

## A Study to Evaluate the Challenge of Abdominal Sepsis.

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### ABSTRACT

**Background:** Abdominal infections cover a variety of pathological conditions, ranging from appendicitis to contaminated, dirty fecal peritonitis. Sepsis is a complex, multifactorial process that if improperly treated can progress to conditions of varying severity with functional impairment of one or more vital organs or systems, finally could lead to multiple organ failure. Abdominal sepsis is associated with significant morbidity and mortality rates. It is the most common cause of sepsis-related mortality in the surgical ICU. This is a major challenge faced by the emergency surgeon everyday. **Methods:** A total of 2150 patients with abdominal infections have been observed and the data analyzed since 2010 at a single tertiary center. The key steps in the management of complicated intra-abdominal infections are source control, hemodynamic support and relevant antibiotic regimen. **Results:** Antimicrobial management is generally not standardized and many regimens, either with monotherapy or combination therapy, are used without having proven their efficacy. Well designed protocols are required to handle this complex situation encountered by the surgeon. **Conclusion:** Recent advances in the technology of investigation are assisting at arriving at the diagnosis early.

**Keywords:** Abdominal Sepsis, Antimicrobial Therapy, Infection.

### INTRODUCTION

Abdominal infection leads to pathophysiological cascade of events culminating in sepsis and death. Studies have demonstrated that mortality rates increase exponentially in severe sepsis and septic shock. Severe sepsis may be the “tipping point” between the positive and negative consequence. A clear approach is necessary to tackle this tipping point beyond which the results are disastrous. Early, source control, hemodynamic support and the optimum antimicrobial therapy should be the keystones of the approach. Early diagnosis using the best investigation modality can help in initiating the treatment and minimize complications.

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An observational study, to look at the present practice and observe the places where we are going wrong and a review of literature for the latest recommendations and guidelines is the need of the hour.

### MATERIALS AND METHODS

- All cases of abdominal infections treated at casualty, Victoria hospital between Aug 2010-Aug 2014

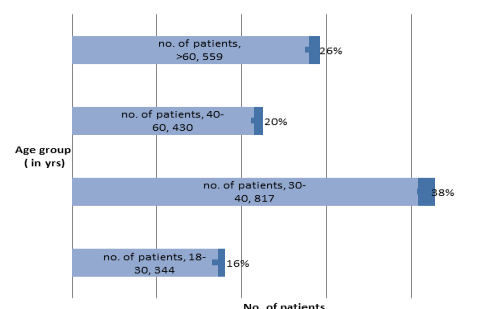
#### Inclusion and exclusion criteria

- Only Emergency cases included.
- More than 18 years of age included.
- Immunocompromised patients excluded.

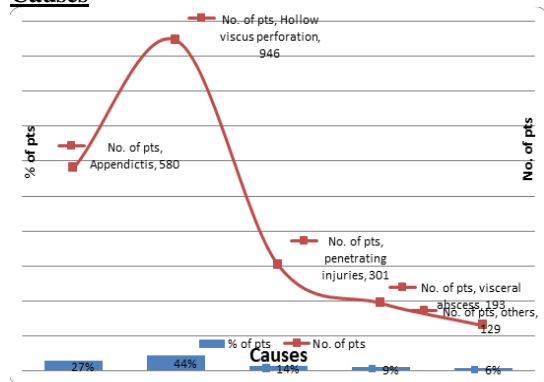
### RESULTS

- A total of 2150 patients have been observed and studied between august 2010 and august 2014
- 68% are male patients and 32 % female

