



Prevalence of Surgical Site Infection in Orthopedics Department: Study of 40 cases at Tertiary Care Institute

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ABSTRACT

Background: Surgical site infection (SSI) has been ongoingly proven to be disastrous after orthopaedic surgeries. This study was aimed to assess the prevalence of SSI following surgeries in orthopaedic Department and to identify risk factors associated with surgical site infections. And plan their preventive measures.

Materials and Methods: All patients admitted to the orthopedic male and female wards between January 2012 and December 2016 were included in the study group. The data, which were collected from the medical records and hospital digitalised storage system and from the HMIS patient filing systems. Analyses were made to find out the association between infection and risk factors, the 2 test and variables was estimated using Relative Risk, with a 95% confidence interval and P,0.05.

Results: A total of 40 patients of 4167 patients (0.96%) were included: 22 males and 18 females with the average age of 36.23 for males. The most common infective organism was Staphylococcus species including Methicillin Resistant Staphylococcus aureus (MRSA), 11 patients (27.50%); Acinetobacter species, 8 patients (20.0%); Pseudomonas species, 7 patients (17.5%); and E coli, 5 patients (12.5%), Proteus 2 patients (5%), Others commensals/ contaminants 2 patients (5%). Klebsiella, 1 patient (2.5%). No death is reported after any uncontrolled septicemia.

Conclusions: SSI was found to be common in Orthopaedic surgeries even at our institute. Planned Elective surgical procedures have been found to have lesser risk of infection than Emergency surgical procedures. Infection can be well controlled using proper operative protocols.

Key Words: surgical site infection, Orthopaedic surgeries, bones and joint, prevalence.

Introduction

There are been always associated fear amongst the orthopaedicians regarding infection following orthopaedic surgery. Even though in today's era

all aseptic precautions are taken before surgeries such as fumigation, sterilisation techniques, antiseptics and disinfectants and perioperative use of antibiotics, there has always remain a

acceptable limit of around 1 % infection amongst orthopaedics practise.

Surgical site infection (SSI) is defined as microbial contamination of the surgical wound within 30days of an operation or within 1 year after surgery if an implant is placed in a patient. Annual incidences of infections all around are estimate to be in the range of 1.07% to 1.75%. with the acceptable limit of less than 1% in clean and closed surgeries. The Surgical site infection has been associated with maximum morbidity, prolonged hospital stay, increase economic burden, stressful condition for family mebers, poor surgical outcome and decreased satisfaction level amongst patient even though infection is cured.

The problem of SSI is universal all over the globe long length of the hospital stay by 8 and 47 extra days on an average. Since the Advancement of Listers principles of sterilisation, many preventable causes of SSI have been identified, and if proper measures are implemented, the incidence could be reduced. Patients, surgeons, and nurses, as well as operative room atmosphere and instrumentation are prime areas of concern. The washing of hands and maintaining basichygiene⁴, prophylactic antibiotics given at the proper time ⁵and at the correct strength,¹⁰ surgicalclothing,¹¹ and reducing the flow of staff

in the operating room¹²⁻¹⁴ all contribute to lowering the incidence of infection.

This study was undertaken to assess the prevalence of SSI amongst the operated patient in the orthopaedic Department at sir J J Group Of Hospitals and also to identify risk factors associated with surgical site infection. Also to plan newer preventable measures in the Orthopaedics department.

Materials and Methods

The study was carried out in State Government run Grant Medical College and Sir J J Group of Hospital ,Mumbai from 2013 to 2016 presenting to the department of Orthopaedics We reviewed the records of the Patients Operated. Based on the intensions of our Study, We included all orthopaedic trauma, deformity correction, arthroplasty patients, treated with surgical intension and implants or prosthesis. Compound injuries grade I, closed diaphyseal and metaphyseal fractures, malunion, arthritis patients for Hip or knee replacement are included in the study designs. Compound grade III, previously multiple operated patients, history of previous infection, patients with compromised host immunity like diabetes, HIV, Potein Energy malnutrition are excluded from study.

