

Time to Closure of Orthopedic Surgical Incisions: A Novel Skin Closure Device* Versus Conventional Sutures

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Background

For thousands of years, orthopedic surgical incisions have been typically closed using conventional sutures¹. While often not considered in the same manner as functional outcomes or symptomatic improvement, cosmetic outcomes of surgical scars can have a significant effect on patient quality of life.¹⁻³

In order to optimize wound healing and mitigate complications associated with conventional wound closure, new technologies are being introduced, aiming to improve upon the ancient art of wound suturing.

Methods

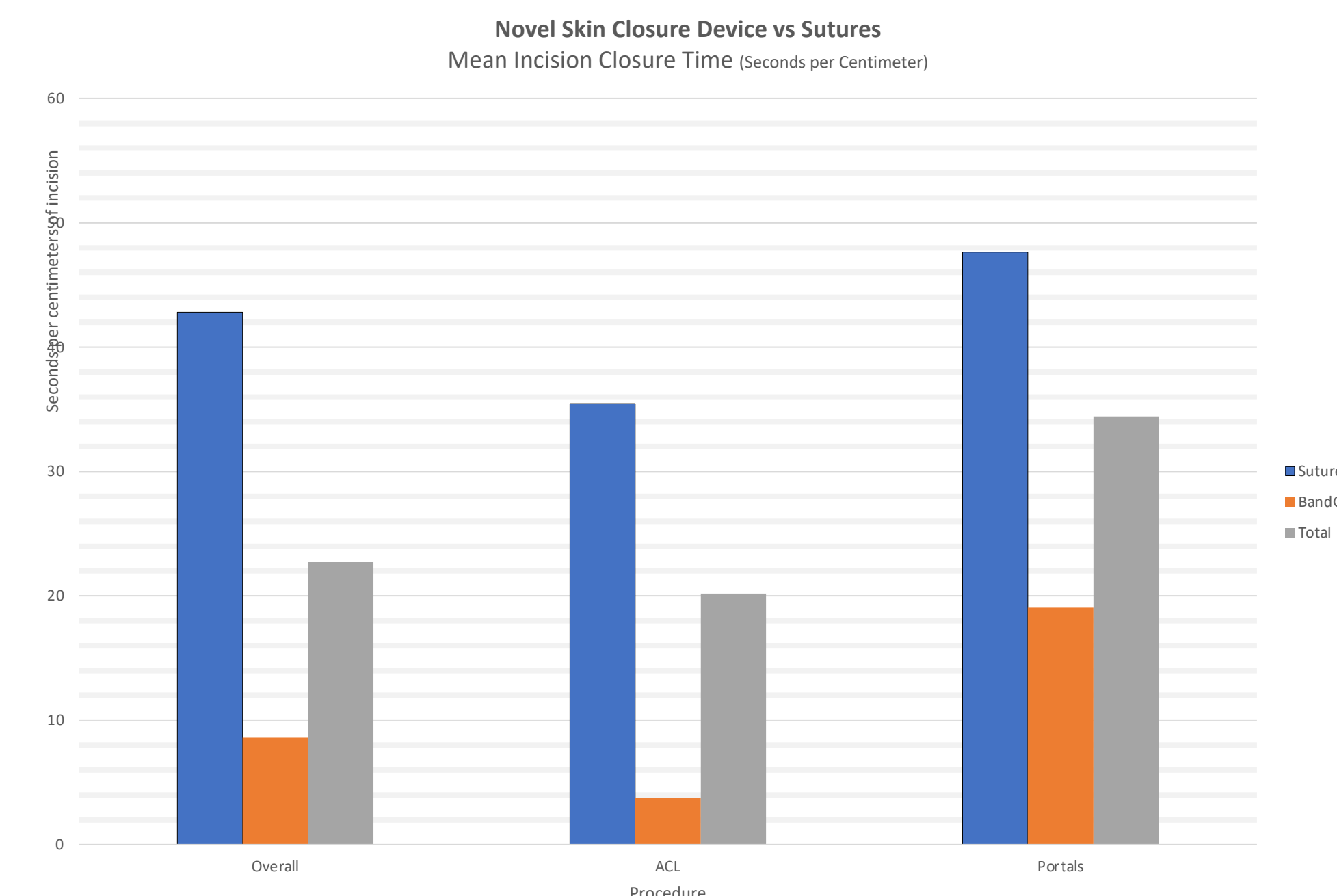
Patients undergoing orthopedic surgery by a single surgeon in 2019 underwent skin closure with either conventional sutures or a novel micro-anchor skin closure device. Patients were divided into three groups according to their procedure typical incisions: anterior cruciate ligament reconstruction (ACLR), simple arthroscopy, and general incisions. Patients who underwent closure of their surgical incision with the novel micro-anchor skin closure device were matched with patients undergoing conventional closure with sutures. Demographic characteristics, length of incisions, and time to closure per centimeter (cm) of skin incision were recorded. Statistical analysis was performed using the unpaired two-tailed student's t-test. Statistical significance was determined as $p < 0.05$.

Results

86 patients were included in the study. Of these, 30 patients underwent ACLR, 30 patients underwent simple arthroscopy, and 26 patients underwent miscellaneous orthopedic procedures. The overall mean time to closure per cm was 22.7 seconds. Overall mean time to closure per cm using a novel micro-anchor skin closure device was faster than with conventional sutures (8.6 seconds and 42.8 seconds, respectively, $p < 0.001$). Mean time to closure per cm for ACLR incisions was 3.7 seconds using a novel micro-anchor skin closure device and 35.5 using conventional sutures ($p < 0.001$). Mean time to closure per cm for simple arthroscopy portals was 19 seconds using a novel micro-anchor skin closure device and 47.6 using conventional sutures ($p < 0.001$).

Patient Demographics	Overall
Age mean +/- SD (range)	36.3+/-18 (15-75)
Gender:	
Female	26 (31.90%)
Male	50 (58.1%)
Laterally:	
Left	50 (58.1%)
Right	50 (58.1%)
Smoker:	
Non-smoker	74 (86%)
Smoker	0 (0%)
Former Smoker	12 (14%)
BMI mean +/- SD (range)	26.3+/-4.9 (17.6-40.9)

*Standard Deviation (SD);
Body Mass Index (BMI)



Discussion

The main findings of this study are that the novel skin closure device is a safe and efficient wound closure device. While using novel closure technologies, surgeons may decrease skin closure time associated with the use of conventional sutures by up to 75%^{4,5} and also avoid relying on their expertise to secure suture loops and knots.⁶ Novel closure technologies have also demonstrated shorter removal times when compared to sutures.⁷ This study shows the novel closure device is ~5 times faster than conventional sutures. The differences in closure times may differ between products for several reasons, including inherent product properties, surgeon's experience, body part affected, patient positioning, and finally, type, length, and the number of incisions. There are several limitations to the current study. This study was not a prospective randomized controlled trial, therefore the level of evidence is lower and bias is possible. Closure of incisions was not performed by a single surgeon, therefore heterogeneity in time to closure between surgeons may exist due to variability in expertise and skills. However, all surgeons were highly-trained surgeons with years of operative experience.

References

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