International Surgery Journal
Saravanan K et al. Int Surg J. 2019 Mar;6(3):843-846
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20190478

Original Research Article

Single dose prophylactic antibiotic before surgery to prevent surgical site infection: a prospective interventional study

K. Saravanan, T. Umamaheswari*

Department of Surgery, Government Theni Medical College, Tamilnadu, India

Received: 25 January 2019
Accepted: 29 January 2019

***Correspondence:**
Dr. T. Umamaheswari,
E-mail: dr.umams1973@gmail.com

ABSTRACT

Background: Surgical site infections (SSI) are one of the most common postoperative complications leading to increased morbidity which also an important factor of increased hospital stays and increased healthcare cost. The use of prophylactic antibiotics may benefit the patients in preventing the surgical site infection. Aim of the study was to study the single dose prophylactic antibiotic use in preventing surgical site infection in elective surgery.
Methods: Patients were included from the list of elective surgery. Patient with comorbid was excluded. The patient was handled as per NICE guideline for prevention of surgical site infection and treatment 2017. Prophylactic antibiotic injection cefuroxime 1500mg administered intravenously 30 minutes before surgery, at the site of the incision.
Results: In 110 patients included in the study, 46% of patients were in 35 to 45 years, male were higher in number. 20% of patients underwent hernioplasty followed by cholecystectomy 18.3%. 9% of SSI was recorded in this study. 4 cases in cholecystectomy, 3 cases in hernioplasty, each 1 case in appendicectomy, Hydrocele and ventral hernia mesh repair. The most common bacteria isolated from the samples were Staphylococcus aureus.
Conclusions: In uncomplicated surgeries, single dose antibiotics before 30 minutes of surgery may benefit in preventing SSI.

Keywords: Antibiotic prophylaxis, Cefuroxime, Surgical site infection

INTRODUCTION

Antibiotics play a particularly important role in the post-operative care of patients undergoing elective surgery because of the high incidence of surgical site infection (SSI). It has been reported that 30-40% of patients experience post-operative SSI when a prophylactic antibiotic is not administered.[1,2] Although several recent studies have indicated that single-dose (SD) administration may be as effective as multiple-dose, controversy still exists concerning the frequency and appropriate combination of antibiotics.[3] In adults of all ages, SSIs represent a significant financial burden and are associated with increased length of hospitalization, re-admission, and mortality. It has been reported that patients who develop SSIs have a mortality rate that is 2-11 times higher than that of patients who do not develop SSIs, and the mortality rate for SSIs is up to 6%.[4,5] Preventative measures in the preoperative period have changed rapidly over the past few decades. A large volume of research has established the importance of a host of preventative measures in the operative period. Examples include skin decontamination, perioperative warming, and antimicrobial prophylaxis.[6,7] Surgical antibiotic prophylaxis given at induction of anesthesia is recommended for any surgery apart from clean

procedures not involving an implant or prosthesis. Antibiotics should be specific and targeted to the likely causative organisms and appropriate for the patient taking account of allergies and comorbidities. The administration of the dose should occur no earlier than 120 minutes prior to the incision being made (WHO). Prolongation of prophylactic antibiotics after the operation is not recommended in the prevention of SSI.[8]

Aim of the study was to study the single dose prophylactic antibiotic use in preventing surgical site infection in elective surgery.

METHODS

In this prospective interventional study was conducted in the department of general surgery at Theni Government Medical College and Hospital. Patients were enrolled during 2018 February to August 2018.

Inclusion criteria

Patients underwent elective surgery, more than 18 years, had no sign of infection before the surgery.

Exclusion criteria

Patients less than 18 years, under treatment of immunosuppressive medicines, hypertensive, diabetes, bleeding disorders, allergic to antibiotics were excluded from the study.

All patients satisfied the inclusion criteria clinical details were collected. The patient was handled as per NICE guideline for prevention of surgical site infection and treatment 2017. Prophylactic antibiotic injection cefuroxime 1500mg administered intravenously 30 minutes before surgery, at the site of the incision. Intraoperative homeostasis maintained (NICE guideline), wound irrigation and drains used in the required cases (not NICE guideline). Surgery was performed maintaining proper asepsis, and surgical wound dressing was done with an appropriate sterile dressing at the end of surgery. The surgical wound dressing was done on a postoperative day 2 following strict aseptic technique. Thereafter the surgical site was left open for inspection. Incisional SSI was defined as a macroscopic abscess or purulent discharge observed on the operative wound. The wounds were examined for suggestive Signs/Symptoms of infection in the post-operative period, during wound dressing or when the dressings were soaked, until the patient was discharged from the hospital and also in the Out-patient department after discharge during follow up.

