# Bacteriological Profile of Wound Infection with Their Antibiotic Sensitivity Following Emergency Gastrointestinal Surgery

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Postoperative wound infection is one of the important cause of morbidity. The main determinants of infection are agent, host and environment. The objective of this study is to identify the underlying organisms responsible for postoperative wound infection following emergency gastrointestinal surgery and also their antibiotic sensitivity according to the culture and sensitivity report of wound swab. This study was a prospective one which was carried out in the department of surgery Rajshahi Medical College Hospital, Rajshahi during the period of July 2012 to December 2012 where 142 patients were selected at random who admitted for emergency surgery for acute appendicitis and burst appendix, duodenal and ileal perforation, acute intestinal obstruction and obstructed inguinal hernia. For bacteriological study wound swab was sent to the department of microbiology in sterile test tube with proper labeling. In this study 142 patients with emergency gastrointestinal surgery were included of which acute appendicitis 62 with infection rate 8.06% (5 infection out of 62 cases) burst appendix 12, infection rate 33.33% (4 infection out of 12cases) Duodenal ulcer perforation 15, infection rate 13.33% (2 infection out of 15 cases) small intestinal obstruction 30, infection rate 13.33 % (4 infection out of 30 cases) ileal perforation 19, infection rate 42.10% (8 infection out of 19 cases) sigmoid volvulus 2, infection 50% (1 infection out of 2 cases) and obstructed inguinal hernia 2 infection rate nil. In this study the peak incidence of wound infection to between 6th – 8th post operative day. Organisms isolated from infected wound swab were E. coli 45.50%, staph. aureus 37.50%, Kl. pneumonia 8.50%, P. aeruginosa 8.50% out of total 24 culture positive cases. Regarding antibiotic sensitivity all the above mentioned organism were 100% sensitive to Imepenam, Kl. pneumonia and P. aeruginosa a 100% sensitive to ceftriaxon, but other antibiotic like ciprofloxacin, cephradin were sensitive to 50% only.If we had a well equipped gastrointestinal ward with clean environment and adequate resuscitative facilities, a planned operation theatre, isolation facilities for septic patients and overall health consciousness of the patient, the incidence of postoperative wound infection in emergency gastrointestinal surgery is bound to come down with only minimal use of antibiotics.

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## Introduction

Surgical wound infection still causes considerable morbidity and high cost to the health care system and is becoming increasingly important in medicolegalaspects.[1] Infection increase the discomfort and disability experienced by patients following gastrointestinal procedure and in their most severe form may endanger life.[2] The main determinants of infection are the microorganism, the environment and the host defense mechanism and there is continuous interaction between these three factors. The purpose of this study is to identify the different causative organisms and determination of antibiotic sensitivity according to the culture and sensitivity report of wound swab following emergency gastrointestinal surgery. In abdominal surgery the source of bacteria may be endogenous (from the patients viscera 98% and skin) contamination from the air in the OT, direct contamination from punctured gloves.[3]

Usually postoperative wound infection appears between 3$^{rd}$ to 5$^{th}$ postoperative day but it may appear as early as in the 1$^{st}$ day of surgery and even after the patient has left the hospital. Classically the presence of postoperative wound infection has been confirmed by documenting the typical clinical signs of inflammation along with drainage of purulent or culture positive materials from the wound.

Early diagnosis by clinical features and isolation of organism from the wound by culture sensitivity test and thereby using most appropriate antibiotic, the morbidity and mortality due to postoperative wound infection especially following emergency gastrointestinal surgery can be reduced.

The objective of this study is to identify the different causative organisms and determination of antibiotic sensitivity according to the C/S report of wound swab following emergency GI surgery.

## Methods

This study was a prospective one where 142 patients were selected at random from surgery department of Rajshahi Medical College Hospital, Rajshahi during the period of six months (July 2012 to Dec 2012)

All the patients studied were admitted for emergency surgery for acute appendicitis, perforated peptic ulcer, ileal perforation, acute intestinal obstruction, burst appendix, volvulus of sigmoid colon, and obstructed inguinal hernia.

