

Impact of Single Dose versus Multidose Prophylactic Antibiotics in Elective Hernia Surgeries

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Abstract

Background and Aim: Prophylactic antibiotics are regularly utilized in all surgical cases. The presence of plastic biomaterial increases the occurrence of difficulties relating to the mesh itself, as well to other known complications of the hernia repair.

Materials and Methods: A total of 320 subjects who were admitted for the elective hernia surgery were incorporated in the research. The incorporated subjects were divided into two groups with equivalent number of subjects in each group: Group A: Subjects in this group were given Amoxicillin-Clavulanic acid (2 gm) intravenously at the time of induction of anaesthesia Group B: Subjects in this group were given Amoxicillin-Clavulanic acid (2 gm) intravenously at the time of induction of anaesthesia followed by Amoxicillin Clavulanic acid (1 gm) intravenously two times a day for two days post-operatively

Results: A total of 320 subjects undergoing the process were incorporated and separated into two groups. In group A and group B there were 160 subjects evenly divided. Out of 160 subjects of Group A, eight subjects developed surgical site infection as compared to none in Group B. There is no statistically significant dissimilarity in occurrence of SSI in both groups (p=0.45).

Conclusion: Prophylactic utilization of antibiotics in clean elective cases is still a subject of many debates. This research of antibiotic prophylaxis for hernioplasty incorporated two classes of antibiotic prophylaxis. The most efficient antibiotics were utilized in single doses in one group and in other group same antibiotics were utilized. Single dose prophylactic antibiotic will be efficient in dipping postoperative infection.

Keywords: Antibiotics, Hernioplasty, Multi dose, Single dose, Site infection

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Introduction

Prophylactic antibiotics are regularly utilized in all surgical cases. The NICE guidelines highlight on no administration of prophylactic antibiotics in clean cases. The European Hernia Society also has

invent the guidelines and it advocates in its Grades 1A and 1B that antibiotic prophylaxis does not significantly diminish wound site infections in non-mesh and with mesh repairs,

correspondingly. Owing to excessive fear of infections, still many practicing surgeons utilize antibiotics in clean surgical cases. The correct utilization of antibiotics in subjects undergoing surgery is essential, or else mistreatment of strong antimicrobials guides to drug toxicity, super infections, and colonization of wards by extremely defiant microbes [1,2].

Surgical Site Infection (SSI) is a major post-operative complication linked with any surgery which will lead to improved hospital stay, loss of productive hours, hospital cost and subject morbidity and mortality [3,4]. While antimicrobial prophylaxis plays an significant role in dropping the rate of SSIs, other features such as interest to basic infection-control strategy, the surgeon's experience and method, the period of the process, hospital and operating-room environments, instrument sterilization issues, preoperative preparation and the underlying medical condition of the subject may have a strapping impact on SSI rates [5,6].

Antibiotics play a particularly significant role in the postoperative care of subjects undergoing elective surgery since high occurrence of surgical site infection (SSI). It has been reported that 30–40% of subjects experience post-operative SSI when a prophylactic antibiotic is not administered. while quite a few current researches have indicated that single-dose (SD) administration may be as successful as multiple-dose, argument still exists concerning the occurrence and suitable combination of antibiotics [7,8].

Inguinal hernia surgery is the most frequently performed surgery. Lichtenstein tension free repair utilizing poly propylene mesh is the gold standard process for inguinal hernioplasty. Surgical site infection is the most common complication in inguinal hernioplasty. Reported surgical Wound Infection rates in voluntary operations vary from 2% for inguinal hernia repair to 26% for

colectomy, and still senior for emergency surgery [9-11].

The risk factors for SSI have been recognized as age (older than 70 years), co morbidity, operative time, and usual utilization of drainage and prostheses. SSI is linked with an augment in length of stay and costs and a reduce in quality of life. The introduction of tension free hernioplasty has made the utilization of antibiotic prophylaxis more significant as of the infection risk when prosthetic materials are utilized. The presence of plastic biomaterial increases the occurrence of complications relating to the mesh itself, also to other acknowledged complications of the hernia repair.

Materials and Method

The current research was performed for the period of two years in the department of surgery, medical college and connected hospital. A total of 320 subjects who were admitted for the elective hernia surgery were incorporated in the research. The incorporated persons were describing about the process of the research and the written informed consent was obtained prior to the inclusion. The ethical committee was informed about the research and the ethical clearance certificate was obtained prior to the begin of the surgery.

