

## Causes and Patterns of Peritonitis at St. Francis Hospital Nsambya, Kampala - Uganda

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**Background:** A wide variety of disease states give rise to intra-abdominal infection<sup>1</sup>. While varying according to age, gender and geography, the three most common causes of generalized peritonitis in low-income countries are probably appendicitis, perforated duodenal ulcer and typhoid perforations, in no particular order<sup>2</sup>. Causes and patterns of peritonitis were evaluated in patients surgically managed at Nsambya hospital. This study was aimed at determining the causes and patterns of peritonitis in patients managed surgically at St. Francis Hospital, Nsambya.

**Methods:** This was both a retrospective and prospective study of patients with peritonitis who underwent surgical treatment at Nsambya Hospital over a 15-months period from January 2012- to March 2013 inclusive. A total of 62 patients were included in the study.

**Results:** Of the 62 patients, 29 patients were retrospective and 33 patients prospective, 46 (74.2%) were males while 16 (25.8%) were females, giving a male to female sex ratio of 3:1. The mean age at presentation was 30.79 (SD 15.55) years, the youngest being 11 and the oldest 77 years. Perforated peptic ulcers, perforated appendix and perforated ileum were the commonest causes of peritonitis.

**Conclusion:** The commonest causes of peritonitis were perforated peptic ulcers, perforated appendix and perforated ileum.

### Introduction

Peritonitis refers to inflammation of the serosal membrane lining the abdominal cavity and contained viscera. It is traditionally classified as primary, secondary and tertiary. The most commonly encountered form in surgery is secondary peritonitis resulting from perforation of a hollow viscous. Primary peritonitis results from spontaneous bacterial infection of the peritoneum, alone or in association with peritoneal dialysis. Tertiary peritonitis is characterized by a class of very ill patients in whom secondary peritonitis fails to resolve despite what appear to be appropriate measures and is associated with multi-organ failure<sup>3, 4,5,6,7</sup>.

A wide variety of disease states give rise to intra-abdominal infection<sup>1</sup>. While varying according to age, gender and geography, the three most common causes of generalized peritonitis in low-income countries are probably appendicitis, perforated duodenal ulcer and typhoid perforations, in no particular order<sup>2</sup>. In a study on Nigerian children, 50% of patients had typhoid perforation<sup>(8)</sup>. In women, the complications of pelvic inflammatory disease predominate. Abdominal trauma resulting in intestinal injury is also a significant cause of peritonitis, particularly in low-income countries<sup>9</sup>.

In the West, appendicitis remains the most common cause of peritonitis, followed by colonic perforation, usually as a result of diverticulitis<sup>(10)</sup>. Perforation of the gastrointestinal tract by ingested foreign bodies is another cause of peritonitis though this is uncommon and less than 1% of ingested foreign bodies perforate the bowel<sup>(11)</sup>. The types of foreign bodies ingested depend on the dietary habits of the relevant countries. Fish bones perforation of the small bowel has been noted in some literature<sup>11</sup>. Tuberculosis peritonitis is a significant problem in parts of the world where tuberculosis is prevalent<sup>12</sup>. Iatrogenic causes, resulting from failure of intestinal anastomosis and inadvertent bowel injuries, need to be kept in mind.

According to Weigelt<sup>13</sup>, mortality in secondary peritonitis decreased significantly throughout the last century from 90% to about 20%. It varies significantly depending on the specific cause:

from 0.25% for appendicitis to 45% for fecal peritonitis. In general it depends very much on the degree of peritoneal contamination and the ability to achieve control of the source<sup>13,14</sup>.

### Patients and Methods

This was both a retrospective and prospective observational study conducted in the department of Surgery at Nsambya Hospital which is a faith based private not for profit hospital founded by Mother Kevin, a Franciscan Sister in 1903. The Retrospective cases included cases of peritonitis admitted from January 2012 to August 2012 and the prospective population was seen between September 2012 and March 2013 inclusive. Patients in the retrospective group were recruited when their medical files had satisfactory information required for the study. In the Prospective group, patients were consecutively enrolled until the sample size was achieved. The hospital has a bed capacity of 342<sup>16</sup>.

