

## Introduction

Proximal humerus fractures are the third most common fracture seen in the elderly<sup>1,2</sup>. Eighty-five percent of proximal humerus fractures are minimally displaced and can be treated non-operatively with immobilization and exercises to increase function<sup>3</sup>. However, displaced fractures commonly result in severe loss of function to the shoulder. Controversy still exists regarding the optimal treatment of displaced proximal humerus fractures, especially the three-part fracture. Open reduction with plates and screws or arthroplasty frequently require extensive operative time with suboptimal results<sup>2,4,5,6</sup>. Hawkins wiring is a technique that uses figure-of-eight tension band wiring to treat three-part proximal humerus fractures. It was popularized by Hawkins et al in 1968 in a study which showed satisfactory results in 14 patients<sup>7</sup>. There is a paucity of data in patient reported outcomes and progression post-operatively. The purpose of this case series is to evaluate patient's functional outcomes treated with this technique.

## Procedure

General anesthesia was induced via the anesthesia provider. The patient was placed supine and the extremity was prepped and draped in a sterile manner. A standard deltopectoral approach was utilized. Fracture fragments were clearly identified. A fracture clamp was used to reduce fragments and reduction confirmed with fluoroscopy. A colposcopy needle was then placed followed by a 18-gauge wire into the lesser tuberosity. The wire is subsequently brought through the greater tuberosity and finally crossed over the anterior aspect of the humerus. Drill holes are placed in the proximal humerus shaft and a second 18-gauge wire is then passed in a figure-of-8 fashion to connect both wires. Wires are then tightened, and fracture reduction is again confirmed with fluoroscopy. Wound is closed in a layered fashion and sterile dressing placed.

