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Clinical assessment of occurrence of appendicitis and non-specific abdominal pain children's in PMCH

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Abstract
Abdominal pain is a common problem in children. Although most children with acute abdominal pain have self-limited conditions, the pain may herald a surgical or medical emergency. The most difficult challenge is making a timely diagnosis so that treatment can be initiated, and morbidity prevented. Laboratory investigations such as ultrasonography, plain abdominal radiography, CRP play an important role in evaluating the cause for pain abdomen. Hence based on above findings the present study was planned for clinical assessment of occurrence of appendicitis and non-specific abdominal pain childrens referred to PMCH.

The study was planned in Upgraded Department of Pediatrics, Patna medical College and Hospital, Patna, Bihar. The study was conducted from the Oct 2017 to March 2018. Total 50 cases of the childrens suffered from the non-specific abdominal pain were enrolled in the present study.

Appendicitis is the most common surgical condition. Complicated appendicitis is associated with high morbidity. High leukocyte count, delayed presentation are reliable indicators of appendicitis. There should be a higher index of suspicion of appendicitis in patients who present late and have a higher leukocyte count. It is important to keep the age of the patient in mind while obtaining history and performing the physical examination. A history of migratory pain together with physical findings and leukocytosis remain accurate diagnostic clues for children.

Keywords: appendicitis, non-specific abdominal pain, childrens, etc

Introduction

Abdominal pain, also known as a stomachache, is a symptom associated with both non-serious and serious medical issues. Common causes of pain in the abdomen include gastroenteritis and irritable bowel syndrome. About 15% of people have a more serious underlying condition such as appendicitis, leaking or ruptured abdominal aortic aneurysm, diverticulitis, or ectopic pregnancy. In a third of cases the exact cause is unclear [1]. Given that a variety of diseases can cause some form of abdominal pain, a systematic approach to examination of a person and the formulation of a differential diagnosis remains important.

The most frequent reasons for abdominal pain are gastroenteritis (13%), irritable bowel syndrome (8%), urinary tract problems (5%), inflammation of the stomach (5%) and constipation (5%). In about 30% of cases, the cause is not determined. About 10% of cases have a more serious cause including gallbladder (gallstones or biliary dyskinesia) or pancreas problems (4%), diverticulitis (3%), appendicitis (2%) and cancer (1%) [1]. More common in those who are older, mesenteric ischemia and abdominal aortic aneurysms are other serious causes [2].

Acute abdomen can be defined as severe, persistent abdominal pain of sudden onset that is likely to require surgical intervention to treat its cause. The pain may frequently be associated with nausea and vomiting, abdominal distention, fever and signs of shock. One of the most common conditions associated with acute abdominal pain is acute appendicitis.

Abdominal pain can be referred to as visceral pain or peritoneal pain. The contents of the abdomen can be divided into the foregut, midgut, and hindgut. The foregut contains the pharynx, lower respiratory tract, portions of the esophagus, stomach, portions of the duodenum (proximal), liver, biliary tract (including the gallbladder and bile ducts), and the pancreas. The midgut contains portions of the duodenum (distal), cecum, appendix, ascending colon, and first half of the transverse colon [6]. The hindgut contains the distal half of the transverse colon, descending colon, sigmoid colon, rectum, and superior anal canal [3].

Each subsection of the gut has an associated visceral afferent nerve that transmits sensory information from the viscera to the spinal cord, traveling with the autonomic sympathetic nerves. The visceral sensory information from the gut traveling to the spinal cord, termed the visceral afferent, is non-specific and overlaps with the somatic afferent nerves, which are very specific. Therefore, visceral afferent information traveling to the spinal cord can present in the distribution of the somatic afferent nerve; this is why appendicitis initially presents with T10 periumbilical pain when it first begins and becomes T12 pain as the abdominal wall peritoneum (which is rich with somatic afferent nerves) is involved [4].

The management of abdominal pain depends on many factors, including the etiology of the pain. In the emergency department, a person presenting with abdominal pain may initially require IV fluids due to decreased intake secondary to abdominal pain and possible emesis or vomiting.

