



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



HANAA ALY



Role of ultrasound guided hydrostatic reduction as alternative therapeutic method in management of intussusception in children

A Thesis

*Submitted for Partial Fulfillment of Master's Degree in
Radiology*

Presented by

Cherouk Hatem Abd El Aziz Zaki

M.B.B.CH. – Ain Shams University

Supervised by

Prof. Dr. Abeer Maghawry Abd El-Hameed

Professor of Radiodiagnosis

Faculty of Medicine

Ain Shams University

Dr. Mona Gamalludin Alkaphoury

Lecturer of Radiodiagnosis

Faculty of Medicine

Ain Shams University

Faculty of Medicine

Ain Shams University

2021

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببنا أنك لا تعلم لنا
إلا ما علمتنا أنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

Acknowledgment

*First and foremost, I feel always indebted to **ALLAH**,
the Most Kind and Most Merciful.*

*I would like to express my deepest appreciation and
gratitude to **Prof. Dr. Abeer Maghawry Abd El-
Hameed**, for her sincere encouragement, constant advice and
valuable guidance throughout the performance of this work.*

*I owe special thanks and appreciation to Lecturer
Dr. Mona Gamalludin Alkaphoury, for her supervision
and continuous advice which gave me the best guidance during
different stages of this work.*

*Finally, I cannot forget to thank my professors, my family,
and my colleagues, for their support and encouragement.*

Contents

Title	Page No.
List of Abbreviations.....	i
List of Tables	ii
List of Figures	iii
Introduction	1
Aim of the Work.....	3
Review of Literature	
Gross Anatomy of the Small Intestine	4
Gross Anatomy of the Large Intestine	11
Sonographic Anatomy of the Intestine	19
Pathophysiology of Intussusception	27
Clinical Features and Diagnosis	31
Radiological Appearance of Intussusception.....	32
Treatment.....	39
Patients and Methods.....	47
Results	52
Illustrative Cases	66
Discussion	72
Summary & Conclusion	80
References	81
Arabic Summary	—

List of Abbreviations

Abb.	Full term
US.....	Ultrasound
PLP	Pathological leading point
USGHR.....	Ultrasound guided hydrostatic reduction

List of Tables

Table No.	Title	Page No.
Table (1):	Predisposing factors in the development of pediatric intussusception.....	30
Table (2):	Advantages and Disadvantages of Air Enema Therapy	41
Table (3):	Advantages and Disadvantages of Barium Enema Therapy	43
Table (4):	Comparison between hydrostatic reduction and surgical manual reduction and resection anastomosis in a study that included 100 patient	46
Table (5):	Descriptive data regarding age and gender.....	52
Table (6):	Descriptive data regarding symptoms (vomiting, constipation) and duration of symptoms.....	53
Table (7):	Descriptive data regarding signs (mass and rectal bleeding).....	54
Table (8):	Descriptive data regarding types of intussusception detected by ultrasound.	55
Table (9):	Descriptive data regarding reduction trials and duration of the procedure.	56
Table (10):	Descriptive data regarding improvement.	57
Table (11):	Relation of improvement with age and gender.....	58
Table (12):	Relation of improvement with vomiting, constipation and duration of symptoms.	59
Table (13):	Relation of improvement with mass and rectal bleeding.....	61
Table (14):	Relation of improvement with type of intussusception detected by ultrasound.	63
Table (15):	Relation of improvement with reduction trials and duration of the procedure.	64

List of Figures

Fig.No.	Title	Page No.
Figure (1):	Three sections of the small intestine	4
Figure (2):	Plicae circulares are transverse folds of mucosa and submucosa that aid in absorption.....	6
Figure (3):	Arterial supply and arcades of small bowel.....	8
Figure (4):	Macroscopic characteristics of the colon	12
Figure (5):	Cecum and appendix position.....	13
Figure (6):	Histology of small and large intestine.....	18
Figure (7):	On ultrasound the 4 layers have distinct echogenicity	20
Figure (8):	Normal small bowel ultrasound.....	20
Figure (9):	Normal small bowel.....	21
Figure (10):	Thickened and stratified bowel walls with hypertrophy of the mucosal and sub-mucosal strata and increased number of folds due to amyloid deposition	22
Figure (11):	Compare a normal terminal ileum and a Crohn's ileum, without compression and with compression (lower images).....	22
Figure (12):	Sonographic appearance of normal small bowel.....	23
Figure (13):	(a) Transverse image of the affected small intestinal loop showing no signal on Doppler; (b) Compared with normal looking adjacent segment of small intestine showing clear Doppler signal	23
Figure (14):	Anatomy	24

List of Figures Cont...