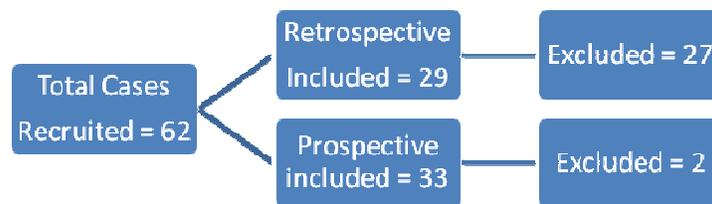


Table 1. Distributin of Cases

All surgically managed patients with peritonitis admitted during the study period were enrolled in the study. Patients with peritonitis who were managed conservatively without surgery and those transferred in after laparotomy for peritonitis, or transferred out to continue treatment elsewhere were excluded. The sample size was calculated using Fisher's formula and was 60 patients. Patients who met the inclusion criteria were enrolled in the study. In the Retrospective arm, patients with relevant information in the files were included and in the prospective arm consecutive patients were enrolled in the study until the sample size was achieved

Prospective candidates for inclusion in the study were recruited by investigator at the initial visit at the emergency department. Following a complete history taking and physical exam and a diagnosis of peritonitis, full blood count, urea and electrolytes, liver function tests were done and imaging studies ultra sound scan, plain abdominal X-ray were done to confirm or exclude the diagnosis. Upon resuscitation, the patients were prepared for emergency surgery. At operation the diagnosis was made or confirmed and the underlying cause of peritonitis determined and managed surgically according to the cause.

In the retrospective group, Theatre operation records and ward admission records were used to generate a list of patients who had been managed for peritonitis within the study period. Using the list, admission files for patients who had peritonitis from January 2012 to August 2012 were retrieved. The data in the files were analyzed and used to complete the questionnaires and only files with required information were included in the study.

From the data collection sheets, data were progressively entered in Microsoft Excel Sheet. At the end of collection, data was transferred to Medcalc Biomedical statistical software version 12.5.0 for analysis. Descriptive statistics used included mean, mode, median, standard deviation, measure of central tendencies and 2 x 2 tables were used for comparison of outcomes. Confidence intervals of 97% were applied as necessary. Chi-square was used as a statistical test.

**Study limitations**

It was a retrospective and prospective observational study; hence the researcher assumes that all patients entered in the study had been subjected to a fairly standard treatment commensurate with the individual diagnosis. Inadequate treatment could have negatively impacted on outcome yet it was not the subject of this evaluation.

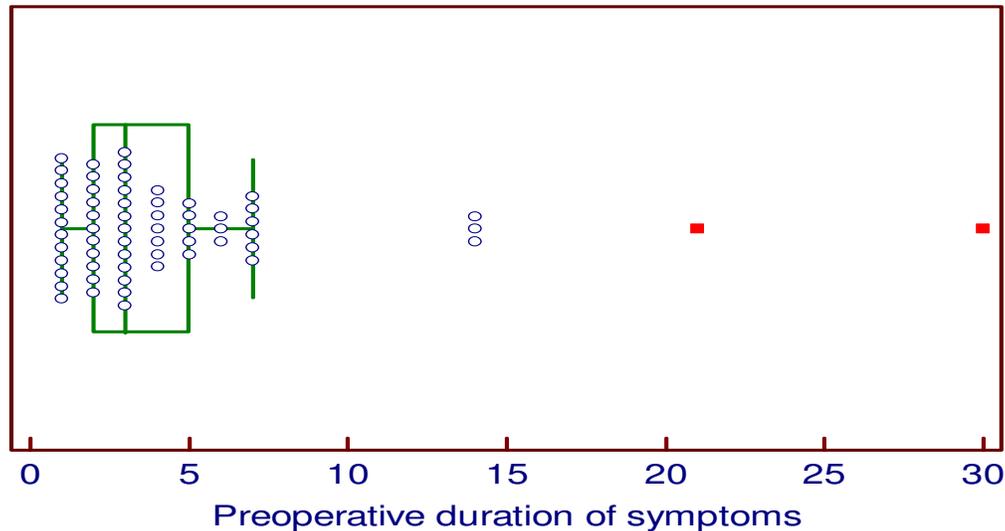
**Results**

Forty six (74.2%) were males while sixteen (25.8%) were females. The male to female sex ratio was 2.9 :1. The youngest being 11 years and the oldest 77 years. The mean age for females and males were 36.73 years and 28.89 years respectively. The mean preoperative duration of symptoms was 4.5 (Sd 4.9) days and ranged from 1-30 days. Thirteen (21%) patients had one or more organ dysfunction with shock being the most frequent at 9.7%. These are summarized in the Table 3 and Figures 3, 4 and 5 below.

