

An audit of appendicitis and appendectomy in Kumasi, Ghana

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Summary

Background: Acute appendicitis is a leading cause of emergency admission into our hospital.

A report on 638 surgical abdominal explorations following emergency admissions for suspected acute appendicitis is presented. The study was conducted at the Komfo Anokye Teaching Hospital between January 1998 and December 2004.

Method: During the 7-year period, all consecutive adult patients admitted to our hospital emergency department with suspected appendicitis and who subsequently had an operation done provided the material for the study. Patients whose symptoms settled without operation were excluded. A special proforma was designed to record patient demographic details, clinical features, laboratory data, operative findings and outcome of treatment.

Results: Six hundred and thirty-eight patients were studied. These were 408 men and 230 women; a male to female ratio of 1.7:1. The mean age was 32.4 ± 15.0 S.D years. All patients were admitted with abdominal pains that were initially located at the umbilicus in 38.0% and diffused in 31.8%. Vomiting 85.7%, fever 73.0% and anorexia 49.0% were the most frequent associated symptoms. The mean duration of illness was 74 hours. Right iliac fossa pain and tenderness were present in 612 patients (89.22%). The total white cell count was significantly raised ($p = 0.05$). Six hundred and thirty-eight appendectomies were performed.

Thirty-nine percent (249/638) of the appendices were perforated at operation and 25.9% (56/216) of the removed appendices had no histological evidence of inflammation. The complication rate was 43.1% and wound infection (41.5%) was the most common. The average stay in hospital was 7 days. There were 12 deaths - a mortality rate of 1.9% - mostly elderly patients.

Conclusion: The diagnosis of appendicitis in our environment is clinical and based mainly on the combination of abdominal pains, signs of peritoneal irritation, and a raised total white cell count with neutrophilia. This mode of presentation is similar to that seen in other communities. The treatment of appendicitis in our hospital is appendectomy. The negative appendectomy rate of 25.9% falls within the range reported in other studies. More than a third of the appendices were perforated. The considerable morbidity and appreciable mortality from acute appendicitis in our community are due mainly to the late presentation of our patients.

Key-words: Acute appendicitis, Clinical features, Appendectomy, Negative appendectomy rate.

Résumé

Introduction: L'appendicite aigue est une des causes majeures attribuable à l'admission d'urgence dans notre hôpital. Il s'agit d'un rapport de 638 cas d'explorations abdominales chirurgicales à la suite des admissions d'urgence provoquées par un cas présumé de l'appendicite aigue. Cette étude a été effectuée au centre hospitalier universitaire de Komfo Anokye entre janvier 1998 et décembre 2004.

Méthode: Au cours d'une durée d'une période de 7 ans, tous les patients adultes consecutifs admis dans notre services d'urgence atteints d'un cas présumé d'appendicite et qui ont par la suite subi à une intervention chirurgicale ont fourni des matériaux pour cette étude. Cette étude ne tient pas compte des patients dont les symptômes apaisent sans l'intervention chirurgicale.

Un proforma spécial a été préparé afin de mettre sur papier des détails démographiques des patients, traits cliniques, données, laboratoires, résultats de l'intervention chirurgicales et les résultats du traitement.

Résultats: Un nombre total de six cents trente huit patients ont été étudiés. C'est-à-dire-408 du sexe masculin et 230 du sexe féminin. Dans une proportion de 1,7:1 sexe masculin sexe féminin de 1, 7:1. L'âge moyen était $32,4 \pm 15,0$ S. D. ans. Tous les patients ont été admis atteints de la douleur abdominale qui était tout d'abord siégée dans l'ombilic en 38,0% et diffusée en 31,8%. Vomissement 85,7% fièvre 73,0% et anorexie 49,0% étaient des symptômes lies les plus élevés. La durée moyen de la maladie était 74 heures. La douleur iliaque fossa et délicatesse étaient présente chez 612 patients soit 89,22%. Le compte total du globule blanc était sensiblement élevé ($P = 0,05$) six cents trente huit cas d'appendectomies ont été opérées. Trente-neuf pourcent (249/638) de ces appendices étaient crevés pendant l'intervention chirurgicale et 25,9% (56/216) d'appendice enlevés n'avaient aucune preuve histologique de l'inflammation. Le taux de la complication était 43,1% et de blessure à travers de l'infection 41,5% était le plus ordinaire. Rester à l'hôpital moyen était 7 jours. Il y a 12 morts. Taux de mortalité de 1,9% les patients plus âgés en particulier.

