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A Prospective analysis of the outcome of wound healing following Subcutaneous Infiltration and topical instillation of Ceftriaxone before Primary closure of skin in abdominal surgeries

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Abstract

Background: Surgical site infection (SSI) continues to be a baffling problem since time immemorial. It is one of the major causes for postoperative morbidity and mortality. Many methods have been evolved to combat wound infection, but the rate of wound infection has been more or less static over past few years. The search for alternative modes of management is going on and one of the methods is intra incisional subcutaneous infiltration of antibiotics.

Methods: This is a prospective study comprising of control and study groups of 30 patients each. Control group patients did not receive subcutaneous infiltration of 1gm (diluted with 10 cc of distilled water) of ceftriaxone whereas study group received the infiltration. Precise examination of wound was done from post-operative day 3 up to day 10 for the presence of pus discharge or any subcutaneous collection.

Keywords: Ceftriaxone, subcutaneous infiltration, surgical site infection

Introduction

Surgical site infection (SSI) continues to be a baffling problem since time immemorial. It is one of the major causes for postoperative morbidity and mortality. Over the years, reasonable success has been achieved in this direction by taking various aseptic measures, which were initiated by Joseph Lister (1827-1912) in 1860 ^[1]. According to the National Nosocomial Infections Surveillance (NNIS) system, SSI are the third most frequently reported nosocomial infections, accounting for 12%-16% of all nosocomial infections among hospitalized patients. Initially, the antibiotics were only administered post-operatively for treatment of already established surgical site infection ^[2]. Later, the concept of antibiotic prophylaxis was introduced. After administration of intravenous (IV) antibiotic, there is distribution of antibiotics, initially in the systemic pool and then in the peripheral pool, which results in a low concentration of the antibiotic at the site where it is needed the most i.e incision ^[3]. Therefore, the search for alternative modes of administration of prophylactic antibiotics was started so as to affect a further decrease in the rate of wound infection. One such method is the intra-incisional infiltration of prophylactic antibiotics. This mode ensured a high concentration of antibiotic at the incision site and it has been proven to provide systemic cover by the absorption of the antibiotic from the incision site. Ceftriaxone, 3rd generation cephalosporin, an antibiotic with long half-life, was chosen because of its known effectiveness against a wide range of wound pathogens, including obligate anaerobes, at concentrations likely to be present locally ^[4]. This study was done to evaluate the role of intra incisional infiltration of ceftriaxone in prevention of SSI.

Materials and Method

60 cases were selected by simple random technique from the in-patients admitted in Department of General Surgery at RLJH Hospital, which required abdominal surgeries. A detailed history was elicited in all patients and thorough clinical examination was done. Relevant preoperative investigations of blood, urine, plain x-ray abdomen and ultrasound abdomen was done in all

possible cases. Informed consent will be taken for the surgery and drug administration (injection ceftriaxone to subcutaneous tissue). Patients will be grouped into two of 30 each with random allocation one group received ceftriaxone subcutaneous infiltration before primary closure of skin in abdominal surgeries (Group A) and in the other group no infiltration will be used (Group B).

Inclusion Criteria

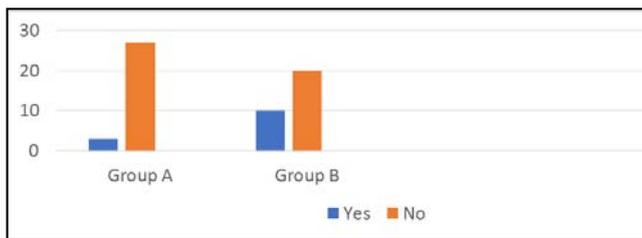
- All patients requiring abdominal surgeries.

Exclusion Criteria

- Patients with hypersensitivity to ceftriaxone
- Pregnancy and children below age of 18.

All patients were tested with test dose of ceftriaxone (0.5 cc into intradermal) for any reaction pre-operatively. Then injection ceftriaxone 1gm diluted with 10cc of distilled water was infiltrated subcutaneously and then skin approximation was done. Post-operatively, patients were assessed for the occurrence of wound infection. Precise examination of wound was done from post-operative day 3 up to day 8 for the presence of pus discharge or any subcutaneous collection. In the presence of seroma or wound infection, few sutures were opened to let out the collection. Regular wound toileting was done in the presence of infection. Antibiotic coverage based on pus culture & sensitivity report and later wound closure by secondary suturing was done after infection control.