RESULTS

In this study, 110 patients underwent elective surgery. Patients more than 18 years without DM, HTN, allergies to antibiotics, immunosuppressive diseases were included. Patients were followed as per NICE guidelines for preoperative procedures to prevent surgical site infections. 68 patients were male, the average age of the study patients is 48 years, most of the patients were in age group of 35 to 45 years 46%, followed by greater than 46 years 24% (Figure 1). The most common procedure performed was hernioplasty 20%, followed by cholecystectomy 18.3% (Figure 2). 9% of SSI was recorded in this study. 4 cases in cholecystectomy, 3 cases in hernioplasty, each 1 case in appendicectomy, Hydrocele and ventral hernia mesh repair (Figure 3).

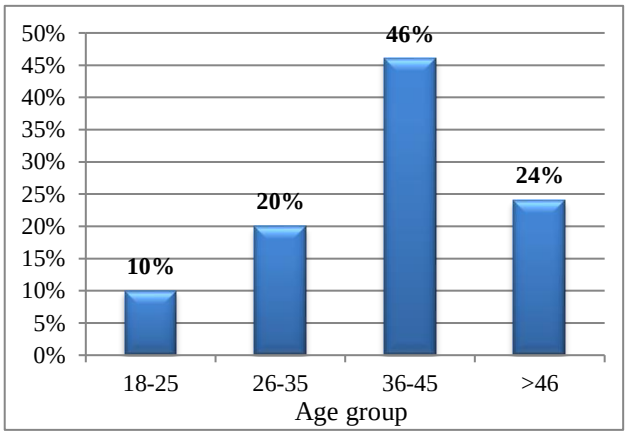

Figure 1: Distribution of age group.

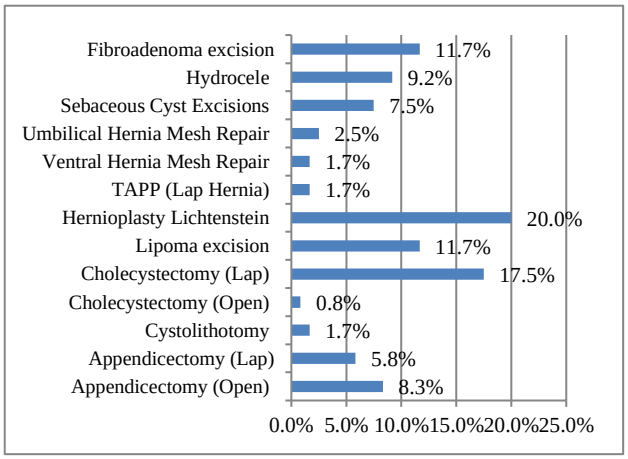

Figure 2: Distribution of surgery.

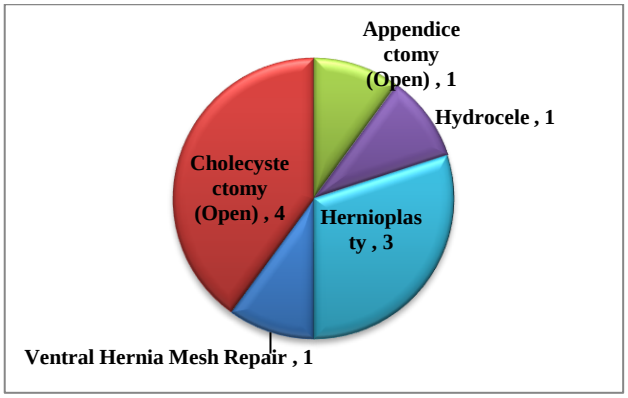

Figure 3: Distribution of SSI in surgical procedures.

The most common bacteria isolated from the samples were Staphylococcus aureus which was followed by *Pseudomonas aeruginosa*, *S. aureus* was isolated from a case of hernioplasty, appendicectomy and ventral hernia mesh repair. Patients with surgical site infection were treated with antibiotics and followed up regularly.

DISCUSSION

The benefit of antimicrobial prophylaxis was reported as far back as the 1960s from randomized trials, and this practice has had a marked impact on surgical practice. General guidelines with respect to prophylaxis advocate the necessity for high tissue concentrations of antibiotics at the time when bacterial contamination is most likely to occur, i.e., from the first incision. Typically, prophylactic antibiotics are administered intravenously at induction of anesthesia. A seminal study of 7000 patients confirmed there is variation in clinical practice with regards to the timing of prophylaxis. Administration of prophylactic antibiotics two hours prior to surgery is effective in reducing SSI. The administration of a first dose earlier than this prior to surgery or post-operatively is ineffective as a prophylactic measure.[9-11]

Borade S et al. reported 3% of superficial surgical site infection in his study.[12] Jogdand S et al, studied 183 clean surgical procedure with single dose antibiotics and found that multiple-dose antibiotics requirement after surgery was reduced.[13] Shah YD et al, compared single dose antibiotics prior to surgery with multiple dose antibiotics treatment, and reported 11% of SSI in single dose regimen and multiple dose antibiotic regimen in patients undergoing laparoscopic surgery and reported that a single dose of antibiotics are more patient compliant, cost-effective, less adverse effects and prevents the emergence of antibiotic resistance.[14]

