Suture Tape Tension Band for Olecranon Fracture Fixation: Early Outcomes of a Novel Technique

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INTRODUCTION: Olecranon fractures requiring open reduction with internal fixation (ORIF) commonly undergo plate fixation or tension band wire fixation. We describe a novel variation of the tension banding technique utilizing Kirschner wires with eyelet holes and suture tape. This study explored surgical and postoperative functional outcomes of these 3 methods of olecranon ORIF. We hypothesize that suture tape tension banding will demonstrate comparable surgical and functional outcomes to both plate fixation and wire tension banding for olecranon ORIF.

METHODS: After institutional review board approval, a retrospective review was conducted for patients who underwent operative olecranon fracture fixation between July 2017 and October 2023. Patients were divided into 3 cohorts based on procedure: plate fixation, suture tape tension band fixation, or wire tension band fixation. Intraoperative data, patient reported outcome measures, and functional outcomes were collected. Radiographs taken at least 12 weeks postoperatively were interpreted by the senior author. ANOVA was used to compare means of continuous variables, while chi-squared tests were used to compare proportions between the three cohorts.

RESULTS: In total, 43 patients underwent an ORIF for isolated olecranon fractures – 19 plate fixations, 16 suture tape tension banding, and 8 wire tension banding. The suture tape tension band cohort had significantly shorter surgery times (68.27 min ± 12.9) compared to the plate fixation (86.61 ± 18.53) and tension band with wire (88.00 ± 18.67) cohorts (p = 0.005). There was no difference in pain, functional outcomes, or range of motion (Table 2) between the three cohorts. Radiographs demonstrated appropriate healing for all patients in each cohort. There were no complications in any group and 1 instance of hardware removal in the tension wire fixation cohort.

DISCUSSION AND CONCLUSION: This novel technique of suture tape tension banding using Kirschner wires with eyelets allows for robust ORIF of olecranon fractures. The suture tape tension banding technique requires significantly less surgical time than wire tension band or plating. No significant differences in outcomes were observed between groups, suggesting this technique is an effective, viable alternative to the traditional procedures.

Table 1. Surgical Information

	Plate Fixation	Suture Tape	Wire	p-value
Number	19	16	8	
Surgery Time (minutes)	86.61 ± 18.53	68.27 ± 12.9	88.00 ± 18.67	**0.005**
Tourniquet Time (minutes)	56.0 ± 20.23	46.15 ± 14.58	55.25 ± 17.64	0.308
Reoperations	0	0	1*	

*One tension band wire fixation patient underwent reoperation for removal of hardware due to hardware irritation

Table 2. Follow-Up Patient Report Outcome Measures and Range of Motion

PROMs	Plate Fixation (n = 15)	Suture Tape (n = 14)	Wire (n = 5)	p-value
QDASH	12.4 ± 10.9	18.7 ± 24.6	11.4 ± 24.1	0.635
Mayo Elbow	87.7 ± 10.0	78.2 ± 28.2	96.0 ± 8.9	0.191
VAS	1.5 ± 2.0	1.1 ± 1.8	0.2 ± 0.5	0.378
ESV	85.3 ± 15.9	83.9 ± 18.1	99.2 ± 1.1	0.176
Follow-up (Years)†	2.0 ± 1.8	1.3 ± 0.8	4.2 ± 0.8	**0.001**
ROM*	**Plate Fixation (n = 18)**	**Suture Tape (n = 15)**	**Wire (n = 6)**	**p-value**
Flexion	134.7 ± 12.3	135.3 ± 16.0	137.5 ± 18.9	0.924
Extension	7.8 ± 10.0	4.7 ± 6.7	0.8 ± 2.0	0.181
Pronation	86.8 ± 5.3	84.0 ± 8.9	85.0 ± 7.8	0.562
Supination	84.4 ± 6.3	79.7 ± 14.8	84.2 ± 7.4	0.426
Follow-up (Years)†	2.0 ± 1.8	1.3 ± 0.8	3.5 ± 1.7	**0.016**

ESV = Elbow Subjective Value; PROMs = Patient Reported Outcome Measures; QDASH = Quick Disabilities of the Arm, Shoulder, and Hand; ROM = Range of Motion; VAS = Visual Analog Scale
*Range of motion measured in degrees.
†Average time at which PROMs or ROM were measured.