Clinical Value of Ultrasonic Examination of the Contralateral Side of Pediatric Patients with Congenital Inguinal Hernia

Thesis

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Dedication

Words can never express my sincere thanks to **My Family and My Loving Wife** for their generous emotional support and continuous encouragement, which brought the best out of me. I owe them all every achievement throughout my life.

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List of Abbreviations

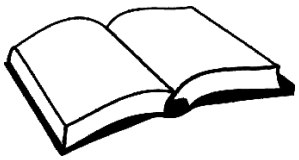
Abb.	Full term
ASIS	Anterior Superior Iliac Spine
CIH	Contralateral Inguinal Hernia
CPPV	Contralateral Patent Processus Vaginalis
CT	Computed Tomography
LH	Left Hernia
MCIH	Metachronous Contralateral Inguinal Hernia
MRI	Magnetic Resonance Imaging
NICU	Neonatal Intensive Care Unit
PPV	Patent Processus Vaginalis
PV	Processus Vaginalis
RH	Right Hernia
SGS	Silk Glove Sign
US	Ultrasonography

Abstract

In this research, 110 infants and children (96 boys and 14 girls) with clinically diagnosed unilateral inguinal hernia, with ages ranging from 1 month to 11 years, were subjected to preoperative ultrasonographic examination on the contralateral asymptomatic side. The examination revealed the presence of a hernia sac (or patent processus vaginalis) in the contralateral groin in 39 cases (35.5%). Those with positive ultrasonographic findings "such as viscera or fluid in inguinal canal or widening of the internal inguinal ring", underwent surgical exploration of the contralateral side, and a true hernia sac was detected in 36 of them (92.3%). The other cases were followed up for a period ranged from 6 months to one year and a hernia appeared in the contralateral side in 2 boys of them.

The research demonstrated the importance of ultrasonic examination of the contralateral side in pediatric patients with a unilateral inguinal hernia especially in the first 2 years of life since it is noninvasive, cheap, available and reliable. Its accuracy in detecting the contralateral clinically inapparent inguinal hernia in pediatric patients is up to 95.5% which prevents a great percentage of children from being exposed to another surgical procedure.

Keywords: Inguinal Hernia – Metachronous Hernia – Contralateral Hernia – Occult Hernia – Ultrasonic.



Introduction

INTRODUCTION

The word "hernia" is derived from a Latin term meaning "a rupture". The earliest reports of abdominal wall hernias date back to 1500 BC. During this early era, abdominal wall hernias were treated with trusses or bandage dressings ***(Zinner and Ashley., 2012)***.

The incidence of pediatric inguinal hernia ranges from 0.8 to 4% in children and is highest in infants, especially in premature children, and decreases as children age. If left untreated, one of the major complications of inguinal hernia is incarcerated hernia, which is an emergency that can lead to intestinal gangrene and gonadal atrophy ***(Chang et al., 2016).***

Inguinal hernia repair is performed on an elective basis, except in patients who have experienced with incarceration. Some studies advocate early intervention to prevent incarcerated hernia because prematurity and prolonged waiting after diagnosis were reported be significant risk factors ***(Zamakhshary et al., 2008).***

The incidence of inguinal hernia in females is 1.9%, the ratio of boys to girls being 6:1. The site of presentation being 68.1% on the right side, 23.4% on the left and 8.5% bilateral. About 15-20% hernias in infant girls contain ovary and Fallopian tube ***(Karabulut., 2011).***

In term infants, the processes vaginalis is usually closed at birth, but it remains patent in 15% to 37% of people. In

premature infants, the incidence of closure is much higher, depending on the gestational age at the time of birth. The continued patency of the processus vaginalis (PV) is the principal factor in the development of congenital hernias and hydroceles ***(Davis and Cladis., 2016).***

A long standing and still unanswered problem concerns the evaluation of the contralateral side of the groin in infants and children who have an inguinal hernia manifest on only one side, since clinically inapparent inguinal hernia can be found on the opposite side in many of them ***(Moss and Am., 1991).***

In one large study with an average follow-up interval of 20 years after a unilateral hernia repair in childhood, a contralateral hernia ultimately develop in 29% of patients. In other study, 47% of the children who underwent a unilateral repaired within their first year of life ultimately required reoperation on the opposite side ***(Skinner and Grosfeld., 1993).***

Therefor some surgeons routinely perform bilateral inguinal exploratory surgery regardless of clinical findings, while others prefer to operate only on the side that clinically manifests a hernia ***(Chou et al., 1996).***

Several methods have been advocated to minimize the frequency of negative exploration of the contralateral side in children presenting with a unilateral congenital inguinal hernia, such as herniography, diagnostic pneumoperitoneum, intra-operative laparoscopy, and recently ultrasonography ***(Hashish and Mashaly., 2006).***

Intraoperative pneumoperitoneum by oxygen insufflation was attempted to determine the presence of a contralateral patent processus vaginalis (CPPV), but the results were not encouraging ***(Curses et al., 1994).***

Laparoscopy was introduced as a tool for the diagnosis of CPPV. If CPPV is observed laparoscopically, the PPV can be repaired through a groin incision or laparoscopy. Trans-inguinal laparoscopy (inguinoscopy) has been shown to be a safe, accurate and effective method of evaluating the contralateral side ***(Lee et al., 2015).***

Ultrasonography (US) is so widely available, noninvasive, rapid, reliable, convenient and easily performance screening technique for inguinal hernias in infants and children. It can also decrease the time of diagnosis, provide prognostic information, and used to perform therapeutic intervention. It can provide up to 100% accuracy rate for preoperative diagnosis of direct inguinal hernia, which could be misdiagnosed by clinical examination ***(Karen and John., 2015).***

Establishing accurate sonographic criteria for inguinal hernia and PPV is an important tool for the pediatric surgeon to plan the approach before groin surgery ***(Erez et al., 2002)***.

The low incidence and benign nature of contralateral hernia development in infants undergoing a unilateral inguinal herniotomy does not justify routine contralateral groin exploration ***(Ballantyne et al., 2001).***