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# Study on Efficacy of Antimicrobial Sutures in Reducing Surgical Site Infection During Hernia Surgery:a Hospital Based Study

Surgery

**KEYWORDS :** *Hernia, Wounds , Suture and Infection*

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## ABSTRACT

*Hernia is a major health care problem requiring surgical intervention. Most of the patients diagnosed with hernia will undergo surgery, with a significant risk of complications. To evaluate the efficacy of new antibacterial suture monocryl plus compared with traditional suture monocryl in reducing surgical site infections in hernia surgery. 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.*

**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. Although continuous advances in aseptic principles of surgery and the ongoing improvement of sterile surgical technique. Surgical site infections are one of the most common nosocomial infections in our population and accounting for 38% of all infections in surgical patients.[5] Among the many strategies evaluated for reducing the surgical site infections. One of the strategy to reduce the burden of surgical site infections is use of antiseptic and or antibiotic coated suture. The first commercial antimicrobial suture, Polyglactin 910 suture coated with triclosan, Vicryl Plus, was approved for clinical use since 2002. The efficacy study in this suture was still unclear for decade until present. The efficacy of this suture was unclearly used and should be re evaluated the efficacy of this suture that clearer than in the past.[5]

Triclosan is a synthetic, polychlorinated, aromatic hydrocarbon with broad antimicrobial properties. Its lipophillic and active broad pH range (4-8) unlike other antiseptics. It passively dissipates from implanted suture to surrounding tissues where it is absorbed and widely distributed. Studies have shown decrease in bacterial colonisation of suture and infections after use of suture coated with antimicrobial (monocryl plus) in surgery. Coating sutures with an antimicrobial has been considered since the early 1970s. Monocryl which is made of Poliglecaprone 25 is a monofilament: for smooth passage through tissue. Synthetic: for minimal tissue reaction. Absorbable: By hydrolysis essentially complete in 90 –120 days and are intended for use in general soft tissue approximation and/or ligation where an absorbable material is indicated. Typical areas of use include: Subcuticular sutures, Small intestine anastomoses, Urological anastomoses. It provides high tensile strength for 21 days. A new antimicrobial suture Poliglecaprone 25 coated with triclosan (monocryl Plus) has been introduced. Triclosan has been widely used in humans for over 30 years.[6]

Monocryl plus has similar features as of monocryl and it also provides protection against bacterial colonization. In vitro study, showed efficacy against both gram positive and gram negative bacteria Staphylococcus aureus, Staphylococcus epidermidis, Methicillin Resistant Staphylococcus Aureus, Methicillin Resistant Staphylococcus Epidermidis, E.coli, Klebsiela Pneumoniae. Few studies have been done to compare the efficacy between monocryl and monocryl plus suture. Inguinal Hernia repair surgery is clean surgery. Surgical site infections after hernia repair would increase the morbidity, and also cost of treating Surgical Site Infections could be high. Aim of the study was to evaluate the efficacy of new antibacterial suture (Monocryl Plus) compared with traditional suture (Monocryl) in reducing surgical site infections in inguinal hernia surgery.

**Material and methods:**

The present study was conducted in the Department of Surgery, Geetanjali Medical College & Hospital, Udaipur, India, during the period from December 2007 to November 2008. The study protocol was approved by the Ethics committee of Geetanjali Medical College & Hospital. The present study consists of total 90 subjects between the age group 18-65 years who are further subdivided into two groups;

**Group-A:** 45 Subjects underwent open inguinal hernia repair with conventional suture Monocryl (MC) and **Group-B:** 45 Subjects underwent open inguinal hernia repair with triclosan coated suture Monocryl Plus (MC Plus). All subjects in the study group will be sutured with monocryl plus. All subjects in the control group will be sutured with monocryl. The wound will be assessed using Southampton wound scoring system on post operative day three, five and seven and ten.

**Inclusion and Exclusion criteria for the study group:**

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. Data will be analyzed in terms of proportion, mean and standard deviation. And appropriate test will be applied.

**Results and Discussion:**

The present study consists of total 90 subjects underwent open inguinal hernia repair both male and females in Group (A & B). The age of patients was found be in the range of 36-65 years in both the groups, groups 21.4% in MC Plus and 25.7% in group MC. While, the mean age in MC group was moderately high (47.02 ± 3.6 yrs) when compared to MC plus group (45.01 ± 6.21 yrs), 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 ($p=0.001$).

Regarding the SSI rate, on post-operative day (POD) 3, SSI grade of IA (1.6%), IC (4.3%), and IIIB (1.6%) was observed in group MC plus while Group MC elicited SSI grade of IC (1.6%), IIC (1.6%) and IIIB (1.6%). Whilst, On POD 5, SSI of grade IA (1.6%), IC (1.6%) and IIIC (1.6%) was seen in group MC Plus while group MC had SSI grade of IA (4.3%), IC (3.1%) and IIC (4.6%). Meanwhile on POD 7, SSI grade of IA (1.6%), IC (1.6%) and IIIB (1.6%) was visualized in group MC plus while group MC displayed SSI grade of IA (1.6%), IC (5.8%). Finally on POD 10, SSI grade of IA (1.6%), IC (1.6%), IIIB (1.6%) was seen in Group MC plus while Group MC had SSI grade of IA (1.6%), IC (5.8%). Fig.-1 shows the 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 not-significant (p>0.05).

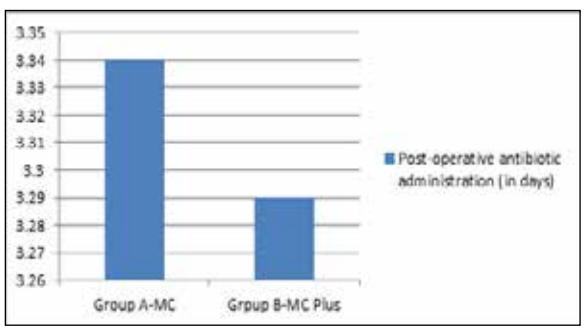


**Fig-1: Shows the effect of TC coated and convention sutures on antibiotic administration.**

Antiseptic is a substance which inhibits the growth and development of micro-organism. They are diverse class of drugs that when applied on skin or mucous-membrane provides anti-infective effect. They may be bacteriostatic or bacteriocidal. They carry little risk of resistance due to their fast, direct and disruptive action, as antibiotics have slow, specific and risk of resistance. Antiseptic could prevent infection without recourse to antibiotics. Monocryl Plus is a suture coated with triclosan (antiseptic) which inhibits bacterial colonization on the suture.

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.[7] It shows profound antimicrobial potential against SSI causing pathogens like Methicillin- Resistant *Staphylococcus aureus* (MRSA), and Methicillin- Resistant *Staphylococcus epidermidis*.[8,9] 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.[10,11] 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.[12] In another study, conducted on breast cancer patients, TC coated sutures displayed increased wound dehiscence rate when compared with uncoated.[13] 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.[14] This present study shows 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.

**Conclusion:**

In conclusion, 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. Studies have shown use of these suture (monocryl plus) in decreasing both bacterial colonisation of suture and infections after surgery. Many studies support the hypothesis that triclosan can reduce the risk of suture-associated surgical site infections.

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