

# A study of events between the onset of symptoms and hospital admission in patients with acute abdomen

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## ABSTRACT

**Background.** Acute abdomen is a common surgical emergency. Prompt investigation and treatment, including surgical intervention, is critical in reducing morbidity and mortality.

**Methods.** We carried out a prospective observational study at a large urban secondary healthcare centre in India. Patients with surgical acute abdomen were consecutively enrolled in the study over a period of 2 years. Data were collected regarding the onset of symptoms, time of presentation to the hospital and events in the intervening period.

**Results.** Analysis showed that misdiagnosis by medical personnel was significantly associated with delay in admission to the hospital. Unfamiliarity with the medical facilities, ignorance, low education and illiteracy and public holiday were the contributing factors for delayed presentation. Even though we detected some trends, the delay was not significantly associated with age, sex, educational level or socioeconomic status of the patient. The delay resulted in an increased mortality and morbidity especially in patients who needed emergency operative management.

**Conclusion.** Delayed presentation of acute abdomen is often not due to a single reason. The causes are distributed over various levels starting from the patient, family, medical personnel, administrative deficiencies, socioeconomic and sociocultural status of the country.

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## INTRODUCTION

Acute abdomen accounts for 5%–10%<sup>1</sup> of visits to the emergency department and is responsible for most non-trauma-related surgical admissions and about 1% of all hospital admissions. The dictum has been that a majority of severe abdominal pain occurs in patients who have enjoyed fairly good health. This pain usually persists as long as 6 hours and is likely to be caused by a disease requiring surgical intervention.<sup>2</sup>

In the majority of patients, symptoms arise from diseases within the abdominal cavity itself, but occasionally they may originate elsewhere in the body.<sup>3</sup> The range of disease extends from the relatively trivial to the life-threatening. Attempts to

reach a diagnosis must sometimes be curtailed in the interests of immediate treatment.

The diagnoses associated with an acute abdomen vary according to age and gender.<sup>4,5</sup> Acute appendicitis is more common in the young,<sup>6,7</sup> whereas biliary disease, bowel obstruction, intestinal ischaemia and infarction, and diverticulitis are more common in elderly patients. The most common causes of abdominal pain requiring admission are acute appendicitis, non-specific abdominal pain, pain of urological origin, intestinal obstruction and biliary tract disease and vary depending on the population and geographical region.<sup>8</sup> The emotional and psychological trauma following emergency admission can increase significantly if surgical intervention is unduly delayed. Although some surgical emergencies can and often should be dealt with within a few hours or days after admission, there remains a group of conditions for which surgery should be available within hours or even minutes of arrival.<sup>9–11</sup>

In a developing country like India, patients tend to present late in the disease course, which in turn may lead to poor outcome. Limited data are available in the literature on this issue from India. On the other hand, it is commonly experienced by surgeons working in India that there is a substantial delay from onset of symptoms to hospital admission in patients with surgical acute abdomen. We aimed to analyse the time period from clinical onset of acute abdomen to admission to our institute to identify factors that may lead to a delayed presentation. A secondary aim was to assess mortality and morbidity associated with delayed presentation in patients needing emergency surgical management.

## METHODS

We did a prospective observational study at a secondary care public sector hospital in Mumbai over a period of 2 years (August 2011 to September 2013). All consecutive patients over 12 years of age, admitted to the department of general surgery with a clinical diagnosis of surgical acute abdomen, were enrolled in the study. The approval of the institutional ethics committee was taken before starting the study. We excluded patients with a history of trauma as well as pregnant women.

Data collected by interviewing patients and their family members, and by extracting information from medical records, were entered in a proforma. The information included demographic details such as name, age, sex, occupation, education, etc. In an attempt to calculate the distance from the hospital, the complete residential address of the patient was noted. Socioeconomic status was assessed using the Modified Kuppuswamy scale 2012.<sup>12</sup>

We defined surgical acute abdomen as pain in the abdomen due to a surgical cause that necessitated admission to the surgical unit. The time of onset was defined as the precise time of occurrence of the first abdominal symptom and the time of presentation as the time of admission to hospital. The pre-hospital interval was the time

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difference between onset and presentation. Delayed presentation was defined as a pre-hospital interval >24 hours. We enquired in detail about the events between onset of the first symptom and admission to our hospital. This included the primary treatment received (any treatment in the pre-hospital interval) and the response to it, nature of provider (family member/self/doctor), place of treatment (general practitioner/nursing home/private hospital/primary health centre), and form of treatment such as antibiotic, analgesic, antiemetic, antacid, laxative, intravenous fluids, etc. The events during the pre-hospital interval were identified and classified as related to patient and family, to medical personnel, and other reasons such as late referral, public holidays, etc.

