Section: Radiology

Original Research Article

CLINICAL EVALUATION OF RECURRENT ABDOMINAL PAIN WITH ULTRASONOGRAPHY IN PEDIATRIC PATIENTS

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ABSTRACT

Background: Recurrent abdominal pain (RAP) is one of the most common medical complaints during childhood and adolescence. Approximately 10% of school aged children get recurrent episodes of abdominal pain. The prevalence of RAP in children ranges from 10 to 20%. RAP was defined as ≥3 bouts of abdominal pain severe enough to interfere with activities, appearing in a period of ≥3 months. The Rome III criteria4 now categorize abdominal pain into 1. Functional dyspepsia (FD). 2. Functional abdominal pain (FAP) and functional abdominal pain syndrome (FAPS). 3. irritable bowel syndrome (IBS). 4. Abdominal migraine. Pain localization in younger children is poor, and in a suffering child, physical examination is often limited. Thus, sonographic evaluation of the abdomen is frequently performed in children to investigate the reason for the pain and to exclude other acute abdominal surgical conditions.
AIM: To assess patients with recurrent abdominal pain in pediatric age group clinically and then correlate with ultrasonography. Objective: 1. To clinically assess recurrent abdominal pain in pediatric patients. 2. To evaluate them by ultrasound. 3. To correlate the clinical assessment with ultrasonography findings. 50
Material and Methods: This was a prospective study done on all cases of recurrent abdominal pain presenting to the Pediatrics department between 8-18 years of age over period of 18 months in Department of Pediatrics and Department of Radiology, at SGT Medical College Hospital and Research Institute, Gurugram. Study size: 50 Pediatric patients. The clinical criteria for diagnosis of recurrent abdominal pain refers mainly to the duration of painful period and frequency of pain which should be at least three months in the preceding period, and over this three-month period, there are at least three episodes of pain that are severe enough to affect the daily activities of the affected patients. Inclusion criteria 1. All children 8 to 18 years of age with recurrent abdominal pain, would form the study group. 2. Their clinical features and radiological findings would be assessed. 3. The study group will be divided into two age groups;8yr-12yr, 12yr-18yr. 51 Exclusion criteria: 1. Acute abdominal pain. 2. Physiological pain during menstruation cycle (dysmenorrhea) in females. 3. Patients with post-operative pain or pain due to trauma. Patients enrolled in the study, were the ones with clinical diagnosed recurrent abdominal pain. Laboratory and radiological evaluation were done for each patient. Radiological assessment was done using ultrasonography.
Observations and Results: Amongst 450 paediatric cases with abdominal pain, a total of 50 were identified as recurrent abdominal pain based on clinical presentations and prevalence was observed as 11.11%. Among 50 cases of RAP cases predominating higher male cases were observed 28 (56%) as compared to

the female cases 22 (44%). Highest number of patients were received from age 9 years i: e 20 patients, followed by 09 patients from 8 years of age, 07 patients from 13 years of age, 06 patients from 11 years of age, 05 patients from 12 years of age and only 03 patients from 10 years of age. P value was insignificant i.e., >0.05. It was observed that a total of 14 patients complained pain for about 1 – 10 minutes, followed by 13 patients from more than 30 minutes of pain duration, 12 patients from 21 – 30 minutes and 11 patients from 11 – 20 minutes of pain duration. The RAP was observed in every of the 50 cases, along with other complains where Loose Stool was observed in 9 of the patients followed by constipation in 07, fever and supra-pubic pain in each of the 06 patients, vomiting with RAP in 05 patients and Decreased appetite in 04 of the patients. Most commonly affected area of abdomen quadrant is peri-umbilical and right iliac fossa region in our study [70%]. In this present study it was observed that; majority of the cases's 44 TLC ranged in normal reference range although had RAP while only 06 of the cases had lesser TLC count than normal range. In SGOT, 39 of the cases had normal range while 11 had values more than normal range and none had values less than normal range. In SGPT, all the cases 50 (100%) were observed with normal reference range. Urea was observed within the normal range in 49 of the cases while only 01 of the case was detected with higher value. Creatinine showed majority of the cases 28 with less than normal reference range, 21 of the cases within normal range and only 01 of the case with higher values. ESR was detected normal range in 44 of the cases and higher amongst the 06 cases that were associated with pallor and weight loss. Amongst all the described clinical USG presentation, 25 cases represented with ML less than 10mm. The cases representing ML >11mm were suggestive of TB and other malignancies. A total of 7 patients showed no abnormalities in USG representation.