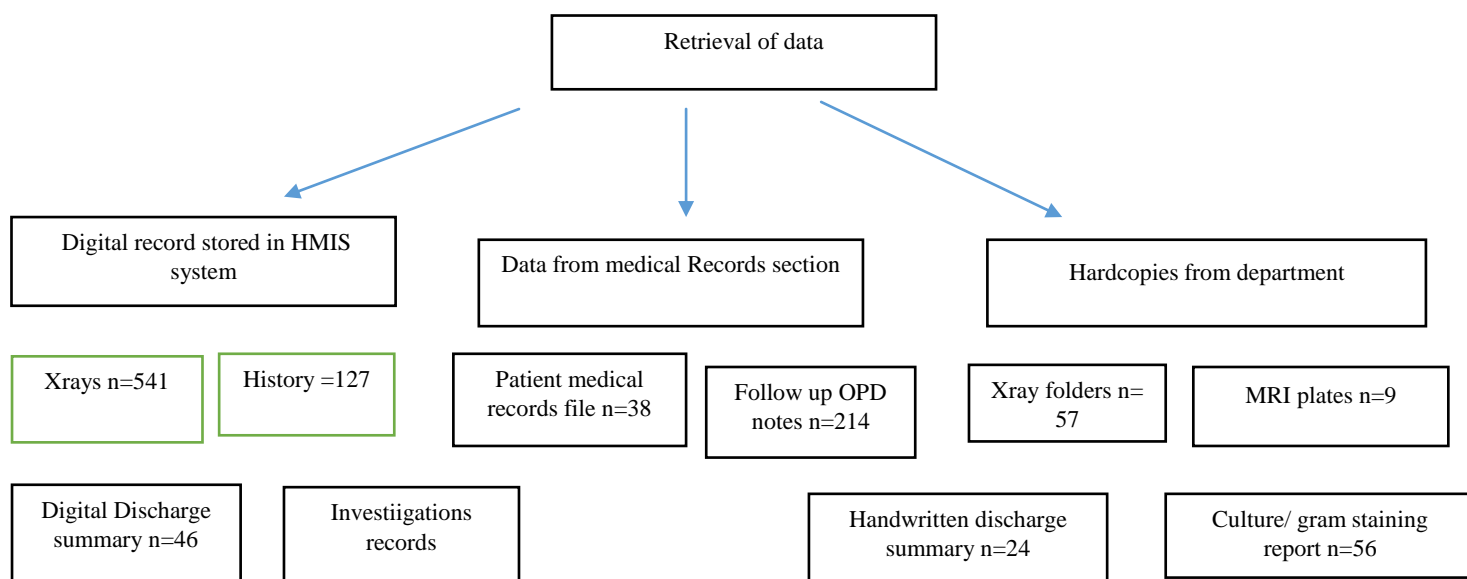


Figure 1. Schematic Diagram showing methods of Retrieval of Data/ resources of data for analysis

On Evaluation of records, all Events are noted down on sheets as per proforma. Analysis started with two main groups. Group A comprised of those patients operated in emergency departments. Group B comprises of those patients operated by elective procedures after thorough preanaesthetic evaluation as per ASA grades

In our study, the common protocol was considered for all selected cases.

1. Preoperative investigations for anesthetic fitness
2. Twice weekly washing and Fumigation of Operation Theatre.
3. Shaving of surgical sites
4. Perioperative antibiotics with half hour before loading dose of 1 gm of cefixime IV.
5. Preparation of wounds with Betadine surgical scrub, Spirit at least for 7 minutes
6. Surgeons scrubbing protocol with Betadine scrub
7. Painting of operative sites with 3 layers of betadine
8. Draping with sterile drapes
9. Use of ioban for high risk cases
10. Use of vacuum suction drain with copious lavage
11. Water tight wound closure followed by sterile dressings.
12. Monitoring check dress on 3rd day .suture removal on 12 th day

Whenever there is evidence of infection

1. On 3rd day – infection is suspected whenever there is serous or seropurulent discharge
 2. Presence of redness and induration
 3. Local rise of temperature
- Following routine investigations are sought
- a. Hemogram
 - b. ESR

- c. CRP value after 7th day (more than 6 is considered significant)
 - d. Pus / fluid for gram staining and culture and sensitivity
 - e. Periodical monitoring of abscesses
- If infection is suspected and confirmed

Following protocol was undertaken

The surgical site infection was classified as per nosochromial infection grade

1. Superficial infection- in duration, limited soakages – treated by antibiotics as per culture sensitivity
2. Grade 2 – infection above fascie by allowing drainage by loening suture and antibiotics and secondary suturing
3. Grade 3 infection beneath fascia by wound exploration, copious wound wash, debridement, suction drain, four quadrant biopsy, water tight suturing with monofilament non absorbable sutures. Perioperative antibiotics for 3 to 4 weeks. Reexploration if required
4. Grade 4 wounds- organisms with glycocalyx membranes needed implant removal, debridement , biopsy from deeper opockets, gram staining, culture sensitivity, antibiotic cement delivry methods like cement beads, rods, cement spacers, six weeks antibiotics followed by secondary definitive procedure iif CRP is normal



Figure 2. External manifestations of Surgical Site Infection

We studied the medical and radiological records of 40 total patients 22 males and 18 female patients and their mean follow up of 2 years. Xrays were analysed for evidence of infection. Hematological investigations, ESR, CRP values and Gram staining, culture and sensitivity analysed.

The infection was assessed by the infective organism, sensitivity of the antibiotics, and recovery. Analyses were made to find out the association between infection and risk factors, the χ^2 test was used. The strength of association of the single event with the variables was estimated using Relative Risk, with a 95% confidence interval and P,0.05.

Results

We studied 40 patients who were treated with orthopaedic surgeries and developed surgical site infection.

Demographic and clinical characteristics of the study population are summarised in Table 1.