The symptoms and signs at presentation were noted and a detailed history was recorded. The provisional diagnosis and clinical decision made by the attending healthcare professional at the time of admission to our hospital were noted. A record of interventions done in the hospital (either conservative or operative management) was kept. Details of intraoperative findings were noted and the final outcome recorded. Information on mortality, morbidity as well as hospital and/or intensive care stay was recorded. Statistical analysis was done to assess factors leading to a delayed presentation to our hospital.

Data were entered in Microsoft Excel and analysed using SPSS version 16. Data are presented as frequency, percentage and cross tables. The chi-square test was used for qualitative data and the Fischer exact test for quantitative data. A p value of <0.05 was considered significant. Logistic regression was used to identify factors that may be related to a delay in presentation to the hospital. Factors that were found to be significantly associated with a delayed presentation were entered into a logistic regression analysis.

## RESULTS

A total of 491 patients with a diagnosis of acute abdomen were studied, of whom 208 (42.4%) were women. About two-thirds (328) of patients belonged to the lower socioeconomic strata. The commonest condition was an appendicular pathology (Table I). The maximum pre-hospital interval was 408 hours while the minimum interval was 1.5 hours (mean [SD] 65.45 [72.38]) hours. A majority of patients (326 of 491; 66.4%) were admitted to hospital 24 hours after the onset of their symptoms (group II) while the rest were admitted within 24 hours (group I). Of the 326, 105 (32.2%) presented 24–48 hours after the start of the clinical illness; 66 (20.2%) presented after 48–72 hours, 79 (24.23%) presented in 3–5 days and 76 (23.3%) patients presented more than 5 day after the onset of their symptoms.

The age, sex, education, socioeconomic level and distance from hospital among patients in groups I and II were not significantly different and not associated with the delay in presentation to our hospital.

While 417 (84.9%) patients received primary treatment in the pre-hospital interval, only 100 (60.6%) in group I received it compared to 317 of 326 (97.2%) in group II. The most common primary treatment received was an intramuscular analgesic with an antacid by 73 (17.5%) patients followed by an intramuscular analgesic alone by 51 (12.2%) patients. Receiving primary treatment was associated with a delay in presentation to our hospital ( $p < 0.001$ ; Table II). We found that a larger proportion of patients in group I had either no relief or an increase in intensity of symptoms after primary treatment compared with patients in group II (71/100 v. 124/317; Table III).

Patients who received treatment from a general practitioner, in nursing homes, from more than one healthcare provider and those

who had multiple events in the pre-hospital interval had a significantly delayed presentation (Table IV). Due to late referral from primary health centres, 10 (3.1%) patients presented after 24 hours. On questioning about the reasons for delay, patients and families expressed fear of approaching a healthcare provider, fear of dying and senility, being refused admission to hospital, ignorance of the seriousness of symptoms, lack of awareness of diseases and financial problems.

After admission, 331 of 491 patients (67.4%) underwent an operative procedure. Of these, 198 were emergency procedures (Table V); 133 were elective procedures done at a later date/subsequent admission. Of the patients who needed emergency surgery and presented to the hospital after 24 hours, 35 (29.2%) had seen a general practitioner and this was significantly associated with a delayed presentation ( $p = 0.03$ , odds ratio: 2.27). Patients who had seen the casualty medical officer (17; 14.2%), had been treated at a nursing home (13; 10.8%), had visited a surgeon (3; 2.5%), been treated by >1 healthcare provider (11; 9.2%), had delayed coming to our centre due to patient and family related

TABLE I. Causes of surgical acute abdomen in the study group

Condition	n (%)
Appendix (acute, perforated or gangrenous appendicitis, appendicular lump)	200 (40.7)
Hepatobiliary (acute cholecystitis, cholangitis, cholelithiasis, cholelithiasis, choledochal cyst, empyema gallbladder, liver abscess)	94 (19.1)
Gastrointestinal (intestinal obstruction, bowel perforation, abdominal tuberculosis, infective colitis, diverticulitis, etc.)	124 (25.3)
Acute and chronic pancreatitis	33 (6.7)
Genitourinary (renal and ureteric calculi, urinary tract infection, pelvic inflammatory disease, ovarian cyst)	33 (6.7)
Hernia (strangulation, obstructed) and others	7 (1.4)
Total	491