Conclusion: Ultra-sonography is the most effective tool for quickly distinguishing the condition from acute appendicitis, and if identified correctly, surgery can be avoided because the majority of cases recover with conservative care.

Keywords: Recurrent abdominal pain, Mesenteric lymphadenopathy.

INTRODUCTION

Recurrent abdominal pain (RAP) is one of the most common medical complaints during childhood and adolescence.[1-3] RAP is prevalent in several clinical settings and often accompanied by substantial family worries and parental work absence.[4] Some children and adolescents are exposed to a lot of costly and invasive medical investigations with typically scarce findings and small benefit for the child.[5] The clinical presentation of RAP shows large variations. The frequency and duration of the pain attacks and the length of periods with pain are highly variable. There are also large differences concerning suffering and impact on everyday life such as school absence.

The aetiology of childhood RAP is also varied, and the cause is considered multifactorial. The currently most customary approach to functional gastrointestinal disorders is the "biopsychosocial model".[6] This model implies that symptoms are a result of the bidirectional interaction between physiological processes and psychosocial influences.[7] Treatment according to the biopsychosocial model relies on validation, family education and reassessment, with the aim of symptom reduction and return to normal activities.[6] Abdominal pain is perhaps the most common painful health problem in school-aged children. J Apley, a British paediatrician, studied abdominal pain among children extensively and observed that approximately 10% of school aged children get recurrent episodes of abdominal pain.

He abdominal pain, severe enough to affect their activities over a named this symptom complex as recurrent abdominal pain (RAP) syndrome and defined it as "at least three episodes of period longer than three months".1 His findings to formed the main guidelines for the practising paediatricians and researchers dealing with this problem. Pain localization in younger children is poor, and in a suffering child, physical examination is often limited. Thus, sonographic evaluation of the abdomen is frequently performed in children to investigate the reason for the pain and to exclude other acute abdominal surgical conditions.2 The prevalence of RAP in children ranges from 10 to 20%. An organic lesion is present in 5 to 10% of children.[3] RAP has been found to be common in the setting of school phobia, sibling rivalry and a family history of multiple abdominal complaints, psychological problems and disturbed interpersonal relationships.

Recurrent abdominal pain may be manifested as isolated paroxysms of periumbilical pain, as pain in the abdomen, pain with dyspepsia, and abdominal pain with dysfunction of the digestive tract. The Rome III criteria,[4] now categorize abdominal pain into. 1. Functional dyspepsia (FD). 2. Functional

abdominal pain (FAP) and functional abdominal pain syndrome (FAPS).[3] irritable bowel syndrome (IBS).[4] Abdominal migraine. The main clinical concerns are acute appendicitis, intussusception, and torsion of the ovary.

With the routine use of high frequency transducers, detection of enlarged abdominal lymph nodes (EALNs) is very common. When enlarged nodes are found with no other abnormality detected, the term "mesenteric lymphadenitis" is often used to describe an inflammatory process of abdominal lymph nodes. However, there is some disagreement in the medical literature about the importance of finding EALNs and use of the term "mesenteric adenitis." In the paediatric literature, the term is reserved for specific inflammation of the mesenteric lymph nodes, caused by Yersinia, Staphylococcus, Salmonella, different types of 3 mycobacteria, and viruses.[5] In the radiologic literature, the term is mainly applied simply to describe lymph nodes greater than 5 mm in diameter.[6,7]

Aim

To assess patients with recurrent abdominal pain in pediatric age group clinically and then correlate with ultrasonography

Objectives

1. To clinically assess recurrent abdominal pain in pediatric patients.
2. To evaluate them by ultrasound.
3. To correlate the clinical assessment with ultrasonography findings.

MATERIALS AND METHODS

Study Type: Observational study, **Study Design:** Prospective study **Population**: All cases of recurrent abdominal pain presenting to the Pediatrics department between 8-18 years of age **Study Setting**: Department of Pediatrics and Department of Radiology, SGT Medical College Hospital and Research Institute, Gurugram. **Place Of Study**: SGT Medical College Hospital and Research Institute, Budhera, Gurugram **Period of Study**: 18 months **Study Size:** 50 Pediatric patients The clinical criteria for diagnosis of recurrent abdominal pain refers mainly to the duration of painful period and frequency of pain which should be at least three months in the preceding period, and over this three-month period, there are at least three episodes of pain that are severe enough to affect the daily activities of the affected patients.