Treatment for abdominal pain includes analgesia, such as non-opioid (ketorolac) and opioid medications (morphine, fentanyl). Choice of analgesia is dependent on the cause of the pain, as ketorolac can worsen some intra-abdominal processes. Patients presenting to the emergency department with abdominal pain may receive a "GI cocktail" that includes an antacid (examples include omeprazole, ranitidine, magnesium hydroxide, and calcium chloride) and lidocaine. After addressing pain, there may be a role for antimicrobial treatment in some cases of abdominal pain [5]. Butylscopolamine (Buscopan) is used to treat cramping abdominal pain with some success [6]. Surgical management for causes of abdominal pain includes but is not limited to cholecystectomy, appendectomy, and exploratory laparotomy.

Acute appendicitis is acute inflammation and infection of the vermiform appendix, which is most commonly referred to simply as the appendix. The appendix is a blind-ending structure arising from the cecum. Acute appendicitis is one of the most common causes of abdominal pain and is the most frequent condition leading to emergent abdominal surgery in children. The appendix may be involved in other infectious, inflammatory, or chronic processes that can lead to appendectomy; however, this article focuses on acute appendicitis. Appendicitis and acute appendicitis are used interchangeably. Common symptoms of acute appendicitis include abdominal pain, fever, and vomiting. The diagnosis of appendicitis can be difficult in children because the classic symptoms are often not present. A delay in the diagnosis of appendicitis is associated with rupture and associated complications, especially in young children. Improvements in rupture rates have been made with advanced radiologic imaging. Appendicitis is a clinical diagnosis with imaging used to confirm equivocal cases.

The definitive treatment for appendicitis is currently appendectomy. Initiation of antibiotics upon diagnosis is critical to initiate treatment, slow the infectious process and prevent progression of a nonperforated appendix. Key to any evaluation and treatment plan are the following: relieve the patient's pain and discomfort early and consistently; communicate with the patient and family about the plans; repeat the examination often; adjust the differential diagnosis as appropriate; and keep the patient for observation if a firm diagnosis is not made. The most widely used antibiotic regimen is a penicillin-based regimen such as piperacillin/tazobactam or ampicillin/clavulanic acid or the combination of ampicillin, clindamycin (or metronidazole), and gentamicin. If a penicillin allergy exists, regimens including cephalosporins, aminoglycosides and clindamycin may be used.

The vermiform appendix is generally 5-10 cm in length. It arises from the cecum, which in most children is located in the right lower quadrant of the abdomen. Although the base of the appendix is fixed to the cecum, the tip can be located in the pelvis, retrocecal, or extraperitoneal. Note that the anatomic position of the appendix determines the symptoms and the site of tenderness when the appendix becomes inflamed. Because the visceral nerve fibers associated with the appendix typically become inflamed first, there is often vague and referred symptoms to the periumbilical region through the T10 dermatome. As the somatic sensory fibers of the peritoneal lining become involved in the inflammatory process, the pain will frequently shift to the right lower abdomen and tenderness is focused at the site of inflammation.

The appendix is lined by typical colonic epithelium. The submucosa contains lymphoid follicles, which are very few at birth. This number gradually increases to a peak of about 200 follicles at age 10-20 years and then subsequently declines. In persons older than 30 years, less than half that number is present, and the number continues to decrease throughout adulthood. The appendix may act as a reservoir for the flora of the gut which may aid in recovery from intestinal infections. However, this function is not vital for life and removal of the appendix is well tolerated. Tradition holds that once the appendix becomes obstructed, bacteria trapped within the appendiceal lumen begin to multiply, and the appendix becomes distended. The increased intraluminal pressure obstructs venous drainage, and the appendix becomes congested and ischemic. The combination of bacterial infection and ischemia produce inflammation, which progresses to necrosis and gangrene. When the appendix becomes gangrenous, it may perforate. The progression from obstruction to perforation usually takes place over 72 hours.

