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Original Article

Sonographic Findings in Children Presenting with Acute Abdominal Pain at Meer Children and Family Clinic, Lahore

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ABSTRACT

Acute abdominal pain is a frequent complaint in children. Acute abdominal pain is severe, sudden, and persistent pain requiring immediate medical attention. Acute abdominal pain can arise in any of the four quadrants of the abdomen. **Objective:** To evaluate sonographic findings in children presenting with acute abdominal pain. **Methods:** Descriptive study was conducted at the Department of Radiology, Meer Children and Family Clinic. Data from 255 participants were designated as done suitable sample method. Data were analyzed by SSPS version-26.0. **Results:** Out of a total number of 255 patients, which presented with acute abdominal pain 56 (41.5%) males and 47 (39.2%) females had a normal scan. The most prevalent disease was splenomegaly which was observed in 10 (3.9%) patients. 8 (3.1%) patients had an inguinal hernia, 8 (3.1%) had lymphadenopathy, 9 (3.5%) had excessive bowel gas, 20 (7.8%) had mesenteric lymphadenopathy, 17 (6.7%) had acute appendicitis and 17 (6.7%) had ascites. **Conclusions:** Our study concluded that most of the children coming for an abdominal ultrasound with acute abdominal pain had a normal scan. The most common sonographic findings were mesenteric lymphadenitis, splenomegaly, and ascites.

INTRODUCTION

Acute abdominal pain is a frequent complaint in children [1]. Acute abdominal pain is severe, sudden, and persistent pain requiring immediate medical attention [2]. Numerous disorders can cause abdominal pain [3]. It is usually a self-limiting, benign condition, such as in gastroenteritis, constipation, or viral illness [4]. The challenge for the physician is to identify children who have uncommon and potentially life-threatening conditions that require urgent evaluation and treatment, such as appendicitis, intussusception, volvulus, or adhesion [5]. However, the most common non-surgical condition for acute abdominal pain in children is gastroenteritis, while appendicitis is the most common surgical condition [6]. Approximately 25% of all children will be brought to medical attention for abdominal pain by the age of 15 years; however, only 5% of the patients will likely require hospitalization, and fewer yet, surgical intervention. As many as 10% of children may experience recurrent abdominal pain. Early diagnosis and treatment of the underlying cause of acute abdominal pain is crucial for symptom relief and improving patients' quality of life [7]. Certain complications can result in response to unattended acute abdominal pain that can be life-threatening. These complications comprise hemorrhage, obstruction, or perforation of the gastrointestinal tract or

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intra-abdominal organs as well as rupture of intra-abdominal organs such as the appendix which can lead to peritonitis. Perforations can lead to various infections in the body infections developing sepsis. Rupture or perforation of intra-abdominal organs can also lead to hypovolemic shock due to excessive blood loss and eventually death. Due to the high risk of life-threatening complications, diagnosing the underlying cause of acute abdominal pain is necessary. Acute abdominal pain in children presents a diagnostic dilemma [8]. Laparoscopy, despite its efficacy in the diagnosis of various acute abdominal conditions, is reserved as a second-line investigation method due to the risk of surgical invasiveness [9]. CT has a few major drawbacks. The patient is exposed to a certain radiation dose. The equipment is bulky and non-mobile; the procedure is time-consuming, requires sedation and the results are sometimes difficult to interpret in children due to the paucity of abdominal fat. These factors limit its use in emergency settings [10]. Radiographs are inexpensive, readily available, and easy to obtain. However, in cases of appendicitis as the underlying cause, radiographs are relatively insensitive and non-specific, particularly regarding the diagnosis. The radiation dose incurred, albeit very small, is also a disadvantage [11]. Sonography is often selected as the initial imaging modality in a child with abdominal pain [1]. It is quick, inexpensive, readily available, and highly reliable [12]. It does not involve the use of ionizing radiation, which is a major advantage [13]. Furthermore, it is a non-invasive procedure and less time-consuming. The ultrasonographic examination gives important information about various organs of the abdomen which includes the biliary tract, gall bladder, liver, spleen, pelvis, and kidneys. Further, it helps in the diagnosis of ascites, conditions of bowel, peristalsis, and abdominal collections. The procedure also doesn't require the need for general Anaesthesia [14]. Sonography is performed in real-time allowing for discourse between the sonographer or radiologist and the patient and parent [15]. This allows for the correlation of sonographic findings with physical examination findings and directed scanning based on information provided by the patient or his or her parent [16]. Ultrasound provides excellent soft tissue contrast and resolution making it a first-line option for direct scanning. Hence, ultrasonography is best suited for children, not only because of its non-invasive nature and cost-effectiveness but also because it doesn't expose children to the danger of radiation [9].