Inclusion Criteria

1. All children 8 to 18 years of age with recurrent abdominal pain, would form the study group.
2. Their clinical features and radiological findings would be assessed.
3. The study group will be divided into two age groups;8yr-12yr, 12yr-18yr.[8]
4. The clinical presentation of the patients will be recorded on the typed Performa made for this study and each patient would be given a research protocol number.
5. Contrast enhanced computerized tomography abdomen will be done where ultrasonography diagnosed is equivocal**.**

Exclusion Criteria

1. Acute abdominal pain.
2. Physiological pain during menstruation cycle (dysmenorrhea) in females.
3. Patients with post-operative pain or pain due to trauma.[9] METHODOLOGY Patients enrolled in the study, were the ones with clinical diagnosed recurrent abdominal pain. Written and informed consent were obtained from parents/guardian of children.

Laboratory and radiological evaluation were done for each patient. Blood sample were taken for CBC, ESR, LFT, KFT and send for laboratory investigation. Radiological assessment was done using ultrasonography. Ultrasonography Ultrasound was done by both the linear (6-12 MHz) and curvilinear probe (3.5-7.5 MHz) of various frequencies attached to a standard logic F8 expert ultrasound equipment.

RESULTS

Baseline characteristics: The observational prospective study was conducted in SGT Hospital, Gurugram, Haryana. This hospital is multi- specialty 750 bedded. It's a tertiary care centre mainly catering to rural population. This study included 50 RAP cases. The 50 cases included were clinically diagnosed cases with recurrent abdominal pain. During the study period, a total of 450 pediatric cases with abdominal pain were conducted in SGT Hospital and the 50 children presenting with clinical symptoms relevant to RAP were undertaken for this study in the Department of Pediatrics and samples were collected. Prevalence of RAP cases on basis of clinical symptoms mentioned in (Table 1). In our study, among 50 cases of RAP cases predominating higher male cases were observed 28 (56%) as compared to the female cases 22 (44%). Male female ratio in this present study was 127.272 (gender ratio). Distribution according to the age of cases described in (table 2). The RAP was observed in every of the 50 cases, along with other complains wherein Loose Stool was observed in 9 of the patients followed by constipation in 07, fever and supra-pubic pain in each of the 06 patients, vomiting with RAP in 05 patients and Decreased appetite in 04 of the patients. Distribution of RAP according to the duration of pain is presented in (table 3). The type of pain cases had mentioned in (table 4). Amongst the 50 patients observed; normal general examination was seen in 27 of the paediatric cases, followed by 17 of the cases with pallor, 04 of the cases with pallor along with history of weight loss and 02 of the patients alone with weight loss. Comparison of elevated laboratory values with normal laboratory values in RAP cases is described in (table 5). In this present study according

to USG presentation, a total of 25 patients were seen to have <10MM presentation in USG while 13 of the patients presented with USG >10MM and in accordance to laboratory profile a total of 13 patients presented with higher values within >10MM USG presentation. The p valued was observed to be significant <0.05. The ultrasonographic findings are mentioned in the (table 6).

Table 1: Prevalence of RAP cases on the basis of clinical symptoms

PAEDIATRIC CASES AT SGT HOSPITAL		
750		
Total Pediatric cases with abdominal pain (n)	Total Clinically diagnosed RAP Cases (n)	Prevalence (%)
450	50	11.11%

Table 2: Distribution on the basis of age of the cases (n=50)

AGE GROUP	No. of Paediatric cases	Percentage (%)
8 years	09	18%
9 years	20	40%
10 years	03	6%
11 years	06	12%
12 years	05	10%
13 years	07	14%
TOTAL	50	100%

Table 3: Distribution of RAP on the basis of duration of pain episodes in cases (n=50)

Duration of Episodes (minutes)	Number of Patients (n)	Percentage (%)
1 – 10	14	28%
11 – 20	11	22%
21 – 30	12	24%
>30	13	26%
TOTAL	50	100%

Table 4: Types of pain per abdomen in Cases (n=50)

PAIN PER ABDOMEN	No. Of Patients	Percentage (%)
S, Mi-Mo Intensity, P-U	30	60%
S, Mi-Mo Intensity	02	4%
S, Mi-Mo Intensity, Guarding	04	8%
S, Mo Intensity, Right Hypochondrium	03	6%
Soft, Mi - Mo, Epigastric Pain	02	4%
S, Severe, Guarding, Right Hypochondrium	02	4%
S, Mi-Mo, Suprapubic Pain	07	14%
TOTAL	50	100%

Table 5: Comparison of elevated laboratory values with normal laboratory values in RAP cases