Most studies have reported an incidence of wound infection of 2.7-11.3% in patients who underwent open colectomy compared with 5.7-26% in laparoscopic colectomy.[15-17] A meta-analysis of post-operative wound infection17 reported a significantly lower incidence of SSI after laparoscopic colectomy (3.9%, 21/537) than after open colectomy (8.3%, 43/518; P = 0.005). In the present study, the rates of SSI in open and laparoscopic surgery were 16.6% (4/24) and 8.7% (6/69), respectively (P = 0.278). It seems to show that skillful surgical technique is more important than wound length for preventing wound contamination.[18]

CONCLUSION

Surgical site infections remain a very important component of patient outcome, contributing to substantial patient morbidity. From a historical perspective, there has been a significant improvement in postsurgical outcomes, but these incremental gains have slowed in recent decades. A multidisciplinary and multifaceted approach to Surgical site infections is absolutely necessary to continue to improve these critical outcomes of surgery.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Jeong WK, Park JW, Lim SB, Choi HS, Jeong SY. Cefotetan versus conventional triple antibiotic prophylaxis in elective colorectal cancer surgery. J Korean Med Sci. 2010;25:429-34.
2. Platell C, Hall JC. The prevention of wound infection in patients undergoing colorectal surgery. J Hosp Infect. 2001;49:233-8.
3. Fujita S, Saito N, Yamada T, Takii Y, Kondo K, Ohue M, et al. Randomized, multicenter trial of antibiotic prophylaxis in elective colorectal surgery. Arc. Surg. 2007;142:657-61.
4. Korol E, Johnston K, Waser N, Sifakis F, Jafri HS, Lo M, et al. A systematic review of risk factors associated with surgical site infections among surgical patients. PLoS One. 2013;8(12):e83743.
5. Teillant A, Gandra S, Barter D, Morgan DJ, Laxminarayan R. Potential burden of antibiotic resistance on surgery and cancer chemotherapy antibiotic prophylaxis in the USA: a literature review and modelling study. Lancet Infect Dis. 2015;15(12):1429-37.
6. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR, Hospital Infection Control Practices Advisory Committee. Guideline for prevention of surgical site infection, 1999. Hospital Infection Control Practices Advisory Committee. Infect Control Hosp Epidemiol. 1999;20(4):250-78.
7. Alexander JW, Solomkin JS, Edwards MJ. Updated recommendations for control of surgical site infections. Ann Surg. 2011;253(6):1082-93.
8. Surgical site infections: prevention and treatment. Updated February 2017. NICE, available at: https://www.nice.org.uk/guidance/CG74/ chapter/1-Guidance (Accessed 29 Dec 2018).
9. Hill C, Mazas F, Flamant R, Evrard J. Prophylactic cefazolin versus placebo in total hip replacement: report of a multicentre double blind randomised trial. Lancet. 1981;11;1(8224):795-6.
10. Classen DC, Evans RS, Pestotnik SL, Horn SD, Menlove RL, Burke JP. The timing of prophylactic administration of antibiotics and the risk of surgical wound infections. N Engl J Med. 1992 Jan 30;326(5)281-6.
11. Burje JF. The effective period of preventive antibiotic action in experimental incision and dermal lesions. Surgery. 1961;50:161-8.
12. Borade S, Syed O. Single dose antibiotic prophylaxis for prevention of surgical site infection in elective surgery. Int Sur J. 2017;5(1):27.

13. Jogdand S, Shinde R, Chandrakar N. Outcome of Evidence-based Allocation of Single-dose Antibiotic extended to Three-dose Antibiotic Prophylaxis in Surgical Site Infection. Int J Rec Sur Med Sci. 2017;3(2):79-84.
14. Shah YD, Thekdi PI, Raut S, Patel KG. Single shot versus multiple shot antibiotic therapy in patients undergoing laparoscopic surgery: our experience. Int J Res Med Sci. 2013;1:252-6.
15. Poon JT, Law WL, Wong IW, Ching PT, Wong LM, Fan JK, et al. Impact of laparoscopic colorectal resection on surgical site infection. Ann Surg. 2009;249:77-81.
16. Romy S, Eisenring MC, Bettschart V, Petignat C, Francioli P, Troillet N. Laparoscope use and surgical site infections in digestive surgery. Ann Surg. 2008;247:627-32.
17. Nakamura T, Mitomi H, Ihara A, Onozato W, Sato T, Ozawa H, et al. Risk factors for wound infection after surgery for colorectal cancer. World J Surg. 2008;32:1138-41.
18. Abraham NS, Young JM, Solomon MJ. Meta-analysis of short-term outcomes after laparoscopic resection for colorectal cancer. Br J Surg. 2004;91:1111-24.

Cite this article as: Lonare R, Singh R, Gupta A, Singh K. A retrospective study of colorectal carcinoma in Central India. Int Surg J 2019;6:843-6.