

V1-V3 hypervariable regions. Bacterial genomic sequencing was performed with the Illumina MiSeq platform. A Wilcoxon Signed-Rank test was used to compare pre and post-surgical preparation skin microbiome composition with particular focus on the predominant organisms in normal skin flora.

**RESULTS:** A total of 36 samples (18 pre-prep and 18 post-prep) from 9 patients were obtained and sequenced. On average, 20 operational taxonomic units (SD 7.4) were found within each sample. In each pre-prep sample, Streptococcus species comprised an average of 1.5% (SD 0.1) and Enterobacteriaceae genera comprised an average of 4.2% (5.7) of the skin microbiome. In each post-prep sample, Streptococcus species comprised an average of 3.7% (SD 3.8) and Enterobacteriaceae genera comprised an average of 14.1% (12.6) of the skin microbiome. Wilcoxon Signed Rank test indicated that post-prep proportions were statistically significantly higher than pre-prep proportions for Streptococcus species ( $S=56$ ,  $p=0.0063$ ) and Enterobacteriaceae genera ( $S=79.5$ ,  $p<0.0001$ ). There was no statistically significant pre- and post-prep difference in the proportion of Staphylococcus and Corynebacterium species, which are also known to be components of normal skin flora.

**CONCLUSIONS:** The use of ChlorPrep appears to have differential bactericidal/bacteriostatic effects on certain microorganisms, leading to an increase in the proportion of the overall skin microbiome comprised by Streptococcus species and members of the Enterobacteriaceae genera, both of which have been implicated in surgical site infections. Appropriate perioperative antibiotic dosing should be employed to potentially decrease the risk of such infections.

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## Application of a Novel Suture Anchor to Abdominal Wall Closure

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**PURPOSE:** Mesh suture is a novel form of suture used to close high-tension wounds such as in hernia repair or laparotomy closure. This is because they have greater tensile strength and increased resistance to suture pulling through tissue compared to standard suture. However, mesh sutures can produce large knots that are susceptible to increased palpability, infection, and foreign body response. We previously developed a small anchor clip that outperformed knot and alternative mesh suture fixations in benchtop testing using silicone. The goal of this study was to determine the ability of the anchor clip to fixate mesh suture in abdominal wall tissue for application to hernia repair and laparotomy closure.

**METHODS:** The anchor clip was iteratively developed using 3D design software (Fusion360®) and produced via 3D printing (Carbon3D® Printer) using a liquid polymer resin. The size of the anchor clip was compared to that of a mesh suture knot (width: 9mm, 4 throws). Next, cyclic fatigue testing of the anchor clip vs. knot and predicate fixation (corkscrew, ProTack™ Fixation Device, Medtronic) was performed using a benchtop abdominal wall suture model with porcine tissue. Suture fixation was tested in a single vs. double fixation format. Cyclic fatigue testing was applied at a force range of 10 to 20N (maximum physiologic force on the abdomen is 16N/cm) at 2Hz for 200 cycles, then pull to failure at a rate of 300mm/min. Completed cycles and failure load were recorded and compared.

**RESULTS:** The size of the anchor clip (160mm<sup>3</sup>) was ~60% smaller than the mesh suture knot (420mm<sup>3</sup>). During cyclic fatigue testing, the knot, anchor clip, and single corkscrew consistently sustained 200 cycles and underwent pull-to-failure while 2 of 3 double corkscrew samples did not complete cyclic testing. For single fixation, the standard knot (84±26N) and single corkscrew (82±8N) had a significantly higher failure load than single anchor clip fixation (39±10N) ( $P<0.05$ ). For double fixation, the double anchor

clip ( $85 \pm 35\text{N}$ ) had a similar failure load to a standard knot ( $84 \pm 26\text{N}$ ) and significantly greater than double corkscrew fixation ( $34 \pm 0\text{N}$ ) ( $P < 0.05$ ).

**CONCLUSIONS:** The anchor clip is able to secure mesh suture under physiologic force ranges in abdominal wall tissue. Double anchor clip fixation has similar mechanical performance to a standard knot and single corkscrew fixation. Other advantages to the anchor clip include its reduced size relative to a knot and decreased tissue damage

in comparison to a corkscrew which penetrates tissue. The inferior pull-to-failure performance of the single anchor clip fixation suggests a need to improve the locking mechanism to prevent disassembly. This study provides a preliminary indication for the use of anchor clips in abdominal wall closure, such as hernia repair and laparotomy closure.

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