

A comparative evaluation of locked intramedullary nailing or dynamic compression plating for humeral shaft fracture

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ABSTRACT

Background: Fractures of the shaft of humerus are relatively common. The present study compared locked intramedullary nailing or dynamic compression plating for humeral shaft fracture.

Materials & Methods: The present study was conducted in the department of Orthopaedics. It comprised of 60 patients of humeral shaft fracture of both genders. Patients were divided into 2 groups. Group I patients were treated with dynamic compression plating and group II patients were treated with interlocking nail. In both groups ASES score, VAS for pain and complications were noted.

Results: The mean time in theatre in group I was 82 minutes and in group II was 91 minutes, VAS was 1.2 in group I and 1.8 in group II, impingement symptoms was 1 in group I and 4 in group II and ASES score was 47 in group I and 48 in group II. The difference was significant ($P < 0.05$). Non union was seen 2 in group I, infection 1 in group I and 2 in group II, loss of fixation 1 in group I and 2 in group II and shoulder impingement 1 in group II. The difference was significant ($P < 0.05$).

Conclusion: Authors found that dynamic compression plate is better than intramedullary nailing and there were less complications with DCP.

Key words: compression plate, Nail, Humeral

Introduction

Fractures of the shaft of humerus are relatively common, representing 1–3 % of all fractures. Humerus shaft fractures are unique among all long bone fractures in having very good results with non-operative methods like hanging cast, functional brace, Velpeau dressing, coaptation splint and abduction cast.¹ Good functional outcomes in these fractures are partly due to the tolerance of malunion in humerus. However, all fractures are not amenable to conservative methods. The indications for operative treatment of the humeral shaft fractures include open fractures, segmental fractures, pathological fractures, fractures associated with vascular injuries, bilateral humerus fractures, polytrauma, radial nerve palsy after fracture manipulation, neurological loss after penetrating injuries, fractures with unacceptable alignment and failure of conservative treatment.²

The options for the commonly used surgical treatment of humeral shaft fractures include intramedullary nailing (IMN) and dynamic compression plate (DCP), which offer good clinical outcomes. At present, both of these surgical approaches are used to treat humeral shaft fractures. Both techniques have certain mechanical and anatomical advantages and disadvantages. Plating with stable fixation and direct visualization, which is known to provide an accurate anatomic reduction and protection of the radial nerve, can reduce the risk of malunion but requires wide intraoperative exposure associated with soft-tissue stripping.³

Usually, fixation is achieved by a dynamic compression plate (DCP), and it is generally accepted and gives satisfactory results. Use of plate, however, requires extensive dissection and is complicated by risk of radial nerve palsy and mechanical failure in osteopenic bone. There is growing interest in the use of the humeral intramedullary nail (IMN) as a result of recent technical advances.⁴ The present study compared locked intramedullary nailing or dynamic compression plating for humeral shaft fracture.

Materials & Methods

The present study was conducted in the department of Orthopaedics. It comprised of 60 patients of humeral shaft fracture of both genders. Patients were informed regarding the study and written consent was taken. Ethical approval was obtained prior to the study.

Patient information such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Group I patients were treated with dynamic compression plating and group II patients were treated with interlocking nail. In both groups ASES score, VAS for pain and complications were noted. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

| Groups | Group I (DCP) | Group II (interlocking nail) |
|--------|---------------|------------------------------|
| Number | 30 | 30 |

