A knotless tailless overlapping suture method may reduce 90 day post op surgical site infection rate in posterior spine surgery when running subcuticular skin closure with absorbable suture is used: a prospective study

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INTRODUCTION:

Surgical site infections (SSIs) can add significant costs to patient care as well as societal and personal costs. SSI can start prior to or after the wound closure. For the latter, the infection most likely occurs through the incision and one could surmise that the type of skin closure could affect the SSI rate. However, the literature has been mixed. For running subcuticular skin closure with absorbable suture (RSAS), the suture ends are usually managed with buried knots (BK) or tails. With tails, loss of skin closure tension at the edges of the incision can sometimes be seen. With knots, loss of suture tensile strength and suture reaction at the edges of the wound can be seen (Figure 1). The question is whether eliminating knots and tails can reduce SSI rates. There are reports of knotless tailless RSAS (Figure 2) and one reported a lower rate of SSI though without a comparison group. These methods involved re-entry of the suture through the previous suture exit sites. In a previous retrospective study, we described a knotless tailless overlapping suture method (KTOS) (Figure 3). In this prospective study, the null hypothesis is that the 90-day post op SSI rate is the same in cases closed using KTOS method versus BK method.

METHODS:

Four spine fellows work with nine attending surgeons and are primarily responsible for closing the wound and rotate among 9 attending surgeons. Fellows were asked to document the skin closure method and when using RSAS, either BK or KTOS was used. One attending and one fellow used the KTOS primarily while the other fellows used BK primarily. Inclusion criterion was posterior spine surgeries closed by the 4 spine fellows using RSAS between Aug 1st, 2024 to Jan 31st, 2025. Exclusion criteria were cases with previous infection, compromised skin such as burns or oncologic diagnosis, use of a vacuum assisted dressing, and less than 90 days of follow up. The primary outcome measure was the rate of return to the operating room for SSI within 90 days of initial surgery. The diagnosis of SSI was made at the time of the surgery by the primary surgery team and/or the OR culture results. Statistical analysis was done using Chi-Square; the statistical difference was set at $p<.05$.

RESULTS:

Amongst the four fellows, the number of consecutive cases that had the skin closed using KTOS was 114 and with BK was 299. The rate of return to the OR for SSI for KTOS was 0% (0/114) and for BK RSAS was 3.7% (11/299) and the difference was statistically significant (p=.038). OR cultures were positive in 10 out of 11 cases.

DISCUSSION AND CONCLUSION:

For posterior spine surgeries, we reject the null hypothesis that the skin closure type does not affect the SSI rate as the return to the OR rate for SSI within 90 days following the index surgery for cases closed with KTOS was lower than those closed with BK RSAS. As the fellows rotate to work with all the attendings, the confounding variables should be limited. This is the first part of a proposed two-part prospective study in which the fellows who used BK RSAS in this first part switch to KTOS at the midpoint of the fellowship. This report supports the hypothesis that KTOS method may reduce the SSI rate compared to the BK method and the continuation of the study.

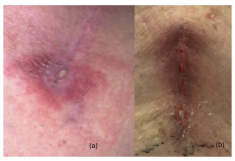
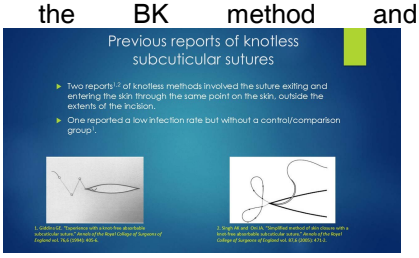


Figure 1: The wound breakdown can start as a suture reaction presenting as a small abscess at the end of the incision (a) and then can spread through the incision (b).



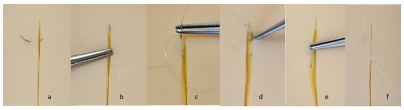


Figure 3: The suture starts perpendicular to the incisional wound 1 to 1.5 cm from the end into the wound, relatively deep in the subcuticular level (a). Second throw is towards the end, deep to superficial (b). Next 3 to 4 throws are done in the standard fashion (c,d,e). The suture is then passed back and forth to tension the wound (f). The running subcuticular stitch is continued to the other end where the reverse of the above is done. The exposed sutures are cut at the skin and the steri-strips are applied.