For bacteriological study wound swab were collected from infected postoperative wound aseptically, by cotton wool swab stick enclosed in sterile tube. The specimens were sent to the laboratory after proper labeling.

## Results

Out of 142 patients with emergency gastro-intestinal surgery in this series 62 cases were acute appendicitis, 12 cases were burst appendix, 15 cases were duodenal ulcer perforation, 3 cases were small intestinal obstruction 19 cases were ileal perforation, 2 cases were sigmoid volvulus and obstructed inguinal hernia. Wound infection rate of specific type of operation shown respectively in the table I. The overall wound infection rate was 16.9%.

Table I: Rate of wound infection

| Name of diseases | Name of operation | No. of operation | No. of infection | Percentage (%) of infection |
|---|---|---|---|---|
| Acute appendicitis | Appendectomy | 62 | 5 | 8.06 |
| Burst appendix | Appendectomy with peritoneal toileting | 12 | 4 | 33.33 |
| duodenal ulcer perforation | Repair of perforation with thorough peritoneal toileting | 15 | 2 | 13.33 |
| Small intestinal obstruction due to band and adhesion | Laparotomy with division of band and adhesion | 18 | | |
| Small intestinal obstruction needs resection and anastomosis | Resection and anastomosis | 12 | 4 | 13.33 |
| lleal perforation | Repair and peritoneal toileting | 19 | 8 | 42.10 |
| Valvulus of sigmoid colon | Resection and Anastomosis | 2 | 1 | 50.00 |
| Obstructed inguinal hernia | Herniotomy and herniorraphy | 2 | 0 | 00 |

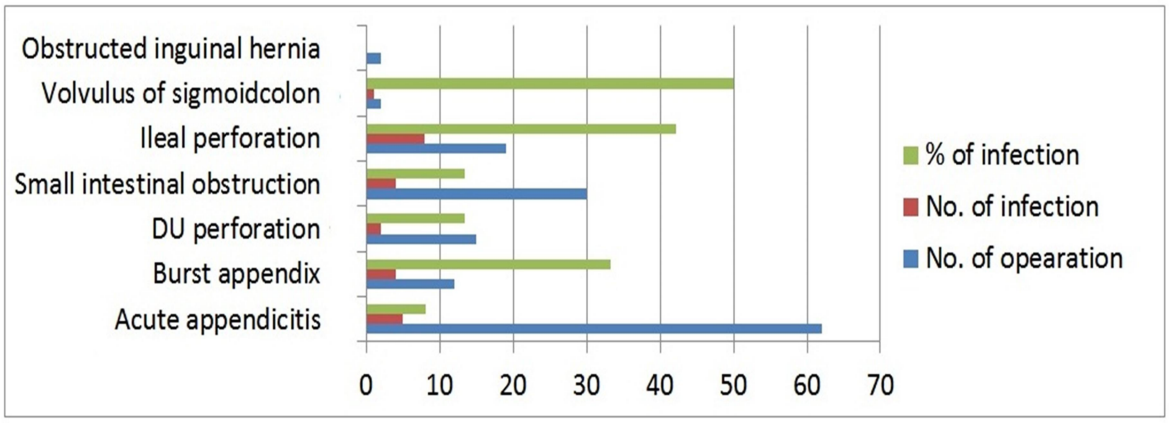


Figure 1. Bar diagram of rate of wound infection

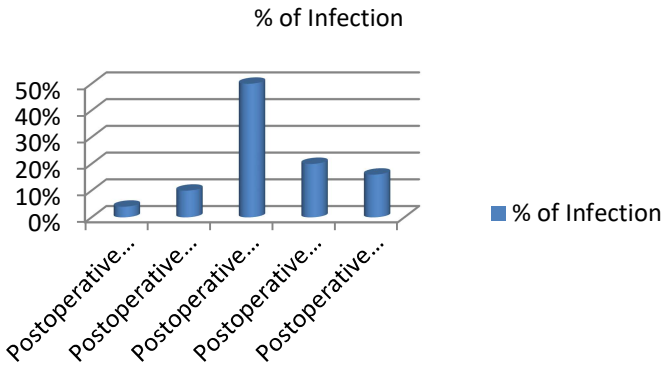


Figure 2. Postoperative day of wound infection

Causative pathogens detected were Eschrechia coli in 11 cases, staphylococcus aureus in 9 cases, Klebsiella in 2 cases, Pseudomonas aeruginosa in 2 cases. No growth found in 2 cases.

