

ULTRASONOGRAPHY FINDINGS IN EGYPTIAN CHILDREN WITH ABDOMINAL PAIN

By

Manal Sayed Ramadan MD*, Raghdaa Ali MD*, Mennat Allah Magdy El barbary
MD**

* Ahmed Maher Teaching Hospital, **Abo Elrich University Hospital

ABSTRACT

Background: *The use of ultrasound (US) has been gaining favor in abdominal pain as the initial study choice. The sensitivity and specificity of ultrasound was high.*

Aim of current study: *was to assess value of US in different cases of abdominal pain.*

Subject and Methods: *The present study was conducted on 280 children complaining of abdominal pain and referred to ultrasonography department in Abo El Rich Hospital and Ahmed Maher teaching Hospital during the period from January to June 2017. Inclusion criteria were Children 1-16 years of both sex, all children were subjected to: detailed history taking, thorough clinical examination, complete urine and stool analysis, abdominal US.*

Results: *Out of 280 children complaining of abdominal pain 125 (44.6 %) were male and 155 (55.4 %) children were female, mean age 9.28 ± 2.92 years (range from 1- 16 years). Functional Abdominal Pain (FAP) represent the higher percentage of cases 92 (32.9) followed by post-operative pain 52 (18.6%), then urolithiasis 45 (16.1%), then parasitic infestation 25 (8.9%), mesenteric adenitis, hepatitis and FMF were (3.6%, 6.8% and 6.4% respectively). Intussusceptions and appendicitis were 3.2% and 1.4% respectively. While the lowest percentage was obtained in pancreatitis, gallbladder disease and ovarian cyst 2 (0.7%). Significant difference between cases as regard the sex, in favor of female than male in FAP, Post-operative pain , urolithiasis, hepatitis, FMF and appendicitis. However, intussusceptions and parasitic infestation in favor of male. Higher percentage of peri-umbilical in FAP, right lower quadrant in mesenteric adenitis, appendicitis, intussusceptions and ovarian cyst, right upper quadrant in hepatitis , gallbladder disease.*

Conclusion: *US had an important role in differentiating causes of abdominal pain.*

Keywords: *Ultrasound, Functional abdominal pain, Familial Mediterranean fever.*

INTRODUCTION

Functional Abdominal pain disorders (FAPDs) also called pain-predominant functional gastrointestinal disorders (FGIDs) are the most common cause of chronic abdominal pain in children and adolescent. Several pain-predominant FGIDs of childhood have recognizable patterns of symptoms & include functional dyspepsia, irritable bowel syndrome, abdominal migraine and FAP not otherwise specific (FAP-NOS), terms that have been interchangeable with FAP-NOS often referred to as FAP include, non-organic abdominal pain, psychogenic abdominal pain & recurrent abdominal pain (Marium, R., & Eric, C., 2019).

The use of ultrasound (US) has been gaining favor as the initial study choice due to being non-invasive, radiation-free, painless, fast, and relatively low in cost compared to other radiological procedures. The sensitivity and specificity of ultrasound in diagnosing causes of abdominal pain was high and range between 96.6% to 100% and 88% to 100%, respectively (Mandeville et al., 2012). Abdominal ultrasound is widely used as first line studies in functional abdominal disorders (Cribblez et al., 2009). US is an important imaging modality for

the evaluation of acute abdominal pain (Fonio et al., 2013). US are valuable in detecting intussusception, with high sensitivity and specificity (Ja Lim et al., 2015). Intussusception is the most common cause of intestinal obstruction in children between three months and six years of age with an incidence of 38 per 100,000 cases in the first year of life and 31 per 100,000 cases in the second year of life (Riera et al., 2012) Intussusception was more common among boys aged younger than 2 years (Vega García et al., 2015).

The main causes of postoperative discomfort after abdominal surgery at 24 hours were pain (82%) (Robleda et al., 2015).

The normal appendix is compressible, blind-ending, and measures 6 mm or less in maximum diameter. It has a tubular appearance on long axis scans and a target appearance in the axial plane. The thin echogenic inner layer of mucosa/submucosa and the hypoechoic outer zone representing the muscularis propria are usually identifiable. A small amount of fluid or gas may be noted within the lumen. On color flow Doppler imaging, there is no appreciable flow (Sargar and Siegel, 2014).

The enlargement of mesenteric lymph nodes (Mesenteric adenitis) in the right lower quadrant, from a variety of infections, usually viral, frequently causes abdominal pain in children. US examination usually shows large enlargement of lymph nodes, the maximum anteroposterior diameter is at least 10 mm. The lymph nodes are iso- or hypoechoic relative to surrounding tissues and muscles and have an oval shape with a central echogenic hilum (Sikorska-Wiśniewska et al., 2006).