The following study contributes to the body of knowledge regarding sonographic findings in children presenting with acute abdominal pain at Meer children and Family Clinic in Pakistan. The results of this study have indicated that most of the children referred to the sonography department presenting with acute abdominal pain had no significant disease. However, the most common sonographic findings were mesenteric lymphadenitis, splenomegaly, excessive bowel gas and ascites.

METHODS

In this descriptive study, during the time period of 4 months, 255 patients were examined in the ultrasound department at Meer children and Family Clinic, Lahore. The sampling method used in the study was convenient sampling. GE logiq P5 Ultrasound Machine was used. Abdominal Ultrasound followed by sonography protocols was performed on these patients. Patients were scanned in fasting and fed state in supine and lateral positions. Inclusion criteria involved both genders. Patients of ages 1 to 13 years were included in this study. Exclusion criteria focused on patients having a known chronic disease. After the approval of the synopsis, a descriptive study was done at Meer children and Family Clinic, Lahore. Quantitative variables i.e., age and gender were recorded on data collection sheets. All collected data were entered in SPSS version 26.0. After determining if the patient needed an ultrasound, the patient was sent to the radiology department where he or she was scanned in accordance with the Ultrasound guidelines. The ultrasound scans were performed by either an experienced consultant radiologist or sonographer using a convex transducer and long and short axis view. Data were analyzed and presented in the form of tables, bar charts and histograms.

RESULTS

In the period of 4 months, a total of 255 patients presented in the ultrasonography department of Meer children and Family clinic with acute abdominal pain. There were 120 female patients and 135 male patients out of 255 total patients. The minimum age was 1 year, and the maximum age was 13 years. 56(41.5%) of the males had a normal scan, and 47(39.2%) a female had a normal scan, out of 255 patients. The most prevalent disease splenomegaly was observed in 10 (3.9%) patients. 8 (3.1%) patients had an inguinal hernia, 8 (3.1%) had lymphadenopathy, 9 (3.5%) had excessive bowel gas, 20 (7.8%) had mesenteric lymphadenopathy, 17 (6.7%) had acute appendicitis and 17 (6.7%) had ascites. Different results were noted. The following table represents that there were 103 (40.4%) patients had a normal scan, out of which 56(41.4%) were male and 47(39.2%) were female, while pathologies were noted in 152(59.6%) %patients. These pathologies included 2 (0.8%) vesical calculous, 1(0.4%) superficial skin edema, 1(0.4%) GB sludge, 1(0.4%) inguinal canal cyst 4 (1.6%) of the 255 patients had a history of right nephrolithiasis, 1 (0.4%) right hydronephrosis, 5 (2.0%) umbilical hernia, 17 (6.7%)

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acute appendicitis, 8 (3.1%) inguinal lymphadenopathy, 2 (0.8%) renal cysts, 1 (0.4%) intestine cyst, 3 (1.2%) urolithiasis, 1 (0.4%) lymphoma, 1 (0.4%) left lobe hepatic cyst, 2 (0.8%) solitary gut loops, 2 (0.8%) hepatomegaly, 1 (0.4%) hepatic hemangioma, 3 (1.2%) inguinal abscess collection, 8 (3.1%) inguinal hernia, 1 (0.4%) of the 255 hepatic mass, 2 (0.8%) renal stone, 1 (0.4%) acute cystitis, 1 (0.4%) hernia, 20 (7.8%) mesenteric lymphadenopathy, 10 (3.9%) splenomegaly, 6 (2.4%) pyloric stenosis, 17 (6.7%) ascites, 1 (0.4%) right hydroureter, 6 (2.4%) hepatic cyst, 6 (2.4%) acalculous cholecystitis, 1 (0.4%) ureteric stone, 4 (1.6%) distended gut loops, 3 (1.2%) mesenteric lymphadenitis, 4 (1.6%) GB stone and 9 (3.5%) excessive bowel gas.