Conclusion: Le diagnostic de l'appendicite dans notre milieu est clinique et surtout basé sur la combinaison de la douleur abdominale, signs d'irritation de la péritonite, et une augmentation totale dans le compte du globule blanc avec neutrophilie. Cette méthode de la présentation est paraille à ce qu' est arrivé dans d'autres communautés. La prise en charge de l'appendicite dans notre hôpital est appendicectomie. Le taux d'appendicectomie négative de 25,9% entre dans les limites rapportées d'autres études. Plus d'un tiers des cas d'appendicites ont été opérées. La plupart de la mortalité et de la morbidité provoquées par l'appendicite

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aigue dans notre région est attribuable principalement à la présentation de dernière minute des nos patients.

Introduction

After many years of dealing with a very common disease world-wide, the pre-operative diagnosis of acute appendicitis remains difficult and the treatment sometimes controversial¹⁻¹⁵. This situation may reflect the legendary variability in the presentation of acute appendicitis²⁻⁹ and the absence of a specific and reliable laboratory test for the accurate pre-operative diagnosis of the disease^{8-9, 14}. The diagnosis has thus remained in many centers essentially clinical, despite the recent introduction of appendiceal CT and laparoscopy to increase the diagnostic accuracy^{3, 8-9, 12, 15}.

In our environment, the prevalence of communicable diseases and tropical enteric infections such as salmonella enteritis, amoebic colitis and hepatitis make the pre-operative clinical evaluation of appendicitis even more difficult¹⁶.

The mortality in acute early or uncomplicated appendicitis in modern times has been reported as less than 1%^{6, 10, 17}. In the event of a complication -perforation or gangrene with generalized peritonitis - the reported death rate has varied between 12% - 33%^{4-6, 10}.

Surgical exploration of patients with suspected acute appendicitis to remove the diseased organ before it perforates has been the tradition over the years^{4, 10-11}.

The aim of this study is to present the cases of appendicitis seen and treated in our institution.

Patients and methods

The study was conducted over a 7-year period between January 1998 and December 2004 at the Komfo Anokye Teaching Hospital, Kumasi, Ghana. All consecutive adult patients admitted to the surgical Emergency Department with suspected acute appendicitis and who underwent a surgical exploration to remove the appendix were studied prospectively. Patients who did not have an appendicectomy were excluded. These were patients in whom symptoms of appendicitis settled without operation, those admitted with an appendix mass and treated conservatively and those admitted with the diagnosis of an appendix abscess in whom simple drainage was done without appendicectomy. Also excluded from the report were patients who at exploration were found to have some other surgical condition.

A specially designed pro-forma was used to record the patient characteristics and other relevant data. The initial site of the abdominal pain, associated symptoms, duration of illness, physical findings on examination, time interval between hospital admission and operation, the axillary temperature and the total white cell count on admission, operative findings, post-operative complications, length of hospital stay and total number of deaths were all recorded. Rovsing's, psoas' and obturator signs¹⁸ were not elicited by the attending doctors in the evaluation of patients suspected of acute appendicitis. These clinical signs have not been adequately emphasized by clinical teachers in our institution. All patients with suspected acute appendicitis were operated upon under general anaesthesia, and all of them had metronidazole 1gm I.V. and cefuroxime 1.5gm I.V at induction. The

incisions used for the appendicectomy were; lower median (204), right para median (210), grid - iron (80) and the Lanz incision (44). Arrangements were made to have removed appendices examined histologically for evidence of inflammation.

Statistical analysis

All the data obtained was analyzed with the aid of IBM compatible DELL PC windows SP, using the SPSS version 11.0 software. Statistical significance was determined at 95% confidence interval.

Results

Demographic data

Data on a total of 638 explorations was analyzed. There were 408 men and 230 women with a male to female ratio of 1.7:1. The mean age of the male patients was 31.1 ± 13.7 SD years and the female 34.7 ± 16.9 S-D years. The mean age of all 638 the patients was 32.4 ± 15.0 S.D. years. Figure 1 shows the age distribution of all 638 patients.

Clinical features

Table 1 shows the site of initial abdominal pain. Table 2 shows the frequency of the various symptoms associated with the abdominal pains.

Table 3 shows the means of the axillary temperature, total WBC, the duration of illness, the time interval between hospital admission and surgical exploration, and the length of hospital stay for patients with normal, inflamed and perforated or gangrenous appendix as seen at operation.

