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Perioperative antibiotics prophylaxis for only 24 hours in orthopaedic surgeries

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ABSTRACT

Background: The objective was to analyse the incidence of surgical site infection in patients undergoing elective orthopaedic surgeries procedure when antibiotics prophylaxis is done for 24 hours only.
Methods: Between June 2020 and January 2022, 50 cases of orthopedic trauma as well as soft tissue surgeries, who were given perioperative antibiotics for only 24 hours post-surgery at our institution, were included in the study. All 50 patients who received 24 hours antibiotics only after surgery were compared with those who received the same for longer duration. Statistics calculated on MS excel.
Results: Rate of infection in this study was 4% which is comparable to other studies but the rate of infection in the present study in cases of open reduction internal fixation was higher (12%) compared to other studies (2%).
Conclusions: 24 hours antibiotics is sufficient in key hole surgeries like closed reduction internal fixation and soft tissue surgery. However, it does not seem to be sufficient in cases of open reduction internal fixation which last for more than 1.5 hours.

Keywords: Antibiotics, Orthopaedics, Surgery

INTRODUCTION

Among all postoperative orthopaedic infections, surgical site infections (SSIs) account for approximately 38%.[1] Surgical site infection rate after surgery for closed fractures range from 1 to 4%.[2,3] Antibiotic prophylaxis peri-operatively can help prevent SSI, and various studies have shown the benefit of administering antibiotics immediately before skin incision in closed fracture surgeries.[4-11] In orthopaedic surgeries, surgical site infection is one of the most dreaded complications.[12]

Antibiotic administration before surgical incision has dramatically improved the safety of modern surgery. Even though antibiotic administration before incision is the standard of care, there is no agreement on the appropriate duration of antibiotic prophylaxis. There are many studies which support prophylactic antibiotic administration for 24 hours post-operatively rather than for multiple days.[13-15] There is indeed a resistance to minimize the duration of Intravenous (IV) antibiotics to 24 hours among Indian surgeons in spite of its advocacy in the orthopaedic literature. The operation theatre conditions in India are not as sanitary as in more affluent countries, where most of the literature is published. Thus, we feel more assured against infection by administering antibiotics for a longer period. The reason to limit the use of perioperative antibiotics to 24 hours is not just for economic reasons (Rs 15,00,000 extra per 10,000 patients if cheapest antibiotic is used for 48 hours instead of 24 hours postoperatively). Continuing antibiotics for more than 24 hours after wound closure may contribute to the development of antimicrobial

resistance.[16-18] Administration prophylactic antibiotic for longer than 24 hours has not been proven to be effective and may actually lead to superinfection with drug-resistant organisms.[17-24] It is necessary to validate, in our conditions, what the surgeons in the developed countries have been advocating. This study was performed to see if there was any difference in the rate of infection among patients who received 24 hours of peri-operative antibiotics and those who received the same for longer duration, in our setting.

METHODS

Study type

It was a prospective observational study.

Study design

After getting clearance from Ethical Committee of Sumandeep Vidyapeeth, we carried out then research on patients admitted in Dhiraj Hospital, Piparia, Vadodara, for Perioperative antibiotics prophylaxis for only 24 hours in orthopaedic surgeries or after getting an informed consent.

Study period

Study was conducted between June 2020 and January 2022.

Study population

Patients operated with perioperative antibiotics prophylaxis 24 hours in the Department of Orthopedics at Dhiraj hospital. 50 patients underwent a study on "Perioperative antibiotics prophylaxis for only 24 hours" in orthopaedic surgeries at our institution.

Inclusion criteria

It includes cases of fractures, closed injuries surgery time less than 2 hours, cold orthopaedic procedure.

Exclusion criteria

Open injuries, patients who don't want to participate in this programme, patients who do not have a minimum two months follow up, surgery time more than 2 hours, arthroplasty, patient with immunodeficiency, diabetes are excluded.

Statistics analysis

Analysis was calculated on MS Excel. All patients who undergo an operation under the Orthopedics and Traumatology department where at least one incision is made through the skin, which was pre operatively intact and unoperated upon for the last three months. Once the patients are included in the study, their case files would be reviewed to gather the pre-operative details, including demographic data, premorbidities, pre-anaesthetic workup, and the diagnosis. For the surgery, the procedure notes are reviewed and the surgery details and its duration are noted.

