



## A Clinical Microbiological Study Comparing Coated And Non-Coated Polyglycolic Acid Sutures In Alveoloplasty Performed Cases

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### Abstract

**Purpose of the study:** Sutures are widely used in oral surgery. Sutures region infection is the most common post-operative danger for surgical treatment. In this study, the effectiveness of sutures in reducing bacterial adherence for suture material is compared.

**Patient and method:** That analysis had 45 patients who were undergo alveoloplasty surgery. Three groups of patients were selected. Triclosan-coated polyglycolic acid sutures (TCS), chlorhexidine-coated polyglycolic acid sutures (CCS), and non-coated polyglycolic acid sutures (NCS) are the first three groups (NCS). Every group has 15 patients in it. The sutures utilised all were 3-0 sutures. The outcome was. The chi square test with spss software was used for descriptive statistics.

**Result:** When compared to group A, bacterial colony growth was higher in groups B and C.

**Keywords:** Alveoloplasty, Bacteria, Chlorhexidine, Polyglycolic acid sutures, Triclosan

### Introduction:

Primary wound closure and the removal of microorganisms at the healing areas are required for the alveoloplasty technique to be successful. Sutures are utilised to close the flap margins and then are left in place for at least eight days. Suture surfaces, particularly braided sutures, were found to include a conducive environment for microbial development only at surgical site. Surgical site infections (SSIs) and tissue necrosis are more likely after long-term microbial contact. Sutures coated with antibacterial compounds like triclosan or chlorhexidine get the ability to stop those germs from growing. Triclosan is indeed an antibacterial agent with a broad spectrum of action that is proposed used in oral formulations. This is also shown that anti-inflammatory properties.

A synthetic antibacterial medication called chlorhexidine is bacteriostatic at low concentrations and bactericidal at higher concentrations.[1]

As a result, use of such triclosan-coated sutures (TCS) and chlorhexidine-coated sutures (CCS) as a substitute to noncoated sutures (NCSs) in preventing or reducing the incidence of SSIs could be a viable option. There's really, therefore, a scarcity of information on the utilisation of these antibacterial-coated sutures in alveoloplasty procedures. Due to a lack in information, reaching a definitive decision is difficult. As a result, the goal of this research is to compare the efficacy of TCS and CCS resorbable polyglycolic acid sutures to non-coated polyglycolic acid resorbable sutures after an alveoloplasty procedure. [1]

## Material And Method:

### *Inclusion criteria:*

Patients in need of an alveoloplasty operation should be between the ages of 25 and 70, and they should be free of the any systemic diseases such as diabetes and hypertension.

### *Exclusion criteria*

- Patients taken antibiotics in any form in the past 3 months
- Smokers
- Immuno compromised patients
- Pregnant or lactating women
- Any known allergies to chlorhexidine or triclosan

## Method:

- A detailed case history is obtained before to treatment, as well as informed permission.
- 45 patients are divided randomly in three groups of 15, with each group consisting of 15 people.
- Three different types of suture material would be utilised to close the incision after the alveoloplasty process (Triclosan coated, chlorhexidine coated, and non-coated vicryl).
- Following the procedure, the suture was released using sterile scissors and tweezers within aseptic condition, or the adhering microbe was isolated.
- The sutures will be placed in a sterile tube having a decreased transport fluid medium right away.
- The suture material will be checked for four millimetres.
- Analgesics (ibuprofen 400 mg TDS for 5 days) will be supplied as well as post-operative instructions.
- Antibiotics will not be given to all the trial participants to see if the antibacterial layer on the experimental sutures has any impact.

- Hot water rinses, rather than antimicrobial mouthwash, will be recommended twice daily for 1 minute for 30 days to eliminate the confusing impact.
- Since day 8, all of the patients will be recalled.

## Result:

Three categories of patients were created. Group A received a triclosan-coated polyglycolic acid suture (TCS), while Group B received a chlorhexidine-coated polyglycolic acid suture (CCS), and Group C received a non-coated polyglycolic acid suture (NCS). The sutures were removed after 8 days or sent to the laboratory to be tested for bacterial growth.

