



RADIOLOGICAL EVALUATION OF PAEDIATRIC ABDOMINAL EMERGENCIES IN A TERTIARY HEALTH CARE CENTRE

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ABSTRACT

BACKGROUND: Abdominal pain in children is a frequent symptom among referrals to the pediatric emergency departments. Besides anamnesis and physical examination, radiological examination is also required for the differential diagnosis of abdominal pain. The majority of abdominal pain in children is because of internal cause, and is generally not associated with intra-abdominal solid organs. The most frequent internal cause of abdominal pain is gastroenteritis, and the most frequent surgical cause is appendicitis.

AIM OF THE STUDY: In this study we aimed to evaluate the radiological examinations of the pediatric patients who were referred to the pediatric emergency department with acute pain abdomen.

OBJECTIVES OF THE STUDY: The purpose of this study was to re-evaluate the radiological findings in pediatric cases undergoing surgery with the prediagnosis of acute abdomen.

RESULTS: The most frequent pathology was appendicitis (34%) in our study whereas the other pathologies were mesenteric lymphadenitis, intussusception, bowel obstruction, hematoocolpos and idiopathic hypertrophic pyloric stenosis in decreasing frequency. Plain abdominal radiographs were valuable in diagnosis of the patients with ileus. It has been showed that ultrasonography was the most useful for patients with appendicitis and intussusceptions. Of the 28 cases post-operatively diagnosed as appendicitis, 4 cases (14%) had given false-negative results on the pre-operative US examination. Of the 4 cases with normal US findings, one was intraoperatively diagnosed as acute, non-perforated appendicitis, and one as perforated appendicitis. The remaining 2 cases (20%), accepted as appendicitis-negative for showing no dilated appendix, but had other US findings such as free fluid, lymph nodes, etc. However, among the cases accepted as appendicitis-positive on the US examination, two cases were later found to be a false-positive, with the diagnosis of Meckel's diverticulitis. Among seven cases examined with CT, there were findings supporting acute appendicitis in two, associated complications of Meckel's diverticulum in two, and the rest had intussusception as findings.

CONCLUSION: Although plain abdominal radiograph is preferred as the first line for the diagnosis of children being referred with acute abdominal pain, its sensitivity is low and its contribution to the diagnosis is non-specific, except in cases suspected to have intestinal obstruction or perforation. Ultrasonography is widely used in pediatric patients, because it is practical, has no radiation, and is non-invasive. Appendicitis, inflammatory bowel disease, intussusception were commonly diagnosed pathologies in this study. CT is performed rarely in pediatric cases preferably in complicated situations or in cases where US is not applicable, particularly in case of obesity, because it has the disadvantages of high radiation and need for contrast material.

KEYWORDS : Plain abdominal radiographs, ultrasonography, computed tomography, pediatric acute abdomen.

INTRODUCTION:

Abdominal pain in children is a frequent symptom among referrals to the pediatric emergency departments. Besides clinical history and physical examination, radiological examination is also required for the differential diagnosis of abdominal pain. The majority of abdominal pain in children is because of internal cause, and is generally not associated with intra-abdominal solid organs. The most frequent internal cause of abdominal pain is gastroenteritis, and the most frequent surgical cause is appendicitis.

Materials and methods

- The present study was conducted from August 2020 to July 2021. We reviewed the clinical records and imaging findings of 82 children referred from emergency paediatric department. Paediatric patients under the age group of 14 years were evaluated by plain abdominal radiographs and ultrasonography (PHILIPS AFFINITY 50). Only few patients were examined using computed tomography (CT- 16 SLICE GE). The imaging findings of the plain abdominal radiographs, ultrasonography and CT of each patient were determined from their detailed archive records according to their clinical diagnosis.

INCLUSION CRITERIA

- Paediatric patients aged 14 years and below who are referred to the department of radiodiagnosis with abdominal pain.

- Both out patients and in patients were included in the study.
- Both male and female patients included in the study.