Ultrasonography is a convenient and non-invasive test. It is the test of first choice for screening to diagnose acute pancreatitis in children (Suzuki et al., 2014). Abdominal pain, nausea and vomiting were common presenting features of childhood pancreatitis (Fayyaz et al., 2015).

AIM OF THE WORK

To assess value of ultrasound in different causes of abdominal pain.

PATIENTS AND METHODS

The present study was conducted on 280 children

complaining of abdominal pain and referred to abdominal ultrasonography department in Abo El Rich university Hospital and Ahmed Maher Teaching Hospital during the period from January to June 2017.

Inclusion criteria:

- Children between 1-16 years, of both sex with any type of abdominal pain whatever the duration of pain.

Methods:

All children were subjected to:

1. Detailed history taking,
2. Thorough clinical examination,
3. Investigations:
 - Complete urine and stool analysis
 - Abdominal ultrasound: using TOSHIBA ISTYLE, convex probe (3-6 MHz), micro-convex (5.7-8 MHz), linear (6-11 MHz).

FAP was diagnosed by exclusion of other causes and its characteristic data, while other causes of abdominal pain in our studied cases were diagnosed previously from their file.

RESULTS

Out of 280 children (55.4 %) children were female, complaining of abdominal pain mean age 9.28 years \pm 2.92 125 (44.6 %) were male and 155 (range = 1- 16 years).

Table (1): Percentage of different causes of abdominal pain in studied children

Causes of Abdominal Pain	no. (%)
FAP	92 (32.9)
Post-operative pain	52 (18.6)
Urolithiasis	45 (16.1)
Parasitic infestation	25 (8.9)
Mesenteric adenitis	10 (3.6)
Hepatitis	19 (6.8)
FMF	18 (6.4)
Intussusceptions	9 (3.2)
Appendicitis	4 (1.4)
pancreatitis	2 (0.7)
Gallbladder disease	2 (0.7)
Ovarian cyst	2 (0.7)

FAP = Functional abdominal pain, FMF = Familial Mediterranean fever.

The FAP represent the higher percentage of cases followed by post-operative pain then urolithiasis then Parasitic infestation, while the lowest percentage was obtained in pancreatitis, gallbladder disease and ovarian cyst.

Table (2): Comparison between different cases as regard the sex

	Male no (%)	Female no (%)	Chi-Square	p value
FAP	24(26.1)	68(73.9)	9.790	0.021* (S)
Post-operative pain	22(42.3)	30(57.7)		
Urolithiasis	19(42.2)	26(57.8)		
Mesenteric adenitis	5(50)	5(50)		
Hepatitis	9(47.4)	10(52.6)		
FMF	8(44.4)	10(55.6)		
Intussusceptions	6(66.7)	3(33.3)		
Pancreatitis	1(50.0)	1(50.0)		
Appendicitis	1(25)	3(75)		
Parasitic infestation	14(56.0)	11(44.0)		
Gallbladder disease	1(50.0)	1(50.0)		
Ovarian cyst	0(0)	2(100)		

There was a statistical significant difference between cases as regard the sex, in favor of female than male in FAP, Post-operative pain, urolithiasis,

hepatitis, FMF and appendicitis. However, intussusceptions and parasitic infestation in favor of male.

Table (3): Comparison between different cases as regard the age

	Mean of age (years)	±SD	ANOVA	p value
FAP	10.37	1.67	13.279	< 0.001** (HS)
Urolithiasis	9.12	1.96		
Mesenteric adenitis	7.14	2.17		
Hepatitis	9.36	1.89		
FMF	8.72	1.87		
Intussusceptions	1.23	0.18		
pancreatitis	8.50	1.87		
Appendicitis	6.22	1.39		
Parasitic infestation	8.96	2.09		
Gallbladder disease	6.50	2.12		
Post-operative pain	9.54	2.31		
Ovarian cyst	15.6	1.31		

ANOVA= Analysis of variance, HS = highly significant

There was a statistical significant difference between cases as regards the age of

children, where the highest mean of age was FAP followed by hepatitis and urolithiasis.

Table (4): Comparison between different cases as regard the duration of pain (months)

	Mean of duration (mo)	±SD	ANOVA	p value
FAP	13.79	7.73	16.967	< 0.001** (HS)
Urolithiasis	9.29	3.45		
Mesenteric adenitis	2.14	1.10		
Hepatitis	0.62	0.32		
FMF	11.66	4.98		
Intussusceptions	0.44	0.19		
pancreatitis	0.62	0.31		
Appendicitis	0.59	0.28		
Parasitic infestation	10.68	3.17		
Gallbladder disease	7.50	0.70		
Post-operative pain	3.35	2.12		
Ovarian cyst	3.56	0.78		

There was a statistical significant difference between cases as regard the duration of pain (months), with a higher

mean of duration of pain in FAP, FMF, parasitic infestation, urolithiasis and gall bladder disease.