**Table 3.** Background characteristics

Variable	Frequency	Percentage
Sex		
Male	46	74.2%
Female	16	25.8%
Age group		
<50	55	88.7%
≥50	7	11.3%
mean age	30.79 (min 11yrs, max 77yrs, median 26yrs.)	
Organ dysfunction		
Yes	13	21%
No	49	79%

**Box and Whisker plot of Preoperative duration of symptoms**



**Figure 1.** Preoperative Duration of Symptoms

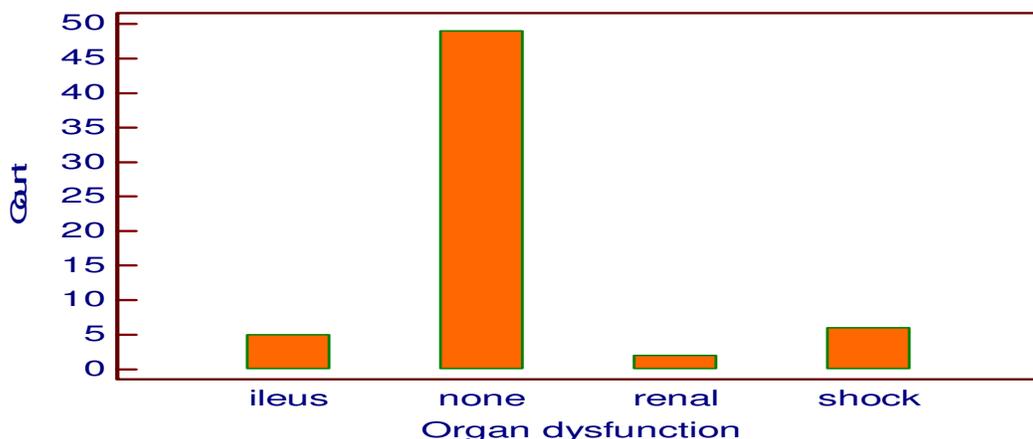


Figure 2. Organ Dysfunction

Table 4. Source of sepsis

Source	Frequency	Percentage
Appendicitis	3	4.8%
Ovarian Abscess	1	1.6%
Para Nephric Abscess	1	1.6%
Pelvic Abscess	1	1.6%
<b>Perforated Appendix</b>	<b>14</b>	<b>22.6%</b>
<b>Perforated Duodenal Ulcer</b>	<b>27</b>	<b>43.5%</b>
Perforated Gastric Ulcer	4	6.5%
<b>Perforated Ileum</b>	<b>8</b>	<b>12.9%</b>
Perforated Sigmoid Colon	2	3.2%
Primary Peritonitis	1	1.6%
<b>Total</b>	<b>62</b>	<b>100.0%</b>

The most common sources of sepsis were perforated duodenal ulcers (43.5%) followed by perforated appendix (22.6%) and ileal perforation at (12.9%) (Table 4).

Of all the 62 patients, only one patient had malignant disease and it was adenocarcinoma of the stomach with gastric perforation. Generalized peritonitis was found in 50 (80.7%) patients while 12 (19.4%) patients had localized peritonitis (Figure 3). Faecal peritonitis was observed in 6 (10%) patients while cloudy or purulent exudates were the most prevalent form of peritonitis encountered in 56 (90%) of the patients.

The overall morbidity rate was 32% (20 cases); females had higher morbidity of 73.3% compared to Males of 19.2%. Wound sepsis predominated at 71.4%, two patients developed fistulae and one patient developed pneumonia that were successfully managed (Figure 4).

Three patients presented with septic shock that persisted after source control and they eventually all died.