Table 1: Frequency distribution of sonographic findings

Ultrasound findings	Male Frequency (%)	Female Frequency (%)	Total
Normal scan	56 (41.5)	47 (39.2)	103
Hepatomegaly	0 (0)	2 (1.7)	2
Hepatic cyst	4 (3.0)	3 (2.5)	7
Hepatic hemangioma	1 (0.7)	0 (0)	1
Hepatic mass	1 (0.7)	0 (0)	1
Cholelithiasis	2 (1.5)	2 (1.7)	4
Acalculous cholecystitis	1 (0.7)	5 (4.2)	6
GB Sludge	0 (0)	1 (0.8)	1
Splenomegaly	4 (3.0)	6 (5.0)	10
Nephrolithiasis	6 (4.4)	3 (2.2)	9
Right hydroureter	1 (0.7)	1 (0.7)	1
Right hydronephrosis	1 (0.7)	0 (0)	1
Ureteric stones	1 (0.7)	0 (0)	1
Renal cysts	1 (0.7)	1 (0.8)	2
Acute cystitis	0 (0)	1 (0.8)	1
Vesical calculous	1 (0.7)	1 (0.8)	2
Inguinal hernia	7 (5.2)	1 (0.8)	8
Inguinal lymphadenopathy	5 (3.7)	3 (2.5)	8
Inguinal abscess collection	2 (1.5)	1 (0.8)	3
Inguinal canal cyst	0 (0)	1 (0.8)	1
Excessive bowel gas	6 (4.4)	3 (2.5)	9
Distended gut loops	1 (0.7)	3 (2.5)	4
Mesenteric lymphadenopathy	11 (8.1)	9 (7.5)	20
Solitary gut loops	0 (0)	2 (1.7)	2
Intestinal cyst	1 (0.7)	0 (0)	1
Pyloric stenosis	4 (3)	2 (1.7)	6
Mesenteric lymphadenitis	2 (1.5)	1 (0.8)	3
Acute appendicitis	10 (7.4)	7 (5.8)	17
Umbilical hernia	5 (3.7)	0 (0)	5
Hernia	1 (0.7)	0 (0)	1
Ascites	3 (2.2)	14 (11.7)	17
Lymphoma	0 (0)	1 (0.8)	1
Superficial skin edema	0 (0)	1 (0.8)	1

Figure 1 and 2 showed sonographic evidences in 2 patients.

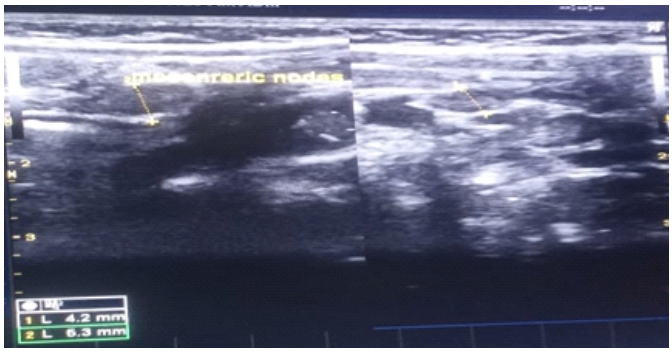

Figure 1: Mesenteric lymphadenitis; patient was 7 years old and had acute abdominal pain

