



A COMPARATIVE STUDY OF EFFICACY OF SINGLE DOSE PROPHYLACTIC V/S CONVENTIONAL PERIOPERATIVE ANTIBIOTIC THERAPY IN CLEAN CASES OF MESH HERNIOPLASTY

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ABSTRACT

Introduction: One of the most often carried out general surgical procedures is inguinal hernia surgery. Despite the fact that open inguinal hernioplasty is one of the cleanest surgical procedures, some surgeons nevertheless provide antibiotics as a preventative measure. The present study was undertaken to compare the efficacy of the single dose prophylaxis v/s conventional perioperative operational therapy. **Material And Methods:** This study was a hospital based observational comparative study which was conducted in the Department of General surgery at Aarupadai Veedu medical college and hospital, Puducherry, A study 60 cases were included. Patients were divided into two groups. Each group consists of 30 cases of Inguinal Hernia. The study group (Group SDA) received single dose of antibiotic preoperatively while the other group (Group CA) received 3 days of empirical antibiotic therapy post operatively. After obtaining pre anaesthetic check-up patients were posted for surgery. All the cases in study group (group SA) were administered with single dose of 1.5gm of inj. Cefuroxime 30 minutes before skin incision was given. They received no further antibiotics intravenously or oral. The data was analysed using SPSS software P value less than 0.05 consider as statistically significant. Data in the form of age, gender, BMI, type of work, side of hernia, type of hernia, habit of alcohol consumption and smoking, presence of DM, hypertension, CVD, COPD, duration of surgery, immediate postop fever, nausea and vomiting were noted in prescribed format and statistical analysis was done. **Conclusion:** However, the SSI in the single dose antibiotic group was remarkably lower than the proportion of SSI in conventional group on post op day 7 however this difference was not substantial on day 14. Also the length of hospital stay, time taken to return to daily activities and work were substantially less in single dose antibiotic group compared to conventional group. We infer that single dose antibiotic is preferred over conventional antibiotics in inguinal hernia repair.

KEYWORDS

Clean case of mesh hernioplasty, Prophylaxis, Surgical site infection.

INTRODUCTION

Nowadays, mesh hernia repair is a popular treatment, and the most popular open mesh inguinal hernia surgical technique is the Lichtenstein repair, which involves covering the entire inguinal canal with polypropylene mesh. Among the "clean" operations, hernia repair may not necessitate antibiotic administration. However, many surgeons still prophylactically provide antibiotics on an empirical basis. Due to the concern over infection from the inserted foreign body, this treatment became increasingly popular when the tension free mesh repair method became the preferred way for hernia repair. Even before the invention of the mesh repair methods, a number of controlled randomised trials on this subject were published with contrasting conclusions. A mesh was employed in some trials, but not in others. Various trials included cases of other hernias in addition to inguinal ones and/or other techniques for surgery, mesh or no mesh. Infections of the incision, organ, or space are known as SSIs, and they can happen after surgery. Payouts for treating SSIs are being cut back on or stopped altogether, and public reporting of procedure, result, and other performance improvement metrics is now required. According to estimates, the use of evidence-based measures can help avoid about half of SSIs¹⁷.

Beyond one third of postop deaths are reportedly attributable to SSIs, which are associated with significant morbidity. The amount of time a patient spends in the hospital can quadruple due to SSI, which raises the price of medical care. Depending on the type of operation and severity of the infection, there may be additional expenditures related to SSI. Re-operations, additional nursing care, and pharmacological therapy are the key areas where there are additional costs.

To reduce the frequency of these diseases, constant care is necessary. This calls for a methodical approach, paying close attention to several risk variables associated with the patient, the surgery, and the hospital setting. With these in view this study was conducted to assess the role of single dose and conventional antibiotics in our setting, among the surgical cases of inguinal hernia repair.

