



Does the Modified Gartland Classification Clarify Decision-Making?

Sophia Leung, MD¹; Ebrahim Paryavi, MD, MPH¹; ²Martin J. Herman, MD²; Paul Sponseller, MD³, Joshua M. Abzug, MD¹

¹University of Maryland School of Medicine, Department of Orthopaedics, Baltimore, MD

²St. Christopher's Hospital for Children, Philadelphia, PA

³Johns Hopkins University School of Medicine, Baltimore, MD



UNIVERSITY of MARYLAND

OBJECTIVE

- The modified Gartland classification system for pediatric supracondylar fractures is often utilized as a communication tool to aid in determining whether or not a fracture warrants operative intervention.
- There is discrepancy amongst surgeons regarding the treatment of Type II fractures, which is often affected by the presence of rotational deformity.
- Rotational deformity is difficult to characterize on standard radiographs.
- This study has two purposes:
 1. To determine the interobserver reliability of the classification system.
 2. To determine if the study participants agreed that a fracture required operative intervention regardless of the classification system.

METHODS

200 AP and lateral radiographs of pediatric extension-type supracondylar humerus fractures were retrospectively reviewed by 3 fellowship trained pediatric orthopaedic surgeons and classified as Type I, IIa, IIb or III. The surgeons were then asked to record whether they would treat the fracture non-operatively or operatively. Kappa coefficients were calculated to determine interobserver reliability.

Table 1. Interobserver reliability rates amongst pediatric orthopaedic surgeons

Group	Kappa Coefficient (95% CI)
Gartland Classification	0.638 (0.557-0.710)
Type IIa vs IIb	0.240 (0.116 – 0.372)
Operative vs Non-operative	0.691 (0.598-0.773)

Table 2. Decision to operate on Types I, IIa, IIb, and III supracondylar humerus fractures

Fracture Classification	Decision to Operate
Type I	3/105 (3%)
Type IIa	34/150 (27%)
Type IIb	203/205 (99%)
Type III	140/140 (100%)

CASE ILLUSTRATIONS

Case 1

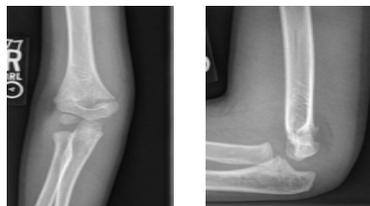


Table 3. Results for Case 1.

Surgeon	Classification	Treatment
A	IIb	Operative
B	IIa	Non-op
C	IIb	Operative

In the case above, two surgeons classified the injury as a Type IIb fracture, and would treat the fracture surgically. One surgeon classified it as a Type IIa, and would recommend non-operative treatment.

Case 2



Case 3

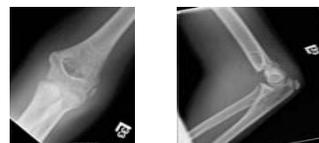


Table 4. Results of Case 2 and Case 3.

Surgeon	Classification	Treatment
A	IIb	Operative
B	IIa	Operative
C	IIb	Operative

Two separate cases are illustrated above, and had the same results. There was disagreement as to fracture classification, however, all surgeons agreed on operative treatment.

RESULTS

- Overall, the modified-Gartland classification had moderate interobserver reliability, with a kappa coefficient of 0.638 (0.557-0.710).
- However, a low reliability rate was found when differentiating between Type IIa and IIb, with a coefficient of 0.240 (0.116-0.372).
- There was moderate to high reliability for decision to operate, with a coefficient of 0.691 (0.598-0.773).
- For fractures classified as Type I, the decision to operate was made 3% of the time. If classified as Type IIa, the decision to operate was made 27% of the time, and 99% of the time if classified as Type IIb. The decision was made to operate for 100% of fractures classified as Type III.

CONCLUSIONS

- There is almost full agreement for the non-operative treatment of Type I fractures and operative treatment for Type III fractures.
- There is agreement that Type IIb fractures should be treated operatively and that the majority of Type IIa fractures should be treated non-operatively.
- However, the interobserver reliability for differentiating between Type IIa and IIb fractures is low.
- The modified-Gartland classification may not be reliable for guiding the treatment of Type II injuries, which suggests that rotational deformity is difficult to assess in pediatric supracondylar humerus fractures.
- There is discordance amongst pediatric orthopaedic surgeons regarding the operative treatment of Type II supracondylar humerus fractures when using the modified Gartland classification system.