Table II: Character of discharge or pus and organisms cultured

| Character of discharge | No of cases | Organisms cultured |
|---|---|---|
| Serosanguiuous | 1 | No growth |
| Thick creamy pus | 9 | Staphylococcus aureus |
| Muddy thin odourless | 11 | E. coli |
| Blue green pus | 2 | Pseudomonas aeruginosa |
| Yellow fishy odour | 2 | Klebsiella |

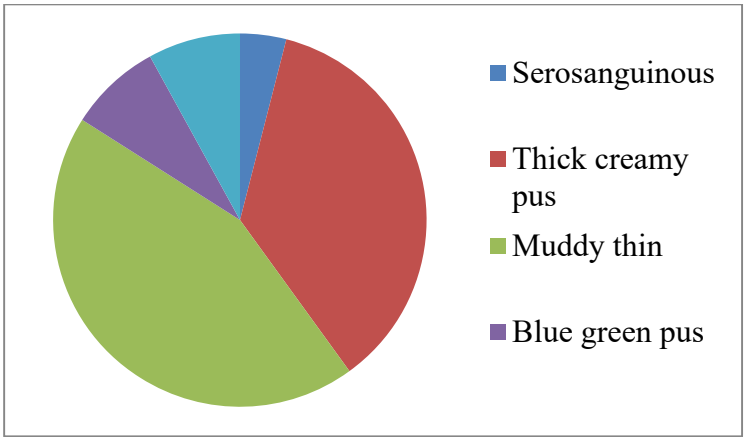


Figure 3. Pie chart of Character of discharge

Present series shows Escherichia coli 45.5% Staphylococcus aureus37.50%, Klebsiella and Pseudomonas 8.5% each (Table III).

Table III: Frequency of organism cultured from the postoperative infected wounds

| Total no. of wound (Isolated organisms cultured from infected wound) | | Isolated organism | Total no. of single isolated bacteria | Percentage (%) |
|---|---|---|---|---|
| Present series | 24 | E. Coli | 11 | 45.50 |
| | | Staph. aureus | 9 | 37.50 |
| | | KI. Pneumonia | 2 | 8.50 |
| | | P. aeruginosa | 2 | 8.50 |
| | | Total | 24 | |

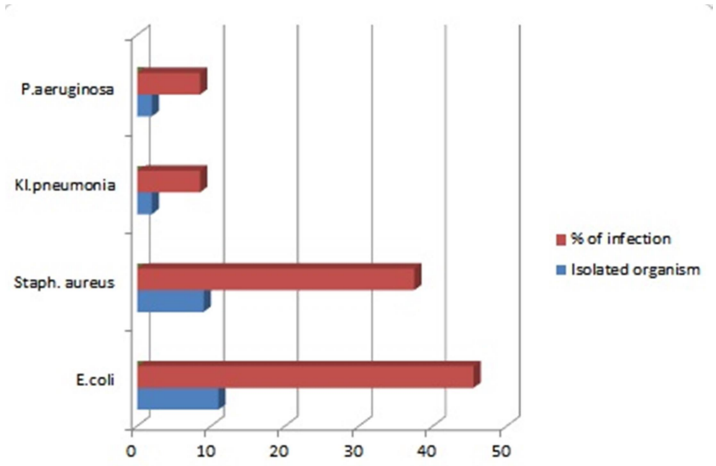


Figure 4. Bar diagram of frequency of organism cultured

E. Coli, Staph aureus, KI Pneumoniae and P. aeruginos are 100% sensitive to Imepenam, 72.73%, 88.9%, 100% and 100% sensitive to ceftriaxone. E. Coli is 45.5% 45.5% and 9.09% sensitive to ciprofloxacin, cephradine, cotrimoxazole and nitofurantoin respectively. Staph aureus is 44.45%, 44.45%, 55.55% sensitive to ciprofioxacin, cephradine and flucloxacilless respectively. K. pneumonia is 50% sensitive to cephradeni and cotrimoxazole each. P. aeruginosa is also 50% sensitive to ciproflxacin and nitofurantoin each (Table IV).

