The Treatment of Difficult Patella Fractures with the Multiple Wire and Tension Band Technique

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Purpose: Our objective was to describe a technique applicable to osteoporotic and comminuted patella fractures as well as for revision surgery of failed patellar fixation. The standard tension band technique can be adapted to situations where multiple fracture planes are involved, to revision surgery, for use in osteoporotic bone, and for situations where there is concern for fixation fragility using standard tension band methods.

Methods: This is a retrospective descriptive case series of consecutive surgically treated patellar fractures using a technique with combinations of multiple wires and tension bands. Constructs were made using #6 (8.0 metric) sternal wires tensioned or cerclaged around two or more Kirschner wires and/or screws to address the major fracture planes while maintaining low-profile fixation. Data were collected at preoperative, intraoperative, and postoperative time points. The primary outcome measure was loss of fixation that necessitated revision surgery. Secondary outcomes included the need for implant removal, postoperative infection, and any need for further surgery associated with initial patella fracture fixation (chondroplasty, lysis of adhesions, manipulation, etc).

Results: 107 patellar fractures were fixed at our institution between 2000 and 2014. 73 patellar fractures were treated with the multiple wire and tension band technique. The incidence of fixation failure was 4.1%, 1 for postoperative peri-ardware failure after a fall and 2 for failure of fixation. A postoperative infection occurred in 2.7% of patients. 38 patients (52.1%) underwent removal of hardware, 1 for infection and 37 for prominent symptomatic hardware. Multivariate analysis demonstrated significantly increased incidence of removal of hardware in patients with American Society of Anesthesiologists (ASA) I/II ($P = 0.002$). Additionally, 6.8% of patients needed a patella-related surgery, including 3 patients who needed manipulations, 1 patient who underwent arthroscopic chondroplasty, and 1 who needed a patellar tendon repair.

Conclusion: The rate of fixation failure and postoperative infection for difficult patellar fractures using multiple wire and tension band constructs was low and less than many retrospective studies describing single tension band or cannulated screw fixation techniques. However, symptomatic hardware needing removal was the most common complication observed with this technique and more frequent than rates found in the literature using other standard techniques. Moreover, analysis demonstrated that healthier patients had significantly higher incidence of hardware removal.