musculature in children with anorectal anomalies has not been studied yet. Also, no trials have been made to evaluate the effect of combined electric stimulation with low frequency current (to the external anal sphincter) and medium frequency current (to the deep pelvic floor muscles) in these children.

One of the aims of our study is to assess the effect of combined pre and post-operative electrotherapy to determine if it is better to operate on electrically stimulated external anal sphincter and pelvic floor muscles, and also to determine the role of combined electric stimulation in strengthening of these muscles.

AIM OF THE WORK

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The aim of this work was to:

1) Assess the diagnostic and prognostic role of EMG of the external anal sphincter and pelvic floor muscles in children born with anorectal anomalies.

2) Assess the role of electrical stimulation to the sphincter muscles when applied pre and/or post-operatively in the control of fecal incontinence in those children.

REVIEW OF LITERATURE

ANORECTAL ANATOMY

1- Anatomy of the rectum:

The rectum is continuous with the sigmoid colon at the level of the third sacral vertebra. It descends along the curvature of the sacrum and coccyx and ends by passing through the levator ani muscle at which level it abruply turns downwards and backwords to become the anal canal **(Nivatvongs and Gordon, 1992)**. This anorectal angle which is maintained by the puborectalis sling has been regarded as an important mechanism in maintaining continence **(Duthie, 1984)**. It is about 12cm long **(McMinn, 1994)**.

The rectum describes three lateral curves: The upper and lower curves are convex to the right, and the middle is convex to the left side **(Nivatvongs and Gordon, 1992)**.

Nerve supply:

The rectum has dual autonomic innervation. The sympathetic (inhibitory) supply is derived from branches directly from the hypogastric plexuses and by fibres which accompany the inferior mesenteric and superior rectal arteries from the coeliac plexus. The parasympathetic supply comes from S_2 and S_3 (or S_3 and S_4) by the pelvic splanchnic nerves, which are motor to the rectal muscle. As from the bladder, pain fibres appear to accompany both sympathetic and parasympathetic supplies **(McMinn, 1994)**.

2- Anatomy of the anal canal:

The anal canal begins at the anorectal junction and terminates at the anal verge. It is about 4cm long. The muscles of the anal canal can be regarded as forming "a tube within a funnel" **(McMinn, 1994)** (Fig.1). The sides of the upper part of the funnel are the levator ani muscles, and the stem of the funnel is the external anal sphincter which is continuous with the levator ani and there is no way to determine the limit between both structures. So, the term "muscle complex" has been used for the intermediate undetermined portion of muscle between levator and external sphincter **(Pena, 1988a)**. The tube inside the stem of the funnel is the internal anal sphincter, and internally lies the submucosa and mucous membrane **(McMinn, 1994)**.

Never Supply:

The (Somatic) inferior rectal branches (S_2) of the pudendal nerves supply the external sphincter and also provide the sensory supply for the lower end of the anal canal which like skin is highly sensitive while the autonomic nerves pass to the internal sphincter and the upper end of the anal canal **(McMinn, 1994)**.

3- Muscles of the anorectal region:

1) Pelvic floor muscles:

The pelvic floor consists of a gutter-shaped sheet of muscle, the pelvic diaphragm,which slungs around the midline body effluents (urethra and anal canal and, in the female, the vagina). The muscles of the pelvic floor are called coccygeus and levator ani, but it is better to regard them as one morphological entity, ischiococcygeus, iliococcygeus, and pubococcygeus from behind forwards. They arise in continuity from the spine