Operative findings

Of the 638 surgical explorations done for suspected appendicitis, 123 (51 male and 72 female) patients had a normal looking appendix excised. Inflamed but non-complicated or

Table 1 Site of initial abdominal pain in 627 adults patients with suspected appendicitis

Site of pain	Frequency (N = 627)	Percentage (%)
Peri-umbilical	238	38.0
General/Diffused	200	31.8
RIF	81	12.9
Epigastric	68	10.7
Lower abdomen	18	2.8
Right flank	25	3.9

Table 2 Clinical symptoms in 630 adult patients with suspected appendicitis

Symptoms	Frequency (N = > 630)	Percentage (%)
Vomiting	540	85.7
Fever	460	73.0
Anorexia	309	49.0
Nausea	240	38.0
Diarrhoea	198	31.4
Constipation	189	30.0
Headache	70	11.1
Dysuria	60	5.2

Table 3 Means and standard deviations (S. D.) of some clinical parameters in patients with acute appendicitis.

Disease process	Duration of illness in hours	Time interval in hours	Length of hospital stay days	Temperature	WBC X 10 ⁹ (S. D.)
Normal appendix Uncomplicated	83.7	19.5	5.7	37.2	8.0 (4.5)
Complicated	55.6	16.0	6.6	38.1	16.0 (5.6)
Appendicitis	84.5	16.9	9.5	38.6	18.0 (5.2)
All patients	74.6	17.5	7.2	37.9	9.8 (6.3)

Mean temperature of all cases of diseased appendices 37.9 (.89)
 Mean WBC of all cases of diseased appendices: 14.0 (10.0)

Table 4 The anatomic position of the vermiform appendix in 460 appendicectomies

Position	Frequency (N = 460)	Percentage (%)
Retrocaecal	335	72.8
Pelvis	88	19.1
Paracaecal	19	4.1
Pre-ileal	12	2.6
Retro-ileal	6	1.3

Outcome

Table 6 shows the types and incidence of post-operative complications after appendicectomy. There were a total of 12 deaths, a mortality rate of 1.9 % (Table 6). Two young male patients aged 26 and 31 years respectively died of aspiration and cardiac arrest during appendicectomy. The rest of the deaths were in elderly patients whose ages ranged from 45 – 81 years with a mean of 66 and a median of 69.5 years. The causes of the deaths were related to severe and persistent intra – abdominal sepsis with acute renal failure in 5,

Table 5 Histopathology of 216 excised appendices

Appendix histology	Men	Women	Total
Histologically normal appendix removed	26	30	56
Histologically proven appendicitis	110	50	160
Total	136	80	216
Negative appendectomy rate	19.1%	37.5%	25.9%

Table 6 Post operative complications after 638 appendicectomies

Operative findings	Wound infection	Wound dehiscence	Pelvic abscess	EC fistula	Chest infection	Others	Total	%	Deaths
Normal appendix (123)	12	5	3	0	9	4	33	26.9	1
Uncomplicated Appendicitis (266)	42	12	13	1	12	11	91	34.2	1
Complicated Appendicitis (249)	60	19	27	6	15	24	151	60.0	10
Total	114	36	43	7	36	39	275	43.1	12

early appendicitis was found in 266 (176 male and 90 female) patients. Perforated or gangrenous appendix was found in 249 patients (males 179, females 70). Table 4 shows the various positions of the appendix as seen at operation

The over-all appendiceal perforation rate was 39.0% (249/638); 34.4% in females and 43% in males. Histology was available for 216 excised. Table 5 shows the histopathology of the appendices excised and the negative appendectomy rate.

septic shock in 3 and respiratory failure (ARDS) in 2 patients.

Discussion

The clinical suspicion of acute appendicitis is usually based on the presentation of abdominal pains starting around the umbilicus and shifting, over some hours to settle at the right iliac fossa, most often in a young male patient (Fig. 1). A recent report from a population similar to our own³ and