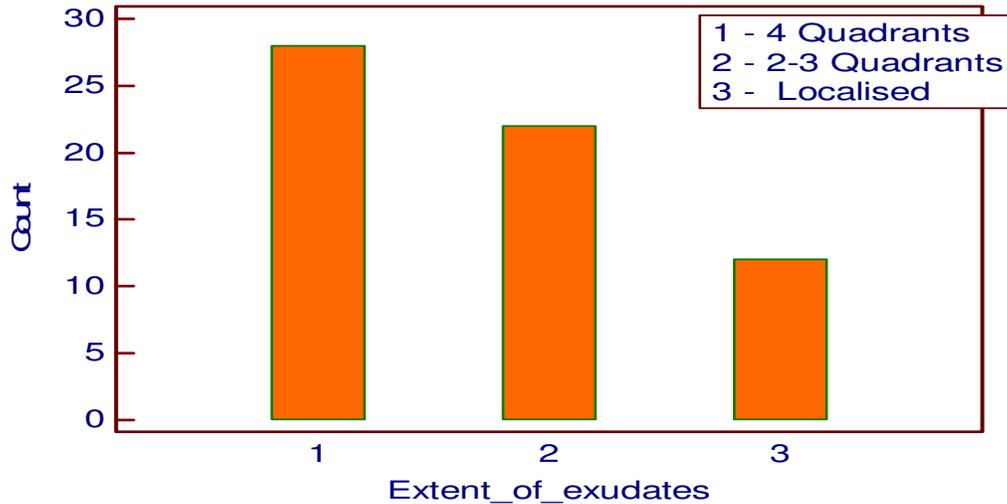


Figure 3: Extent of Exudates

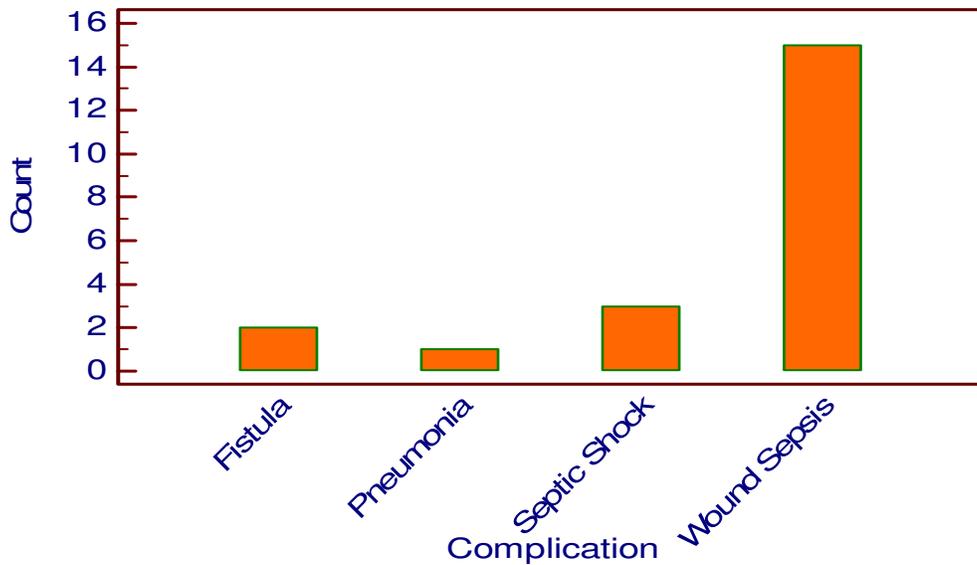


Figure 4. Causes of Morbidity

**Discussion**

Of the 62 patients recruited, an unequal sex distribution was observed giving a male to female ratio of 3:1. This pattern of male preponderance in laparotomy for general surgical pathology had been observed locally in the surgical audit of 2010 and 2012 of 2:1<sup>16</sup>. This pattern, however seems to sharply contrast studies from the developed countries which show an even gender distribution or a slight preponderance of either sex<sup>3, 17, 18, 19, 20</sup>. An explanation for this observation could be the result of variations in the predominant etiologies of secondary peritonitis in our set up compared to the west where appendicitis and perforated diverticular disease predominate.

The majority of our patients were young with a mean age of 30.79 ± 15.5 years and 75.8% of the study group falling in the 10-40 years age category. Rodolfo L. Bracho -Riquelme<sup>18</sup> in Mexico

reported a similar distribution with a mean of 34.6 years and median of 27 years<sup>(21)</sup> but studies from Europe show a much older age group with a range of 44-58 years. The explanation could also be due to the major etiological cause of peritonitis being perforated diverticulum and malignant perforations in Europe which occurs in older age group<sup>3, 17, 19, 22</sup>. In contrast to our setting where the major etiological cause of peritonitis was perforated peptic ulcers which is known to occur in younger age group and has a strong association with *H. pylori* that is prevalent in developing countries with low socioeconomic status like ours<sup>23, 24</sup>.