It was promptly placed into thioglycolate carrier medium after suture removal and brought to our college's microbiology lab for further investigation. To achieve a 1:10<sup>6</sup> dilution, a serial dilution approach was used. 0.1 mL of material was uniformly plated on six separate blood agar plates (Laboratories Bhopal, Madhya Pradesh, India). Three of these plates were incubated aerobically at 37°C for 72 hours, whereas the remaining three were cultured anaerobically at 37°C. The plates were removed from the incubator after 72 hours of culture and colony bacterial colonies are recorded.

Nutrient broth agar for candida, MacConkey agar for enterobacteria, mannite salt agar for staphylococci, and blood agar for streptococcus were used to seed the prevalent bacteria found in the oral cavity. For 72 hours, samples were incubated at 37°C in an incubator. Materials were smeared onto glass slides for Gram and Giemsa staining at same time. After that, all of the specimens were inspected using a light microscopy with a resolution of 100.

For each plate, colonies were counted and the quantity of colonies/ml was determined using the following formula:  $c = n / (s \times d)$  (where  $c$ =cfu/ml,  $n$ =number of colonies,  $d$ =dilution factor, and  $s$ =volume transferred to plate). The total bacterial count was calculated using the mean score of colonies/ml.

**Table No.1: Comparison of Bacterial colony count between Triclosan coated polyglycolic acid suture(TCS),chlorhexidine coated polyglycolic acid suture(CCS) and non-coated polyglycolic acid sutures(NCS) groups**

Bacteria	Group A	Group B	Group C	T value	P value
Aerobic	432.8±55.2	545.3±64.9	611.2±51.2	39.66	0.001*
Anaerobic	321.7±54.1	491.4±83.8	727.8±62.2	7.64	0.001*

**Table No.2: Comparison of different Bacterial Colony Count among Triclosan coated polyglycolic acid suture(TCS), chlorhexidine coated polyglycolic acid suture(CCS) and non coated polyglycolic acid sutures(NCS) groups**

Bacteria	Group A	Group B	Group C	T value	P value
Streptococcus	288.3±39.5	452.6±52.4	689.12±21.2	27.69	0.001*
Enterococcus	76.4±14.1	89.1±13.8	92.2±12.3	7.64	0.001*
Lactobacillus	136.2±16.9	153.3±18.7	170.21±12.2	2.98	0.03*
Staphylococcus	85.7±12.5	106.3±16.4	131.21±34.9	6.54	0.001*
Candida	305.8±74.6	356.9±86.2	412.23±67.2	12.29	0.001*

\*Significant

**Discussion:**

According to one research, postoperative problems in alveoplasty surgery therapy occur in 5.5 percent of patients, while another study found a prevalence of 2.09 percent. Under the umbrella of postoperative complications, SSI is one of the most common causes. Because of their flowing function, surgical sutures can suck germs and fluid into the wound site, raising the risk for SSIs. Use of antibacterial compounds such as triclosan and chlorhexidine to coat surgical sutures has indeed been reported in the literature. Wu et al. (2017) found that antibacterial sutures dramatically decreases the risk of SSI in a systematic review. Different suture, wound, and procedure types have similar antimicrobial coating effects. The data from randomized clinical trials was of middling quality, whereas that from observational research was of extremely low quality. TCS may

lower the risk of SSI, according to this systematic review; however, the available evidence is of moderate/low quality, and several studies had conflicts of interest. As a result, there is a scarcity of information on the effects of surgical sutures coated with antibacterial agents in alveoplasty procedures. As a result, the goal of this research was to see how its antibacterial capabilities affected the tissues after an alveoloplasty treatment. [1,5]However, apparent plaques were decreased by 50% in both the TCS and CCS groups, indicating that antibacterial-coated sutures are more effective at reducing plaques than NCS. Four patients in the NCS suture group had wounds dehiscence. On day 8, while it occurred in two and three patients in the TCS and CCS groups, accordingly, all three groups had satisfactory wound closure. It is in line with Kruthi et al findings. 's [4]