MATERIAL & METHODS

After obtaining ethical approval from institutional ethical committee, a hospital based observational comparative study was conducted in Department of General surgery Aarupadai Veedu medical college and hospital, from August 2021 to September 2022. The study group (Group SDA) received single dose of antibiotic preoperatively while the other group (Group CA) received CONVENTIONAL PERIOPERATIVE ANTIBIOTIC THERAPY. Age 18 – 70 yrs, Elective hernia repair. Both direct and indirect inguinal hernia were included, Immuno compromised status, Emergency surgeries, Patients with complicated hernia, pre existing infection at surgical site, Patient taking steroids, severe co-morbid ill were excluded. After obtaining pre anaesthetic check-up patients were posted for surgery. All the cases in study group (group SDA) were administered with single dose of 1.5gm of inj. Cefuroxime 30 minutes before skin incision was given. They received no further antibiotics intravenously or oral. All the procedures were carried out by consultant surgeons under all standard aseptic precautions. Monofilament Polypropylene mesh was used for hernioplasty. After the surgery all the cases in the other group (Group CA) received single dose of 1.5gm of inj. Cefuroxime 30 minutes before skin incision and post operatively 3 days of inj. Cefuroxime 1.5gm intravenously twice a day followed by oral antibiotics for 3 days. Surgical site inspection was done on 2nd, 4th and 6th in surgery inpatient ward and stitch removal was done on 8th postoperative day. Follow up was done on 30th post-operative day in surgery outpatient department for further surgical site infection.

Data were collected in excel. Categorical variables were summarized as frequency and percentage. Continuous variables were summarized as mean $\pm$ standard deviation. Independent student t test was used to compare the continuous variables and chi-square test the categorical variables was compared between the groups. The p value less than 0.05 was considered as statistically significant in all the statistical tests. The data were analysed using the Statistical Package for Social Sciences (SPSS version 28).

RESULTS

In this study among Group SA 5% cases were below 30 years of age, 18.3% of the cases were between 31-40 years of age, 16.7% of the cases were between 41-50 years of age group and 10% of the cases were between 51-60 years of age. In Group CA 1.7% of the cases were less than 30 years of age, 20% of the patients were between 31-40 years of age. In the age range of 41-50 years 15% of the cases were between 41-50 years of age and 13.3% of the cases were in the age range of 51-60 years. There was no significant association recorded between Group SDA and Group CA based on age (p value = 0.7098).

Age group	Group SDA	Group CA	Total	P value
≤ 30 years	3 (5.0)	1 (1.7)	4 (6.7)	0.7098
31-40 years	11 (18.3)	12 (20.0)	23 (38.3)	
41-50 years	10 (16.7)	9 (15.0)	19 (31.7)	
51-60 years	6 (10.0)	8 (13.3)	14 (23.3)	
Total	30 (50.0)	30 (50.0)	60 (100.0)	

The mean age of the participants from Group SDA was 38.5±8.6 and the mean age of the participants from Group CA was 39.4±7.5, but the difference between the groups for mean age was not significant statistically (p value=0.6673).

Parameter	Group SDA	Group CA	P value
Mean Age	38.5±8.6	39.4±7.5	0.6673

All the participants in this study were males were 50% of the cases are from Group SDA and 50% of the cases are from Group CA. There was no significant association noted between the groups for gender (p value = 1.0000)

Gender Distribution Of The Cases

Gender	Group SDA	Group CA	Total	P value
Male	30 (50.0)	30 (50.0)	60 (100.0)	1.0000
Female	0 (0.0)	0 (0.0)	0 (0.0)	
Total	30 (50.0)	30 (50.0)	60 (100.0)	

BMI was normal among 41.7% of the cases among whom 18.3% of the cases were in Group SDA and 23.3% of the cases are from Group CA, whereas 21.7% of the cases were overweight and 15% of the cases are overweight from Group SDA and Group CA respectively. However among 21.7% of obese patients 10% were from Group SA and 11.7% of the patients were from Group CA, there was no statistical association recorded between both the groups for BMI (p value = 0.5587).

BMI VS Group SDA And Group CA

BMI	Group SDA	Group CA	Total	P value
Normal	11 (18.3)	14 (23.3)	25 (41.7)	0.5587
Overweight	13 (21.7)	9 (15.0)	22 (36.7)	
Obese	6 (10.0)	7 (11.7)	13 (21.7)	
Total	30 (50.0)	30 (50.0)	60 (100.0)	

BMI VS Group SDA And Group CA

The mean BMI of Group SDA patients was 24.7 ± 6.2 and the mean BMI of Group CA patients was 25.1 ± there was no statistical significant difference recorded for mean BMI among both the group participants, the p value was noted as 0.8082.

Mean BMI Among The Patients

Parameter	Group SDA	Group CA	P value
Mean BMI	24.7±6.2	25.1±6.5	0.8082

Based on the type of work 27, 20 and 13 patients were found to be heavy, moderate and sedentary workers respectively. Among heavy workers 13 cases were from Group SDA and 14 cases are from Group CA whereas about moderate workers 10 and 10 are from Group SDA and Group CA respectively. Among sedentary workers 7 cases and 6 cases are from Group SDA and Group CA respectively. There was no significant association registered between Group SA and Group CA (p value = 0.9446).