Only 12 of the 62 patients in this study were operated within 24 hours of onset of symptoms. Seventy percent were operated within 5 days after onset of symptoms and 8% of patients were operated after 14 days of onset of symptoms. The longest preoperative duration of symptom was 30 days and this was due to the fact that the patient had atypical presentation of peritonitis. Those who were operated within 24 hours after onset of symptoms had a morbidity of 8.3% and mortality of 16.7% meanwhile those who were operated after 24 hours of onset of symptoms had a morbidity of 38.8% and mortality of 2%. Early operation within 24 hours carried a lower morbidity compared to operation after 24 hours of onset of symptoms. Though statistically there was no significant difference in morbidity ( $p = 0.103$ ) and hospital stay ( $p = 0.257$ ) between those who were operated within 24 hours of onset of symptoms and those operated after 24 hours of onset of symptoms. Wabwire<sup>15</sup> found similar findings however Ntirenganya, Ntakiyiruta and Kakande<sup>25</sup> and Seiler<sup>1</sup> found that operation after 24 hours of onset of symptoms was associated with morbidity and mortality. The explanation could be that in the later studies the major causes of peritonitis was ileal<sup>(25)</sup> and colonic perforation<sup>(3)</sup> respectively and therefore more virulent bacterial contamination from the sources accounted for the poorer outcome after 24 hours of onset of symptoms compared to our study where there was less virulent bacterial contamination from the perforated peptic ulcers.

Shock was the most frequent organ dysfunction encountered; 2 out of 13 of the patients who had organ dysfunction died. They presented with irreversible septic shock despite resuscitation and source control the outcome could not be changed. Eight out of the thirteen patients who had the organ dysfunction had morbidity. The influence of organ failure on outcome has been highlighted in previous studies, with some noting increasing mortality with more organs failing and as high as 100% mortality were reported where 4 organs were failing<sup>3, 4, 5, 26, 27</sup>. This study found organ failure was associated with morbidity and mortality though only two patients had more than one organ dysfunction (Septic Shock and renal dysfunction).

Ajaz Ahmad Malik<sup>27</sup> and Wabwire<sup>15</sup> in Turkey and Kenya in 2010 and 2009 respectively found that perforated peptic ulcer was the commonest cause of generalized peritonitis followed perforated appendix and ileal perforation. The same findings have been noted in this study and perforated duodenal ulcer was the commonest cause of peritonitis at 43.5% followed by perforated appendix (22.6%) and perforated ileum (12.9%). However a study from Rwanda 2010<sup>17</sup> showed ileal perforations as the commonest cause followed by perforated gastric ulcer and perforated appendix. This could be due to typhoid fever being a high risk major infectious disease after hepatitis in Rwanda<sup>(28)</sup>. Studies from Europe however, reported colonic perforation due to diverticular disease and cancer (16-70%) as the leading causes of peritonitis followed by gastro duodenal peptic ulcer perforation and perforated appendicitis<sup>3, 21, 2</sup>.

Only one patient in this study had tumor perforation (gastric adenocarcinoma) causing peritonitis. Due to the small numbers and lack of statistical significance, this study did not find malignancy predictive of eventual outcome despite findings that suggest a strong correlation elsewhere<sup>6, 49</sup>. The studies that showed correlation of malignancy with outcome had more elderly patients who had higher risk of developing malignancy compared to our study that had younger patients<sup>21, 22</sup>.

Morbidity rates in surgery for peritonitis vary worldwide with reports ranging from 18% to 67 % (3,18, 29, 30). Regionally, Wambire<sup>(15)</sup> found a morbidity rate of 47.1% in Kenya while Ntiringanya<sup>(25)</sup> found 51% in Rwanda. These are higher than what this study found (32%). The difference could have been due to the difference in the etiological causes especially in Rwanda where typhoid ileal perforation was the commonest cause of peritonitis and this is known to be associated with morbidity and mortality<sup>(25)</sup>. Although localized complications replicate patterns observed in other studies, it is noteworthy that systemic complications were less observed in this study than one would have expected (3, 18, 29, 30). This could have been due to good resuscitation of the patients and initiation of broad spectrum antibiotics at admission.

### Conclusion

The commonest causes of peritonitis were perforated peptic ulcers, perforated appendix and perforated ileum. The most presenting form being generalized peritonitis with males being predominately affected than females.

### Recommendations

A study could be done to determine the risk factors for duodenal perforations and current treatment patterns for peptic ulcer disease in our setting.

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