TCS had the lowest colony counts of aerobic and anaerobic bacteria, followed by CCS, but NCS had the highest, and this difference was statistically significant (P 0.05). According to Kruthi et al., bacterial adherence was higher in NCS than in TCS (P 0.001). The NCS group had more aerobic bacterial adherence, but the coated suture groups had more anaerobic bacterial adherence. According to Sharma et al., the aerobic bacterial load was higher in CCS than in NCS, but the anaerobic bacterial load was higher in NCS than in CCS. The CCS group did not have a statistically significant drop in CFU count in our study. It could be related to a decrease in the antibacterial agent's medication concentration in the suture. Gram staining revealed Gram-positive cocci clusters, Gram-positive and Gram-negative rods, Gram-positive filaments, and Gram-positive chains of cocci, among other things. While precise bacterial species detection was not available, the colonies observed could be Staph species, Strep species, E.coli, Actinobacillus species, and Peptostreptococcus species based on morphological traits and Chromogenic. The existence of viridians group Streptococci species was shown by the

inclusion of alpha hemolysis around the colony. [1,2,3]

One of the most important conditions for a smooth recovery is the absence of microorganisms there at surgery region. Antibiotics that are taken systemically are more routinely used it to prevent infections after surgery. Antibiotics are frequently used in immunosuppressed patients. Resistance to antibiotics has emerged as a result of indiscriminate use of antibiotics. Furthermore, while systematic antibiotics are used, area at a given of certain medicines do not reach the minimum inhibitory concentration for infections, resulting in ineffective suppression of pathogenic development in the mouth cavity. Antibiotics delivered locally can help overcome these limits. Antibacterial-coated suture is one of most effective ways to get a prolonged release of antibacterial agent at the surgical site without using systemic antibiotics. Despite not getting any systematic antibiotics, none of the patients in our research reported any edema or other indicators of infection. Therefore, irrespective of whether the study participants got any preventive, therapeutic, or no antibiotic at all, Oswal et al. found no postoperative infection in any of the patients. [4,7,8]



Figure No-2 : Chlorhexidine Coated Resorbable Suture

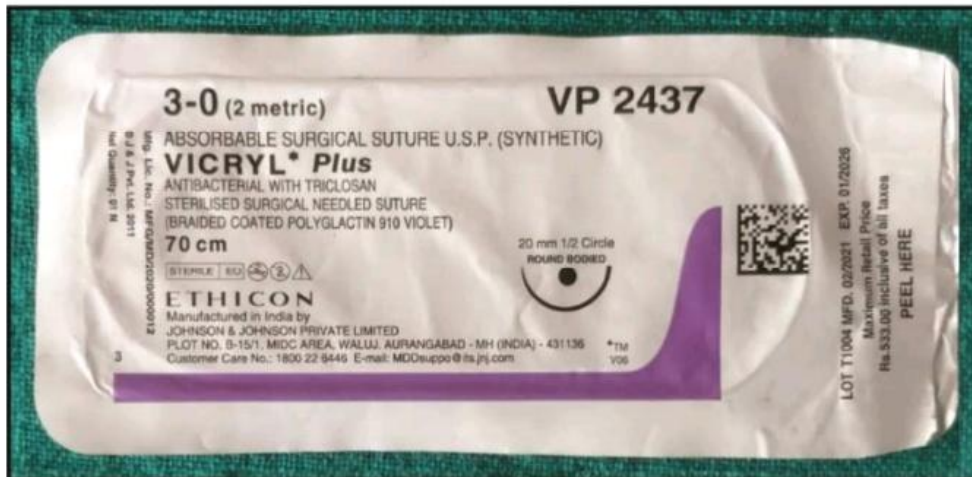


Figure No-3 : Triclosan Coated Resorbable Suture



Figure No-4 : Non Coated Resorbable Suture

**Conclusion:**

Antibacterial agents such as triclosan and chlorhexidine are well-known. As demonstrated in our work, local drug administration in the form of coated sutures can limit biofilm development and reduce bacterial load at the surgical site, reducing the need for systemic antibiotics and removing this need antimicrobial mouthwash postsurgery. Furthermore,

decreased biofilm production near the surgical site can enhance the surgical success rate. As a result of the data analysis and evaluation, it can be concluded that antibacterial sutures coated with triclosan or chlorhexidine can be utilised in alveoloplasty procedures. However, in order to claim control over conventional NCSs, its cost–benefit ratio should be assessed in bigger clinical testing.

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