

## Original research article

**The role of preventive antibiotics in elective procedures and postoperative surgical infections: a prospective study****Dr. Kumar Chandra Kant<sup>1\*</sup>, Dr. Md Noman<sup>2</sup>, Dr. Kumar Shashi Kant<sup>3</sup>**<sup>1</sup>Senior Resident, Department of General Surgery, All India Institute of Medical Science, Patna, Bihar, India<sup>2</sup>Senior Resident, Department of General Surgery, A. N. Magadh Medical College & Hospital, Gaya, Bihar, India<sup>3</sup>Assistant professor, Department of Orthopaedics, Patna medical college & Hospital, Patna, Bihar, India**Corresponding Author: Dr. Kumar Chandra Kant****Abstract****Aim:** The aim of the present study to determine the role of prophylactic antibiotics in elective surgeries and postoperative surgical infections.**Methods:** 110 patients who undergone elective surgical procedures were include in this study. All the cases were elective and patients were healthy and had maintained adequate nutrition. Preoperative workup was done; all the patients were followed from the date of admission till discharge and followed up for 2-4 weeks depending upon various procedures done. Recording of temperature continuously for 72 hours, pain in the operative site, redness, any discharge or collection and drug administration for any complication, checklist use has been associated with improved compliance with antibiotic administration guidelines and significantly lower SSI rate in various global trials. Preoperatively patient-applied chlorhexidine scrub may decrease SSI rate as compared to no bathing. Hair removal is a common preoperative practice. If hair is removed, however electric clipper should be used, razors have been linked to SSI rate. Chlorhexidine scrubs are more effective and long lasting as compared to iodine in decreasing the bacterial count.**Results:** Out of 110 operations done by elective procedure males were 61.82% and females were 38.18%, age ranged between 20 years and 58 years. Average age group was between 20 years and 55 years. The most common elective operations procedure done were inguinal hernias (26.36%), followed by hydrocele (19.09%) and fibroadenomas (18.18%) respectively. The least common being thyroid swellings (2.73%). co-morbid condition among elective operations procedure 18.18% of cases had hypertension followed by 6.36% COPD, 5.45% bronchitis, and 2.73% cardiac diseases. out of 110 clean cases 5 (4.55%) patients had developed fever which subsided within 2-3 days, no antibiotic was administered. 7 patients developed fever with serous discharge, out of 5 patients 3 patients showed no growth in culture and sensitivity so no antibiotic was given.**Conclusion:** The necessity of antibiotics prophylaxis so as to prevent surgical site infections in cases of elective surgery.**Keywords:** surgical site, infection, antibiotics prophylaxis**Introduction**

SSIs are the most frequent infections associated with health care and are the costliest. SSIs are responsible for 38 percent of nosocomial infections in surgical patients. Wound infection is one of the most common complications of surgery and causes up to 5% of all surgical procedures. They are referred to as surgical site infection (SSI) and account for a quarter of all

nosocomial infections. In terms of hospital stay, pain, reintervention, and cost, SSI adds to the morbidity.<sup>1</sup> A variety of risk factors that contribute to SSI-intrinsic (patient-related) and extrinsic (procedure-related) have been established. Many of the patient-related factors are non-modifiable, such as age, co-morbidities (diabetes, chronic re). Since the surgical site is a possible port for exogenous microbes, this presents an immediate threat to the skin and complications which contribute to delayed healing of wounds.<sup>2,3</sup> The preoperative stage is known to be the most crucial period of a procedure in which the aim is to reduce the bacterial load surrounding the area of incision. The use of antibiotics before surgery is considered effective in the prevention of SSIs, which are among the most common complications preventable after surgery.<sup>4</sup> By demonstrating antibiosis, Joseph Lister greatly reduced the rate of disease and presented surgeons with a tool to fight infections. The invention of antibiotics further revolutionized the surgery field. Yet through understanding of infection control and improvements in clinical procedure, postoperative infection remains a problem that every surgeon faces. A patient with SSIs has a risk of being admitted to intensive care by more than 60 percent and is 15 times more likely to be readmitted to the hospital within 30 days after discharge. The use of antimicrobial prophylaxis (AMP) has been long advocated as a means of preventing post-operative infections. The rationale behind the use of peri-operative antimicrobial prophylaxis is that if present in sufficient concentration in the tissue, antibiotics boost the immune system and help eliminate any bacteria that may be present in these surgical sites. Serum concentrations of some antimicrobials tend to drop rapidly during certain surgical procedures while the concentration of others hardly gets affected. Throughout cardiothoracic surgery, the use of cardiopulmonary bypass significantly lowers the plasma vancomycin level and thus increases the risk of acquiring SSIs in these patients. Specific recommendations have been developed for the proper use of AMP, covering a wide range of surgical procedures.<sup>5-9</sup> Most of these recommendations advise the use of cephalosporin's, particularly those with anaerobic activity as the drug of choice, but antibiotic preference may vary depending on the bacterial flora at the incision site, antibiotic penetration at the site, and allergic profile of the person. As suboptimal levels of antibiotics in the tissue significantly increase the risk of SSI, the correct timing of antimicrobial administration prior to surgical incision is crucial. The exact timing of the administration of antibiotics varies from 30 minutes to 2 hours before the incision. According to the Surgical Care Improvement Project (SCIP), for most antimicrobials except for flouroquinolones and vancomycin, the ideal time for antibiotic administration should be 1 hour before incision, for which 2 hours is considered the ideal time.

