## Original Article

# Evaluation of the Management of Extraarticular 2-Part, Displaced Surgical Neck in Humerus Fracture (AO 11A3) by PHILOS Plate

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**Abstract:**

**Background:** Philosplates are pre-shaped and pre-contoured locking compression plates, with an aiming device for insertion of the locking screws and positioning of the plate to prevent impingement in displaced surgical neck humerus fracture. The aim of the study was to evaluate treatment outcome of extraarticular 2-part, displaced surgical neck humerus fractures (AO 11A3) in patients by philos plate.

**Method:** This study was carried out to evaluate the treatment outcome of PHILOS plate fixation for extraarticular 2-part, displaced surgical neck humerus fractures (AO 11A3) in 19 consecutive patients.15 men and 4 women aged 22 to 59 (mean, 39) years underwent PHILOS plate fixation for extraarticular 2-part, displaced surgical neck humerus fractures (AO 11A3). All fractures were closed with no associated injuries. Patients were assessed radiologically and functionally using the Constant shoulder score. Patients were followed up for 5 to 24 (mean, 11) months. **Results:** 18 fractures united. In one case there was infected nonunion with implant failure. The mean Constant shoulder score was 72 (range, 30–89).10 patients had a score exceeding 75, 8 were scored between 50 and 75, and 1 was below 50. **Conclusion:** PHILOS plate fixation provided stable fixation, minimal metal work problems and enabled early range-of-motion exercises to achieve acceptable functional results.

**Indexing words:** Extraarticular 2-part, Displaced surgical neck humerus fractures, PHILOS (Proximal Humeral Internal locking System).

**Introduction:**

Proximal humeral fractures account for 4 to 5% of all fractures[1]. Most are stable and minimally displaced and can be treated non-operatively with good results[2]. Displaced and unstable fractures are difficult to manage and have a high morbidity. The treatment goal is to achieve a painless shoulder with full function. Various methods have been used, including Kirschner wire fixation, suture fixation, external fixation, tension band fixation, Rush pin fixation, nailing, and prosthetic replacement with plating[3–6]. Locking plate fixation provides angular and axial stability and minimizes the risk of screw toggle and pullout as well as reduction loss. Divergent or convergent locked screws improve the pull out resistance of the whole construct[7]. Locking plates fail at a greater load than non-locking plates[8]. Philos plates are pre-shaped and pre-contoured locking compression plates, with an aiming device for insertion of the locking screws and positioning of the plate to prevent impingement. In this study evaluation of outcome treatment of extraarticular 2-part, displaced surgical neck humerus fractures (AO 11A3) in 19 consecutive patients was done.

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**Methods:**

Between January, 2017 and June, 2019, 15 men and 4 women aged 22 to 59 (mean, 39) years underwent Philos plate fixation for extraarticular 2-part, displaced surgical neck humerus fractures (AO 11A3). 16 patients were aged ≤60 years and 3>60 years. The causes of injury were falls (n=10) and road traffic accidents (n=9). All

the fractures were closed with no associated injuries. Patients were placed in a beach-chair position under general anesthesia. A delto-pectoral incision was made. The fractures were reduced and temporarily held with Kirschner wires and sutures. Reduction was confirmed using an image intensifier. A philos plate was applied. Negative suction drainage was applied and wound closed in layers. Postoperatively the arm was placed in a sling. Passive assisted movements were started on day 1, followed by active-assisted exercises after 3 weeks. Patients were assessed radiologically and functionally using the constant shoulder score[9].

**Results:**

Patients were followed up for 5 to 24 (mean, 11) months. 18 fractures united properly. In one case there was infected nonunion with implant failure. In one case there was superficial wound infection which healed with dressing and antibiotics. In 3 cases shoulder stiffness developed, which were managed by exercise and physiotherapy. The mean Constant shoulder score was 72 (range, 30–89). 10 patients had a score exceeding 75, 8 were scored between 50 and 75, and 1 was below 50.

**Discussion:**

Non-operative treatment for displaced proximal humeral fractures is still advocated; patient satisfaction is high, especially in those with 2-part fractures[10] or the elderly with low functional demand despite poor reduction on radiographs and low Constant scores[11]. Surgical treatment with minimal soft tissue stripping enables satisfactory reduction, stable fixation, and early mobilization, but the technical difficulties include poor bone stock, minimum subchondral bone in the humeral head, and excessive soft tissue damage. The most common risks include screws cutout and backed out, penetration of the humeral head, loss of reduction, avascular necrosis, and subacromial impingement. Fixation using 2 one-third tubular plates resulted in a complication rate of 12%, including implant loosening, avascular necrosis, subacromial impingement, frozen shoulder, and fracture redisplacement[6]. Tension band wiring and non-operative treatment had similar functional outcomes[12,13]. The former was superior in 4-part fractures and the latter in 3-part fractures[12]. AOT plate fixation also had a high complication rate, including deep infection (4/32), impingement needing plate removal (5/32), and avascular necrosis (4/32)[3]. Clover leaf plate fixation achieved good results, but a hemiarthroplasty was recommended in elderly patients with poor bone stock[14]. Although hemiarthroplasty achieved good pain relief, its functional results were unpredictable and its strength poor[15]. Reverse shoulder prosthesis fixation achieved better functional outcomes[16]. Polarus nail fixation yielded good results and was useful in combined neck and shaft fractures[17], but the complication rate was high (proximal screw loosening [3/20], revision surgery [2/20], and lateral metaphyseal communition predisposing to implant failure)[18]. Revision surgery was required in 17% of patients due to non-union, avascular necrosis, screw migration, or inadequate position of the implant[19]. Locking proximal humeral plate fixation achieved acceptable functional results even in osteoporotic bones, but non-union, implant failure, avascular necrosis of the humeral head, and revision surgery have also been reported[20–23]. Angle stabilising plates were not necessarily associated with good functional outcomes[22]. Caution is needed in cases of medial communition during locking plate fixation[24].

In the present study, Philos plate fixation provided stable fixation with minimal metal work problems and enabled early range-of-motion exercises to achieve acceptable functional results. Nonetheless, the choice of treatment should be based on patient age, functional requirements, bone quality, fracture pattern, and the surgeon's preference.

**Conclusion:**

PHILOS plate fixation though provided acceptable functional results but in the present study, sample size was small. So, prospective randomised trialsare needed to compare different methods of fixation.

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