# Comparison of On-Track versus Off-Track Lesions: Which Characteristics of Glenoid and Humeral Head Lesions are Clinically Significant?

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INTRODUCTION: The purpose of this study is to compare on-track and off-track lesions in patients with recurrent anterior shoulder instability in order to quantify significant characteristics of glenoid and humeral head defects in each group using 3-dimensional (3-D) modeling software.

METHODS: A consecutive cohort of 75 recurrent anterior instability patients with evidence of Hill-Sachs lesions (HSL) and glenoid bone loss (GBL) with a mean age of 27.1 years (range = 18 to 48 years) were reviewed. 3-D models of unilateral proximal humeri and glenoids were reconstructed. Volume, surface area (SA), width, and depth of identified HSLs were quantified along with their location (medial, superior) and orientation Hill-Sachs Angle (HSA). Glenoid bone loss percentage, width, defect angle relative to the long axis, and glenoid track status was calculated. Off and on glenoid track cohorts were compared using the Mann-Whitney U test.

RESULTS:

Off-track HSLs had greater HSL SA loss (374.23 $mm^2$ vs. 272.64 $mm^2$, p =0.001), more medialization (14.96 mm vs. 17.62 mm, p =0.02), greater volume loss (603.08 $mm^3$ vs. 433.61 $mm^3$), and greater average HSL width (16.06 mm vs. 11.53 mm). Glenoids in off-track group had greater glenoid bone loss (22.55% vs. 17.73%, p=0.037), greater glenoid bone loss width (6.92 mm vs. 3.58 mm, p <0.001), and greater glenoid defect length (21.61 mm vs. 18.55 mm, p=0.015). Further analysis of large off-track lesions revealed greater HSLc angles (33.16° vs. 26.20°, p =0.048) and more superior extent of HSL when compared with lesions that were borderline off-track.

DISCUSSION AND CONCLUSION: Off-track lesions were found to have larger GBL, larger HSL width, more medialized HSL, greater HSL surface area loss, and larger HSL angles. By utilizing the glenoid track concept, the current gold standard for prediction of shoulder instability, this study outlines specific characteristics of high-risk Hill-Sachs and GBL lesions to simplify identification of those patients in clinical settings and provide appropriate treatment planning.