### **Material and methods**

This was a prospective observational study conducted in the Department of General Surgery, Anugrah Narayan Magadh Medical College & Hospital, Gaya, Bihar, India for 15 months, after taking the approval of the protocol review committee and institutional ethics committee.

### **Methodology**

Only clean, not contaminated cases are taken. Preoperative checkups done thoroughly, like personal hygiene of the patient, BP and cardiac status of the patient to be evaluated. Preventive measures to avoid or reduce exogenous and endogenous contamination. A single stat dose of first generation cephalosporin 1gm given IV at the time of giving anesthesia. If surgery is prolonged for more than 2 hours then 2nd dose of prophylactic antibiotics is given IV. Preoperative any pathological cause and also contamination were observed and further follow up done. Post-operative any signs and symptoms like infections, fever with chills, wound discharge will be observed. All the operative care (wound) is seen in 48 hours and to be inspected every day. Final review will be done after 1 week and 2 weeks. If any evidence of wound infection is present, accordingly sent for culture and sensitivity and suitable antibiotics

are given. The post-operative stay in hospital was noted.

### Parameter examined under given clause to study morbidity postoperatively

Recording of temperature continuously for 72 hours, pain in the operative site, redness, any discharge or collection and drug administration for any complication, checklist use has been associated with improved compliance with antibiotic administration guidelines and significantly lower SSI rate in various global trials.<sup>10-11</sup>

Preoperatively patient-applied chlorhexidine scrub may decrease SSI rate as compared to no bathing.<sup>12</sup> Hair removal is a common preoperative practice. If hair is removed, however electric clipper should be used, razors have been linked to increased SSI rate.<sup>13</sup> Chlorhexidine scrubs are more effective and long lasting as compared to iodine in decreasing the bacterial count.<sup>14</sup>

### Intra operative considerations

Maintaining the stable hemodynamics throughout the perioperative period and intraoperative hemodynamic control significantly reduces the SSI rates.<sup>15</sup> A performa was made in each cases and detailed study is done and maintained, the record of investigation done in all cases preoperatively depending upon the age up to 45 years, complete hemogram, RFT, LFT, RBS, urine routine, chest X ray and ECG, the other relevant investigations are done depending upon individual patients as and when required. The complete details of surgical operation, its duration, and any factors which influence contamination or table, instruments were carefully noted and data analyzed using Microsoft excel with frequency distribution.

### Results

Out of 110 operations done by elective procedure males were 61.82% and females were 38.18%, age ranged between 20 years and 58 years. Average age group was between 20 years and 55 years.