Fig. No.	Title	Page No.
Figure (15):	Cross section of empty distal descending colon with minimal air outlining the lumen (open arrow), showing the three sonographic layers from outer to inner	25
Figure (16):	Normal colon filled with feces	25
Figure (17):	(A) Grey scale ultrasound image shows concentric wall thickening and blurring of normal mural stratification in colon, (B) Power Doppler image reveals marked hyperemia in affected segment denoting colitis	26
Figure (18):	Showing part of the intestine telescoping into the adjacent part of the intestine	28
Figure (19):	Intussusception	29
Figure (20):	Shows a large soft tissue opacity in the right upper quadrant which appears to bulge into what is presumably the transverse colon	32
Figure (21):	Crescent sign: Semilunar lucency within the course of the colon (especially the transverse colon) beyond the hepatic flexure, which is wider than normal bowel in diameter and represent intestinal gas trapping between the two intestinal surfaces caused by stretching of the bowel wall	33
Figure (22):	Barium enema study showing head of intussusception (arrow) and interruption of contrast at the site of invagination	34

List of Figures Cont...

Fig. No.	Title	Page No.
Figure (23):	The appearance of target sign is generated by concentric alternating hyperechoic and hypoechoic bands.....	35
Figure (24):	The lead point of the invagination in the distal loop of bowel resembles a kidney.....	36
Figure (25):	Vascularity on Colour Doppler application in case of Ileocolic intussusception	36
Figure (26):	Axial CT of the abdomen shows the presence of a bowel-within-bowel configuration with mesenteric fat and vessels, characteristic for intussusception	38
Figure (27):	Ileocolic intussusception in a 4-year-old child	41
Figure (28):	Meniscus and coiled spring signs).	43
Figure (29):	US-guided saline enema therapy.....	44
Figure (30):	This pie chart shows that 68.2 % of cases were males and that 31.8 % of cases were females.....	52
Figure (31):	This bar chart shows that 81.8 % of cases were presented with vomiting and 31.8 % of cases were presented with constipation.....	53
Figure (32):	This bar chart demonstrated that there was a palpable abdominal mass on examination in 36.4 % of cases and that 86.4 % of cases came with rectal bleeding.....	54

List of Figures Cont...

Fig. No.	Title	Page No.
Figure (33):	This pie chart shows that on ultrasound scan 81.8% of cases were ileocolic type of intussusception, while 9.1 % of cases were of the ileoileocolic type and 9.1 % of cases were of the ileoileal type.	55
Figure (34):	This pie chart shows that ultrasound guided reduction done from the first attempt was 81.8%, 13.6 % from the second attempt and 4.5% from the third attempt.	56
Figure (35):	This pie chart shows the 81.1 % of cases were improved after the ultrasoung guided htdrostatic reduction while 18.2% didn't improve.	57
Figure (36):	This bar chart shows the percentage of improvement as regard gender of the patient where 22.2% of improved cases were females while 77.8% of improved cases were males.	58
Figure (37):	This bar chart shows that 83.3% of cases that were presented with vomiting got improved and that 27.8% of patients that were presented with constipation improved.	60
Figure (38):	This bar chart shows the relation of improvement with palpable mass where 44.4% of cases that were presented with abdoimnal masses got improved and that 55.6% of cases without abdominal mass on examination didn't improve.	62

List of Figures Cont...

Fig. No.	Title	Page No.
Figure (39):	This bar chart show the relation of improvement with rectal bleeding where all the cases that were presented with rectal bleeding showed 100% improvement and 75% of cases with abscent rectal bleeding didn't improve.	62
Figure (40):	This bar chart shows the relation of improvement with the type of intussusception where 88.9 % of cases that improved where of the ileocolic type and 5.6 % of cases that improved were of the ileoileocolic type and 5.6 % of cases that improved were ileoileal type.	63
Figure (41):	This bar chart shows the relation of improvement with number of reduction trials where 77.8% of cases improved from the first trial, 16.7% improved after the second trial and 5.6% improved after the third trial.	65
Figure (42):	(A) Ileo colic intussusception is seen in the mid transverse colon with the characteristic target sign (B) Color Doppler application reveals intact vascularity in bowel wall.....	66
Figure (43):	Showing the technique of ultrasound guided hydrostatic reduction with gradual resolution of the intussusception and free flow of saline in terminal ileum.....	67

List of Figures Cont...

Fig. No.	Title	Page No.
Figure (44):	(A): The classic doughnut sign of intussusception in seen (B) Viable bowel wall on color Doppler assessment.....	68
Figure (45):	Successful Ileoileocolic intussusception hydrostatic reduction under Ultrasound guidance with total disappearance of intussusception.....	68
Figure (46):	Intussusception: Pseudo kidney sign. Ultrasound appearance of longitudinal section of the intussuscepted bowel. Echogenic mesentery herniated along the Intussusciens appears like hilum of the kidney.	69
Figure (47):	After reduction, the intussusception mass is no longer evident. Fluid separates the leaflets of the ileocecal valve and fills distal small bowel loops.	69
Figure (48):	Right hepatic flexure shows large complex mass where bowel loop is seen invaginated into another bowel.	70
Figure (49):	Successful reduction of intussusception after two trials, with free flow of the saline into the terminal ileum.....	70
Figure (50):	Ileoileal intussusception was seen at the left paraumbilical region with normal central and peripheral vascularity on Doppler application.	71
Figure (51):	Failed hydrostatic reduction under ultrasound guidance, where the intussusception didnt resolve and there were no free flow of saline reaching the terminal ileum.	71