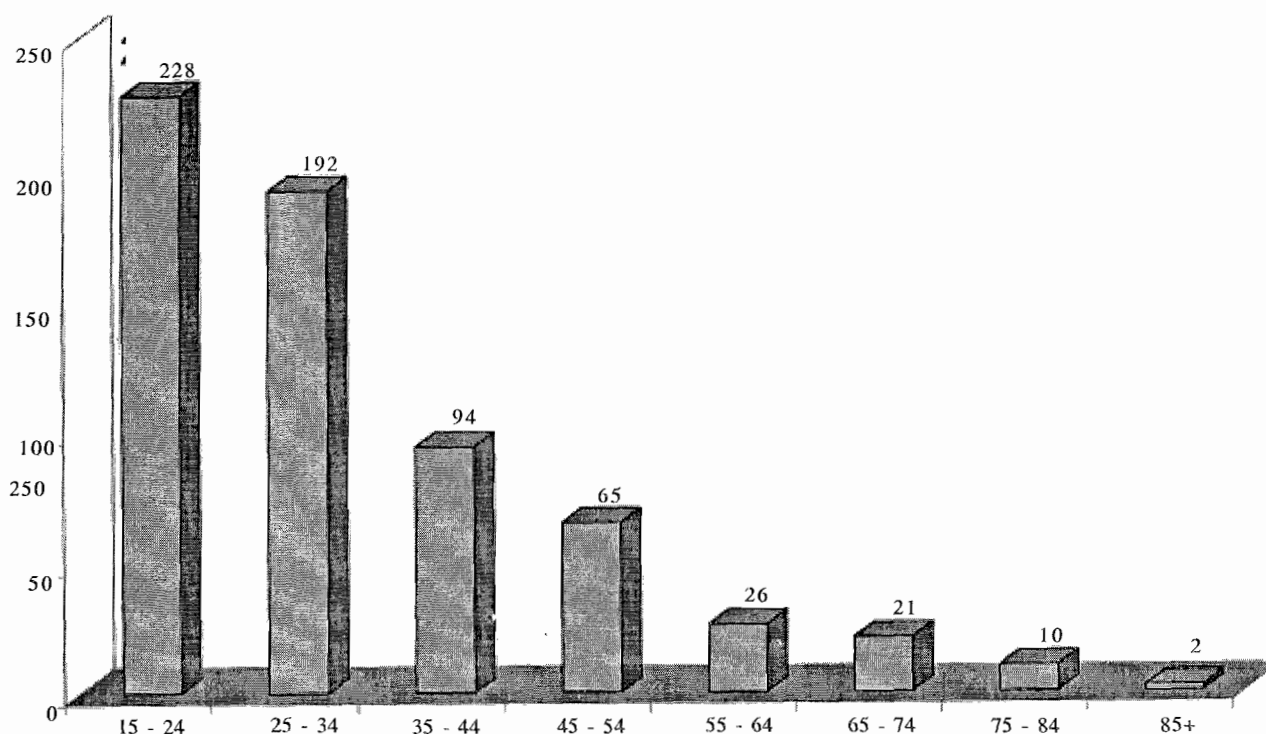


Fig. 1 Age distribution of 638 patients with suspected appendicitis

previous published series^{4, 11, 13} indicate that this classical visceral – somatic sequence of pains occurs only in about 50% of the patients. In the present series, a little over a third of the patients reported with initial pain at the umbilicus; and in another third the initial pain was diffused (Table 1). These demographic characteristics are consistent with those reported by previous investigators in the sub-region^{3-4, 20-21} and elsewhere⁵⁻⁹. Poor localization of visceral pain may partly explain the reporting of initial pain in the right iliac fossa (12.9%), the lower abdomen (2.8%) and the right flanks (3.9%). In a series from a community of our sub-region, the initial pain was localized to the right iliac fossa in 85 out of 100 patients with acute appendicitis²⁰. The diagnosis of appendicitis must therefore still be considered even with initial pains at these other sites (Table 1).

The abdominal pains of appendicitis are usually associated with symptoms of significant upset or dysfunction of the gastro-intestinal tract^{3, 13, 19-20}. In this series vomiting was the most common associated symptom with a frequency of 85.7%. Fever (73.0%) and anorexia (49%) were some of the other frequent associations. The mean axillary temperature recorded in out patients was 37.9C and 38.6C in patients with perforated appendix. Many tropical enteric infections may present with complaints similar to those of acute appendicitis as discussed above²⁰. The symptoms of acute appendicitis are thus non-specific and must be interpreted in relation to the physical signs and laboratory tests^{9, 13-14}.

Signs of peritoneal irritation are detectable in nearly all cases of acute appendicitis^{3, 13, 20, 22}. The location of tenderness is often reported as at the right iliac fossa in the majority of patients^{3, 8-9, 11, 13-14, 20, 22-24}. This study confirms the impor-

tance of right iliac fossa tenderness in the diagnosis of acute appendicitis as it was detectable in the majority, 89% of the patients.