**Table 1: Age and gender-wise distribution of study population**

Age (in years)	Male	Female	Total
Below 35	29	17	46
Above 35	39	25	64
<b>Total</b>	68	42	110

**Table 2: Distribution of cases as per studies operative diagnosis summarised**

Operative diagnosis	No. of cases	Percentage
Inguinal hernias	29	26.36
Hydrocele	21	19.09
Fibroadenomas	20	18.18
Thyroid swellings	3	2.73
Cholelithiasis	8	7.27
Ventral hernias	5	4.54
Soft tissue tumors or giant lipomas	11	10
Others	13	11.82
<b>Total</b>	110	100

Table 2 demonstrated that most common elective operations procedure done were inguinal hernias (26.36%), followed by hydrocele (19.09%) and fibroadenomas (18.18%) respectively. The least common being thyroid swellings (2.73%).

Table 3 revealed co-morbid condition among elective operations procedure 18.18% of cases had hypertension followed by 6.36% COPD, 5.45% bronchitis, and 2.73% cardiac diseases.

**Table 3: Cases associated with co-morbidities.**

Associated conditions along with the primary disease	No. of cases	Percentage
<b>Hypertension</b>	20	18.18
<b>Cardiac diseases</b>	3	2.73
<b>Bronchitis</b>	6	5.45
<b>COPD</b>	7	6.36

out of 110 clean cases 5 (4.55%) patients had developed fever which subsided within 2-3 days, no antibiotic was administered. 7 patients developed fever with serous discharge, out of 5 patients 3 patients showed no growth in culture and sensitivity so no antibiotic was given. 2 cases showed staphylococcus aureus and 2 case showed pseudomonas growth. Total 5 (4.55%) cases showed sepsis which had been treated accordingly with antibiotics according to culture and sensitivity reports.

### Discussion

Many serious and time consuming operations performed with great skill and labour get spoiled in a minute by a tiny microbe - most common being the staphylococcus. The various neurosurgical, cardiothoracic and plastic surgeries, whose expertise has already sucked nearly half of a surgeon's carrier, are casted into tears of pus in the wound by these selfish microbes. How depressing it is to look at the patient feeling ill and lethargic even seven days after operation, making him/her weaker day by day, both by lowering his/her resistance to microbes and to a weeping pocket caused due to prolonged use of prophylactic antibiotics. Surgical site infections are an important type of infection associated with health care and their monitoring is part of infection control measures in most hospitals. SSI rates are commonly used in hospitals to evaluate the quality of assessment for infection control.<sup>16</sup>

The use of prophylactic antibiotics can reduce the rate of surgical infection, providing the right drug is chosen for the right occasion and given at the optimal time. The term prophylaxis is only appropriate when there has been no preoperative contamination or established infection. Many studies showed that properly administered prophylactic antibiotics could prevent postoperative infection.<sup>17,18</sup>

The incidence rate of 3.64% of the study is well within the infection rates of 2.8% to 17% seen in other studies. The difference in incidence rates may probably due to variations in interpretations of infection. Also, a meaningful single infection rate for all types of wounds is not possible, as the likelihood of infection differs in each type of wound. Cruse and Ford observed that the rate of infection of clean wounds was more useful as an indicator of control of infection of surgical wounds than the overall incidence.<sup>17</sup>

The incidence rate in clean wounds in our study of 3.64% is almost similar to those of the other studies. As per the National Nosocomial Infection Surveillance Study (NNISS) data the accepted infection rate for clean cases 2.1%, clean contaminated cases 3.3%, contaminated cases 6.4 %, dirty cases 7.1%.<sup>19</sup>

Although the comparative study with NNISS study data showed the infection rate of clean cases is 2.1% whereas in our study compared with NNISS is 3.64% which is almost near to NNISS. Use of prophylactic antibiotic in clean contaminated and contaminated cases are well advocated but still controversial in clean cases.<sup>20</sup>

In the present study in the clean wound category with no obvious of contamination, the cultured infected wound was Staphylococcus aureus predominantly similar pattern of micro flora was observed by Anvikar et al, Olson et al with Staphylococcus aureus as most common.<sup>21,22</sup> The

pattern of organisms isolated in wound types in various studies suggested skin colonizers to be the main source of SSI in clean procedures.

### Conclusion

Our study indicates the necessity of antibiotics prophylaxis so as to prevent surgical site infections in cases of elective surgery. Since there is a lack of properly ventilated and cleaned operation theatres in India, it is of at most importance to conduct a number of studies in different parts of the country to collectively assess the duration for antibiotics prophylaxis.

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