A PROSPECTIVE COMPARATIVE STUDY OF SINGLE DOSE PROPHYLACTIC ANTIBIOTIC VERSUS EMPIRICAL POST-OPERATIVE ANTIBIOTICS IN PREVENTION OF SSI

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ABSTRACT

BACKGROUND

The use of antibiotic prophylaxis for clean surgical procedure, such as inguinal hernia surgery is controversial. In modern surgical care, antibiotics are known to account for about 20% of total expenses during hospitalisation. In our country where the proportion of health budget to GDP is one of the lowest in the world, the amount of savings that can be obtained by reducing our over reliance on antibiotics will be enormous.

MATERIALS AND METHODS

This study includes 50 clean cases randomised to groups of 25 each. The study group will receive a single dose of antibiotic preoperatively, while the control group will receive 3 to 5 days of empirical antibiotic therapy.

RESULTS

In my study, the incidence of SSI was 0.5% in the control group and 0.75% in the study group which is not statistically significant as evidenced by the p value of 0.6 which is not significant. The incidence of SSI is comparable to the occurrence in other studies of similar nature.

CONCLUSION

Based on my study, I would like to recommend single dose antibiotic prophylaxis using appropriate antibiotics for all Class I and Class II cases. As per the study results, there is no significant difference in incidence of SSI when compared to the traditional regimes with the added advantage of significant reduction in hospital stay with its resultant savings in resources.

KEYWORDS

Prophylactic Antibiotic Surgical Site Infection.

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BACKGROUND

Infections that occur in the wound created by an invasive surgical procedure are generally referred to as Surgical Site Infections (SSIs). SSIs are one of the most important causes of Healthcare-Associated Infections (HCAIs). A prevalence survey undertaken in 2006 suggested that approximately 8% of patients in hospital in the UK have an HCAI. SSIs accounted for 14% of these infections and nearly 5% of patients who had undergone a surgical procedure were found to have developed an SSI. However, prevalence studies tend to underestimate SSI because many of these infections occur after the patient has been discharged from hospital.[1][2][3]

SSIs are associated with considerable morbidity and it has been reported that over one-third of post-operative deaths are related at least in part to SSI. However, it is important to recognise that SSIs can range from a relatively trivial wound discharge with no other complications to a life-threatening condition. Other clinical outcomes of SSIs include poor scars that are cosmetically unacceptable,[4][5] such as those that are spreading, hypertrophic or keloid, persistent pain and itching, restriction of movement, particularly when over joints and a significant impact on emotional wellbeing.

SSI can double the length of time a patient stays in hospital and thereby increase the costs of health care. The main additional costs are related to re-operation, extra nursing care and interventions and drug treatment costs. The indirect costs due to loss of productivity, patient dissatisfaction and litigation and reduced quality of life have been studied less extensively.[6][7][8]

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Aim of Study

To compare the efficacy of single dose antibiotic prophylaxis versus empirical post-operative prophylaxis in prevention of SSI in clean cases.

MATERIALS AND METHODS

The present study was conducted in the Department of General Surgery, Govt. Chengalpattu Medical College from the period of November 2015 to August 2016. The study involved 50 cases of clean cases.

This prospective study includes 50 clean cases, randomised to groups of 25 each. The study group will receive a single dose of antibiotic preoperatively, while the control group will receive 3 to 5 days of empirical antibiotic therapy.

All the clean Class 1 cases in the study group were given a single dose of 1 gm of Inj. Ceftriaxone at the time of induction or 30 minutes before skin incision in case the procedure is prolonged for more than 3 hrs. a second dose was given. They received no further antibiotics, IV or oral.

All the Class 2 cases in study group received Inj. Ceftriaxone 1 gm and Inj. Metronidazole 500 mg IV 30 minutes before the skin incision. In case the procedure was extended beyond 3 hrs. a second dose was given. They received no further antibiotics IV or oral.