EXCLUSION CRITERIA

- Patients/Guardian who are not willing to give the consent

RESULTS:

The most frequent pathology was appendicitis (34%) in our study whereas the other pathologies were mesenteric lymphadenitis, intussusception, bowel obstruction, hematoocolpos and idiopathic hypertrophic pyloric stenosis in decreasing frequency. Plain abdominal radiographs were valuable in diagnosis of the patients with ileus. It has been showed that ultrasonography was the most useful for patients with appendicitis and intussusceptions. Of the 28 cases post-operatively diagnosed as appendicitis, 4 cases (14%) had given false-negative results on the pre-operative US examination. Of the 4 cases with normal US findings, one was intraoperatively diagnosed as acute, non-perforated appendicitis, and one as perforated appendicitis. The remaining 2 cases (20%), accepted as appendicitis-negative for showing no dilated appendix, but had other US findings such as free fluid, lymph nodes, etc. However, among the cases accepted as appendicitis-positive on the US examination, two cases were later found to be a false-positive, with the diagnosis of Meckel's diverticulitis.

Among seven cases examined with CT, there were findings

supporting acute appendicitis in two, associated complications of Meckel's diverticulum in two, and the rest had intussusception as findings

TABLE 1:
Findings on plain abdominal radiographs in acute abdomen cases.

	Normal	AFL	AFL+ DIST	AFL+ APPLITH	APPLITH	GAS DIST	TOTAL
ACUTE ABDOMEN	44	18	7	2	3	8	82
ACUTE APPENDICITIS	9	9	2	2	3	3	28
INTUSSUSCEPTION	-	5	3	-	-	2	10
MECEL'S DIVERTICULUM	1	1	-	-	-	-	2
INTESTINAL OBSTRUCTION	-	1	2	-	-	1	4
MESENTRIC LYMPHADENITIS	29	1	-	-	-	1	31
HEMATOCOLPOS	2	-	-	-	-	-	2
IHPS	1	1	-	-	-	1	3
TYPHILITIS	2	-	-	-	-	-	2

AFL-Air Fluid level,AFL+DIST- Air Fluid Level+ Distention, APPLITH- Appendicolith, GAS DIST – Gaseous Distention, IPHS –Idiopathic Hypertrophic Pyloric Stenosis.

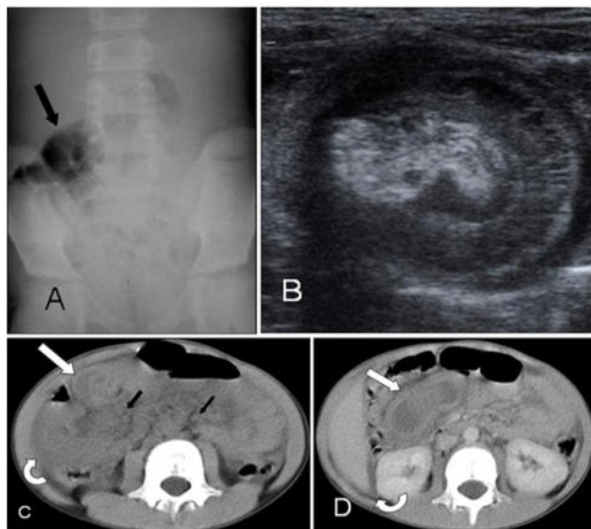
TABLE 2:
Ultrasound imaging findings in all acute abdomen cases:

	AP+	FLUID	LYMPH NODE	FAT STRANDING	APPLITH	GAS DIST	INTU	MASS	total
ACUTE APPENDICITIS	24	20	6	25	3	2	-	4	28
INTUSSUSCEPTION	-	4	-	-	-	6	9	-	10
MECEL'S DIVERTICULUM	-	1	1	2	-	2	2	-	2
INTESTINAL OBSTRUCTION	-	2	-	-	-	4	-	-	4
MESENTRIC LYMPHADENITIS	-	3	31	22	-	-	-	-	31
HEMATOCOLPOS	-	-	-	-	-	-	-	2	2
IPHS	-	1	-	-	-	-	-	-	3
TYPHILITIS	-	-	1	2	-	-	-	-	2

AP+ - Appendicitis present, FLUID- Free fluid in abdomen, APPLITH – Appendicolith,GAS DIST- Gaseous distention, INTU- Intussusception,IPHS- Idiopathic hypertrophicpyloric stenosis.

IMAGE GALLERY:

1) INTUSSUSCEPTION



1)INTUSSUSCEPTION:

- A) Plain abdominal radiograph showing dilated air filled small bowel loops
- B) USG showing bowel with bowel appearance in short axis
- C)Plain and contrast axial ct abdominal images showing minimal
- D)Free fluid with target appearance.

2) Enlarged Lymphnode In Mesenteric Lymphadenitis



2) USG image showing enlarged mesenteric lymphnode.

