

Laparoscopy in developing countries in the management of patients with an acute abdomen

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Surgeons in developing countries see a need to improve diagnosis and decision making in patients with an acute abdomen. Without the benefit of diagnostic aids such as computers and high-resolution ultrasonography, the rate of unnecessary laparotomy is often unacceptably high. The laparoscope is usually available in a developing country and its use easily acquired. Using laparoscopy in doubtful situations the unnecessary laparotomy rate was significantly reduced from 14.0 to 6 per cent ($P < 0.05$). Laparoscopy achieved a diagnostic accuracy of 86 per cent and prevented unnecessary laparotomy in 57 per cent of those in whom it was used.

Unnecessary laparotomy in those with an acute abdomen carries a risk for the patient and increases the duration and cost of hospital stay. Much recent effort has aimed to improve preoperative decision making in this condition^{1,2}. Diagnostic methods recently advocated, such as computer-aided diagnosis and high-resolution ultrasonography, are not available in most developing countries. The limited hospital bed space and frequently poor financial status of patients call for more efficient management of resources. Diseases such as ectopic pregnancy and pelvic inflammatory disease, which can be confused with acute appendicitis, are common^{3,4} and increase the potential for incorrect diagnosis. This study examines the value of laparoscopy in this situation and compares the results with the records of years before its introduction.

Patients and methods

The records of all patients undergoing operation with an acute abdomen between 1 April 1985 and 31 March 1989 were retrieved and analysed for clinical presentation, diagnosis, mode of management, timing of operation, operative findings and histological diagnosis.

Between 1 April 1989 and 31 March 1990, patients with an acute abdomen presenting to one surgical team were studied prospectively. Based on clinical assessment and simple investigations such as urine analysis and plain abdominal radiography, the patients were divided into three management options: conservative management (group 1); immediate operative management (group 2); and decision uncertain, signs and symptoms equivocal (group 3).

Patients in group 3 underwent emergency laparoscopy using a KLI laparoscope (KLI, Newton, Pennsylvania, USA). After the procedure patients were subdivided into groups 3A (conservative management chosen) and 3B (immediate laparotomy necessary). All material obtained at surgery was examined by a pathologist.

Statistical analysis was carried out using Student's *t* test.

Results

A total of 554 operations were performed during the 4-year retrospective period. Diagnoses in these patients had been achieved by analysis of clinical features and simple laboratory investigations. The commonest operations were appendectomy (35.4 per cent), and laparotomy for intestinal obstruction (30.3 per cent) and abdominal trauma (16.4 per cent) (Table 1). During the 1-year prospective period, 92 patients with an acute abdomen were referred to one surgical unit. The preoperative diagnoses based on similar clinical analysis are shown in Table 1.

Of 424 case files available for the retrospective study, 378 contained information (e.g. histopathology results) allowing a final diagnosis. Table 2 shows the degree of diagnostic inaccuracy during this period. Most unnecessary operations were appendectomies and laparotomies for blunt abdominal

injury. Others included laparotomies for advanced abdominal malignancy (three patients), no pathological findings at surgery (three), pelvic inflammatory disease (two) and peritonitis from umbilical stump sepsis in one infant. The overall rate of unnecessary laparotomy during this period was 14.0 per cent.

Of 92 patients in the prospective study, conservative management was chosen in eight (group 1), immediate laparotomy in 63 (group 2), and in 21 patients the decision was uncertain (group 3).

All patients in group 1 did well. Three patients in group 2 underwent unnecessary surgery: two appendectomies and one laparotomy for hepatic schistosomiasis.

Table 1 Causes of acute abdomen

Diagnosis	No. of patients	
	1985-1989	1989-1990
Acute appendicitis	196 (35.4)	40 (43)
Intestinal obstruction	168 (30.3)	21 (23)
Abdominal trauma		
Blunt	70 (12.6)	8 (9)
Penetrating	21 (3.8)	1 (1)
Perforated typhoid enteritis	29 (5.2)	5 (5)
Unknown after laparotomy	27 (4.9)	0 (0)
Miscellaneous causes	25 (4.5)	9 (10)
Perforated peptic ulcer	18 (3.2)	2 (2)
Unknown	0 (0)	6 (7)
Total	554 (100)	92 (100)

Values in parentheses are percentages

Table 2 Unnecessary laparotomies performed during the retrospective period

Diagnosis	No. analysed	Unnecessary laparotomy	Unnecessary laparotomy rate (%)
Acute appendicitis	118	35	29.7
Intestinal obstruction	120	0	0
Abdominal trauma			
Blunt	49	9	18
Penetrating	16	0	0
Perforated typhoid enteritis	21	0	0
Perforated peptic ulcer	16	0	0
Other	38	9	24
Total	378	53	14.0

Table 3 Effect of laparoscopy on the diagnosis and management of 21 patients in group 3

Working diagnosis	No.	Laparoscopic diagnosis	No.	Histopathological diagnosis	No.
Acute appendicitis	18	Acute appendicitis	4*	Acute appendicitis	3
		None (appendix not visualized)	2*	Normal appendix	1
		Pelvic inflammatory disease	9†	Acute appendicitis	2
		Premenstrual pelvic congestion	2†		
		Ruptured right tube in bilateral tubal gestation	1*	Bilateral tubal gestation	1
Blunt abdominal injury	1	Bruising of peritoneum of anterior abdominal wall	1†		
Acute abdomen (cause unknown)	2	<i>Armillifer armillatus</i> infestation	1†		
		Unknown	1‡		

