

## OUTCOME OF LAPAROTOMY FOR PERITONITIS IN 302 CONSECUTIVE PATIENTS IN IBADAN, NIGERIA

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### ABSTRACT

**Background:** Peritonitis is a life-threatening condition and requires urgent surgical management. Despite improvements in the care of patients with peritonitis, its management is still challenging and associated with significant morbidity and mortality. The aim of this study was to determine factors influencing the outcome in patients managed for peritonitis in a tertiary health institution in Nigeria.

**Methods:** A retrospective study involving 302 patients managed for peritonitis over a 3- year period. The biodata, clinical findings, diagnosis, pre-operative care, mode of anaesthesia, cadre of the surgeon, intraoperative findings, postoperative care, and the outcomes were retrieved from their records.

**Results:** Three hundred and two patients were operated on for peritonitis during the period. The mean age of the patients was  $48 \pm 12$  years. Twenty (6.6%) patients had other co-morbidities, with hypertension being the most frequent. Ruptured appendicitis was the most common cause of peritonitis, 83(27.5). Twenty-eight (9.2%) patients had complications, 19 patients (6.5%) required intensive care unit admission, 25 patients (8.4%) required a second exploratory laparotomy. The mortality rate was 2.4%. There was a statistically significant association between an adverse outcome and presentation with shock, anaemia, jaundice and oliguria

**Conclusion:** The factors influencing outcome are similar to those of other Africa countries. However, the mortality rate in our study is lower. Peri-operative specific organ support and prompt surgical intervention should be instituted to improve outcome. We suggest a prospective study to elucidate the effect of these factors, and to determine the predictive power of the various scoring systems.

### INTRODUCTION

Peritonitis is a life threatening condition, which requires urgent optimal surgical attention. It is a common surgical emergency in developing countries as well as the world at large<sup>1</sup> with varying aetiologies. Peritonitis may be primary or secondary based on its causative mechanism. Primary peritonitis rarely requires any surgical intervention unlike, the more common, secondary peritonitis. Secondary peritonitis occurs following gastro-intestinal perforations from inflammatory, post traumatic or post-operative aetiologies<sup>2</sup>.

Despite modern surgical techniques, recent developments in antimicrobial therapy and supportive care, the treatment and outcome of patients managed for generalized peritonitis remains challenging<sup>4</sup>. The management of the surgical condition is still associated with significant morbidity and mortality<sup>5,6</sup> because of marked derangement of the body's homeostasis, and subsequent progression to Multiple Organ Dysfunction Syndrome(MODS). Mortality rates of 13-43% have been reported<sup>7</sup>. These adverse outcomes are closely

influenced by interplay of patient related, disease related and intervention related factors. There are very few studies in developing countries, such as Nigeria, that have evaluated the role of patient-related, disease-related and intervention-related factors in the outcome of generalized peritonitis.

This study, therefore, aimed to evaluate the outcome of generalized secondary peritonitis in a cohort of patients treated in a single tertiary hospital in Nigeria by considering patient-related factors, disease-related factors and intervention-related factors.

### METHODS

This retrospective study was conducted at a tertiary level, University College Hospital Ibadan in Nigeria, which is 1000-bedded, serving a population of about six million people. It has the full complement of medical and surgical specialties with an Emergency Department and a functional Intensive Care Unit. The case notes of patients who were treated for generalized peritonitis in the hospital between January 2010 and

December 2012 were reviewed. The records reviewed included the admission records in the Emergency Department and surgical wards registers, theatre operation records and unit registers of the general surgery divisions. All patients aged 16 years or older and admitted with a diagnosis of peritonitis were included in the study. Patients who were diagnosed appropriately but died prior to surgery were excluded from the study. The hospital protocol for patients with peritonitis included adequate fluid resuscitation, nasogastric decompression, administration of broad-spectrum antibiotics and oxygen supplementation prior to surgery. Hydration continued during and after the surgery.