#### Demographic profile



**Causes**



**Scoring system used**

POSSUM scoring used only in 26 patients

**Open or laparoscopic intervention**

No emergency laparoscopy was performed in any patients

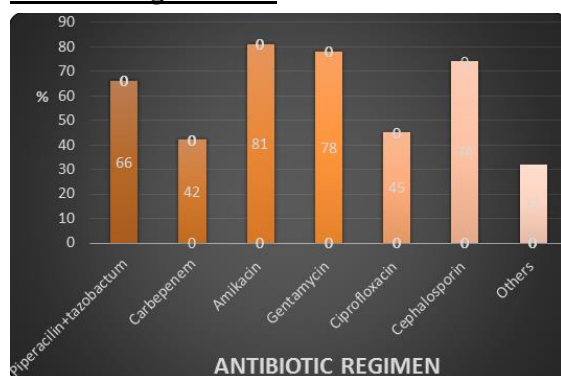
**Conservative management**

- 115(appendicular mass, recurrent appendicitis)
- 62(liver, splenic abscess)
- 11(blunt injury)
- 26(others)

**Culture growth**

Bacteria isolated	%
E.coli	72
Klebsiella	70
G-ve enterococcus	48
streptococcus	33
staphylococcus	28
polymicrobial	69
others	21

**Antibiotic regimen used**



**Investigation used**

Investigations	No. of pts	% of pts
X-ray	1278	59
USG	1835	85
CT(Plain+ Contrast)	646	30

**DISCUSSION**

The age groups most involved are between 30-40 years. Appendicitis is recorded as the second most commonly encountered abdominal infection in our study. Uncomplicated appendicitis has good

outcome and in many situations conservative management is successful. Unruptured liver abscess is best managed by percutaneous drainage and antibiotic coverage.

**Prognostic evaluation**

It is gloomy that the use of the prognostic scoring system hasn't gained popularity inspite of its simplicity. POSSUM and APPACHE scoring systems are recommended, the practice of using them routinely to predict the outcome should be encouraged.

**Antibiotic therapy**

In our study the highly used antibiotic is piperacilin tazobactam combination; this is just as per the recommendation.<sup>[7]</sup>

Clinicians must be aware that drug pharmacokinetics may differ significantly in sepsis.

The "dilution effect", also called the 'third spacing' phenomenon, must be considered when administering hydrophilic agents such as  $\beta$ -lactams, aminoglycosides, and glycopeptides.

Table 1 Recommended dosing regimens of the most frequently used renally excreted antimicrobials according to rena function [21]

Antibiotic	Renal function			
	Increased	Normal	Moderately impaired	Severely impaired
Piperacilin/ tazobactam	16/2 g q24 h CI or 3.3/3.5 q6 h EI over 4 hours	4/0.5 g q6 h	3/0.3/7.5 g q6 h	2/0.25 g q6 h
Imipenem	500 mg q4 h or 250 mg q3 h over 3 hours CI	500 mg q6 h	250 mg q6 h	250 mg q12 h
Meropenem	1 g q6 h over 6 hours CI	500 mg q6 h	250 mg q6 h	250 mg q12 h
Ertapenem	ND	1 g q24 h	1 g q24 h	500 mg q24 h
Gentamycin	9 to 10 mg/kg q24 h <sup>b</sup>	7 mg/kg q24 h	7 mg/kg q36-48 h	7 mg/kg q48-96 h
Amikacin	20 mg/kg q24 h	15 mg/kg q24 h	15 mg/kg q36-48 h <sup>b</sup>	15 mg/kg q48-96 h
Ciprofloxacin	600 mg q12 h or 400 mg q8 h	400 mg q12 h	400 mg q12 h	400 mg q24 h
Levofloxacin	500 mg q12 h	750 mg q24 h	500 mg q24 h	500 mg q48 h
Vancocmycin	30 mg/kg q24 h CI	500 mg q6 h	500 mg q12 h	500 mg q24-72 h
Tecoplanin	LD 12 mg/kg q12 h for 3 to 4 doses; MD 6 mg/kg q12 h	LD 12 mg/kg q12 h for 3 to 4 doses; MD 4 to 6 mg/kg q12 h	LD 12 mg/kg q12 h for 3 to 4 doses; MD 2 to 4 mg/kg q12 h	LD 12 mg/kg q12 h for 3 to 4 doses; MD 2 to 4 mg/kg q24 h
Tigecycline	LD 100 mg; MD 50 mg q12 h	LD 100 mg; MD 50 mg q12 h	LD 100 mg; MD 50 mg q12 h	LD 100 mg; MD 50 mg q12 h

Carbapenems including imipenem/cilastatin, meropenem sharing activity against g-ve bacilli are particularly suitable for severe intra-abdominal infections.