Inclusion criteria

- Adult subjects of either gender between 18 and 65 years
- Subjects scheduled for usual open hernioplasty
- Both direct and indirect inguinal hernia

Exclusion criteria

- Subjects allergic to the given antibiotic
- Strangulated hernia or recurrent hernia
- Subjects posted for emergency surgeries.
- Subjects with severe co-morbid diseases like diabetes, cardiovascular diseases and any other are disqualified from the research

All the subjects underwent custom investigation and pre-anesthetic checkup. The incorporated subjects were divided into 2 groups with equivalent number of subjects in each group:

Group A: Subjects in this group were given Amoxicillin-Clavulanic acid (2 gm) intravenously at the time of induction of anaesthesia

Group B: Subjects in this group were given Amoxicillin-Clavulanic acid (2 gm) intravenously at the time of induction of anaesthesia followed by Amoxicillin Clavulanic acid (1 gm) intravenously twice a day for two days post-operatively.

All the subjects posted for these elective surgeries were admitted on the day prior to surgery. All essential investigations were performed and anaesthetic fitness acquired. The operative site was cleaned/shaved with aseptic precaution. All subjects were enquiring to take body wash with soap on the day of surgery and the operative site was roofed with a sterile dressing.

All the events were performed by consultant surgeons under all standard aseptic precautions. Monofilament Polypropylene mesh was utilized for hernioplasty. Surgical site inspection was done on 3rd, 5th, 8th, 14th, 30th post-operative day. Stitch removal performed on 8th postoperative day. Cost of the antibiotic integrated in this research was

too calculated as an average cost of the antibiotics.

Statistical Analysis: Quantitative data is accessible with the help of Mean and Standard deviation. Relationship among the research groups is measured with the assist of Chi-Square test. 'P' value less than 0.05 is taken as significant.

Results

A total of 320 subjects undergoing the process were incorporated and alienated into two groups. In group A and group B there were 160 subjects evenly divided. Out of 160 subjects of Group A, eight subjects developed surgical site infection as compared to none in Group B. There is no statistically significant dissimilarity in occurrence of SSI in both groups ($p=0.45$).

Six subjects developed sign of inflammation on 2nd postoperative day among group A. The affected subjects were afterwards given extra doses of antibiotic to treat infection and inflammation resolved on 4th post-operative day. Not any of the subjects among group B developed SSI on all followed post-operative days.

Chief complaints by many subjects in the post-operative era were pain and headache managed well with intravenous fluids for spinal headache and analgesics. Seroma was establish in the 3rd postoperative day in 2 subjects in group I, fluid aspirated, and culture turned out to be negative.

Table 1: Incidence of surgical site infection between group A & Group B subjects

Subjects	Group A	Group B	P value
No. of subjects	160	160	-
Incidence of site infection	8	0	0.45

Table 2: Distribution of Incidence of Surgical site infection in relation to various observation days

	Preoperative	2 nd day	4 th day	8 th day	16 th day	32 nd day
No. of subjects	160	160	160	160	160	160
Infection in group A	0	8	0	0	0	0
Infection in group B	0	0	0	0	0	0

Discussion

Antibiotic prophylaxis is still designated in elective surgical procedures where the prosthesis is implanted; anticipating odds of infection can be at times lethal. Alternatively, the advantage of antibiotic prophylaxis in elective surgical procedures, such as inguinal hernia surgery repair, the prophylactic antibiotic is measured arguable [12].

The insignificant rate of wound infections and the technically sound surgical management are all measured as factors alongside usual utilization of antibiotic prophylaxis in inguinal hernia repair [13]. Surgical site infection subsequent hernia repair is linked with a elevated rate of recurrence in hernia repair consequently leading to recurrence. Platt *et al* randomized double-blind research which was aimed to throw light into this utilization of antibiotics in elective surgery [14].

The utilization of prophylactic antibiotic in all surgical cases are advocated ever since, the concept of utilization of antibiotic preoperatively to shutter and avoid wound infection was postulated by Bernard and Cole in 1964. On the whole understanding from around the world has obviously suggested utilization of the the precise antibiotics in the preoperative era rather than conventional utilization of 5-7 days of antibiotics in the post-operative period [15,16].

The present original research was done in the total of 320 subjects. All the subjects were scheduled for elective open hernioplasty and were equally separated into 2 groups, with 160 subjects in each group. Rate of surgical site infection (SSI) is fairly comparable in SD group (8%) as compare to MD group (0%), 16 subjects developed SSI in SD group whereas none of the subject developed SSI in MD group. There was no significant dissimilarity in surgical site infection (SSI) among both groups (P value =0.295).