The bio-data, clinical findings, diagnosis, pre-operative care, mode of anaesthesia, cadre of surgeon, intra-operative findings, post-operative care and outcome were retrieved. The pre-operative (at presentation) and post-operative clinical and biochemical parameters like co-morbidity, jaundice, shock, vital signs and urinary output were also recorded. The outcome variables were morbidity or mortality within one month of surgery, and morbidity related to the surgery even after one month of surgery. The patients that were followed up for at least one-month post operation but were lost to follow up were considered as alive. The data were presented in frequency tables and percentages as well as graphical representation. Statistical analysis was done with descriptive statistics using SPSS version 21 and level of association between the outcomes and clinical/laboratory parameters like co-morbidity, jaundice, shock, pre-operative vital signs and urinary output were conducted using Chi square. The level of significance was set at p-value of 0.05.

## RESULTS

The records of 302 patients managed for peritonitis during the period of the study were obtained. The mean age of the patients was  $48 \pm 12$  years. Other sociodemographic characteristics of the patients are shown in Table 1. Most of the patients (92.1%) paid for their care in the hospital through personal funds (out of pocket), as neither evidence of National Health Insurance Scheme documents nor the letter of exemption from payment issued by the hospital management were found in the patients' case notes (Table 1).

### Aetiology and Co-morbidity

The sources of the peritonitis in the patients were ruptured appendicitis, 83 (27.5%), perforated peptic ulcer disease, 29 (9.6%) and perforated typhoid ileitis, 24 (7.9%). Other causes of peritonitis are shown in Table 2. Twenty-four patients had co-morbidities, of

**Table 1:** Sociodemographic characteristics of the 302 patients operated on for peritonitis

Variables	Frequency (%)
<b>Sex</b>	
Male	195 (64.6%)
Female	107 (35.4%)
<b>Highest Education Level</b>	
Primary	121 (40.1%)
Secondary	67 (22.2%)
Tertiary	75 (24.8%)
None	39 (12.9%)
<b>Source of funding for care</b>	
<b>Out of pocket</b>	
Health Insurance	278 (92.1%)
Others e.g. Hospital exemption from payment	17 (5.6%) 7 (2.3%)

which 15 (5%) and 9 (3%) were hypertension and diabetes mellitus respectively.

### Pre-operative parameters

Eleven (3.7%) patients presented in septic shock state with blood pressures less than 90/60 mmHg. One hundred and fifty-nine patients (52.8%) had tachycardia (pulse greater than 90 per minute) and 195 (65.0%) had tachypnea (respiration greater than 20 per minute) preoperatively, prior to the commencement of fluid resuscitation. Six (2.0%) patients had hypothermia with temperature less than 35°C, and 38 (16.4%) patients had hyperthermia with temperature greater than 39°C. A review of the haematological parameters revealed

**Table 2:** Distribution of aetiology of peritonitis

Aetiology	Frequency	Percentage
Ruptured appendicitis	83	27.5
Penetrating abdominal injury	49	16.2
Perforated peptic ulcer disease	29	9.6
Perforated gastric carcinoma	26	8.6
Gangrenous small bowel	24	7.9
Perforated typhoid ileitis	24	7.9
Partial intestinal obstruction	22	7.3
Pelvic inflammatory disease	6	2.0
Obstructed supra umbilical hernia	6	2.0
Gangrenous sigmoid volvulus	6	2.0
Perforated diverticular disease	2	0.7
Ruptured hepatic abscess	5	1.7
Cancer of the ascending colon	3	1.0
Ruptured mesenteric cyst	3	1.0
Pancreatitis	2	0.7
Others	12	3.9
<b>Total</b>	<b>302</b>	<b>100%</b>

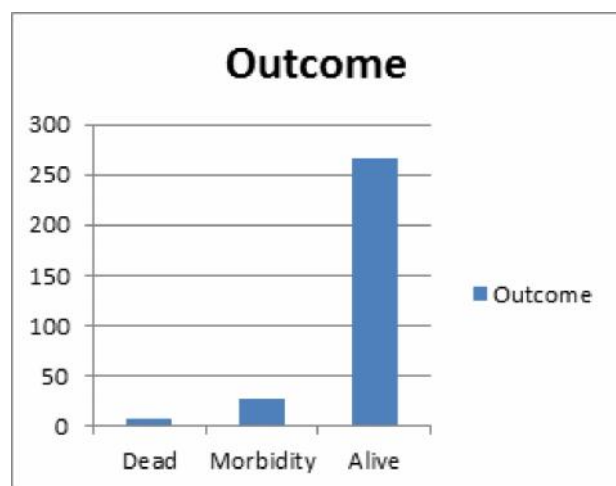
that 50 (16.8%) patients had anaemia with a packed cell volume of less than 30%, 17 (5.8%) had leucopenia with a white blood cell count of less than