TABLE II. Events in the pre-hospital interval

Initial event prior to reporting to our centre	n (%)
Treatment at single/multiple private nursing home(s) after which patient went home	37 (7.5)
Treatment by single/multiple general practitioners (GPs) after which patient went home	121 (24.6)
Treatment by casualty medical officer at our centre after which patient went home	67 (13.6)
Treatment by emergency surgical resident at our centre after which patient went home	17 (3.5)
Treatment given by GP/nursing home after which patient went home and came to our centre and went back home or vice versa	35 (7.1)
Visited more than one private clinic (GP and private nursing home)	5 (1.0)
Admission to department other than general surgery	4 (0.8)
Self medication or medication given by family members	51 (10.4)
Sought discharge from private hospital and came to our centre	7 (1.4)
Discharge against medical advice from our centre and reported back	9 (1.8)
No self medication/ no visit to healthcare provider	65 (13.2)
Did not seek any medical advice nor self-medicated	12 (2.4)
Delayed visit to hospital due to public holiday/festival/hospital workers' strike	2 (0.4)
Treatment taken at primary health centre and referred to us	18 (3.7)
Multiple events	41 (8.4)
Total	491

TABLE III. Response to primary treatment

Response	Group I (≤24 hours)	Group II (>24 hours)	Total
Symptoms decreased initially, appeared again with increased intensity	9 (9)	48 (15.1)	57
Symptoms decreased initially, appeared again with same intensity	5 (5)	64 (20.2)	69
No relief	29 (29)	60 (18.9)	89
Symptoms increased in intensity	42 (42)	64 (20.2)	106
Symptomatic relief followed by reappearance	15 (15)	54 (17.0)	69
Symptomatic relief initially, followed by reappearance of symptoms, which were then refractory to medication	0	27 (8.5)	27
Total	100	317	417

TABLE IV. Factors that contributed to a delayed presentation

Variable	Odds ratio	Confidence interval	p value
Treated by general practitioner	2.682	1.66–4.32	<0.001
Treated at nursing home	3.959	1.68–9.35	0.002
Treated by more than one healthcare provider	6.466	2.45–17.04	<0.001
Multiple events in history	36.947	5.00–272.90	<0.001

TABLE V. Emergency procedures performed

Procedure	n (%)
Appendicectomy	152 (76.8)
Primary closure of gastric/duodenal perforation	15 (7.6)
Primary closure of small bowel perforation for abdominal tuberculosis, post-typhoid perforation	6 (3.0)
Resection anastomosis for abdominal tuberculosis, strangulated incisional, inguinal hernia	7 (3.5)
Ileostomy/jejunostomy for abdominal tuberculosis, inflammatory bowel disease or small bowel cancer	13 (6.6)
Sigmoid/transverse colectomy for sigmoid volvulus, iatrogenic perforation	3 (1.5)
Open cholecystectomy	1 (0.5)
Exploration for obstructed hernia	1 (0.5)
Total	198

factors (9; 7.5%) and those that had been admitted to other departments (3 patients were admitted to other departments in our hospital were not associated with a delayed presentation).

The mean (SD) hospital stay was 5.2 (4.9) days; range 1–45 days. Patients who delayed coming to our hospital for >24 hours were more likely to stay for >5 days ( $p=0.01$ ); 86 (26.4%) patients in group II stayed for >5 days compared with 27 (16.4%) in group I. Even among those who had emergency surgery, patients in group II had a hospital stay of >5 days ( $p=0.04$ ). The overall mortality in our patients was 0.6% and all those who died were in group II.

## DISCUSSION

Acute abdomen presents with rapid onset and progression of symptoms that may indicate a life-threatening intra-abdominal pathology. A definitive diagnosis is often difficult but early

presentation to a healthcare provider will lead to appropriate management and a good outcome.<sup>13</sup> The practice of medicine, referral pattern, access to healthcare and awareness about medical emergencies is different in the developing world compared with the developed world.

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<sup>14</sup> 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.<sup>15</sup> A Nigerian study in 2010 found lack of financial resources to be an important factor in the delay in emergency abdominal surgery.<sup>16</sup> 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.

We had, for many years, observed delayed presentation of patients with acute abdomen. Most studies from the developing world have focused on complications related to delayed diagnosis in specific abdominal problems such as acute appendicitis. Few studies have assessed factors relating to delay in patients with a surgical acute abdomen.

We focused on the time from the onset of acute abdomen to presentation in an effort to determine factors that led to delayed presentation at our hospital, a secondary public urban health centre in a metropolitan city in India. We divided patients into two groups based on an arbitrary cut-off time of 24 hours as representative of an 'early' or 'late' presentation, as did Salman *et al.*<sup>13</sup> while studying causes for delay in diagnosis and treatment, and the effect on prognosis.