Because of its tissue penetration in peritoneal and soft tissues, tigecycline is a very useful optional drug in peritoneal infections.

**Isolated flora**

The most common flora or culture observed in our study is Ecoli and klebsiella. The polymicrobial culture is on rise and these complicate the situation. The organism isolated depends on the source of contamination

Sepsis from an abdominal origin is initiated by the outer membrane component of G-ve organisms (e.g., lipopolysaccharide [LPS]), or G+ve (e.g., lipoteichoic acid), as well anaerobe toxins.

**Diagnosis**

Early detection and treatment is essential to minimize complications. Overall, computerized tomography (CT) is the best imaging modality for intra-abdominal infections. If both oral and intravenous contrast studies are conducted, very accurate results can be obtained.

Plain Xray films have low sensitivity and specificity, and in most cases, have been replaced by computed tomography (CT). However, plain films remain a reasonable initial study. X ray films may provide evidence of perforation within short time.

USG has become the most commonly used noninvasive investigation in the emergency setup. Ileus, obesity and hemoperitoneum may significantly mask the view. USG is operator-dependent.

**Table 1 Expected organisms according to source**

	Source	Expected Organism
Primary Peritonitis	Young healthy female	Streptococcus
	Cirrhotic	Enteric gram negatives Enterococcus
	CAPD	Staphylococcus aureus
Secondary peritonitis	Stomach and duodenum	Streptococcus Lactobacillus
	Biliary	E. coli, Klebsiella, Enterococcus
	Small Intestine	E. coli, Klebsiella, Lactobacillus Streptococci Diptheroids Enterococci
	Distal ileum and colon	Bacteroides fragilis Clostridium spp. E. coli Enterobacter spp. Klebsiella spp. Peptostreptococci Enterococci
Tertiary peritonitis		Enterococcus Candida Staphylococcus epidermidis Enterobacter

### **Source control and hemodynamic support**

This generally involves drainage to evacuate the pus or infected fluid collections, debridement of necrotic and definitive control of the origin of contamination. Crystalloid solutions are recommended in the initial resuscitation of patients with severe sepsis and septic shock

Fluid overload should be avoided, which may aggravate the sepsis cascade.

Vasopressor agents should be administered early in patients with severe sepsis or septic shock of abdominal origin to restore organ perfusion. Their early use may

Prevent excessive fluid resuscitation. Norepinephrine is now the recommended first-line vasopressor agent used to correct hypotension in the event of septic shock.

Echo has been shown to forecast fluid responsiveness precisely and is a noninvasive tool able to determine hemodynamic status in circulatory failure.

### **Laparoscopic Approach to Abdominal Sepsis**

Our study reveals Laparoscopy is unfortunately not utilized in emergency setup at our institution. Though Laparoscopy represents a standard procedure for patients with an acute abdomen (Pecoraro et al., 2001), there is controversy about its therapeutic use in the presence of sepsis.

Hemodynamic instability is still a limiting factor regarding the use of laparoscopy.

The early use of laparoscopy in an abdominal sepsis is recommended as an appropriate method to prevent a delay in obtaining a definitive diagnosis.

A good field of view of the peritoneal cavity and easier to obtain tissue and fluid samples under direct

vision are pros of laparoscopy. Unnecessary laparotomies can be avoided with laparoscopy.

Despite the doubts about the feasibility and efficiency, laparoscopy is getting recognized among surgeons, especially for patients with abdominal sepsis.

## **CONCLUSION**

Management of abdominal sepsis has evolved considerably.

Advances in intensive care, imaging, laparoscopic intervention, and antimicrobial regimens have equipped the surgeon better. So the surgeon, if follows and utilizes these in the right possible way then we can defeat the challenge of abdominal sepsis with ease.

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