Type of work vs Group SDA and Group CA

Type of Work	Group SDA	Group CA	Total	P value
Heavy work	13 (21.7)	14 (23.3)	27 (45.0)	0.9446
Moderate work	10 (16.7)	10 (16.7)	20 (33.3)	
Sedentary work	7 (11.7)	6 (10.0)	13 (21.7)	
Total	30 (50.0)	30 (50.0)	60 (100.0)	

On assessing the side of hernia 31 participants had right side hernia and 29 participants had left side hernia. Among the cases with right sided hernia 17 patients were from Group SDA and 14 patients are from

Group CA whereas among cases with left sided hernia 13 and 16 are from Group SDA and Group CA respectively. There was no significant association seen between Group SDA and Group CA for side of hernia (p value = 0.4383).

Side Of Hernia Vs Group SDA And Group CA

Side of Hernia	Group SDA	Group CA	Total	P value
Right	17 (28.3)	14 (23.3)	31 (51.7)	0.4383
Left	13 (21.7)	16 (26.7)	29 (48.3)	
Total	30 (50.0)	30 (50.0)	60 (100.0)	

Likewise based on the type of hernia 13 participants from Group SDA and 11 participants from Group CA had direct hernia while 17 participants from Group SDA and 19 participants from Group CA had indirect hernia, but the association between the group participants for type of hernia was not significant statistically (p value = 0.5981).

Type of Hernia

Type of Hernia	Group SDA	Group CA	Total	P value
Direct IH	13 (21.7)	11 (18.3)	24 (40.0)	0.5981
Indirect IH	17 (28.3)	19 (31.7)	36 (60.0)	
Total	30 (50.0)	30 (50.0)	60 (100.0)	

In Group SDA 21 patients were smokers while among Group CA 24 cases are smokers while 9 and 6 participants from Group SDA and Group CA are non-smokers respectively. There was no association found for smoking habit between the groups (p value = 0.3710).

Smoking habit vs Group SDA and Group CA

Smoking habit	Group SDA	Group CA	Total	P value
Present	21 (35.0)	24 (40.0)	45 (75.0)	0.3710
Absent	9 (15.0)	6 (10.0)	15 (25.0)	
Total	30 (50.0)	30 (50.0)	60 (100.0)	

Likewise in Group SDA 19 patients were alcohol consumers while among Group CA 20 cases are alcohol consumers while 11 and 10 participants from Group SDA and Group CA are non-alcoholic respectively. There was no association found for alcohol consumption between both the groups (p value = 0.7866).

Alcohol consumption vs Group SDA and Group CA patients

Alcohol consumption	Group SDA	Group CA	Total	P value
Present	19 (31.7)	20 (33.3)	39 (65.0)	0.7866
Absent	11 (18.3)	10 (16.7)	21 (35.0)	
Total	30 (50.0)	30 (50.0)	60 (100.0)	

In our study 11 patients and 9 patients from Group SDA and Group CA were diabetics respectively while 19 participants from Group SA and 21 participants from Group CA were non diabetics. The association between Group SDA and Group CA was statistically insignificant with p value 0.5838.

DM vs Group SDA and Group CA patients

DM	Group SDA	Group CA	Total	P value
Present	11 (18.3)	9 (15.0)	20 (33.3)	0.5838
Absent	19 (31.7)	21 (35.0)	40 (66.7)	
Total	30 (50.0)	30 (50.0)	60 (100.0)	

DISCUSSION

In this study the single dose antibiotic is preferred over conventional antibiotics in inguinal hernia repair. In addition, Subburathinam et al¹ stated that SSI was seen in 8.3% of participants in Group SA and 6.7% of subjects in Group with triple dose antibiotic, both with negligible difference. They came to the conclusion that SDA is the most popular and cost-effective choice for subjects having open mesh surgery for inguinal hernias. Durai R M et al² noted that compared to those who got postop MD groups, it was found that the rate of infection related to surgery was only 8% in the SDA group. They came to the conclusion that the postop wound-related infection rate following an SDA parenterally administered at the beginning of anaesthesia is much better than that of MDA. Jain S K et al³ reported that evidence of SSI was observed in 12 subjects treated with antibiotics and 9 subjects given a placebo. This distinction was proven to be inconsequential. Deep SSI occurred in three subjects in placebo group, however research revealed that this difference was likewise negligible. None of these subjects needed the mesh to be taken out. They came to the conclusion that there is no additional protection from infections provided by the use of AP after mesh repair of primary inguinal

hernias.