**Table 3:** Pre and post-operative clinical and biochemical parameters of the patients

		Parameters	
		Pre-operative Frequency (%)	Immediate (1hour) post-operative. Frequency (%)
Blood pressure	Hypotensive(<90/60mmHg)	11(3.7%)	6(2.0%)
	Normal(90/60– 140/90mmHg)	265(87.7%)	223(84.9%)
	Hypertensive (>140/90mmHg)	26(8.6%)	40(13.0%)
SpO2	<98%	6(30.0%)	10(3.7%)
	>98%	14(70.0%)	260(96.3%)
Pulse rate (per minute)	<75	17(5.7%)	21(7.0%)
	76-95	125(41.5%)	147(48.7%)
	>95	159(52.8%)	133(44.3%)
Respiratory rate (per minute)	≤18	9(3.0%)	10(3.3%)
	18-22	97(32.0%)	85(28.0%)
	>22	195(65.0%)	207(68.7%)
Blood urea(mg/dl)	<30	92(36.9%)	93(44.1%)
	30-50	80(32.1%)	67(31.8%)
	>50	77(30.9%)	51(24.2%)
Creatinine (mg/dl)	<0.7	113(37.5%)	95(31.3%)
	0.7-1.2	132(43.8%)	132(43.8%)
	>1.2	57(18.8%)	75(25.0%)

3000/mm<sup>3</sup>, and 76 (25%) had leucocytosis with a white blood cell count greater than 12,000mm<sup>3</sup>. Other biochemical parameters are shown in Table 3.

One hundred and seventy-one (60.4%) patients were classified as American Society of Anaesthesiologists (ASA) Class III prior to surgery. The anaesthesiologists were either consultant or senior registrar grade, while the surgeons were senior registrar and consultant grade. A total of 126 (43.6%) patients had intra-operative transfusion of blood or blood-products.



**Figure 1:** Outcome of the post operative patients with peritonitis

#### Post-operative care

Nineteen (6.5%) patients required post-operative intensive care unit admission for supportive care (mechanical ventilation or inotropic support); six of whom were hypotensive postoperatively necessitating inotropic support. Bradycardia and tachycardia were recorded for 21(7.0%) and 133 (44.3%) patients respectively. Post-operative biochemical parameters revealed acidosis (blood bicarbonate of less than 20mMol/L) in 15 (19.9%) patients while 51 (24.2%) patients had azotaemia (blood urea greater than 45mg/dl). Two out of four patients with elevated creatinine had haemodialysis.

**Table 4:** Associations outcome and clinical/laboratory parameters

Parameters	P Value
Co-morbidity	0.455
Jaundice	0.020
Shock	0.010
Pre-operative pulse rate	0.552
Pre-operative respiratory rate	Respiratory rate 0.861
Pre-operative blood pressure	0.166
Pre-operative urinary output	0.011

## Outcomes

There were 7 (2.4%) mortalities, while 28 (9.2%) patients developed post-operative complications, including 25 (8.4%) patients that required a second exploratory laparotomy (Figure 1). Seventeen patients (6.0%) developed features of intra-abdominal adhesions within three months of follow up.

There was no statistically significant association between the outcome and any pre-operative diagnosis, but there was a statistically significant association between the outcome and jaundice, shock, pre-operative urine output and pre-operative haematocrit.

Post operatively, there was no statistically significant association with any biochemical parameter and outcome except for post-operative serum sodium concentration ( $p = 0.034$ ).

## DISCUSSION

A total of 302 patients with peritonitis were seen during the study period, averaging 100 patients per year. The male to female ratio of 2:1 is similar to the study in Azare, Bauchi state, North eastern Nigeria, where males constituted 73.2% of 153 patients with peritonitis over a five year period<sup>8</sup>.

The age range of patients with peritonitis in this study of 20 - 84 years is similar to a study in Srinjar, India in which the age range was 15-90 years<sup>7</sup>. Analysis of the educational status of these patients revealed that 12.9% and 40.9% had no formal education or received primary school education only respectively. Only 24.8% of these patients had higher than secondary level of education.