TESTS	Normal values (n)	Elevated values (n)	p value
TLC	44	0	-*
SGOT	39	11	0.038
SGPT	50	0	-*
UREA	49	01	1.06
CREATININE	49	01	1.06
ESR	44	06	0.73

Table 6: Ultra-sonographic representation with RAP (n=50)

REPRESENTATION	No. of patients
No abnormality detected in USG	07
Mesenteric Lymphadenopathy less than 10mm	25
Mesenteric Lymphadenopathy more than 10 mm	08
Cholelithiasis (11mm)	01
Non Specific Cystitis	04
Polycystic Ovarian Morphology	01
Hepatomegaly	02
B/L Hydronephrosis, Cystitis, Splenomegaly	01
Heteroechoic Lesion Of Rt Lobe Liver (12.4*9.7*11.1). Liver Abcess	01

DISCUSSION

Recurrent abdominal pain is one of the commonest gastrointestinal complaints in children, affecting approximately 10% of school-aged children and adolescents. There is no consensus with regards to etiology, investigation, and management of this common problem. This research study addresses

some of the issues related to age, type of pain, laboratory investigations and correlation between ultra-sonography and laboratory findings of recurrent abdominal pain. Amongst 450 paediatric cases with abdominal pain, this study shows a total of 50 patients with recurrent abdominal pain based on clinical presentations that gives a prevalence of 11.11% of RAP in the study area. The studies done by Nishant Wadhwa, Mehrotra et al., Rasul and khan reported prevalence of recurrent abdominal pain as 14.6%, 10%, 11.5 % and 36 % respectively.[10,11] The above-mentioned documents are similar to the findings of this study. The prevalence of RAP is directly proportional to the study area, climatic conditions when concerned with protozoal infection and diet of any child as well as the socio-economic conditions.

In our study, it was observed that among 50 cases of RAP cases predominating higher male cases were observed 28 (56%) as compared to the female cases 22 (44%) and Male female ratio in this present study was 127.272 (gender ratio). As compared to Study done by Vikram Hirekerur & Ajay Bhagawat documented higher prevalence of male patients 54% as compared with the female patients.[12] Another study by Mehrotra et al. also reported 54% of male patients in their study and rest 46% female patients, highlighting higher prevalence of RAP among male patients.[11] The above studies show similar findings as our study but the medical reason behind male child being prone to RAP is unknown. In Contrast, study from Delhi documented higher prevalence among girls 18.9% than in boys 11.5%.[10] This may indicate the physical exertion at playground male child in our country usually possess as compared to female child, eating habits of male child as well as the tendency to avoid school among male children.

The RAP cases diagnosed in this study included patients from adolescence age group 8 to 18 years of age. Highest number of patients were received from age 9 years i: e 20 patients, followed by 09 patients from 8 years of age, 07 patients from 13 years of age, 06 patients from 11 years of age, 05 patients from 12 years of age and only 03 patients from 10 years of age. P value was insignificant i.e., >0.05 (Table 2). A study from Maharashtra documented maximum numbers 46% of patients from 5-8 years age group.13 Another study by Mehrotra also highlighted the maximum frequency of patients with RAP from 5 – 8 years of age.[10]

Study from Maharashtra, India showed 43.3% in 7-10 years of age group, followed by 36.3% in 4-6 years old and 20% in 11-14 years old.[13]

In contrast to this study, other previous studies conducted in younger children have shown significant associations between health care consultation and age of onset, severity, frequency and duration of pain episodes, school absenteeism, sleep interruption and disruption of normal activity.[14]

In this present study, duration of pain was divided into 4 groups namely; 1 – 10 minutes, 11 – 20 minutes, 21 – 30 minutes and more than 30 minutes. It was observed that a total of 14 patients complained pain for about 1 – 10 minutes, followed by 13 patients from more than 30 minutes of pain duration, 12 patients from 21 – 30 minutes and 11 patients from 11 – 20 minutes of pain duration. Study by Mehrotra et al. documented that most patients had symptoms lasting from 1-10 minutes and 30 % of patients suffered school loss due to pain abdomen.[11]

Regarding duration of episodes and frequency of episodes there aren't much published literature available for comparison in this present study but from the above-mentioned study and our findings it shows that 1 – 10 minutes duration is the most prevailing time period related to RAP.

Amongst the 50 patients observed; normal general examination was seen in 27 of the paediatric cases, followed by 17 of the cases with pallor, 04 of the cases with pallor along with history of weight loss and 02 of the patients alone with weight loss was seen.