In another study, Riyees L A et al⁴ claimed that in subjects undergoing open hernia surgery, AP decreased the chance of SSI. Additionally, it was discovered that although there was no discernible difference in SSI risk following herniorrhaphy, antibiotics had a considerable advantage for mesh repair subjects. Additionally, AP was linked to a notable decrease in the probability of superficial SSI but not deep SSI. They came to the conclusion that AP is advantageous before open mesh hernia surgery.

However, Saha A K et al⁵ evaluated SSI prevention for children inguinal herniotomies with a single preoperative antibiotic dosage to a five-day antibiotic course. On day 3, the SSI in Group CA was reported to be 4%, which was greater than that in Group SA (2.0%) but not significantly different. When the health status of subjects from the two groups was compared on postoperative days 7 and 28, there was no discernible change. As the study demonstrates a substantial decrease in hospital stay with no appreciable rise in SSI incidence, they came to the conclusion that the deployment of single dose AP regimes suited to the common organisms in the institution can yield in enormous savings.

Also, Cijan V et al⁶ claimed that using prophylactic antibiotics in elderly individuals undergoing LIH did not demonstrate any appreciable benefits in lowering SSI. Their findings refute the routine administration of antibiotics during elective inguinal hernia repair. Centeno A C Q et al⁷ found the following factors to be related with early mesh infection: peritoneal adhesions, intestinal resection, lap surgery, and surgical site problems. They stated that the incidence of early mesh infection was 0.59%. They came to the conclusion that, despite its rarity, early infection is linked to a significantly elevated risk of consequences. Masood A et al⁸ asserted that the trial group's infection rate (13.3%) was higher than the placebo group's (10%). No subjects had mesh removal, and there was no discernible difference between the two groups' outcomes in terms of postop problems. They came to the conclusion that AP and standard pre- and post-surgical care were both equally successful. However, because prophylactics are economical and guard against bacterial medication resistance, we advise using them. However, Roshan R K et al⁹ noted that there was no discernible difference between the 8.3% of subjects in group SD who got SSI and none in group MD. The most common post-operative complaints of many subjects were pain and headache, which were effectively treated with analgesics and intravenous fluids for spinal headache. Three subjects in group I had seroma discovered on the third postoperative day; fluid was aspirated, but culture results were unfavourable. Five members of the SD group experienced illness, which was treated with medication and went away. The average cost of an antibiotic for each patient in the SD group was Rs. 150, whereas the cost of an antibiotic for each patient in the MD group was Rs. 1500. This difference was significant. The cost of an antibiotic for each patient in the SD group was Rs. They came to the conclusion that the infection rates for SD and MD antibiotics are pretty comparable, making SDA prophylaxis just as effective as MD antibiotic prophylaxis. They also came to the conclusion that SD AP is cost-effective in straightforward elective surgery.

Similarly, Alam M S et al¹⁰ observed that SSI occurred in 8.3% of subjects in group SD but not at all in group MD. In terms of statistics, there was no discernible difference between the SSI in the SD and MD groups. Three subjects in group SD had seroma discovered on the third postoperative day; fluid was extracted, but culture results were unfavourable. Five members of the SD group experienced an illness, which disappeared with the help of antibiotic treatment. The average cost of an antibiotic for a patient in the SD group was Rs. 150, whereas the average cost for a patient in the MD group was Rs. 1200. This information came from an analysis of the patient's sole expenditure for an antibiotic. Jiladia A G et al¹¹ reported that eight individuals out of 160 in Group SA (as opposed to none in Group CA) had SSI. There is no substantial difference between the two groups' SSI occurrence rates. They came to the conclusion that a single dosage of preventive antibiotics would effectively reduce postoperative infection.

CONCLUSION

In the present study both single dose and conventional antibiotic groups were similar in age, gender, BMI, type of work, side of hernia, type of hernia, habit of alcohol consumption and smoking, presence of DM, hypertension, CVD, COPD, duration of surgery, immediate postop fever, nausea and vomiting. However, the SSI in the single dose antibiotic group was remarkably lower than the proportion of SSI in

conventional group on post op day 7 however this difference was not substantial on day 14. Also the length of hospital stay, time taken to return to daily activities and work were substantially less in single dose antibiotic group compared to conventional group.