Access of the patients to a health insurance system was minimal with only 5.6% of the patients receiving support from a formal health insurance scheme. This is similar to the findings of Ogundiran et al. in the sub region, who reported that patients requiring surgical care pay for treatment predominantly from personal funds<sup>9</sup>. Ruptured appendicitis was the commonest non-traumatic cause of peritonitis in this study, which is in tandem with other studies in the country.<sup>10,11</sup> The lower incidence of proximal bowel perforations may be attributable to reduction in the incidence of complicated peptic ulcer disease due to treatment of helicobacter pylori. While this is reflected in some other study<sup>12</sup>, it is not consistent with reports from developed countries, where lower gastro intestinal perforations are more common.<sup>13</sup> There are some similarities with reports from India where higher proportions of peritonitis are as a result of perforated typhoid ileitis and perforated peptic ulcer disease.<sup>14,15</sup>

The morbidity rate of 9.2% in our series is significantly lower than that of 36% -50% reported from other developing countries<sup>7,16</sup>, and this difference may be attributable to the higher frequency of ruptured appendicitis as cause of the peritonitis in our series, as well as the fluid resuscitation protocol that was instituted on admission, during and after surgery, until the initial features of Systemic Inflammatory Response Syndrome (SIRS) were resolved. The pattern of complications seen in the present series is, however, similar to what was reported by Desa and Mehta in their study in India, where wound infection was the most common complication<sup>17</sup>. The mortality rate of 2.4% in the study is lower than that from a study conducted in Malawi (15%)<sup>12</sup>, this maybe as a result of the early initiation and protracted fluid resuscitation as well as support of the organ systems where necessary peri-operatively with mechanical ventilation and inotropic support. The mortality rate is also lower than values reported from India (17%-24.8%)<sup>7,17</sup>. The difference may be explained by the lower incidence of proximal bowel perforations and typhoid ileitis in the study and the different pathogens compared to the series from India. When compared to the series in western literature, which have reported mortality rates as high as 15%,<sup>13</sup> the lower mortality rate in our study may be attributed to the lower incidence of colonic perforation as the cause of peritonitis. Colonic perforation causes more severe peritonitis because of the higher bacterial load in the colon. In our series, there was no statistically significant association between the outcome of treatment and presence of co-morbidity. This was not in keeping with findings in other studies where there was a significant association<sup>18,19</sup>. The reason for this disparity may be related to the differences in demographics and low incidence of co-morbidities in our study (8%). There was no statistical significant association between outcome and any preoperative vital signs. This is contrary to the findings of Khan *et al*, where the pulse and respiratory rate had a significant association with morbidity and mortality, although the same could not be said of the blood pressure<sup>7</sup>. Pre-operative shock was clearly shown by Boey in his series to influence outcome significantly<sup>20</sup>.

The pre-operative urinary output ( $p=0.011$ ) and presence of jaundice ( $p=0.02$ ) had statistically significant association with outcome in our series. While the pre-operative urinary output is related to the practice of early initiation and continuation of appropriate fluid resuscitation before surgery, the presence of jaundice may underline the severity of the sepsis and the extent organ dysfunction. Temperature and total white blood cell on outcome further corroborate the extent to which the severity of the sepsis affects the outcome<sup>7</sup>.

Pre-operative packed cell volume was the only haematological indices which had a statistically significant association with outcome ( $p < 0.001$ ).

Out of all the biochemical parameters, the post-operative serum sodium concentration had a statistically significant association with the outcome ( $p = 0.034$ ). There is a statistically significant relationship with patient mortality. This finding may be related to the severity of the metabolic response to stress and surgery elicited in these patients.

### LIMITATION

Source of funds for those considered as out of pocket could not be ascertained from the case notes. Some patients were lost to follow up a month after surgery and were considered alive. This assumption might not be completely true for all of them.

### CONCLUSION

Peritonitis is a life threatening surgical emergency with diverse causes. The severity and outcome are influenced by patient-related, disease-related and intervention-related factors. The presence of shock and eventual reduction in urine output negatively impacted on the outcome. Adequate resuscitation and appropriate surgical intervention, as well as apposite peri-operative specific organ support should be instituted to improve outcome. A prospective study to further elucidate the effect of these factors in our environment, as well as to determine the predictive power of the various scoring systems is suggested.

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