Figure (1) to (8): Shows the US pictures of some of the studied cases



Figure (1): Ascites in FMF some cases of FMF shows ascites



Figure (2): Intussusceptions (target sign)



Figure (3): pancreaticitis bulky pancreas with hypoechoic lesions



Figure (4): Normal US in FAP



Figure (5): Hepatomegaly in Hepatitis



Figure (6): Appendicitis with appendicular abscess



Figure (7): Kidney stone

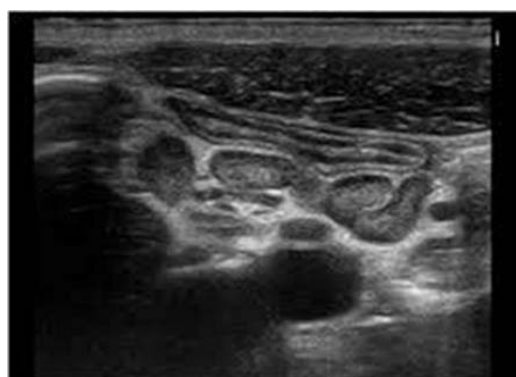


Figure (8): Mesenteric adenitis

DISCUSSION

In the current study the FAP represent the higher percentage of cases 92(32.9) followed by post-operative pain 52(18.6%), then urolithiasis 45(16.1%), then parasitic infestation 25(8.9%). mesenteric adenitis, hepatitis and FMF were (3.6%, 6.8% and 6.4% respectively). Intussusceptions and appendicitis were 3.2% and 1.4% respectively. While the lowest percentage was obtained in

pancreatitis, gallbladder disease and ovarian cyst 2(0.7%). These results were in agreement with **Plunkett and Beattie, 2005** who reported that the chronic or recurrent abdominal pain (RAP) is a commonly encountered complaint in general practitioner and pediatrician clinics. Its prevalence ranges from 10%–45% in school-going children. Also **Ganesh et al 2010** found that the chronic abdominal pain continues

to be a diagnostic and therapeutic challenge. It affects about 10% of school-going children and adolescents. **Polito et al., 2009** reported that the possibility of urolithiasis should be considered in children with RAP who have a family history of urolithiasis and/or infrequent pain attacks, even when dysuria and hematuria are lacking, **Sikorska-Wiśniewska et al., 2006** reported that in about 20% of the children primary mesenteric lymphadenopathy is diagnosed. **Simanovsky and Hiller, 2007** stated that the enlarged abdominal lymph nodes are frequently encountered in asymptomatic children and should not always be considered abnormal. Enlarged abdominal lymph nodes exceeding 10 mm in their shortest axis in children with abdominal pain may represent mesenteric lymphadenitis of various causes. **Jain et al., 2007** found that the acute pancreatitis occurs in 5.65% of patients with acute viral hepatitis; it is mild and recovers with conservative management. **Tefera et al., 2015** reported that the prevalence of intestinal helminths was 13.8%.

In the current study there was a post-surgical abdominal pain resulting from inflammatory condition. This results was in agreement with **Van Rijckevorsel**

et al., 2015 who reported that the chronic post-surgical pain (CPSP) may develop after any surgical procedure, and is a common feature after abdominal and pelvic surgery with a prevalence varying between 10 and 40%. The pathological mechanisms leading to chronic CPSP are probably inflammation, tissue and nerve damage and alterations in central pain processing. The mechanisms in chronic post-surgical abdominal and pelvic pain are poorly studied and research has largely focused on reporting of prevalence and describing risk factors, including patient characteristics, psychological factors, surgical procedure and pre- and acute postoperative pain.

In the present study there was a statistical significant difference between cases as regard the sex, in favor of female than male in FAP, Post-operative pain, urolithiasis, hepatitis, FMF and appendicitis. However, intussusceptions and parasitic infestation in favor of male. There was a statistical significant difference between cases as regards the age (years) of children, where the mean of age in FAP, Urolithiasis, Mesenteric adenitis, Hepatitis, FMF, pancreatitis, Parasitic infestation and gallbladder disease appendicitis, ovarian cyst and Post-operative pain were (10.37,

9.12, 7.14, 9.36, 8.72, 8.50, 8.96, 6.50 , 6.22 , 15.6 and 9.54, respectively), while in Intussusceptions was 1.23. These results were in agree with Oh et al., 2004 who reported that the incidence of RAP in Singaporean children was around 23.4%, with a mean patient age of 11.7 years (range 6–17 years) and a female preponderance (62.4%). **Geltzeiler et al., 2015** stated that Intussusception is the most common cause of bowel obstruction in children from 3 months to 3 years of age. **Vega García et al., 2015** reported that a total of 95 cases of Intussusception (65.3% boys and 34.7% girls) were selected; 76.6% were younger than the age of 2 years.

