

Does the Matta Acetabular Fracture Nomogram Have External Validity? Evaluation Over Ten Years at an Academic Level I Trauma Center Acetabular Service with Two Years of Follow-up

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Purpose: Tannast et al developed a widely used nomogram to predict rates of conversion to total hip arthroplasty (THA) within 2 years following operative fixation of acetabular fractures using a single master-surgeon database of 810 patients. The purpose of this study was to assess the external validity of the nomogram when applied to a set of younger surgeons and different patient population.

Methods: All patients receiving operative care for acetabular fractures at a Level I academic trauma center from 2009 to 2019 were reviewed. Data contained within the Matta nomogram including radiographic and anatomic features of the fracture before and after fixation were collected on each patient using methods described in the original article. The nomogram was used to generate a total point score correlating with a percent indicating the predicted risk for conversion to THA for each patient. The predicted percent risk of conversion to THA was then plotted on a receiver operating characteristic (ROC) curve.

Results: 371 patients were identified, 247 (67%) of which had ≥ 2 years postoperative follow-up. 124 patients were excluded (22 with periprosthetic fracture or acute THA, 11 with incomplete imaging, 77 with < 2 years follow-up, and 14 deceased within 2 years). The overall rate of conversion to THA was 14.6% at 2 years postoperatively. Area under the ROC curve was 0.67 (confidence interval: 0.58-0.76, $P < 0.001$). Youden analysis of ROC curve indicated that a cut-point risk score of $\geq 35\%$ (corresponding to a nomogram score of 220/450 possible points) was the optimal predictor of conversion to THA, with sensitivity 0.75 and specificity 0.53. Patients converted to THA by 2 years had significantly higher nomogram risk percentages than the patients who were not ($P < 0.001$). Positive predictive value (PPV) of a risk of conversion of $\geq 35\%$ remained low at 0.22.

Conclusion: Overall, the rate of conversion to THA (14.6%) was higher at 2 years postoperatively compared to Matta's rate of 12.0% at 5 years in the original cohort. While patients who converted to a THA did tend to have a significantly higher nomogram risk score, there are limitations in using the score for individual patient clinical prognostication given that the PPV was lower than 25%.