The study involves 50 cases of orthopedic trauma as well as soft tissue surgeries, who were given perioperative antibiotics only for 24 hours post-surgery. All the 50 patients received Inj. cefoperazone+sulbactum 1.5 g IV 30 minutes before incision and Inj. Cefoperazone+sulbactum 1.5 g IV and Inj. gentamycin 80 mg IV immediately after surgery, followed by the same at 8 PM on the same day and 6 AM next day and calculate the incidence of surgical site Infection in all 50 patients who received antibiotics only for 24 hours post-surgery. No oral antibiotics were continued after 24 hours.

RESULTS

26% of the people in this study stayed in the hospital for 2-4 days. 68% patients had hospital stay of 5-9 days.

Table 1: Hospital stays.

Number of days	No. of patients	%
2–4	13	26
5–9	34	62
>10	3	6

58% of the surgeries in this study were of closed reduction type, while 32% were of open reduction type and 10% were soft tissue surgeries.

Table 2: Type of surgery.

Type	Total no. of patients	%
Closed reduction	29	58
Open reduction	16	32
Soft tissue	5	10

Table 3: Post-operative infection.

Post -operative infection	No. of patients	%
Present	2	4
Absent	48	96

The incidence of post-operative infection in this study was 4%.

Table 5: Duration of operative procedure.

Duration (minutes)	No. of patients	%	No. of patients infected
<30	2	4	0
30-60	19	38	0
60-90	22	44	0
>90	9	18	2

Most of the surgeries lasted for 1-1.5 hours in 44% of the cases, followed by 30-60 minutes in 38% of cases. Both the patients who were infected had surgeries lasting more than 90 minutes.

Table 6: Co-morbidities.

Comorbidities (HTN/ Asthma)	No. of patients	%
Present	14	28
Absent	36	72

Of the total 50 patients in this study, 14 patients had comorbidities. i.e., 28% of the patients in this study had co-morbidities.

Table 7: Pus culture findings.

Culture findings	No. of patients	%
Not infected	48	96
Staphylococcus aureus	2	4

4% patients were infected with Staphylococcus aureus while 96% of the patients were not infected. The majority of patients (62%) had a hospital stay of 5-9 days, while 26% stayed for 2-4 days.

Only 6% had a stay longer than 10 days. This indicates that most patients recovered within a week after surgery with 24-hour antibiotic prophylaxis.

Closed reduction surgeries constituted the majority (58%) of the cases, followed by open reduction surgeries (32%) and soft tissue surgeries (10%). This distribution suggests that the study mainly involved less invasive procedures, which may have influenced the low infection rates observed.

Only 4% of the patients developed post-operative infections, indicating that the 24 hours antibiotic prophylaxis was generally effective in preventing surgical site infections (SSI) in most cases.

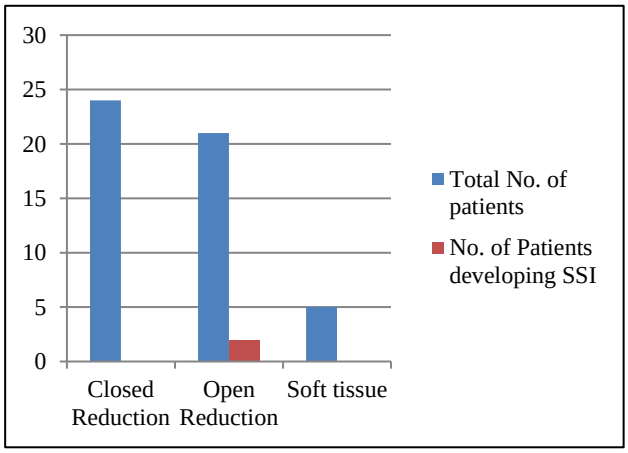

Figure 1: Rate of SSI in different type of surgeries.

Out of 50 patients, 21 patients were operated with open reduction internal fixation, of which 2 patients (9.5%) were infected.