One study noted that appendiceal perforation is more common in children, specifically younger children, than in adults. A substantial risk of perforation within 24 hours of onset was noted (7.7%) and was found to increase with duration of symptoms. While perforation was directly related to the duration of symptoms before surgery, the risk was associated more with prehospital delay than with in-hospital delay [7].

During the initial stage of appendicitis, the patient may feel only periumbilical pain due to the T10 innervation of the appendix. As the inflammation worsens, an exudate forms on the appendiceal serosal surface. When the exudate touches the parietal peritoneum, a more intense and localized pain develops. Perforation results in the release of inflammatory fluid and bacteria into the abdominal cavity. This further inflames the peritoneal surface, and peritonitis develops. The location and extent of peritonitis (diffuse or localized) depends on the degree to which the omentum and adjacent bowel loops can contain the spillage of luminal contents. If the contents become walled off and form an abscess, the pain and tenderness may be localized to the abscess site. If the contents are not walled off and the fluid is able to travel throughout the peritoneum, the pain and tenderness become generalized.

Acute appendicitis is a complex disease with quite a bit of variability in presentation and pathophysiology. Several theories have been promoted to explain the etiology, epidemiology and natural history of the disease. Many contend that appendicitis is due to obstruction of the blind ending appendix, resulting in a closed loop. In children, obstruction usually results from lymphoid hyperplasia of the submucosal follicles. The cause of this hyperplasia is controversial, but dehydration and viral infection have been proposed. Another common cause of obstruction of the appendix is a fecalith.

Rare causes include foreign bodies, parasitic infections (eg, nematodes), and inflammatory strictures. The obstructive theory of appendicitis is widely taught but may not explain all the data regarding providers' experience with this common disease. Outbreaks and clusters of appendicitis have been reported making a true infectious etiology a possible etiologic agent. Appendicitis seems to run in families with first degree relatives of those who have had appendicitis being at a much

higher risk of developing the condition which suggests an role of the host genetics. Finally, perforated and non-perforated appendicitis, which should be linked by the progression from early to late appendicitis, appear to act epidemiologically as two separate disease processes. Even though appendicitis is very common, much is not understood about the etiology or pathophysiology of this disease process. Appendicitis has an incidence of 70,000 pediatric cases per year in the United States. The incidence between birth and age 4 years is 1-2 cases per 10,000 children per year. The incidence increases to 25 cases per 10,000 children per year between 10 and 17 years of age. Overall, 7% of people in the United States have their appendix removed during their lifetime. The male-to-female ratio is approximately 2:1.

Appendicitis is much more common in developed countries. Although the reason for this discrepancy is unknown, potential risk factors include a diet low in fiber and high in sugar, family history, and infection. Gut flora and exposure to gastrointestinal infections have also been proposed as a hygiene theory of appendicitis. There may also be a role of the genetics of the host and the microbiome of the gut in the development of appendicitis and, possibly, with the risk of perforated appendicitis.

Appendicitis occurs in all age groups but is rare in infants. Appendicitis is most common in the second decade of life (age 10-19 y), occurring at a rate of 23.3 cases per 10,000 per year. Thereafter, the incidence continues to decline, although appendicitis occurs in adulthood and into old age.

Interestingly, non-perforated appendicitis and perforated appendicitis are not linked when the epidemiology of the diseases is explored. The incidence for these two diagnoses differs over time suggesting that they are potentially unrelated to each other and may represent different pathologic processes. Similarities have been shown to other diseases such as diverticulitis and even hospital admissions for influenza.

Generally, the prognosis is excellent. At the time of diagnosis, the rate of appendiceal perforation is 20-35%. The rate of perforation is 80-100% for children younger than 3 years, compared with 10-20% in children 10-17 years old. Children with ruptured appendicitis are at risk for intra-abdominal abscess formation and small bowel obstruction, and they can have a prolonged hospital stay (several weeks or more). The mortality rate for children with appendicitis is 0.1-1%.