Symptoms and complains that are red flags related to recurrent abdominal pain are; Fever,

Anorexia, weight loss, Pain that awakens patient, Blood in stool or urine, Jaundice, Edema, Abdominal mass or organomegaly. In this study, weight loss, constipation and vomiting where the major complains apart from pain.

Some case-control studies have shown higher levels of anxiety and depression in patients with RAP than in healthy children.[15]

Type of pain in this study is depicted in (Table 4). Most commonly affected area of abdomen quadrant is peri-umbilical and right iliac fossa region in our study [70%] which correlate with study by Chanchlani R et al.[16] The origin of abdominal pain is complex and does not lend itself to a single model of causation. Apley and Naish suggested that organic pathology cannot be identified in 90% of children suffering from this problem.[17]

In this present study it was observed that; majority of the cases's 44 TLC ranged in normal reference range although had RAP while only 06 of the cases had lesser TLC count than normal range. In SGOT, 39 of the cases had normal range while 11 had values more than normal range and none had values less than normal range. In SGPT, all the cases 50 (100%) were observed with normal reference range. Urea was observed within the normal range in 49 of the cases while only 01 of the case was detected with higher value. Creatinine showed majority of the cases 28 with less than normal reference range, 21 of the cases within normal range and only 01 of the case with higher values. ESR was detected normal range in 44 of the cases and higher amongst the 06 cases that were associated with pallor and weight loss.

In this present study, it was also observed that SGOT was significant <0.05 among normal values versus elevated values in RAP cases while all other tests were insignificant.

In a case report from 2016, it was documented that High levels of serum amino transferases are used as indicators of liver disease. AST and ALT are specific

to the liver, with levels greater than 400 units/L being indicative of liver disease indicating pain or RAP.[18] In most cases, liver enzyme levels are only mildly and temporarily elevated. Most of the time, elevated liver enzymes don't signal a chronic, serious liver problem.

As observed in this study, the correlation between liver enzymes and other laboratory investigations may not provide significant correlation with RAP. Howsoever, elevated values were seen in a few patients while the rest showed normal values and yet were suffering from RAP, providing that these two are not correlated to each other. A better depth research study in future might provide with a scientific cause and correlation in between the both.

In a study by Mehrotra et al. it was documented that right lower quadrant of the abdomen and periumbilical region were most commonly distributed site (35+35 = 70 %) for nodes or malignancies as seen under USG. The largest proportion of the nodes were seen in the right lower quadrant, followed by left lower quadrant. A review of the dimensions of the lymph nodes detected showed that the transverse diameter was by and large always greater than the antero-posterior diameter. The maximum transverse diameter values were seen between 10- 14 mm whereas antero-posterior diameter value was seen between 4-8 mm.[11]

RAP should not require an exhaustive series of diagnostic tests to rule out organic causes of pain. Excessive testing may increase parental anxiety and put the child through unnecessary stress. On the other hand, uncertainty about the diagnosis and the recurrent nature of the problem also tend to corrode the trust between clinician and the parents.

Therefore, it is crucial from both child-parent's end and the clinician's end to come to a reasonable clinical diagnosis at initial consultation. A thorough analysis of the complaint and the other components of the history, meticulous examination and ordering a judicious set of investigations will not only give a good insight to the clinician but also reassure the child and parents that their concerns are seriously taken in to consideration.

CONCLUSION

Paediatric RAP is a significant and widespread issue that can have a significant impact on a child's well-being, affecting school attendance, mood, and perception of one's own health and fitness. If an inordinate amount of time is spent looking for disease at the expense of thorough assessment, engagement, explanation, and review, the problem can become increasingly difficult for parent, patient, and doctor.

In paediatric patients, mesenteric lymphadenitis is a prevalent medical cause of abdominal pain. It is a typical self-limiting inflammatory condition that affects the mesenteric lymph nodes in the abdomen and is frequently caused by a viral infection.

Mesenteric adenitis has never been proven to be the cause of any death or consequences. Ultra-sonography is the most effective tool for quickly distinguishing the condition from acute appendicitis, and if identified correctly, surgery can be avoided because the majority of cases recover with conservative care.

However, without referral, drugs, or extensive testing, good results for children can be obtained with careful history and examination, clear explanation and follow-up and a commitment from parent and child to stop the condition limiting normal activities.

Limitations in the Present Study

- The current study has a smaller sample size, the large sample size is required for answering the question related to the RAP and its clinical correlation with laboratory findings.
- As the current study is a single-center study, large multicentre studies will help in the assessment of improved outcome which will be beneficial for our society.
- The duration of study on a long term basis will help in more additional therapeutic benefits along with our primary outcome.

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