In the current study there was a statistical significant difference between cases as regard the site of pain, with a higher percentage of periumbilical in FAP, right lower quadrant in mesenteric adenitis, appendicitis, intussusceptions and ovarian cyst, right upper quadrant in hepatitis, gallbladder disease. These results were in agree with **Johnson and Egan, 2015** who found that appendicular complication presenting as a right lower quadrant mass. **Rasquin et al., 2006** reported that the FAP is characterized by episodic or continuous abdominal pain arising

at least once per week for at least two months. The pains is usually located in the peri-umbilical or epigastric region and does not radiate elsewhere.

In the present study US pictures of cases shows that some cases of FMF shows ascitis and hepato-splenomgaly the result was in agree with **Aslan et al ., 2012** who reported that a small amount of peritoneal fluid collection can be observed during peritoneal attacks in patients with Familial Mediterranean fever (FMF),

In the present study there was a 2 cases of ovarian cyst causing abdominal pain, this result was in agree with **Nyhsen and Mahmood, 2014** who reported that a case with bleeding from a ruptured simple ovarian cyst causing epigastric pain radiating to the right shoulder tip.

As mentioned by **Thomas Ray et al., 2016** Abdominal pain is very common in the pediatric population (<18 years of age). Sonography is a safe modality that can often differentiate the frequently encountered causes of abdominal pain in children.

CONCLUSION

US had an important role in differentiating cases of abdominal pain and rapid intervention for emergency cases.

RECOMMENDATION

Use of US in cases of abdominal pain for differentiation of pathological from functional condition.

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الموجات فوق الصوتية في الأطفال المصريين الذين يعانون من آلام في البطن

منال سيد رمضان*، منة الله مجدى البربرى**، رعداء محمود*

استشارى مساعد طب الأطفال م / احمد ماهر التعليمى*

زميل طب الأطفال م / ابو الريش الجامعى**

الموجات فوق صوتية على البطن من الطرق الاولية المفضلة فى حالات آلام البطن وهو ذو حساسية عالية.

الهدف من البحث: تقدير قيمة الموجات فوق صوتية على البطن فى تشخيص حالات آلام البطن.

طرق البحث: اجريت الدراسة على 280 طفل من عمر سنة حتى 16 سنة الذين يعانون من الام البطن فى الفترة من يناير حتى يونيو 2019 فى مستشفى ابو الريش الجامعى و مستشفى احمد ماهر التعليمى وتم الفحص الاكلينيكي وعمل الموجات فوق صوتية على البطن وتحليل بول وبراز كامل للأطفال.

نتائج البحث: اظهرت النتائج ان 44.6% من الأطفال ذكور بينما كانت الاينات تمثل 55.4%، وتبين من الدراسة ان آلام البطن الوظيفية تمثل اعلى نسبة من الاسباب 32.9% يليها فى الارتفاع الام البطن التى تلى اجراء عمليات جراحية 18.6 ثم اسباب تتعلق بالجهاز البولى 16.1% بينما تمثل الطفيليات 8.9%، ووجد ان الالتهاب الكبدى وحمى البحر المتوسط تمثل 6.8% و 6.4% على التوالى، بينما كان انسداد الامعاء

والتهاب الزائدة الدودية 3.2 % ، 1.4 على التوالي. ووجد ان التهاب البنكرياس، امراض تتعلق بالمرارة و تكيس المبيض يمثل 0.7%. ارتفاع نسبة آلام البطن الوظيفية، الام البطن التي تلى اجراء عمليات جراحية، اسباب تتعلق بالجهاز البولي، الالتهاب الكبدى، حمى البحر المتوسط والتهاب الزائدة الدودية، فى الاناث عن الذكور، بينما ترتفع نسبة انسداد الامعاء و الطفيليات فى الذكور عن الاناث.

الخلاصة: الفحص بالموجات فوق صوتية على البطن ذو اهمية فى تشخيص حالات الام البطن.

الكلمات الكاشفة: الموجات فوق صوتية، آلام البطن الوظيفية، حمى البحر المتوسط.