Acute Open Reduction and Internal Fixation versus Non-Operative Management of Displaced Scapular Spine Insufficiency Fractures after Reverse Shoulder Replacement

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Introduction:
Scapular spine fractures occur in 1–10% of patients after reverse shoulder arthroplasty (RSA). Non-operative management has been recommended; however, it has been reported to result in a higher rate of nonunion. The literature on surgical management is limited and consists mostly of patient series that underwent open reduction and internal fixation (ORIF) for symptomatic delayed unions or established non-unions. Currently, there is little literature available on acute ORIF (<6 weeks after fracture) of displaced scapular spine fractures in patients after RSA. As such, the purpose of this comparative cohort study was to compare non-operative management to acute operative management with double plating or hook plating techniques for displaced Levy type II and III scapular spine fractures.

Methods:
The ORIF group consisted of 15 patients with displaced and angulated Levy type II and III (Figure 1) fractures (90% females; mean age: 75 years) managed with acute fixation within 6 weeks of fracture. The non-operative group consisted of 24 Levy type II and III fractures (75% females; mean age 76 years) managed with sling immobilization. In the operative group, 11 patients (73%) were treated with compression double plating (Figure 2) and 4 with compression hook plating (27%). Clinical (Subjective Shoulder Value (SSV), ASES score, VAS, patient satisfaction, and active forward elevation) and radiographic outcome data were compared at final follow up.

Results:
At final follow-up (mean 3.4 years follow-up after fracture), SSV, ASES score, VAS pain score and active forward elevation were significantly better ($p<0.05$) in the ORIF group compared to the non-operative group: SSV: mean 90% versus 50%; ASES mean 88 versus 53; VAS pain: mean 0.6 versus 4; active forward elevation: mean 129° versus 75°). In the acute ORIF group 14 of 15 (93%) were very satisfied and one (7%) satisfied. In the non-operative group, 15 patients (63%) were satisfied and 9 patients (38%) were not satisfied with their outcome. In the acute operative group, all fractures united. In the non-operative group, 11 of 24 fractures went on to union (46% healing rate).

Discussion
The results of this comparative cohort study demonstrate that significantly better patient outcomes and union rate can be achieved with acute ORIF of displaced and angulated Levy type II and III fractures. It should be noted, that all ORIF patients underwent surgery within 6 weeks of fracture, and all were managed with advanced fixation techniques utilizing double plating or hook plating for improved time-zero fracture stability. Additionally, patients in the ORIF group were deemed to have sufficient scapular spine and acromial bone stock amenable to plate fixation as subjectively determined by the operating surgeon. Future work is required to determine objective indications for operative and non-operative management of these fractures.

Figure 1: Levy type II & III fractures were assessed in this study

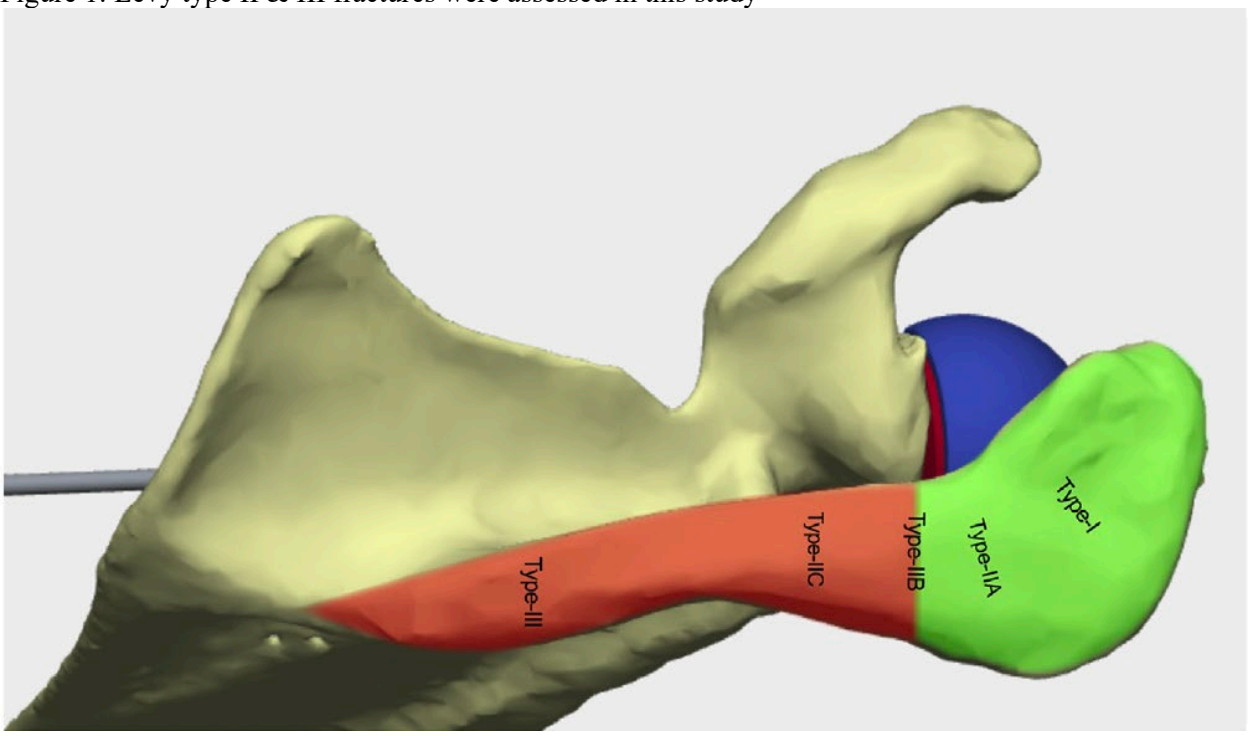

Figure 2: Double compression plate fixation of a Levy type II fracture with 90:90 plate orientation.