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Research Article

Efficacy of antimicrobial sutures in reducing surgical site infection during hernia surgery: a comparative study

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ABSTRACT

Background: Even though rampant advances in aseptic principles of surgery are available, surgical site infections (SSI) are one of the most common nosocomial infections in our population. The aim of the present study was to evaluate whether triclosan coated (TC), an antimicrobial suture could prevent the occurrence of SSI and incidence of using antibiotics post operatively after hernia surgery.
Methods: The study was carried out in two populations: group 1- 61patients underwent hernia surgery with conventional sutures (Momocryl); group 2- 61 with TC-coated sutures (Monocryl Plus). Post operatively on day 3, 5, 7 and 10 the wounds were analysed for SSI using Southampton wound scoring system and duration of antibiotic administration were also measured.
Results: There was no significant difference in the wound scoring between the TC coated suture and conventional suture group. Further, the duration of antibiotic administration was found to be similar in both the groups (3.27 ± 0.69 and 3.30 ± 0.72 days) respectively.
Conclusions: Thus the results of the indicate that both conventional and TC coated has the same effects. However, further studies using large population is highly warranted to study the clinical utility of TC coated sutures.

Keywords: Suture, Triclosan, Hernia, Surgical site infection, Wounds

INTRODUCTION

Hernia is a major health care problem requiring surgical intervention. It accounts for 10-15% of all the surgical procedures. Inguinal hernia is the commonest one accounting for 75-80% of the hernias.[1-4] Most of the patients diagnosed with hernia will undergo surgery, with a significant risk of complications. Albeit, the complications are minor, 30% of the patients may be affected with quality of life, higher treatment costs, and increased duration of hospitalization.

During the hernia surgery, the frequently encountered side effects are GI disturbances and surgical site infection (SSI).[5] The treatment strategies to prevent nosocomial infections encompass prophylactic antibiotic treatment, preoperative care, strict aseptic technique asepsis and postoperative protocols. Even though, the measures to prevent SSI have been clinically validated but still there is a need for improved prevention of surgical complications, specifically related to infections.[6]

Mounting studies indicate that suture material is the potential cause of infection after surgery.[7,8] Thus, strategies to prevent microbial growth in suture material used for surgical closure have been developed, for eg. Triclosan-coated polyglactin 910 suture materials with antibacterial activity (Vicryl Plus and Monocryl Plus Ethicon GmbH, Nordersdedt, Germany). Triclosan (TC) is a phenolic antiseptic and act as an effective

antibacterial agent against SSI causing organisms like *S. aureus* and *S. epidermidis*. The antimicrobial potential of TC in inhibiting bacterial adherence and microbial viability in the suture material has been well documented in invitro and preclinical studies.[9-11] Recently, studies have tried to use TC-coated suture in inguinal hernia surgery, and showed better cosmetic outcomes and efficiency in reducing SSI.

The aim of the current study was to assess the incidence of using antibiotics post operatively and surgical site infections (SSI) between two populations: those with and without the use of triclosan-coated monocryl plus.

METHODS

The study was conducted on 132 patients undergoing elective open inguinal hernia repair. The patients were divided into two groups as follows,

Group 1: 66 patients underwent open inguinal hernia repair with conventional suture Monocryl (MC).

Group 2: 66 patients underwent open inguinal hernia repair with triclosan coated suture Monocryl Plus (MC Plus).

All the women gave informed written consent to the therapeutic procedures and to the analysis of data related to their pathology.

Both male and female patients undergoing elective inguinal hernia repair above 18 years of were included in the study. Meanwhile, immune compromised individuals (diabetics, HIV, bleeding disorder, patients on steroid and immunosuppressive therapy), allergic to suture materials, pre-existing surgical site infection and age less than 18 were excluded from the study.

Post operatively the wound will be assessed using Southampton wound scoring system on post-operative day three, five and seven and ten were as follows, grade 0 - normal healing; grade I-normal healing with mild brusing or erythema; grade II- erythema and signs of inflammation; grade III-clear or homogenous discharge; grade IV-pus and grade V- deep or severe wound infection.