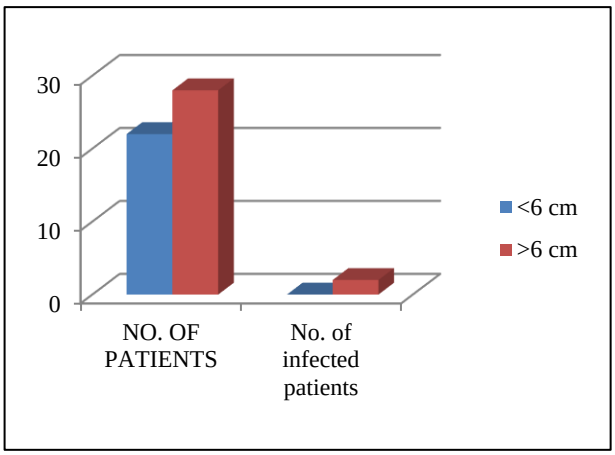

Figure 2: Length of incision.

In the present study, all of the infected patients had length of incision more than 6 cm. Among the 50 patients, those who underwent open reduction internal fixation (ORIF) had a higher infection rate (9.5%) compared to other types of surgeries. This suggests that ORIF surgeries might require a longer duration of antibiotic prophylaxis to prevent SSIs effectively.

Most surgeries (44%) lasted between 60-90 minutes, and infections were observed only in surgeries that lasted more than 90 minutes. This highlights the correlation between longer operative times and increased risk of infection, emphasizing the need for extended antibiotic prophylaxis in longer surgeries. 28% of the patients had co-morbidities like hypertension or asthma, and these patients were more prone to infections, underscoring the importance of considering patient health status when deciding on the duration of antibiotic prophylaxis.

All infected patients had an incision length greater than 6 cm, indicating that larger incisions might be associated with a higher risk of SSIs, which might necessitate longer antibiotic coverage. Staphylococcus aureus was the infective organism in the 4% of patients who developed infections. This suggests that the antibiotic regimen should be effective against this pathogen to prevent SSIs.

DISCUSSION

The overall incidence of surgical site infection (SSI) in the study was 4%, which aligns with the infection rates reported in other studies, such as Kumar et al at 4.5%, Bikramprasad et al at 5.3%, Mathur et al at 2%, and Marimuthu et al at 1.17%.[27-29] A comparative analysis reveals that longer antibiotic regimens in these other studies did not significantly reduce infection rates compared to the 24-hour regimen used in this study. In the ORIF subgroup analysis, a higher infection rate (12.5%)

was observed in ORIF cases compared to other procedures (0% in closed reduction internal fixation and soft tissue surgeries), suggesting the need for longer antibiotic prophylaxis in ORIF cases. Staphylococcus aureus was identified as the infective organism in all infected cases, with effective antibiotics including linezolid, vancomycin, daptomycin, clindamycin, cefazolin, and amoxiclav. Additionally, a higher infection rate (14.2%) was noted in patients with comorbidities such as hypertension and asthma, indicating a higher risk of infection in these patients despite the 24-hour regimen. Surgeries lasting more than 1.5 hours also showed a higher infection rate, suggesting that prolonged surgical time increases the risk of infection.

Recommendations for practice include using 24-hour antibiotic prophylaxis for short surgeries and non-comorbid patients, as it is effective, cost-efficient, and reduces hospital stays and antibiotic resistance. For ORIF cases and longer surgeries, longer antibiotic prophylaxis may be required, with consideration for a repeat antibiotic dose after two hours of incision.

Limitations of study includes only 50 patients, which is relatively small and may limit the generalizability of the findings. The research was conducted at a single institution, which may not reflect the conditions or outcomes in other hospitals or regions, especially considering that operating room conditions vary significantly across different settings. The study excluded certain patient groups, such as those with open injuries, surgeries lasting more than two hours, patients with immunodeficiencies, and those undergoing arthroplasty. This limits the applicability of the results to a broader patient population. Patients who did not have a minimum follow-up of two months were excluded, potentially missing late-onset infections that might develop after this period.

The study excluded surgeries longer than two hours and arthroplasty procedures, which may limit the applicability of the results to more complex or longer surgical procedures. The study specifically used cefoperazone+sulbactam and gentamycin, which may not reflect outcomes if different antibiotics were used.

CONCLUSION

The study suggests that a 24-hour antibiotic prophylaxis regimen is adequate for most orthopedic surgeries but may need to be extended for more complex and longer procedures to reduce the risk of post-operative infections. Further research is recommended to refine these guidelines.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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