A study by Wig *et al.*<sup>17</sup> in 1978 showed that arrival of patients to hospital was delayed with 45% presenting 24 hours after the onset of symptoms. However, 66.4% of our patients were admitted after 24 hours of onset of symptoms and a substantial number of them needed an emergency operative intervention (40.3%). Wig *et al.* also showed that men were more frequently affected than women in a ratio of 3:1. We had similar findings but with a men:women ratio of 1.4:1. However, gender was not significantly associated with a delay in presentation. Most patients with acute abdomen were in the third and fourth decade of life and age was not associated with a delay in presentation in our study as well as in the study by Chung *et al.*<sup>18</sup> A similar study by Hansson *et al.*<sup>19</sup> observed that delay was not influenced by gender. Women (69.7%) tended to present late as compared to men though the difference was not significant. Akin to other countries in South Asia, in India too women are neglected and their health concerns are not taken seriously.

The level of education contributes to awareness about diseases and its consequences. It is also an important factor in the use of available medical facilities.<sup>20</sup> Due to poor awareness and knowledge about health-related issues, patients tend to present late and this increases morbidity. However, we did not find any relation between the patient's level of education and the delay in presentation ( $p=0.11$ ), despite a large proportion of our patients as well as those in the delayed group being illiterate or educated up to high school (66.8% and 77.6%, respectively). Doumi and Mohammed<sup>14</sup> in 2007 studied patients admitted to the emergency wards of the University Surgical Unit in El Obeid Teaching Hospital, Western Sudan and observed that late presentation of common diseases such as acute



appendicitis was due to poor awareness of disease and its seriousness despite it being common in the area.

Among the delayed group, 65.3% of patients were from the lower socioeconomic strata. However, we did not find a significant association of this with delayed presentation ( $p=0.66$ ). Mustafa and Abbas<sup>15</sup> from Lahore highlighted the importance of socioeconomic status for early and better utilization of available medical facilities. They showed that 74% of their study population belonged to poor and lower middle class leading to delayed presentation of acute abdomen, which was three times more common than among the more affluent. Another study from a University Hospital in Turkey<sup>21</sup> found that appendiceal perforation was associated with parental delay largely because of low socioeconomic levels. Similarly, Salman and Razzonki<sup>13</sup> found poor socioeconomic status to contribute to a delay in presentation.

Certain sociocultural aspects too could lead to a delay in presentation. We found family issues led to delayed presentation more often in women. The reasons given during the interview were usually the fear of not being available to provide for children and elders of their household. Due to the fact that hospital admission would result in absence of a caregiver for their spouses most of them refused admission on the first visit.

When we interviewed patients in our outpatient department regarding the history of their illness, we found that many patients had received primary treatment in the pre-hospital period. We also observed that delayed presentation was associated significantly with receiving primary treatment during the pre-hospital interval ( $p<0.001$ ). In our study, the spectrum of primary treatment was not influenced by patients' demographic factors such as age, gender, education and socioeconomic status. The primary treatment was often provided by a family member or at times self-medication was resorted to.

The most common treatment received was intramuscular injection of an analgesic. Anand *et al.*<sup>24</sup> studied injection use in a village in northern India and observed that the use of injections in the study area was high—2.46 injections per person per year. This may lead to a delay in appropriate treatment. It is therefore important to triage patients according to the acute abdominal condition.

We found that receiving treatment from healthcare personnel was significantly associated with a delay in presentation. Misdiagnoses and administering analgesics were the main reasons for delay. Similar findings were observed in a study done in Iraq by Salman and Razzouki<sup>13</sup> which showed that in a significant number of cases the physician was responsible for the delay. Our patients were also referred late from primary health centres; this was similar to a study by Doumi and Mohammed<sup>14</sup> from Sudan. Our patients who presented late were more likely to have a prolonged hospital stay. von Titte *et al.*<sup>25</sup> observed that length of hospital stay and postoperative complications were related to a delay in diagnosis at an appropriate healthcare centre.

Compared to patients who were managed conservatively or underwent elective surgery, delay in presentation was more important in patients needing emergency surgery. The 3 patients who died presented after 24 hours and had peritonitis due to a perforation of the bowel.

Our study has a few limitations. Data were collected by interviewing patients and their family members. It is therefore dependent upon the information providers' ability to accurately recall events, their level of education, as well as understanding and awareness of the clinical condition. As the information was being

gathered during an illness and in a hospital setting, it is possible that the informant may have responded so as not to upset any healthcare provider. In India, hospital stay is not an accurate indicator of severity of illness as social and economic factors may lead to a longer or shorter stay. Recording the complications would have been more accurate to assess morbidity. However, we believe that our study is representative of the present situation in India as it covers a fairly large number of patients from a public hospital.

We conclude that delayed presentation of patients with acute abdomen is often due to multiple reasons. These include patient, family, healthcare system, socioeconomic and other reasons. Further research needs to be directed towards identifying the contributing factors that play a role in delay in presentation and subsequently policy-making to tackle these issues.

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