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Predictive Value and Clinical Validation of the “On-Track” vs. “Off-Track” Concept in Bipolar Bone Loss in Anterior Glenohumeral Instability

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Objectives: Bone loss is a well-described risk factor for failure with arthroscopic stabilization. The isolated importance of bone loss on both the glenoid and humeral side has been increasingly studied. A more recent evolution considers how both the glenoid and humeral bone loss interact to determine whether their combination results in an “on-track” or “off-track” lesion, which may be more predictive of recurrent instability than looking at either side individually. While the biomechanics of this concept have been elucidated, no study has tested this theory in a clinical population. The purpose of this study is to compare a series of arthroscopic Bankart reconstructions stratified by whether they are “on-track” or “off-track” with regard to bipolar bone loss and to compare their rates of recurrence and functional outcome scores.

Methods: Over a two year period, all isolated, primary Bankart reconstructions performed at a single facility by one of three fellowship trained Orthopaedic Sports Surgeons were included in this study. All patients had preoperative advanced imaging and had postoperative outcome measures including SANE and WOSI scores, as well as data return to work status. Glenoid bone loss, Hill-Sachs lesion size and location, as well as a radiographic measurement of the glenoid track were measured. Patients were stratified according to whether they sustained a subsequent recurrence of their instability, and these groups were analyzed according to their bone loss status, specifically whether they were “on-track” or “off-track”.

Results: 57 shoulders met inclusion criteria. The average age was 25.5 years (range 20-42) at the time of surgery. Average follow up was 28.4 mos. There were 10 recurrences (18%). Patients in the recurrent group had WOSI and SANE scores that were roughly half as good as the group that did not recur (p=0.003 and p=0.002 respectively). Of the 49 on-track patients, 4 (8.2%) failed. Conversely, of the 8 off-track patients, 6 (75%) failed (p=0.0001). Six of the 10 (60%) of the patients who sustained a recurrence of their instability after arthroscopic stabilization were off-track at the time of their surgery. In contrast, in the 47 patients who remained stable at latest follow-up, only 2 (4.3%) were off-track (p=0.0001). Eight of 47 patients (17%) in the non-recurrent group had glenoid bone loss greater than 20%; two of 47 stable patients (4%) were off-track. The positive predictive value (PPV) of the off-track measurement was 75% which was significantly higher than the predictive value of glenoid bone loss >20% (PPV=43%, p=0.02).
Conclusion: This is the first study to apply the on-track vs. off-track assessment of bipolar bone loss to a clinical population. In this study, being off-track was a significant predictor of recurrent instability after isolated Bankart reconstruction, correctly predicting failure in 75% of cases. This was superior to the predictive value of glenoid bone loss >20% alone, which correctly predicted failure 43% of the time. Recurrence correlated with worse functional outcomes scores. Bipolar bone loss as measured by the track method is quite accurate in predicting success and failure after arthroscopic Bankart reconstruction in a clinical population. This method of assessment is encouraged as a routine part of the preoperative evaluation of all patients under consideration for arthroscopic anterior stabilization.