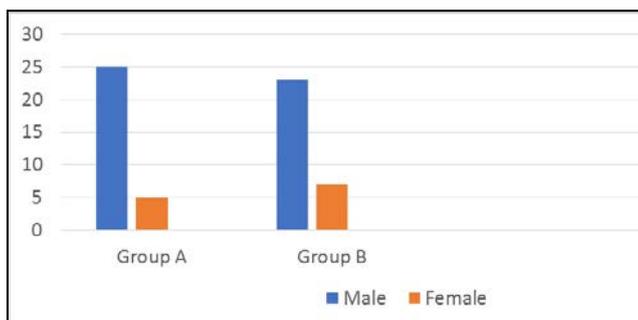
Results



Graph 1: Based on number of SSI

Table 1: Based on number of SSI

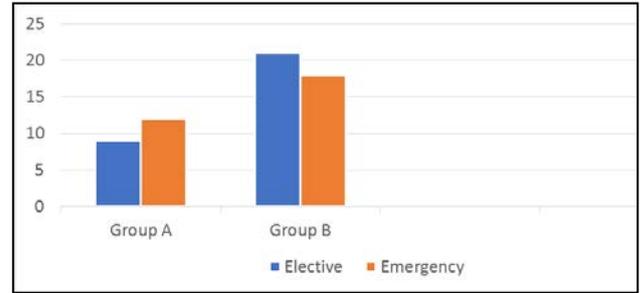
SSI	Yes	NO
Group A	3	27
Group B	10	20



Graph 2: Based on gender

Table 2: Based on gender

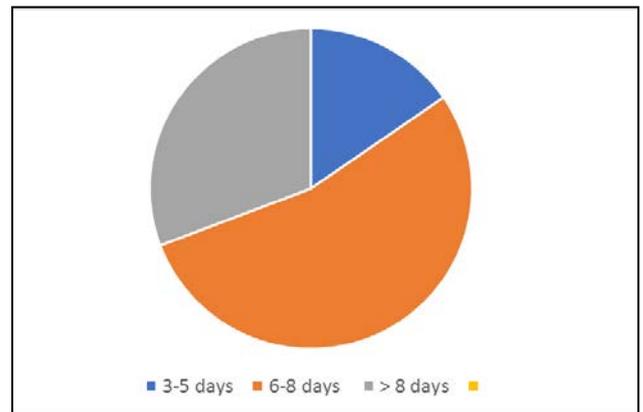
Gender	Male	Female
Group A	25	5
Group B	23	7



Graph 3: Based on type of surgeries

Table 3: Based on type of surgeries

Cases	Elective	Emergency
Group A	9	12
Group B	21	18



Graph 4: Based on POD

Table 4: Based on POD

POD	SSI
3-5 days	2
6-8 days	7
> 8 days	4

Table 5: Based on duration of hospital stay

Group	Hospital stay
Group A	6.42 days
Group B	13.66 days

Discussion

SSI are nightmare for a surgeons in case of abdominal surgeries. Risk of SSI has been described to be around 2.6% in all operations and SSI rates are likely to be greater than reported since all surgical wounds are contaminated by atmospheric bacteria but only a few actually develop clinical infection [5].

In the above study that was conducted SSI was seen more in group B (33.3%). The above study also showed that SSI were more common in the surgeries that were conducted as emergencies. More commonly seen in the POD 6 to 8, and had longer duration of hospital stay (13.66 days).

In a study conducted by Singh *et al*, 15 out of 60 patients (25%) which did not receive ceftriaxone developed SSI, while in group A that received ceftriaxone, 3 out of 60 patients (5%) developed SSI. Overall rate of SSI in Group B (test) was found to be nearly five times more than Group A [6].

In study carried out by Pollock *et al*, where, a total of 624 patients undergoing abdominal operations were included. They used a single preoperative dose of amoxicillin/clavulanic acid

(1.2g Augmentin) instead of ceftriaxone for the prophylaxis of surgical wound infection. It was found that 15.9% rate of SSI was seen in patients that received intravenous antibiotics and 8.4% in intra-incision group. P value for this study was significant (0.005) [7].

In study carried out by Taylor *et al* study, A total of 181 patients who underwent abdominal surgeries were included. In this study, it was observed that SSI in 4 out of 91 patients (4.39%) in the group that received ceftriaxone and 15 out of 90 patients (16.60%) in category B, that did not receive ceftriaxone. P value was 0.007, which is significant [8].

In study carried out by Dogra *et al*. They found that four out of 40 (10%) patients in group A and seven out of 40 (18%) in Group B developed SSI [9].

Another study carried out by Sudhir S. *et al*. They studied 50 cases of exploratory laparotomy for perforation peritonitis in there study. The incidence of SSI in the group which received subcutaneous infiltration of antibiotic was less than the group of patients, which did not receive ceftriaxone [10].

This difference of the rate of SSI in Indian study group and in developed countries is probably due to poor nutritional status, increased incidence of infective disease and operating environment in Indian population. Also India being a tropical country, has higher temperature and humidity also favours SSI.

Conclusion

SSI are the most common cause of morbidity and mortality in surgical patients. The above study shows a significant decrease in the number of SSI in patients who received ceftriaxone infiltration and thereby reducing the burden on the patients and our health care system.

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