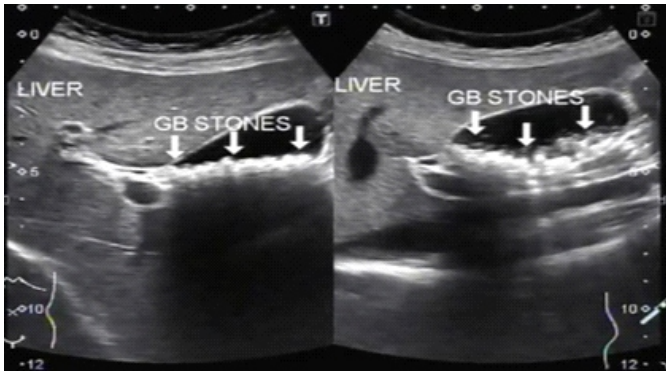

Figure 2: Cholelithiasis; patient was 13 years old and had acute abdominal pain

DISCUSSION

Our research showed vesical calculus in children who came with acute abdominal pain. The table showed that 2 (0.8%) children out of the 255 had a history of vesical calculus. Table 1 of our research demonstrate superficial skin edema and showed that 1 (0.4%) out of the 255 children had a history of superficial skin edema. It also represents that 1 (0.4%) out of the 255 patients had a history of acute cystitis. Certain complications can result in response to unattended acute abdominal pain that can be life threatening. These complications comprise of hemorrhage, obstruction, or perforation of the gastrointestinal tract or intra-abdominal organs as well as rupture of intra-abdominal organs such as appendix which can lead to peritonitis [8]. Table 1 of our research showed acute appendicitis table represents that 17 (6.7%) out of the 255 patients had a history of acute appendicitis. Siegel *et al.*, conducted a study. The aim of this study to determine the ability of ultrasonography to detect appendicitis and to identify other conditions responsible for symptoms in children with acute abdominal pain. Consecutive sample of 178 pediatric patients who were referred for ultrasonography because of suspected acute appendicitis, but in whom the diagnosis could not be definitively established by clinical criteria. Approximately half of children referred for suspected appendicitis will have a

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final diagnosis of abdominal pain of unknown origin. In the remainder, ultrasonography is useful, both to establish the diagnosis of appendicitis and to aid in diagnosing other causes of acute abdominal pain [1]. The ultrasonographic examination gives important information about various organs of the abdomen which includes the biliary tract, gall bladder, liver, spleen, pelvis, and kidneys. Further, it helps in the diagnosis of ascites, condition of bowel, peristalsis, and abdominal collections. The procedure also doesn't require the need for general anesthesia [9] Few tables of our research show gall bladder pathologies in children who came with acute abdominal pain. Table 1 showed gall bladder sludge. The table represents that 1 (0.4) % out of the 255 patients had a history of GB sludge while another table showed gallstones, and this table represents that 4(1.6) % out of the 255 patients had a history of GB stone. One of the tables represents a calculus cholecystitis and represents that 6(2.4) % of the 255 patients had a history of a calculus cholecystitis. Ultrasonography is best suited for children, not only because of its noninvasive nature and cost-effectiveness, but also because it doesn't expose the children to the danger of radiation. Table of our research showed liver pathologies in children who came with acute abdominal pain. One of the tables showed Left lobe hepatic cyst and represents that 1 (0.4) % of the 255 patients had a history of left lobe hepatic cyst. Another study showed hepatomegaly and represents that 2 (0.8 %) of the 255 patients had a history of hepatomegaly while another table represents that 1 (0.4) % out of the 255 patients had a history of hepatic hemangioma. Hepatic masses come to clinical attention when they are perceived by the patient, discovered on physical examination by the physician, or, most commonly, detected on diagnostic radiologic studies [17]. Our research table represents that 1 (0.4) % of the 255 patients had a history of hepatic mass. Another following table represents that 6(2.4%) of the 255 patients had a history of hepatic cyst. The kidneys have a complex internal architecture with a highly variable appearance on US. Ultrasound is also valuable for distinguishing congenital variants and simple cystic lesions from renal masses [18]. Our research demonstrates that 4 (1.6) % of the 255 patients had a history of right nephrolithiasis, 1 (0.4) % of the 255 patients had a history of right hydronephrosis, 2 (0.8) % of the 255 patients had a history of renal cyst, 3 (1.2) % of the 255 patients had a history of urolithiasis and 1(0.4) % of the 255 patients had a history of right hydroureter. Chin-Ling Yip *et al.*, conducted a study in 1998 on value of sonography in assessment of children with acute abdominal pain. The aim of this study was to evaluate the usefulness of sonography in the diagnostic assessment of children with abdominal pain. From July 1988 to October 1996, 676 children who had abdominal pain and were referred for sonography underwent abdominal and pelvic sonographic examination. Of these, 32 children had acute abdominal pain. The mean ages and relative risks of underlying abnormalities were calculated for children with acute abdominal pain [19]. Abdominal sonography is useful in children with acute abdominal pain. Children with Acute abdominal pain had urinary cystitis, intussusception, appendicitis, appendiceal abscess, perforated gut with ascites, gut duplication, thickened gut wall with fluid from severe gastroenteritis [20].

CONCLUSIONS

Our study concluded that most of the children referred to the sonography department presenting with acute abdominal pain had no significant disease. However, the most common sonographic findings were mesenteric lymphadenitis, splenomegaly, and ascites.

Authors Contribution

Conceptualization: SFK, MU
Methodology: ZA, AH
Formal analysis: TA, MF, SMYF
Writing-review and editing: NN, NA, AZ

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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