Initiation of antibiotics represents the single most critical step in the treatment of acute appendicitis. Multiple studies in children report safety and no increase in rates of perforation once antibiotics are initiated even if the appendectomy is delay to the next morning. Commonly, the most advanced cases of acute appendicitis are managed exclusively with antibiotics with the appendectomy delayed for several weeks to months, the so-called interval appendectomy. Data is mounting to expand this approach of using just antibiotics for the acute episode of appendicitis to all types of appendicitis. Many centers are pursuing this approach in ongoing research trials.

Abdominal pain is perhaps the most common painful health problem in school-aged children. J Apley, a British pediatrician, studied abdominal pain among children extensively and observed that approximately 10% of school aged children get recurrent episodes of abdominal pain. He named this symptom complex as recurrent abdominal pain (RAP) syndrome and defined it as “at least three episodes of abdominal pain, severe enough to affect their activities over a period longer than three months”. His findings formed the main guidelines for the practising pediatricians and researchers dealing with this problem. Even though, the term chronic is used when referring to RAP, each episode of pain is distinct and separated by periods of wellbeing.

Abdominal pain is a common problem in children. Although most children with acute abdominal pain have self-limited conditions, the pain may herald a surgical or medical emergency. The most difficult challenge is making a timely diagnosis so that treatment can be initiated, and morbidity prevented. Laboratory investigations such as ultrasonography, plain abdominal radiography, CRP play an important role in evaluating the cause for pain abdomen. Hence based on above findings the present study was planned for clinical assessment of occurrence of appendicitis and non-specific abdominal pain childrens referred to PMCH.

Methodology

The study was planned in Upgraded Department of Pediatrics, Patna medical College and Hospital, Patna, Bihar. The study was conducted from the Oct 2017 to march 2018. Total 50 cases of the childrens suffered from the non-specific abdominal pain were enrolled in the present study.

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study.

Inclusion Criteria

1. Children in the age group of 5-15years presenting with pain abdomen to Father Muller Medical College.
2. Acute pain abdomen

Exclusion criteria

1. Infants.
2. Children above 15years of age
3. Children presenting with chronic pain abdomen
4. Traumatic pain abdomen.

Results & Discussion

Abdominal pain in childhood is always a source of anxiety to the family doctors and parents. The very young patient may not be able to give any history, and when they do, the history may not be reliable. Problems of misdiagnosis and serious consequences are therefore, more common in the paediatric age group, particularly in abdominal emergency. A retrospective study on acute gastrointestinal emergencies requiring surgery in 100 children below the age of 12years with the mean age of presentation 7.09years was done at Indhira Gandhi Medical college and hospital, Nagpur from June 2004 to June 2006. The largest group in this study was acute appendicitis (58%) followed by intestinal obstruction (32%) [8].

A study was done by Holland A and Gollow I J at Princess Margaret Hospital for children, Perth over a 3 year period on 1313 children admitted with acute abdominal pain.54% were discharged without surgical intervention out of which 70% of them diagnosed to be NSAP. Of children undergoing surgery 443 (74%) were proven appendicitis on histopathology. Based on these results only 35% of children referred to surgeon with abdominal pain will actually require surgical

intervention [9].

A prospective observational study was conducted by Shakya K N, Dongol U M S, Khadka S B in Jan 2006-08. Clinical examination was done followed by routine investigations, ultrasound abdomen, and radiological investigations were done according to case merit. Causes of pain abdomen were apparent only in 32.9% of which 91.5% were medical causes, predominantly of diarrhoeal 28.3%, infantile colic 9.4%, UTI 7.7% peptic diseases 6.8%.Surgical conditions were around 8.5%.they concluded that Appendicitis is the most common surgical condition in children who present with abdominal pain [10].