All the cases were followed up at 8th POD, 15th POD, 30th POD and later at 3 months and 6 months. Any wound related complications noted and data obtained. The incidence of SSI in both the groups was calculated and results analysed.

Inclusion Criteria

Clean cases in Department of General Surgery.

Exclusion Criteria

1. Clean Contaminated and Contaminated cases are excluded.
2. Those patients who do not consent are excluded.
3. Patients below 18 years of age were excluded.
4. Pregnant patients were excluded.

RESULTS

In our study, the age distribution of the patients varied from less than 30 years to more than 60 years. The most common age group was 50 - 60 years. There was no significant difference between the control and study group based on age as borne out by p value of 0.33, which is not significant.

In the above study, most of the patients were male, as inguinal hernia is more common in males. Again, there was no significant difference between both the groups in sex wise distribution of cases as borne out by the p value of 0.3, which is not significant.

In this study, there was an even distribution of cases based on the side of hernia. There was a slight preponderance of right-sided hernia overall. But again, as borne out by p value of 0.2 which is not significant, there is no significant discrepancy in distribution of cases based on side of hernia between the groups. In the above study, 0.5% of control and 0.75% of study group patients developed fever secondary to wound infection. Again, there is no significant difference in incidence of post-operative fever between the groups as shown by the p value of 0.6, which is not significant.

In our study, the incidence of post-operative swelling of operative site presumably due to SSI was 2 in control group and 3 in study group. But the difference was significant as evidenced by the p value of 0.6.

In our study, the incidence of post-operative swelling of operative site secondary to infection was 0.5% in control group and 0.75% in study group. Again, there is no significant difference in incidence between the two groups as shown by p value of 0.6, which is not significant.

In the present study, 2 patients in the control group and 2 patients in the study group developed purulent discharge. In addition, one patient in the study group developed serous discharge. The difference is not significant as shown by the p value of 0.7.

All the patients with wound discharge had pus culture and sensitivity of the discharge done. There was a predominance of Staph. aureus grown in the culture of the 5 patients with organisms grown 4 were Staph. aureus. Group A streptococcal SP was grown in one case and there was no growth in another case.

This is in line with other studies where the predominant organism grown is Staph. aureus. Most of the strains were sensitive to cephalosporins except for one that was sensitive to piperacillin tazobactam.

In the present study, 2 out of control and 3 out of study group patients developed SSI's. All of them developed superficial SSI and none had deep SSI. The incidence of SSI in the present study was 0.5% in the control group and 0.75% in the study group. The difference is not significant as shown by the p value of 0.6.

In the present study, 2 patients in the control group and 3 patients in the study group developed SSI. All of them were managed with additional antibiotics. They were initially started on broad-spectrum IV antibiotic like piperacillin tazobactam and based on culture and sensitivity reports antibiotics were changed. None of the patients in the study required any further intervention.

In the present study, the mean duration of stay of patients in the control group was 5.24 days, while it was 3.32 days for the patients in the control group. There was a significant reduction in hospital stay of 85% and the p value of 0.0001 again signifies significant association.

In our study, the incidence of SSI was 0.5% in the control group and 0.75% in the study group, which is not statistically significant as evidenced by the p value of 0.6, which is not significant. The incidence of SSI is comparable to the occurrence in other studies of similar nature.

DISCUSSION

Inguinal hernia is the commonest problem amongst all external hernias and surgery for inguinal hernia is one of the most common procedures performed in a general surgical service accounting for approximately one-third of all interventions. Although, many patients are asymptomatic, most of them have local symptoms and if left untreated hernia itself has potential complications such as irreducibility, incarceration, strangulation, peritonitis and sepsis. Mesh repair is accepted as a gold standard in inguinal hernia repair worldwide.[8][9][10] Of open mesh repair Lichtenstein, "open flat mesh repair" is the most popular. There is also no doubt that antibiotic prophylaxis is needed in selected 'clean' surgical procedure where prosthesis is implanted, because the consequences of graft infection can be severe or even fatal. However, the benefit of antibiotic prophylaxis in other 'clean' surgical procedure, such as inguinal hernia surgery has been considered questionable. The low rate of wound infection and the straightforward treatment if they occur at all are the main arguments against routine antibiotic coverage during inguinal hernia surgery. Since inguinal hernia repair represents one of the most frequently performed surgical procedure any improvement in their treatment could have a large medical and economic impact, especially a reduction in number of wound infections.[11][12][13] Conversely, discarding the use of antibiotic prophylaxis could reduce the risks of toxic and allergic side effects, the possible development of bacterial resistance or super-infection and reduce costs. Although, age

