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Validation of the Acetabular fracture Classification Tool (ACT)

Background:

Classification of acetabular fractures remains challenging. The three-dimensional shaped bones have surfaces that are difficult to visualize on conventional x-ray as well as CT-imaging studies. The low incidence of acetabular fractures results in low exposure and therefore minimal expertise among clinicians. Previously mentioned factors account for a large inter-rater variability in acetabular fracture classification. Most acetabular fractures are classified according to Letournel and Judet (*figure 1*). Inter-rater variability is moderate with kappa values of 0.59 for senior consultants.

Aim:

We aim to standardize acetabular fracture classification by developing and validating a simple tool for acetabular fracture classification.

Methods:

Based on the classification according to Letournel and Judet, a diagnostic classification decision tree was developed (Acetabular fracture Classification Tool (ACT)). Based on four simple questions on fracture line involvement of the acetabulum, acetabular fractures can be classified. Specialists on acetabular fractures were approached to participate in the validation study. During 3 rounds 30 acetabular fractures are classified. In round 1 all fractures will be classified without the ACT. In round 2 and 3 the same fractures will be classified with the ACT. To verify the outcome of the ACT, three top specialists were contacted to set the golden standard. In three consecutive rounds all fractures were classified, after consensus was reached on fracture classification. Classification of participants according to the ACT will be compared to the golden standard.

Results:

Raw agreement between participants and the golden standard will be calculated, with and without the use of the ACT. Cohen's Kappa coefficient will be calculated to determine the inter-rater agreement between all participants. The kappa coefficient will be interpreted according to Landis & Koch as: slight agreement if $\kappa \leq 0.20$, fair $0.21 \leq \kappa \leq 0.40$, moderate if $0.41 \leq \kappa \leq 0.60$, substantial if $0.61 \leq \kappa \leq 0.80$, almost perfect agreement if $\kappa > 0.81$.

Discussion:

We expect to ease the process of classification and to reduce inter-rater variability with the introduction of the ACT, a simple and time-saving tool. Future research on acetabular fractures will benefit from more uniform classification of acetabular fractures.