Characteristics	GroupA emergency	GroupB elective
Age	45.6±10.4	49.06±0.4
Right : left	10:10	12:08
Trauma cases	16	7
Deformity correction	0	4
Hemireplacement Hip	0	2
Total hip replacement	0	1
Total knee replacement	0	1
Spine surgery	2	2
Others	2	3

Table 2. showing Incidences of Surgical site infection

Grades of Infection	Group A	Group B
I	10	8
II	3	4
III	2	5
IV	5	3
Total	20	20

Table 3. Infective organisms found in SSI

	Group A	Group B
Staphylococcus aureus +MRSA	5	6
Acitinobacter species	5	3
Pseudomonas species	4	3
E coli species	2	3
Proteus mirabilis	1	1

Kleibsella	1	0
Mycobacteria	0	1
Other species	1	1

In Our study, the prevalence of Organisms cultured from Surgical site infection are Methicillin Resistant Staphylococcus aureus (MRSA), 11 patients (27.50%); Acinitbacter species, 8 patients (20.0%); Pseudomonas species, 7 patients (17.5%); and E coli, 5 patients (12.5%), Proteus 2 patients (5%), Others commensals/contaminants 2 patients (5 %). KLeibsiella, 1 patient (2.5%).

These patients were subjected for periodical radiological and haematological monitoring and based on presence of grades of SSI, treatments are given. Results are tabulated. Functional score after treatment has been also notified.

Table 4. showing Radiological assessment in surgical site Infections

Radiological parameters	Preoperative assessment	
	Group A	Group B
Osteopenia	3	4
Delayed union	2	1
Non-union	2	1
Implant loosening	3	2
Periosteal reactions	4	3
Collapse/ depression in mm/ articular step	2	3
Sequestra	1	5
Medullary lysis	3	2
Lysis around screws	16	14
Implant breakage	1	1

Table 5. showingtypes of treatment Given

Treatments	Group A	Group B
IV antibiotics	20	20
Wound wash	3	
Debridement	4	6
Antibiotic impregnated PMMA cement beads	2	2
Calcium trisulphatebeeds	0	1
Antibiotic coated nail	0	
Antibiotic spacer		
Implant removal	6	3
Intramedullary reaming	4	2
Multiple surgery average	1.5	2
Revision of implants	2	2
External fixation	2	1
LRS Fixation+ compr	6	1
Ring Fixatot + cOmpression	1	1
Distraction Osteogenesis	2	1
Excision Arthroplasty	0	1

Table. 6 Follow of Rasmussen score in both groups

Function score	Group A	Group B
Excellent	7	6
Good	4	7
Fair	7	6
poor	2	1

Discussion

The incidence of SSI in the present study was 1.06 %, which is below the reported worldwide incidence of 2.6% to 41.9%.¹⁵ Secondly, our study differs in following it has included all grades of nosocomial infections following surgery in tertiary care institutes. In reported studies the older people above 45 has been shown to be involved but in our study both younger and elderly people are found to be affected .This could be because the majority of our patients were operated on due to trauma, and it has been reported that preoperative soft-tissue damage is a major risk factor for developing SSI.¹² The other independent risk factors for patients developing SSI were having an emergency operation and prolonged surgery more than 4 hours, and tourniquet use¹². The movement and number of staff in the operating room is long known to influence the incidence of SSI. In our patients, we have practiced to reduce the staff in the operating room to essential staff only, and this has shown that there was no serious deep-seated infection post arthroplasty, whereas during other types of surgery the entry and exit of the staff was not controlled. The incidence of SSI was significantly higher in trauma surgery versus total joint arthroplasty (P, 0.001). There are apparent unintended differences in the quality of care that exist between patients undergoing joint arthroplasty or spinal surgery and those undergoing trauma surgery. During total joint replacement, scoliosis and other spine surgery senior staff are available, while routine trauma surgery is performed by junior staff. Last, because of the gravity of infection in a patient with arthroplasty, surgeons tend to extend extra care while operating, and arthroplasty surgeons go

the extra mile to limit SSI on the basis of research,¹⁹⁻²⁰ and monitoring the quality of care²¹ In the recent past, the outbreaks of Acinetobacter infections, has been noted probably contacted in ICU Or Emergency Department can be all controlled by antibiotics. The deep seated infections have been found in our study, most of the joint infection have been resolved with debridement, copious lavage, intravenous antibiotics if required Implant removal Antibiotic impregnated polymethyl methacrylate beads or spacer for 6 week. However only disadvantage of these procedures were the required cement beads removal after 6 weeks.

Conclusions

Even though our study is performed in the oldest institute in India, the incidence of Surgical site infections are less and at par with reported incidences in other institutes worldwide. This study has limitations that it has included infections happening postoperatively. proper fumigation of operation theatre protocols, perioperative sterility and antibiotics, reduced number of movements of staff during surgery and none the less improving protein and nutritional intake of patient. Further studies are suggested on long term follow up and identifying hidden factors

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