Following laparoscopy *seven patients underwent laparotomy (group 3A) and †13 were managed conservatively (group 3B); ‡one patient died while being resuscitated for laparotomy. One of the nine patients with a laparoscopic diagnosis of pelvic inflammatory disease had a chronic right tubal gestation that was missed

Table 4 Complications of unnecessary laparotomy during the two periods

	1985-1989 (n = 53)	1989-1990 (n = 4)
Deaths	6	0
Morbidity	9	1
Wound infection	7	1
Postoperative pneumonia	2	0
Unmasking of latent hypertension	1	0

Table 5 Cost of unnecessary laparotomy

	1985-1989 (n = 53)	1989-1990 (n = 4)
Total hospital bills (naira)*	22 750	1535
Mean cost per patient (naira)*	429.2	383.8
Total duration of hospital stay (days)	397	14
Mean duration of hospital stay (days)	7.5	3.5

*Seventeen naira are equivalent to £1. The average operation fee over this period was 300 naira for laparotomy and 200 naira for appendectomy. The average admission fee was 6 naira per day. The rest of the charge is cost of drugs, infusions, dressings etc.

Table 3 shows the effect of laparoscopy on the management of patients in group 3. Twelve laparotomies were correctly avoided and one was delayed.

One of the seven patients in group 3A underwent an unnecessary appendectomy.

The rate of unnecessary laparotomy during the prospective period was 6 per cent. The unnecessary appendectomy rate was 11 per cent and there was no unnecessary laparotomy for blunt abdominal injury.

Table 4 compares the complications of unnecessary surgery during the two periods. During the retrospective period, nine operations had been delayed longer than 24 h owing to equivocal symptoms and signs, with a mortality rate of 33 per cent. These were laparotomies for perforated peptic ulcer (three patients), perforated typhoid enteritis (two), ruptured tubal pregnancy (one), intussusception (one), strangulated femoral hernia (one) and torsed ovarian cyst (one). One laparotomy for chronic tubal gestation was delayed during the prospective study, with no mortality.

Table 5 shows the cost of admission and surgery, and the duration of hospital stay in patients who underwent unnecessary laparotomy.

The overall mortality rate (including those who were

managed conservatively and those who had necessary laparotomy) was 13.4 per cent during the retrospective period and 5 per cent during the prospective period. Overall morbidity rates were 21.2 and 11 per cent respectively. Morbidity during the first period included wound infections (17.7 per cent), superficial wound dehiscence (1.4 per cent), burst abdomen (0.5 per cent), postoperative pneumonia (2.6 per cent), faecal fistula (0.9 per cent) and unmasking of latent hypertension (0.2 per cent). During the second period morbidity included wound infections (4 per cent), intestinal obstruction from adhesions (1 per cent), postoperative pneumonia (2 per cent), hepatitis (1 per cent) and malaria (3 per cent).

Discussion

Unaided clinical diagnosis of the acute abdomen may lead to a high unnecessary laparotomy rate. This is unacceptable: it puts the patient at increased risk and there are various aids to improve diagnosis and decision making^{1,2}.

Most unnecessary laparotomies during the retrospective period in this study were appendectomies and laparotomies for blunt abdominal trauma. This was the result of the unreliability of clinical features in these conditions. There was high diagnostic accuracy for intestinal obstruction because of the typical clinical presentation and reliability of plain abdominal radiography. Most delayed operations were for perforated peptic ulcers because of unreliability of presentation and inadequate diagnostic facilities. Unnecessary operations carried a lower mortality rate than delayed surgery. The cost of unnecessary surgery was considerable and these operations caused 10 per cent of the total mortality and morbidity from the acute abdomen during the period. The patients spent a total of 397 days in hospital.

During the prospective study, the rate of unnecessary laparotomy in two other surgical teams where unaided clinical diagnosis of the acute abdomen was practised was 12 per cent. By using the laparoscope that was available from the obstetrics and gynaecology department, the unnecessary laparotomy rate was reduced from 14.0 to 6 per cent after a period of training. Laparoscopy achieved a diagnostic accuracy of 86 per cent and spared unnecessary laparotomy in 57 per cent of those in whom it was used. These 12 patients were saved about 3000 naira (£180), 30-50 days of admission, and potential complications. Three-quarters of these patients had pelvic inflammatory disease, a condition that may be confused with appendicitis, particularly in an environment where both are common.

Laparoscopy prevented delayed laparotomy in a patient with bilateral tubal gestation presenting with features suggestive of acute appendicitis. Without laparoscopy this patient would

probably have undergone a gridiron incision for appendicectomy and the left tubal pregnancy might have been missed.

The missed diagnosis of a chronic right tubal gestation was caused by extensive pelvic adhesions surrounding it. If there is incomplete visualization of the peritoneal cavity then patients proceed to a period of observation or laparotomy depending on their condition. Ultrasonography, which is available in very few centres (where its use is dominated by the large numbers of patients attending for antenatal care), may also help in evaluating such patients.

The significant reduction in the mortality and morbidity rates in the prospective period resulted from a combination of improved facilities for medical care and a reduction in the unnecessary laparotomy rate.

As Paterson-Brown and Vipond¹ stated in 1990, those surgeons 'who are not pursuing routines (to reduce unnecessary surgery) are failing to deliver an adequate service to the patient with acute abdominal pain'. For the surgeon working in a developing country, careful clinical evaluation and laparoscopy may be the cheapest and most practical routine. Laparoscopy is most useful in patients with suspected appendicitis and in

blunt abdominal trauma when the indications for laparotomy are equivocal.

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