Statistical analysis

Data will be analyzed in terms of proportion, mean and standard deviation. The student T test was applied to compare between the groups and the p value less than 0.05 ($p<0.05$) was considered as statistically significant.

RESULTS

The age of patients was found be in the range of 40-60 years in both the groups, groups 20.5% in MC Plus and 27.3% in group MC. While, the mean age in MC group was moderately high (49.20 ± 13.93 years) when compared to MC plus group (47.95 ± 15.97 years), however it was found to be statistically non-significant ($p>0.05$). Meanwhile, the mean pulse rate, blood pressure were non- significant ($p>0.05$) between the groups, except the respiratory rate ($p=0.0001$).

Regarding the SSI rate, on post-operative day (POD) 3, SSI grade of IA (1.5%), IC (4.5%), and IIIB (1.5%) was observed in group MC plus while Group MC elicited SSI grade of IC (1.5%), IIC (1.5%) and IIIB (1.5%). Whilst, On POD 5, SSI of grade IA (1.5%), IC (1.5%) and IIIC (1.5%) was seen in group MC Plus while group MC had SSI grade of IA (4.5%), IC (3%) and IIC (4.5%). Meanwhile on POD 7, SSI grade of IA (1.5%), IC (1.5%) and IIIB (1.5%) was visualized in group MC plus while group MC displayed SSI grade of IA (1.5%), IC (6.1%). Finally on POD 10, SSI grade of IA (1.5%), IC (1.5%), IIIB (1.5%) was seen in Group MC plus while Group MC had SSI grade of IA (1.5%), IC (6.1%).

Post operatively the mean duration of antibiotic administration in group MC Plus and MC was found to be 3.27±0.69 and 3.30±0.72 days respectively. However, the results was found to be statistically non-significant ($p>0.05$) (Table 1).

Table 1: Effect of TC coated and convention sutures on antibiotic administration.

Groups	Post-operative antibiotic administration (in days)
MC	3.30 ± 0.72
MC Plus	3.27 ± 0.69 ^{NS}

The data were analysed in terms of mean±S.D (n=61).The comparisons were between two groups MC vs MC plus. NS-Non significant.

DISCUSSION

Despite the advances made in asepsis, antimicrobial drugs, sterilization and operative techniques, SSI's have been responsible for the increasing cost, morbidity and mortality. Surgical sutures orchestrate a cardinal role in the cause of infection post operatively. Hence, the present study was aimed to evaluate the efficiency of a triclosan-coated suture Monocryl plus (MC plus) as that of the uncoated Monocryl (MC) to decrease both SSI and antibiotic usage after hernia surgery.

For the past three decades, Triclosan, a broad spectrum antimicrobial moiety has been used in the formulation of wide array of topical products like soaps, tooth paste, surgical scrubs etc.[12] It shows profound antimicrobial potential against SSI causing pathogens like Methicillin-Resistant *Staphylococcus aureus* (MRSA), and Methicillin- Resistant *Staphylococcus epidermidis*.[10,13] TC has the efficacy to inhibit/minify the microbial colonization on the materials used in the preparation of surgical. Further, triclosan have been reported in the

inhibition of SSI in gynaecological, neuro, thoracic, and abdominal surgery.[14,15] However, the usage of TC-coated sutures displayed negative results in various clinical studies. In one clinical study, TC-coated sutures used for wound closure after appendectomy or head and neck surgery, failed to reduce the infection rate post operatively.[16] In another study, conducted on breast cancer patients, TC coated sutures displayed increased wound dehiscence rate when compared with uncoated.[17] Furthermore, apart from the prevention of infection, TC coated sutures inhibits the bacterial colonization, alters the cytokine levels which may prelude to accelerated wound healing.[11]

In our study, the based on the Southampton wound scoring system there was no significant improvement in the wound healing in patients treated with TC coated sutures as that of the conventional sutures. Further, the duration of antibiotic administration post operatively was not decreased in TC coated sutured as that of the conventional suture.

These findings suggest that, the infection control offered by Monocryl plus is equal to that of conventional Monocryl and there was no benefit in terms of reduction in antibiotic administration. This could be due to the smaller sample size. However the numbers of patients developing SSI's were less in Monocryl plus.

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