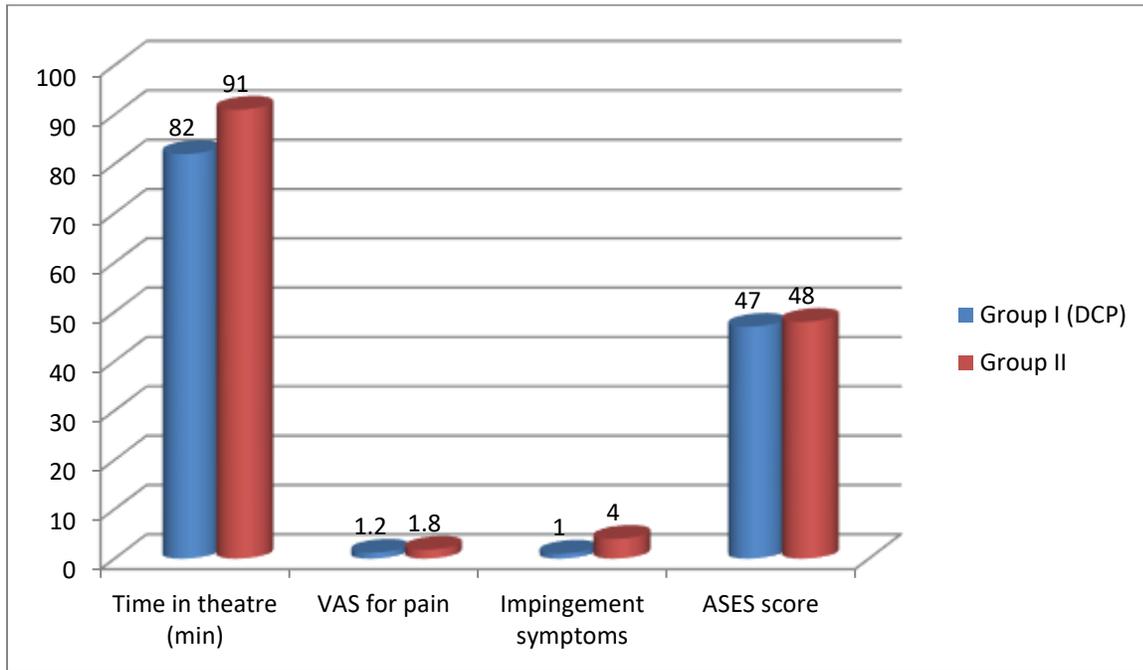
Table I shows that group I patients were treated with dynamic compression plating and group II patients were treated with interlocking nail. Each group comprised of 30 patients.

Table II Comparison of parameters

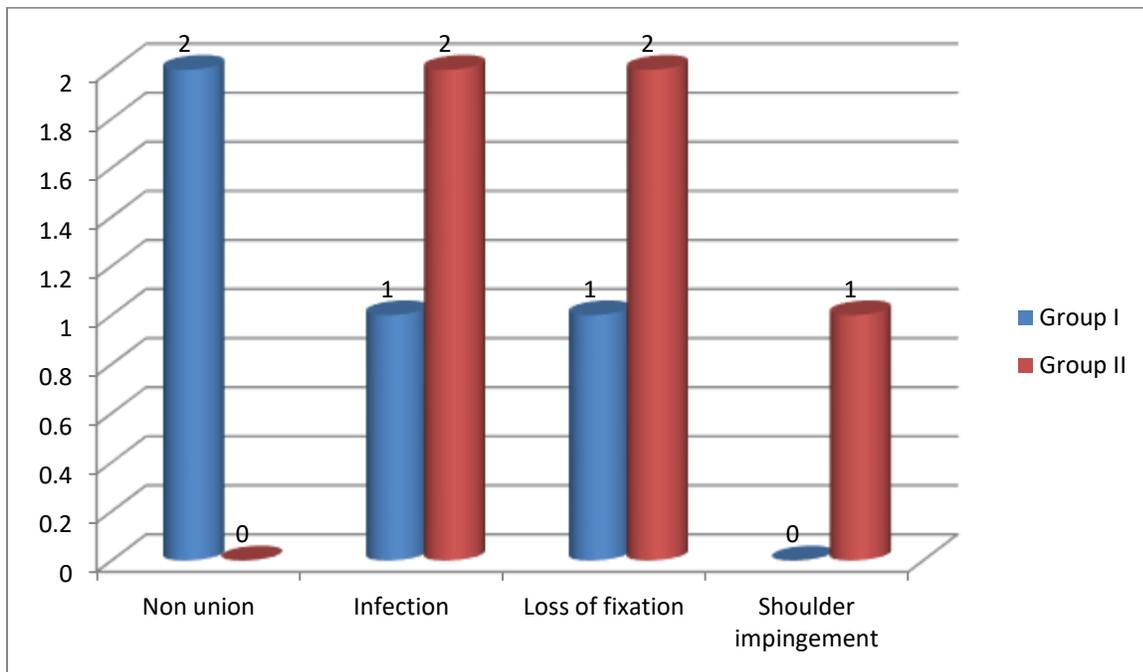
| Groups | Group I (DCP) | Group II | P value |
|-----------------------|---------------|----------|---------|
| Time in theatre (min) | 82 | 91 | 0.91 |
| VAS for pain | 1.2 | 1.8 | 0.12 |
| Impingement symptoms | 1 | 4 | 0.01 |
| ASES score | 47 | 48 | 0.95 |

