Is Minimally Invasive Plate Osteosynthesis Helpful in the Fixation of 2-Part Proximal Humerus Fractures Compared to Open Plating?

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Purpose: Although 2-part fractures of the proximal humerus are usually treated conservatively, open reduction and plate osteosynthesis (ORPO) is generally used when operation is needed. Recently, minimally invasive plate osteosynthesis (MIPO) is favored with its excellent fracture healing and functional recovery. We performed a comparative study between ORPO and MIPO for the treatment of 2-part proximal humeral fractures to discover the differences of radiologic and functional outcomes.

Methods: From 2007 to 2013, 41 fractures were fixed with a Philos plate (DePuy Synthes) in our institution. Excluding 5 cases that were lost to follow-up, 36 (AO/OTA A2, 4; A3, 32) were enrolled in this study. 17 (mean 52.6 years; range, 23-72) patients underwent ORPO through a deltopectoral approach, and 19 (mean 58.7 years; range, 20-80) patients underwent MIPO through a deltoid-splitting approach. There was no obvious individual difference between two groups in either age (**Purpose:** Although 2 part fractures of proximal humerus are usually treated conservatively, open reduction and plate osteosynthesis (ORPO) is generally used when operation is needed. Recently, minimally invasive plate osteosynthesis (MIPO) is favored with its excellent fracture healing and functional recovery. We performed a comparative study between ORPO and MIPO for the treatment of 2 part proximal humeral fractures to discover the differences of radiologic and functional outcomes.

Methods: From 2007 to 2013, forty-one fractures were fixed with a Philos plate (Depuy Synthes, Paoli, PA, USA) in our institution. Excluding 5 cases that lost to follow-up, 36 (AO-OTA A2: 4, A3: 32) were enrolled in this study. Seventeen (mean 52.6 years, range, 23-72) patients underwent ORPO through deltopectoral approach, and 19 (mean 58.7 years, range, 20-80) patients underwent MIPO through deltoid splitting approach. There was no obvious individual difference between two groups in either age ($P = 0.255$, Mann-Whitney test) or fracture types ($P = 0.906$, X^2 test). Radiologic results were evaluated by union, time to union, and alignment. Functional outcome was assessed by using Constant score and UCLA score. Radiation exposure time and operative time were also appraised.

Results: Union was achieved in all cases. The mean time to union was 15.6 weeks in the ORPO group and 14.9 weeks in the MIPO group ($P = 0.465$, Mann-Whitney test). The mean neck shaft angle was 137.8° in ORPO group and 133.8° in MIPO group ($P = 0.102$, Mann-Whitney test). There were 3 cases of malunion (ORPO: 1, MIPO: 2). With respect to the functional outcome, mean Constant score was 78.4 in ORPO group and 75.6 in MIPO group ($P = 0.619$, Mann-Whitney test) and mean UCLA score was 28.8 in ORPO group and 27.9 in MIPO group ($P = 0.560$, Mann-Whitney test). The mean radiation exposure time was 18.2 seconds in ORPO group and 38.5 seconds in MIPO group ($P < 0.001$, Mann-Whitney test).

The mean operative time was 145.9 minutes in ORPO group and 109.7 minutes in MIPO group (P <0.001, Mann-Whitney test).

Conclusion: This study revealed that 2-part fractures of the proximal humerus had high union rate and excellent functional outcome with both ORPO and MIPO techniques. Taking the disadvantages into account, ORPO took longer operative time and MIPO had longer radiation exposure time.

See pages 49 - 106 for financial disclosure information.