Abdominal pain is a common problem in childhood, although it is clearly apparent that not all children with abdominal pain will have a surgical problem requiring an emergency operation. A retrospective study was done by Williams and colleagues which audited the presenting symptoms and signs in a consecutive series of 447 children presenting to paediatric surgical unit in an attempt to quantify the value of particular symptoms and signs in differentiating acute appendicitis(AA) from non-specific abdominal pain(NSAP). There was no difference in the site of onset of pain between AA and NSAP groups although tachycardia and right iliac fossa tenderness was significantly more in AA compared to NSAP [11].

Tseng Y C and colleagues studied 400 patients who were having acute pain abdomen and divided them into traumatic and non-traumatic groups. In the non-traumatic group, the most common etiology was acute appendicitis and major causes in traumatic pain abdomen was road traffic accidents. The liver was the most commonly injured organ, followed by the spleen. Abdominal CT scanning was a useful diagnostic imaging modality in patients with both traumatic and non-traumatic abdominal pain [12].

Table 1: Types of Abdominal Pain

Types of Abdominal Pain	No. of Cases
Nonspecific Abdominal Pain (NSAP)	22
Appendicitis	17
Mesenteric lymphadenitis	2
Acute gastroenteritis	2
Urinary tract infection	1
Ovarian cyst	1
Respiratory tract infection	1
Other	4
Total	50

Table 2: Comparison of Both Groups

Variable	NSAP	Appendicitis
No. of Cases	**22**	**17**
Sex		
Male	15	12
Female	7	5
Age (years)	7 – 13	6 – 12
Duration of symptoms hrs	14 – 40	8 – 42
Tenderness with coughing, hopping and/or percussion, *n* (%)	3	11
Migration of pain to RIF,	3	9
Anorexia	5	11
Nausea and/or vomiting,	12	12
Leukocytes ($\times 10^9$/L), mean±SD	11.1 ± 4.9	15.6 ± 4.7
Neutrophils ($\times 10^9$/L), mean±SD	8.1 ± 5.4	12.4 ± 3.6
CRP (mg/L), mean±SD	16.3 ± 9.3	36.5 ± 14.6

Diagnosis of acute appendicitis in children may be difficult, especially in those having atypical symptoms and signs. Delay in diagnosis may lead to complicated appendicitis with an increase in morbidity and mortality. Various risk factors have been studied for the increased risk of perforation. These include extremes of age, male sex, rural locality, delayed presentation, delay in diagnosis, presence of appendicolith, and elevated blood parameters, namely, neutrophils [13, 17].

A few studies from developing countries have explored the factors responsible for mortality and morbidity associated with delayed presentation of acute abdomen. A study from Sudan [18] in 2000 found late presentation to be due to poor awareness about the disease and misdiagnosis at primary healthcare settings. Another study from Lahore in 2006 showed that illiteracy, lack of awareness about medical facilities, and social and cultural values were associated with a delayed presentation [19]. A Nigerian study in 2010 found lack of financial resources to be an important factor in the delay in emergency abdominal surgery [20]. India has its own unique set of sociocultural and behavioural factors that may impact on medical care. Even though acute abdomen is a common surgical emergency, published data about the spectrum of surgical causes of acute abdomen and reasons for delayed presentation are lacking.

Early and accurate diagnosis of acute appendicitis is required to reduce the morbidity and mortality associated with delayed diagnosis and its complications. In addition to significant morbidity and mortality, negative appendectomy is also responsible for loss of precious staff hours and financial resources. These days the diagnosis of acute appendicitis is clinical. Different diagnostic aids have appeared recently and among these laparoscopy and ultrasonography have shown good results, but they also have limitations and drawbacks. A no. of clinical scoring systems have been used as complimentary aid in diagnosis of acute appendicitis. Initial assessment can be improved by use of a clinical scoring system.

Conclusion

Appendicitis is the most common surgical condition. Complicated appendicitis is associated with high morbidity. High leukocyte count, delayed presentation are reliable indicators of appendicitis. There should be a higher index of suspicion of appendicitis in patients who present late and

have a higher leukocyte count. It is important to keep the age of the patient in mind while obtaining history and performing the physical examination. A history of migratory pain together with physical findings and leukocytosis remain accurate diagnostic clues for children.

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