Wideman and Matthijssen in their research stated cefotaxime and cefazolin are uniformly beneficial on all aspect, and uses depend on the cost and accessibility. Many researches have been performed on the choice of antibiotic and timing of utilization of antibiotics. Majority of the findings of the researches have suggested the first dose to be given 30- 60 min previous to surgery, and long-acting antibiotic must be selected.

Conclusion

Prophylactic utilization of antibiotics in clean elective cases is still a subject of lots of controversies. This research of antibiotic prophylaxis for hernioplasty incorporated two classes of antibiotic prophylaxis. The most efficient antibiotics were utilized in single doses in one group and in other group same antibiotics were utilized. Single dose prophylactic antibiotic will be efficient in reducing postoperative infection.

References

1. Prasanna PG, Ranganath H: A comparative study on antibiotics and no antibiotics in clean surgical cases. *International Surgery Journal* 2020; 7:447-50.
2. Tubre D, Schroeder A, Estes J, Eisenga J, Fitzgibbons R: Surgical site infection: the "Achilles Heel" of all types of abdominal wall hernia reconstruction. *Hernia* 2018; 22:1003-13.
3. Bagnall NM, Vig S, Trivedi P: Surgical-site infection. *Surgery (Oxford)* 2009; 27:426-30.
4. Badia J, Casey A, Petrosillo N, Hudson P, Mitchell S, Crosby C: Impact of surgical site infection on healthcare costs and subject outcomes: a systematic review in six European countries. *Journal of Hospital Infection* 2017; 96:1-15.
5. Liu J, Li N, Hao J, Li Y, Liu A, Wu Y, Cai M: Impact of the antibiotic stewardship program on prevention

- and control of surgical site infection during peri-operative clean surgery. *Surgical Infections* 2018; 19:326-33.
6. Bratzler DW, Dellinger EP, Olsen KM, Perl TM, Auwaerter PG, Bolon MK, Fish DN, Napolitano LM, Sawyer RG, Slain D: Clinical practice guidelines for antimicrobial prophylaxis in surgery. *Surgical infections* 2013; 14:73-156.
 7. Liao K-H, Aung K-T, Chua N, Ho C-K, Chan C-Y, Kow A, Earnest A, Chia S-J: Outcome of a strategy to reduce surgical site infection in a tertiary-care hospital. *Surgical infections* 2010; 11:151-9.
 8. Uçkay I, Hoffmeyer P, Lew D, Pittet D: Prevention of surgical site infections in orthopaedic surgery and bone trauma: state-of-the-art update. *Journal of hospital infection* 2013; 84:5-12.
 9. Sanabria A, Domínguez LC, Valdivieso E, Gómez G: Prophylactic antibiotics for mesh inguinal hernioplasty: a meta-analysis. *Annals of surgery* 2007; 245:392.
 10. Arroyo Sebastian A, Perez F, Serrano P, Costa D, Oliver I, Ferrer R, Lacueva J, Calpena R: Is prosthetic umbilical hernia repair bound to replace primary herniorrhaphy in the adult subject? *Hernia* 2002; 6:175-7.
 11. Moeen A, Niaz Z, Gardazi S: Comparison of Laparoscopic hernia repair (TEP) with Lichtenstein repair for inguinal hernias. *Annals of King Edward Medical University* 2007; 13:29-31.
 12. Wolf JS, Bennett CJ, Dmochowski RR, Hollenbeck BK, Pearle MS, Schaeffer AJ: Best practice policy statement on urologic surgery antimicrobial prophylaxis. *The Journal of urology* 2008; 179:1379-90.
 13. Roshan RK, Singh U: Prospective Comparative Study to Assess the Impact of Single Dose Versus Multidose Prophylactic Antibiotics in Elective Hernia Repair. *International journal of pharmaceutical and clinical research*, 2022; 14(1): 277-282.
 14. Durai RM, Mohamed N: Impact of single dose versus multidose prophylactic antibiotics in elective hernia repair: an institutional study. *International Surgery Journal* 2021; 8:2998-3001.
 15. Jayalal J, Kumar SJ, Thambithurai D: Effect of single-dose antibiotic prophylaxis versus conventional antibiotic therapy in surgery: a randomized controlled trial in a public teaching hospital. *International Journal Of Scientific Study* 2015; 3:109-13.
 16. Bernard H: The prophylaxis of surgical infection: the effect of prophylactic antimicrobial drugs on the incidence of infection following potentially contaminated operations. *Surgery* 1964; 56:151-7.