In a recent meta-analysis of the clinical and laboratory diagnosis of appendicitis, the authors stressed the role of inflammatory response indicators such as the total WBC in improving the diagnostic accuracy especially for perforated appendicitis⁸. Other workers have emphasized similar observations^{14, 20, 22}. In this series the mean WBC for diseased appendix was significantly higher than for normal appendix $P=0.05$ at 95% C I. and the mean axillary temperature was significantly raised $p=0.05$. The findings of this study thus confirm the conclusion that “laboratory examination for the inflammatory response, clinical descriptors of peritoneal irritation and a history of migratory pain yield the most important diagnostic information” in the clinical evaluation for suspected acute appendicitis⁸.

Since the 1880’s, early appendicectomy has been performed for acute appendicitis^{10-11, 20, 21, 25-26}. In our series appendicectomy^{11, 13, 120-21, 24-26} was performed within a mean time interval of 17 hours following hospital admission. The delay in surgery was due to the time required for adequate resuscitation. Most patients arrived at the hospital after two to three days of illness (Table 3) and thus required several hours to correct dehydration.

The negative appendicectomy rate of 25.9% (table 5) is similar to rates of 15 – 30% reported by other investigators^{4, 20, 21}. Thus a quarter of these appendicectomies were unnecessary as these patients may have suffered an attack of the well known non-specific abdominal pains –NSAP³²⁻³³. The reported incidence of NSAP in a population similar to our

own is 21.4%³⁴ and this rate may not completely explain the high negative appendicectomy rate in this series.

Some surgeons have suggested a period of active in-hospital observation of patients with acute abdominal pains to decrease unnecessary appendicectomies.^{10-11, 27-31}

In this series more than a third of the patients (39%) were found to have perforated at operation. Delays both in presentation and surgical explorations are the accepted risk factors for finding a perforated appendix at operation^{10, 11, 25}. Indeed the mean duration of illness in our series was 74 hours and operations were delayed for 17 hours. These delays may not completely explain the number of complicated appendices found at exploration as perforated / gangrenous appendices have been found in patients operated on within 12 hours or less after the onset of illness. Luckmann and others have observed that the perforated appendix may be a different disease from the non-perforated and not simply a complication³⁵. Thus in many patients the disease may start in the perforated form⁴. Obstructive appendicitis perforates early.¹³ These observations may explain further the high incidence of perforations in our patients.

Wound infection - defined as discharge of pus from the appendicectomy wound - was the most common complication, occurring in 17.95% (114/638) of the series. The over-all complication rate was 43.1% and reflects the effects of late presentation and high numbers of perforations in this series (Table 6). More than a quarter of patients who had non-diseased appendicitis developed complications. These complications accounted for the prolonged hospital stay (table 3) with related increased costs (Table 3).

A mortality of 1.9% recorded in this series is considered high when compared with published data from Europe and other centers where mortalities are less than 1%^{10, 17}. Early presentation with the excision of the inflamed appendix before it perforates may reduce the death rate to levels below 1%, and produce fewer post-operative complications.

Conclusion

This paper concludes that the clinical presentation of acute appendicitis in our community is no different from the presentation in other populations. However the disease is associated with considerable morbidity and mortality due mainly to the late presentation of our patients with associated higher numbers of perforations.

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References

1. Bett W R. Appendicitis; in Bett, A short history of some common diseases; pp. 162 – 171 Oxford University Press, London 1934.
2. Fitz R H. Perforating inflammation of the vermiform appendix. *Am. J. Med. Sci.* 1886, 92: 321 – 346.
3. Clegg-Lamprey J N A. Clinical features of acute appendicitis:

- A two-year study in a surgical unit at Korle Bu Teaching Hospital. *Ghana Med. J.* 2002 ; 4: 164 – 167.
4. Badoe E A. Acute appendicitis in Accra, *Ghana Med. J.* 1967; 6: 69 - 75.
5. Cooper J N, Williamson R C N. The continuing challenge of acute appendicitis *Surv. Dig. Dis.* 1985; 3: 114 – 128.
6. Wagner J N, McKinney W P, Carpenter J L. Does this patient have appendicitis *JAN* 1996; 276: 1589 – 1594.
7. Chan M Y P, Teo B S, Ng B L. The Alvarado Score in acute appendicitis. *Ann. Acad. Med. Singapore*, 2001; 30: 510 - 12.
8. Anderson R E B. Meta-analysis of the clinical and laboratory diagnosis of appendicitis *Br. J. Surg.* 2004; 91: 28 – 37.
9. Anderson R E, Hugander A, Ravn H, Offenhart K. et al. Repeated clinical and laboratory examination in patients with a diagnosis of appendicitis. *World J. Surg.* 2000; 24: 479 – 485.
10. Jones P F. suspected acute appendicitis: trends in management over 30 years. *Br. J. Surg.* 2000; 88: 1570 – 1577.
11. Malt A R. The perforated appendix *N. Eng. J. Med.* 1986; 315: 1546 – 1547.
12. Benjamin I S, Patel A G. Managing acute appendicitis *BMJ*, 2002; 325: pg. 505 – 506.
13. Connell P R. The vermiform appendix in Bailey & Love's Short Practice of Surgery 23rd Edition by Russell RCG, Williamson NS, Bulstrode CJK published by Arnold Publications London 2000; pg 1076 – 1092.
14. Anderson R E, Hugander P O et al. Diagnostic value of disease history, clinical presentation and inflammatory parameters of acute appendicitis *World J. Surg.* 1999; 23: 133-140.
15. Novethine A, Introduction of appendiceal CT. impact on negative appendicectomy and appendiceal perforation rates. *Ann Surg.* 1999; pp 2993.
16. Badoe E A. Causes of Peritonitis in Accra. *W. Afr. J. Med.* 1968; 17: 42.
17. Registrar General for Scotland annual report 1995 Edinburgh. General Register Office 1996.
18. Dixon J M, Elton R A, Rainey J B, Macleod D A D. Rectal examination in patients with pain in the right lower quadrant of the abdomen. *BMJ* 1991; 302: 386-388.
19. Hardin D M. Acute appendicitis: review and update: *An Fam. Phy.* 1999; 601: 2027-2034.
20. Adekunle O O, Funmilayo J A. Acute appendicitis in Nigeria *Roy. Coll. Surg. Edin.* 1986; 31: 102 – 105.
21. Ayorinde R O, Ofoegbu C K P. Negative appendicectomy rate at U.I.T.H. Ilorin Nigeria *WAJM* 2004; 23: 74.
22. Owens B J, Hamit H F. Appendicitis in the elderly *Ann. Surg.* 1978; 187: 392 - 396.

23. Colledgs J, Toms A P, Franklin I J, Saiven N, Calland R B. Assessment of pritonism in appendicitis. *Ann R. Col. Surg. Engl.* 1996; 78: 11-14.
24. Hallans, Asberg A, Edna T H. Additional value of anatomical tests in suspected acute appendicitis. *Eur. J. Surg.* 1997; 1637: 533 – 538.
25. Riddell JS. Appendicitis *Scot. Med. J.* 1900; 6 : 214 – 22.
26. Worcester A. Appendicitis *Bost. Med. Surg.* 1893; 129: 506-509.
27. Heafield R, Roe A M, Watkins R, Brodribb A J M, Brown C. Outcome of emergency surgical admissions for non-specific abdominal pain. *Gut* 1990; 31 : A1167 (Abstract).
28. Jones P F. Active observation in the management of acute abdominal pains in children *BMJ* 1976; 11: 551 - 3.
29. White J J, Santillana M, Haller J H. Intensive in-hospital observation; a safe way to decrease unnecessary appendicectomy *Ann. Surg.* 1975; 41: 793 – 798.
30. Thompson H J, Jones P F. Active observation in acute abdominal pain *Am. J. Surg.* 1986; 152: 522 - 5.
31. Dolgin S E, Beck A R, Tarter P L. The risk of perforation where children with possible appendicitis are observed in the hospital, *Surg. Gynae/Obstetrics* 1992; 175: 320 – 4.
32. deDombal F T, Leaper D J, Stan land J R, MaCann A P, Horrocks J C. Computer - aided diagnosis of acute abdominal pains *BMJ*, 1972; ii: 9-13.
33. Grey D W R, Collin J. Non-specific abdominal pain as cause of acute admission to hospital *Br. J. Surg.* 1987; 74: 239 - 242.
34. Naaeder S B, Archampong E Q. Clinical spectrum of acute abdominal pain in Accra Ghana. *W. Afr. J. Med.* 1990; 18: 13-16.
35. Luckmann R. Incidence and case fatality rates for acute appendicitis in California *Am. J. Epidemiol.* 1989; 129: 905 - 918.