incidence is distributed in all decades of life, in this study we had included patients above 18 years of age. Age distribution ranged from 19 years to 90 years with Mean Age of 38.53 years (17.6 SD); majority of the patients 23 (38.3%) were between 19 - 29 years of age followed by 18 (30%) who were 50 years of age. Aufenacker et al in a study of 1008 patients had mean age 58.25 years (13.1 SD). The mean age of the patients included in a study by Tzovaras et al was 63 years, ranged from 15 years to 90 years. Taylor et al found mean age of 56.6 years (16.9) out of 563 patients. Mean age was lower in this study, could be because most of patients (70%) were operated in day care operation theatre under local anaesthesia. There were 59 males (98.3%) and 1 female (1.7%) patient. It is comparable to the study done by Aufenacker et al, where there were 971 male (96.3%) and 37 female (3.7%) patients; Taylor et al where there were 533 male (95%) and 30 female (5%) patients. Inguinal hernia is more common on the right side in adult male 55% are right sided. In our study, the incidence of SSI was 0.5% in the control group and 0.75% in the study group, which is not statistically significant as evidenced by the p value of 0.6 which is not significant. The incidence of SSI is comparable to the occurrence in other studies of similar nature.

CONCLUSION

The study on prophylactic antibiotic for clean surgeries has led me to this conclusion.

1. Surgical site infection is the condition that may increase the morbidity and hospital stay of the patient. In severe cases, may lead to loss of hospital resources, emergence of resistant bacteria or may even lead to death of patient due to sepsis.
2. Risk factors for development of SSI should be identified if present and patient factors like anaemia, DM are to be corrected prior to surgery.
3. Local factors and microbial factors should be borne in surgeon's mind and appropriate steps taken to avoid them.
4. When surgical site infection is diagnosed, wound/pus swab should be sent for culture sensitivity and antibiotic started on the basis of sensitivity to organism cultured.
5. Adequate drainage of pus in case of major infection should be encouraged by release of one or more suture and planned for secondary closure once infection is controlled.
6. Surgical site infection with hospital acquired infection should be reduced by providing proper nursing care and proper surgical wards.
7. Prophylactic antibiotic with third generation cephalosporins should be given to patients and when appropriate additional antibiotics like Metronidazole can be added based on anticipated contaminants.
8. When given antibiotic prophylaxis must be given at least 30 minutes before skin incision and dose repeated if duration of surgery is prolonged.
9. Misuse of antibiotics should be avoided as it may lead to increased cost burden on patients, increases the emergence of resistant micro-organisms and increases side effects seen with antibiotic usage.
10. In a resource deficit nation like ours implementation of single dose antibiotic prophylaxis regimes tailored to the prevalent organisms in the institution can result in enormous savings, as the study shows significant reduction in hospital stay with no significant increase in incidence of SSI and as a single dose of antibiotic is used as the cost savings can also be enormous.

Based on our study, I would like to recommend single dose antibiotic prophylaxis using appropriate antibiotics for all Class I and Class II cases, as per the study results there is no significant difference in incidence of SSI when compared to the traditional regimes with the added advantage of significant reduction in hospital stay with its resultant savings in resources. In addition, as the use of antibiotics is reduced, it further results in increased cost effectiveness and reduces the incidence of complications due to antibiotic overuse.

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