We infer that single dose antibiotic is preferred over conventional antibiotics in inguinal hernia repair.

REFERENCES

- Subburathinam DA, Karthick MP, Princy J. Effectiveness of single over triple dose antibiotic prophylaxis in open inguinal hernioplasty. *International Journal of Surgery*. 2021;5(1):297-300.
- Durai RM, Mohamed N. Impact of single dose versus multidose prophylactic antibiotics in elective hernia repair: an institutional study. *International Surgery Journal*. 2021;8(10):2998-3001.
- Jain SK, Hameed T, Jain D, Singh M, Nizam A. The Role of Antibiotic Prophylaxis in Lichtenstein Repair of Primary Inguinal Hernia: A Prospective Double-Blind Randomized Placebo-Controlled Trial. *Nigerian Journal of Surgery*. 2021;27(1):5-8.
- Al Riyees L, Al Madani W, Firwana N, Balkhy HH, Ferwana M, Alkhudhayri A. Antibiotic Prophylaxis against Surgical Site Infection after Open Hernia Surgery: A Systematic Review and Meta-Analysis. *European Surgical Research*. 2021;1-3.
- Debnath PR, Meena AK, Shah S. Comparative study of single dose preoperative antibiotic versus five days antibiotic course in preventing surgical site infection for pediatric inguinal herniotomy.
- Cijan V, Bojovic P, Bojicic J. P066 Elective Lichtenstein Inguinal Hernioplasty In Geriatric Patients Without Antibiotic Prophylaxis: How Safe Is It?. *British Journal of Surgery*. 2021;108 :24,395-062.
- Quiroga-Centeno AC, Hoyos-Rizo K, Chaparro-Zaraza AF, Pinilla-Merchán PF, Chávez MC, Serrano- Pastrana JP, Ochoa SA. Early infection of the surgical mesh in incisional herniorrhaphy. Incidence, risk factors, and outcomes in more than 60,000 patients. *Revista Colombiana de Cirugía*. 2022 (2):194-205.
- Masood A, Arshad AR, Ashraf M. Comparison between outcome of single dose of prophylactic antibiotic versus postoperative antibiotic in inguinal hernia surgery. *Pakistan Journal of Medical Sciences*. 2022 ;38(5).
- 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;(1):277-82.
- Alam MS, Ahmed S. Prospective, Longitudinal Study Comparative Assessment of the Impact of Single Dose versus Multidose Prophylactic Antibiotics in Elective Hernia Repair. 2022; 2(2) 73-79
- Jiladia AG, Patel HM, Soni HY, Nayak C. Impact of Single Dose versus Multidose Prophylactic Antibiotics in Elective Hernia Surgeries. *surgery*. 2022;9:11
- Basavarajappa M, Mathad AS, Deepak G. A Comparative Study of Effect of Single-Dose Prophylactic Antibiotic versus Conventional Antibiotic Therapy in Selected Clean Surgical Cases in A Tertiary Care Centre. 2021 ; 3 (3) 12-19
- Garg S, Garg S, Shoaib M, Area S. Efficacy Of Single Dose Versus Multiple Dose Antibiotic Prophylaxis In Clean And Clean-Contaminated Herniorrhaphy Surgery. 2022 ;2(2) 11-19
- Khongwar D, Tongper D, Topno N, Hajong R, Baruah AJ, Komut O, Saikia J, Anand M. Assessment of effectiveness of prophylactic topical antibiotic vis-a-vis oral antibiotic in the prevention of surgical site infection in elective open inguinal hernioplasty. 2021 ;1 (5) 24-31
- Kahla SM, Gaber A, Al-Rahawy MM. The role of antibiotic prophylaxis in the prevention of surgical- site infection after hernioplasty in Menoufia University Hospital. *Menoufia Medical Journal*. 2019 ;32(3):1137.
- Sumukha SR. Efficacy of single dose versus multiple dose antibiotic prophylaxis in anterior abdominal wall hernia repair at a tertiary hospital. *International Journal of Surgery*. 2020;4(3):230-2.
- Yadav S, Keshawa DS, Meena J. Effect of antibiotic prophylaxis in open inguinal hernioplasty (Lichtenstein hernia repair): a study in tertiary care center. *International Surgery Journal*. 2020;7(12):4034-8.