Table IV: Antibiotics sensitivity of the cultured organisms from infected wound

| Name of Organisms | Name of sensitive antibiotics | | | | | | |
|---|---|---|---|---|---|---|---|
| | Ciprofloxacin | Cephradin | Cotrimoxazole | Flucloxacin | Nitofurantion | Ceftriaxone | Imepenam |
| E. coli | 45.5 | 54.5 | 45.5 | | 9.09 | 72.73 | 100 |
| S. aureus | 44.45 | 44.45 | | 55.55 | | 88.9 | 100 |
| Kl. pneumoniae | | 50 | 50 | | | 100 | 100 |
| P. aeruginosa | 50 | | | | 50 | 100 | 100 |

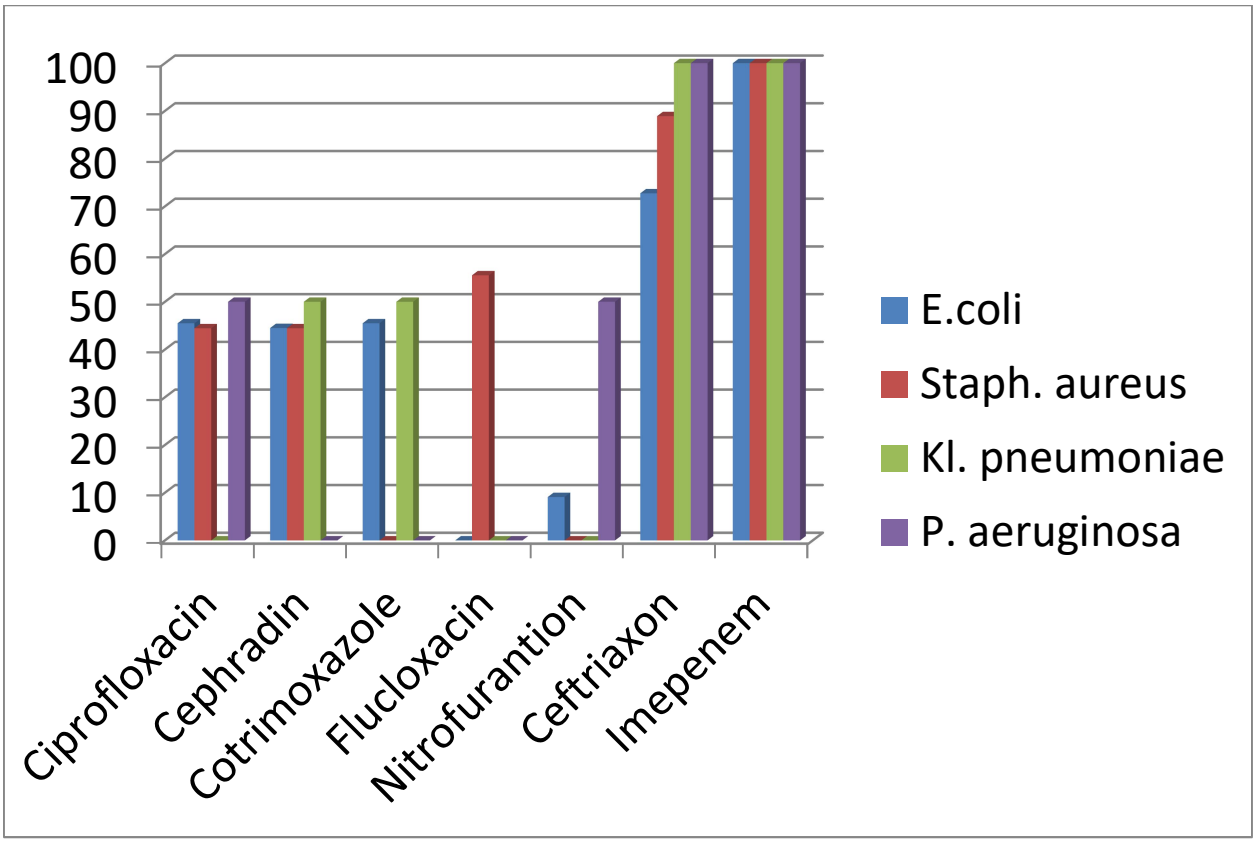


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Figure 5. Bar diagram of Antibiotics sensitivity of the cultured organisms from infected wound

**Discussion**

Gastrointestinal infection was studied by Lewispasteur and Joseph Lister, hundreds of years ago, is still a subject of controversy and problem all over the world.[4] In this series 142 cases are included. They are from all walks of life and selected at random. They were admitted at Rajshahi Medical College, Hospital for emergency operation during the period of July 2012 to December 2012. Operative treatment was carried out for different acute abdominal conditions such as acute appendicitis 62 with infection rate 8.06% (5 infection out of 62 cases) burst appendix 12, infection rate 33.33% (4 infection out of 12 cases) Duodenal ulcer perforation 15, infection rate 13.33% (2 infection out of 15 cases) small intestinal obstruction 30, infection rate 13.33 % (4 infection out of 30 cases) ileal perforation 19, infection rate 42.10% (8 infection out of 19 cases) sigmoid volvulus 2, infection 50% (1 infection out of 2 cases) and obstructed inguinal hernia 2 infection rate nil. Name and number of operation are shown in the table I.

In this study rate of infection in different operation, bacteriological studies were carried out along with antibiotic sensitivity and clinical presentation's of wound infection are also carefully noted.

Our findings were similar with the results of study of Rasul et al,[5] Cruse et al[6] and Saha et al et al.[7]