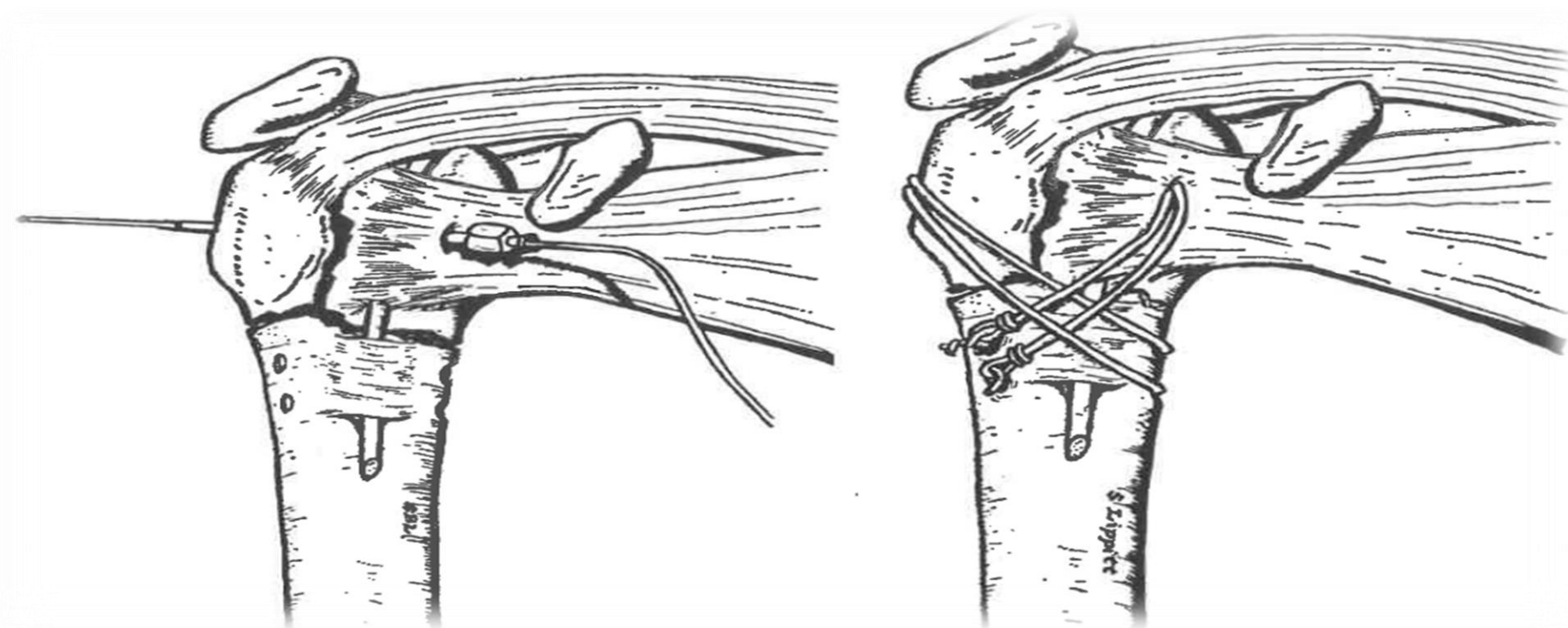


Fig 1: Illustration of the figure-of-8 tension band wiring technique

## Imaging

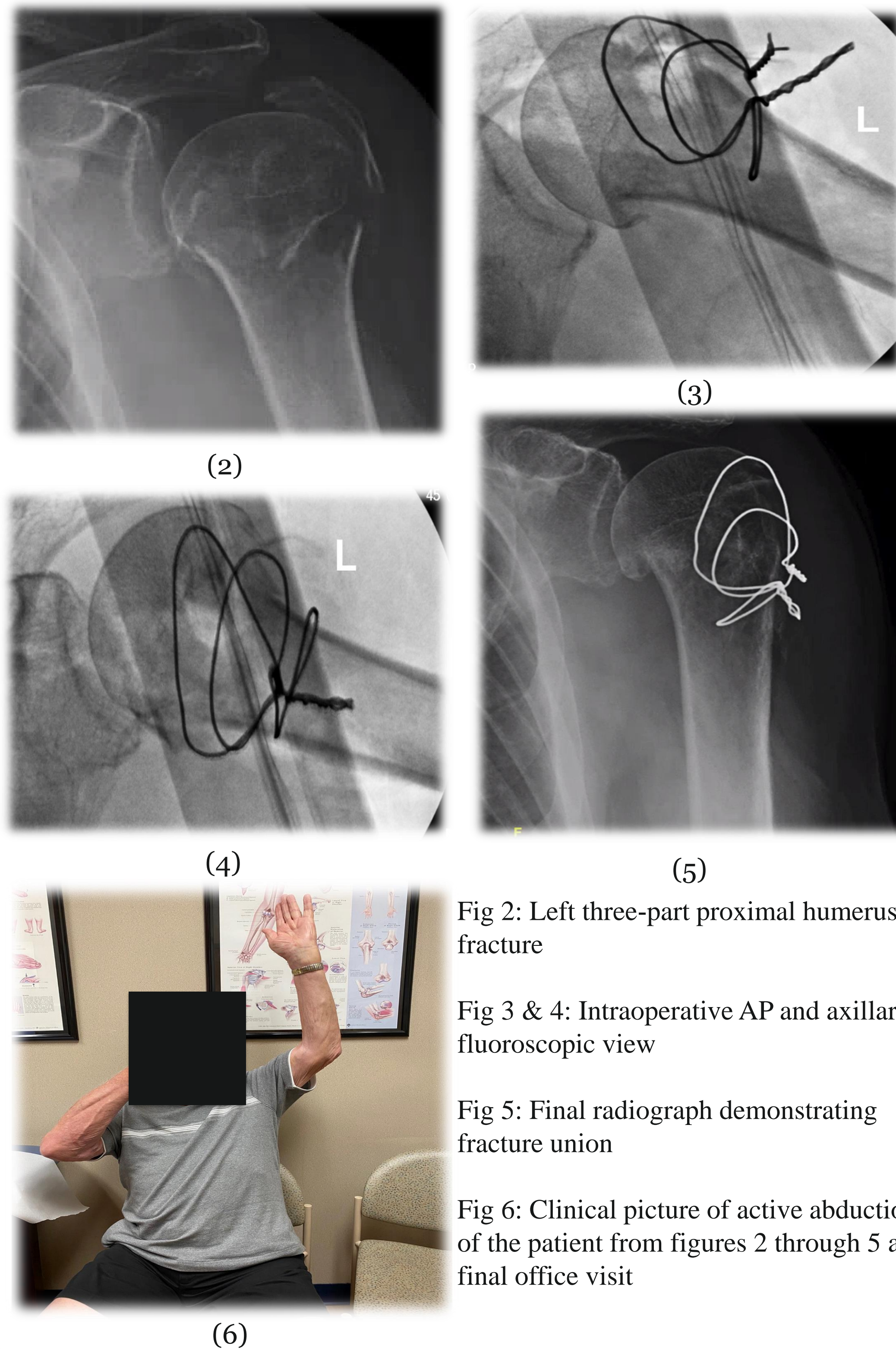


Fig 2: Left three-part proximal humerus fracture

Fig 3 & 4: Intraoperative AP and axillary fluoroscopic view

Fig 5: Final radiograph demonstrating fracture union

Fig 6: Clinical picture of active abduction of the patient from figures 2 through 5 at final office visit

## Methods

Four patients were contacted to conduct the DASH and Oxford Shoulder Score questionnaires to evaluate functional status. Patients were asked to return to clinic for a final visit. At this visit, range of motion was measured in forward flexion, lateral elevation, and internal/external rotation. Final radiographs were obtained and evaluated for fracture union.

## Results

Of the four patients, three were evaluated. One patient opted out of the study due to stage 4 lung cancer. Two of the three were unable to attend the final office visit for clinical evaluation secondary to relocation. The study group consisted of two Caucasian females and one Caucasian male with the average age of 82.6 years old (range: 78 – 86). All patients had 3-part proximal humerus fractures involving the greater tuberosity. Two of the three fractured their non-dominant arm. The average time from surgery until questionnaire completions was 261.6 days (range: 241 – 285). Average DASH Score was 14.6. Average Oxford Shoulder Score was 42. Final measured range of motion in one patient was 180 degrees of forward flexion, 100 degrees of abduction, 110 degrees of internal rotation, and 90 degrees of external rotation. Radiographic union was achieved in all three patients. There were no complications from surgery.

Patient	Injured Arm	DASH Score	Oxford Shoulder Score
1	Dominant	40.5	35
2	Non-Dominant	0.93	46
3	Non-Dominant	2.5	45
Average		14.6	42

## Conclusion

All three patients had successful repair of three-part proximal humerus fractures. The results of DASH and Oxford shoulder function questionnaires demonstrate satisfactory return of function after surgery. Our study shows the Hawkins wiring technique is efficacious in the treatment of three-part proximal humerus fractures however is limited due to small sample size. Further research is needed to compare this technique in a larger scale trial to determine efficacy compared to other techniques.

## References

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