Table II, graph I shows that mean time in theatre in group I was 82 minutes and in group II was 91 minutes, VAS was 1.2 in group I and 1.8 in group II, impingement symptoms was 1 in group I and 4 in group II and ASES score was 47 in group I and 48 in group II. The difference was significant (P< 0.05).

Graph I Comparison of parameters



Graph II Complications in groups



Graph II shows that non union was seen 2 in group I, infection 1 in group I and 2 in group II, loss of fixation 1 in group I and 2 in group II and shoulder impingement 1 in group II. The difference was significant ($P < 0.05$).

Discussion

Humerus fracture is unique amongst the long bone fractures in its tolerance of less than anatomical reduction.⁵ Shortening up to 3 cm, rotation < 30° and angulation up to 20° are considered acceptable. Due to this fact, most of the humerus fractures are still managed conservatively and have good functional results.⁶ The most common indication of operative intervention is inability to achieve acceptable reduction, followed by associated vascular lesions, open fractures, radial nerve palsy, polytrauma patients, floating elbow and pathological fractures. The preponderance of the fracture in young males, commonly in third and fourth decade of life, was seen in our series, as has been reported by other similar studies.⁷ Road traffic accident is the most common mode of injury, especially in younger patients. Browner et al. and Rockwood and Green recommend fixation of diaphyseal fractures of the humerus by an IMN which can be inserted into the humerus antegrade, from the shoulder, or retrograde, from the elbow. In theory, fixation by an IMN requires less invasive surgery, and reaming can yield autograft material. The biomechanics are improved, with higher moments of inertia and load-sharing capabilities.⁸ The present study compared locked intramedullary nailing or dynamic compression plating for humeral shaft fracture.

In present study, group I patients were treated with dynamic compression plating and group II patients were treated with interlocking nail. Each group comprised of 30 patients. Putti et al⁹ in their study twenty-five patients were managed with closed antegrade interlocking intramedullary nail, and 25 underwent open reduction and internal fixation using dynamic compression plating. The mean age of patients with IMN fixation was 37.28 years and 37.72 years for those who underwent plating. Road traffic accident was the most common mode of injury in both groups. There was a statistically significant difference between the two groups with respect to duration of hospital stay, operative time and blood loss. There was no significant difference between the two groups in terms of union or complications. The functional assessment at the end of 1 year between the two groups did not show any significant difference in outcome. Antegrade interlocking IMN and DCP fixation are comparable when managing diaphyseal shaft of humerus fractures with respect to union rates and complications. Although shoulder related complications are more in the IMN group, however, it is associated with shorter hospital stay, lesser operative time and less blood loss. This makes interlocking IMN an effective option in managing these fractures.

In present study, mean time in theatre in group I was 82 minutes and in group II was 91 minutes, VAS was 1.2 in group I and 1.8 in group II, impingement symptoms was 1 in group I and 4 in group II and ASES score was 47 in group I and 48 in group II. Non union was seen 2 in group I, infection 1 in group I and 2 in group II, loss of fixation 1 in group I and 2 in group II and shoulder impingement 1 in group II.

Puri et al² conducted a study in which 30 patients with fractures of the shaft of the humerus were treated by open reduction and internal fixation by dynamic compression plate (DCP) in 15 cases and closed reduction and internal fixation with interlocking intramedullary nail in 15 cases. Patients were followed up for a minimum of six months. There were no significant differences in the function of the shoulder and elbow, as determined by the American Shoulder and Elbow Surgeons' score, the visual analogue pain score, range of movement, or the time taken to return to normal activity.

Conclusion

Authors found that dynamic compression plate is better than intramedullary nailing and there were less complications with DCP.

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