

LAPAROSCOPIC REPAIR OF DIAPHRAGMATIC DEFECTS IN INFANTS AND CHILDREN

THESIS

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List of Abbreviations

3D	:	Three Dimension
5PDE	:	5 Phosphodiesteras
CBC	:	Complete blood count
CBH	:	Congenital Bochdalek hernia
CDD	:	Congenital diaphragmatic defect
CDE	:	Congenital diaphragmatic eventration
CDH	:	Congenital diaphragmatic hernia
CMH	:	Congenital Morgagni hernia
CT scan	:	Computerized Tomography scan
ECMO	:	Extracorporeal membrane oxygenation
FGF10	:	Fibroblast growth factor 10
FRC	:	Functional residual capacity
GERD	:	Gastro-esophageal reflux disease
IAP	:	Intra-abdominal pressure
MCL	:	Mid-Clavicular-Line
MIS	:	Minimally invasive surgery
MRI	:	Magnetic resonance imaging
NICU	:	Neonatal intensive care unit
PA	:	Postero-anterior
PCP	:	Provoked controlled pneumothorax
PHTN	:	Pulmonary hypertension
PIP	:	Peak inspiratory pressure
PPHN	:	Persistent pulmonary hypertension in neonates
SEM	:	Standard error of the mean
US	:	Ultrasound

ABSTRACT

Congenital diaphragmatic defects discussed in the current study include, posterolateral defect (Bochdalek hernia), anterior retrosternal or parasternal defect (Morgagni hernia), and diaphragmatic eventration. Although they are usually asymptomatic, congenital diaphragmatic defects may be diagnosed early in the newborn period. In infants and older children, they are diagnosed incidentally or when they become symptomatic. The repair of congenital diaphragmatic defects is indicated in all stable newborns; and symptomatic infants and children.

The current study includes, 70 cases of congenital diaphragmatic defects, (35) Bochdalek and (15) Morgan hernia and 20 cases of diaphragmatic eventrations, repaired laparoscopically. The results of the operations were satisfactory with cure defined with radiological image after one month.

The use of laparoscopy in the repair procedure is advocated, because it is a safe and effective method. Benefits include that it provides an excellent view of the surgical field, ease of execution, minimal surgical trauma, excellent cosmetic results, rapid recovery and shorter hospitalization stay.

Keywords :

Laparoscopy - Thoracoscopy - Neonate-children , congenital diaphragmatic defects-minimally invasive surgery.

INTRODUCTION

Surgical procedures are frequently performed on the diaphragm in children. The diseases associated with this organ may be either congenital or acquired.

A. Congenital.

1. Bochdalek Posterolateral diaphragmatic hernia and its variant.
2. Morgagni Anterior hernia.
3. Congenital eventration of the diaphragm.
4. Paraesophageal hernia.

B. Acquired:

1. Phrenic nerve paralysis.
2. Traumatic rupture.

The development of minimally invasive surgery brought about a significant change in the surgical repair of these diaphragmatic conditions. Now there is more clinical experience available, in the near future most diaphragm-related problems will be amenable to Laparoscopic or thoracoscopic repair.

This study will concentrate on the approach to diaphragmatic defect through the use of the laparoscopic repair, and will concentrate also on the upper three congenital diaphragmatic defects.

The current study dealt with the diaphragmatic defects (Morgagni and Bochdalek hernias and diaphragmatic eventration), other than hiatus hernia which was excluded as it was subjected to study and analysis with its type, variants and different modalities of management in another study running at the time parallel to the current study.

Bochdalek Posterolateral diaphragmatic hernia and its variants :

Background and development of surgical techniques :

Although in 1848 Vincent Bochdaleck, an anatomist, described two cases of diaphragmatic hernia, it was in 1902 that Heidenhaim first successfully repaired a diaphragmatic hernia in a 9- year old child.

Thirty-eight years later, Ladd and Gross successfully performed surgical operation of the defect in a 40- hour-old infant.

This was followed by an increase in survival until 1950s and 1970s when despite the fast development of neonatal intensive care units, an increase in mortality was observed. Improvement in prenatal diagnostic techniques with particular emphasis on sonography- served to emphasize this observation.

The medical community slowly came to the conclusion that what seem to be a simple anatomical defect, able to be surgically repaired, represented a complex embryological pathophysiology resulting in bilateral pulmonary hypoplasia with pulmonary hypertension (*Ferro, 2002*).

The concept of hidden mortality described in 1978 revealed that, in fact, the number of patients dying of this pathology was significantly

higher than that observed in major referral centers, given that many patients died before birth or in the immediate perinatal period, and many of them died untreated.

Successful techniques such as high-frequency ventilation, nitric oxide and extra-corporeal membrane oxygenation (ECMO), which were implemented through the years for the treatment of severely affected neonates, failed to decrease the rate of mortality of this serious malformations that is currently observed in 50% of the affected cases.

Surgical techniques are divided into those designed to repair the defect before birth (fetal surgery) and postnatal techniques. In this study we concentrate on postnatal techniques via minimally invasive surgery (MIS).

Postnatal techniques, remained unchanged from the 1950s to the advent of minimally invasive surgery (MIS).

In 1995 Vander Zee described the laparoscopic surgical repair of a congenital posterolateral hernia in a six month-old infant. Thereafter, video-assisted repair become the method of choice for non-severely affected patients in those centers highly specialized in these techniques (*Ferro, 2002*).

Morgagni Retrosternal hernia :

Embryology and incidence :

Morgagni hernia, also known as retrosternal or parasternal hernia, is located anterolaterally in the area embryologically belonging to the junction between the septum transversum and the chest wall. This condition