3) Appendicitis Associated With Appendicolith



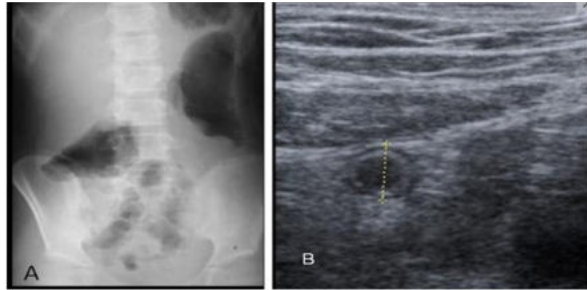
3) USG image showing appendicitis with appendicolith

4)Hematocolpos



4) USG showing hematocolpos associated with imperforate hymen

5) APPENDICITIS



5) APPENDICITIS

- Radiolucency in erect abdominal radiograph -distended colon with gas.
- USG abdomen showing thickened appendix measuring about 7.2 mm diameter in short axis.

DISCUSSION:

Acute abdominal pain, which is a frequent complaint in pediatric patients, is an important issue in pediatric emergency due to having both medical and surgical causes in its etiology. Acute appendicitis is the cause of abdominal pain that most frequently needs surgical intervention [1, 2, 3].

Although plain abdominal radiograph is preferred as the first line for the diagnosis of children being referred with acute abdominal pain, its sensitivity is low and its contribution to the diagnosis is non-specific, except in cases suspected to have intestinal obstruction or perforation [4, 5].

US is widely used in pediatric patients, because it is practical, has no radiation, and is non-invasive. Appendicitis, inflammatory bowel disease, intussusception were commonly diagnosed pathologies in this study.

Besides, minor causes of acute abdomen such as intraabdominal free fluid, heterogeneity of fatty tissue, and mesenteric lymph nodes could be detected by US. The disadvantages of US are its operator dependency and limited diagnostic value in cases of obesity, overlying gas, or perforation [6].

CT is performed rarely in pediatric cases preferably in complicated situations or in cases where US is not applicable, particularly in case of obesity, because it has the disadvantages of high radiation and need for contrast material [3].

The most frequently detected pathology, and the only specific US imaging finding, of the acute appendicitis cases was an enlarged appendix, which has a diameter of over 6 mm.

CONCLUSION

Although plain abdominal radiograph is preferred as the first line for the diagnosis of children being referred with acute abdominal pain, its sensitivity is low and its contribution to the diagnosis is non-specific, except in cases suspected to have intestinal obstruction or perforation. Ultrasonography is widely used in pediatric patients, because it is practical, has no radiation, and is non-invasive. Appendicitis, inflammatory bowel disease, intussusception were commonly diagnosed pathologies in this study. CT is performed rarely in pediatric cases preferably in complicated situations or in cases where US is not applicable, particularly in case of obesity, because it has the disadvantages of high radiation and need for contrast material.

REFERENCES

1. Erkan, T Cam, H Ozkan, HC et al. (2004). Clinical spectrum of acute abdominal pain in Turkish pediatric patients: A prospective study. *Pediatrics International* 46: 325-329, DOI: <https://doi.org/10.1111/j.1442-200x.2004.01889.x> PMID: 15151551.

2. Scholer, SJ, Pituch, K, Orr, DP and Dittus, RS (1996). Clinical outcomes of children with acute abdominal pain. *Pediatrics* 98: 680-685, PMID: 8885946.
3. Leung, AK and Sigalet, DL (2003). Acute abdominal pain in children. *Am Fam Physician* 67: 2321-2326, PMID: 12800960.
4. Rothrock, SG, Green, SM, Harding, M, Bervel, D, Rush, JJ and Pignatiell-Thomas, T (1991). Plain abdominal radiography in the detection of acute medical and surgical disease in children: a retrospective analysis. *Pediatr Emerg Care* 7: 281-285, DOI: <https://doi.org/10.1097/00006565-199110000-00005> PMID: 1754487.
5. Krietner, KF, Mildemberger, P, Maurer, M and Heintz, A (1992). The value of imaging techniques in the diagnosis of nonspecific abdominal pain in young patients. *Aktuelle Radiol* 2: 234-238.
6. García Peña, BM, Cook, F and Mandl, KD (2004). Selective imaging strategies for the diagnosis of appendicitis in children. *Pediatrics* 113: 24-28, DOI: <https://doi.org/10.1542/peds.113.1.24>