In this study the peak incidence of wound infection was 6th - 8$^{th}$ post operative day (Fig.2). Al-Fallouje and Mcbrien in 1998 showed the same result.[8] In this study the appearance of abdominal wound infection was highest at 7$^{th}$ post operative day (50%).

Haddad and Alexander & Prudden showed the largest number of wound infection became clinically evident on the 7th post operative day and on an average of 6.8 post opertativeday.[9,10]

This study revealed that out of 142 cases wound infection were found in 24 cases (16.90%). Causative pathogens detected were E.coli in 11 cases (45.50%), Staph. aureus in 9 cases (37.50%), Klebsiellain 2 cases (85%), Pseudomonas in 2 cases (85%) This findings showed similarities with the work of Ashraf and Matin.[11,12]

The study shows E.Coli, Staph aureus, KI Pneumoniae and P. aeruginosa allare 100% sensitive to Imepenam, 72.73%, 88.9%, 100% and 100% sensitive to ceftriaxone. E. Coli is 45.5% 45.5% and 9.09% sensitive to ciprofloxacin, cephradine, cotrimoxazole and nitofurantoin respectively. Staph aureus is 44.45%, 44.45%, 55.55% sensitive to ciprofioxacin, cephradine and flucloxacilless respectively. K. pneumonia is 50% sensitive to cephradin and cotrimoxazole each. P. aeruginosa is also 50% sensitive to ciproflxacin and nitofurantoin each.In all cases antibiotics were used in both preoperative and in the postoperative period as therapeutic or prophylactic measures. Antibiotics mostly used were ciprofloxacin, ceftriaxone, cephalosporin, gentamycin and metronidazole. Rasul G, Ashraf SA et al[13] did not used any antibiotic in 65 selected cases. There was not a single incidence of infection. The results of recent clinical trials of perioperative antibiotic therapy after emergency abdominal surgery support such policies.[14]

*Conclusion*

Determination of appropriate antibiotics according to the C/S report of wound swab is very important to reduce the complication and morbidity of post operative wound infection specially following emergency GI surgery.

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