Comparison of Two Cannulated Lag Screw Placements for Internal Fixation in Treatment of Transverse Fracture of Proximal Phalanx

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INTRODUCTION:

Proximal phalanx fractures are common fractures in hand trauma; improper treatment can easily lead to serious dysfunction. According to the course of the fracture line, proximal phalanx fractures can be divided into transverse, short oblique, long oblique, and spiral. For transverse fractures of the proximal phalanx, both the Kirschner wire internal fixation method and the microplate internal fixation method commonly used in clinical practice have certain shortcomings. Cannulated lag screw internal fixation has been gradually applied to the treatment of proximal phalanx fractures due to its advantages of minimally invasive and reliable fixation, but there is paucity of literature on the specific placement of cannulated lag screws.

METHODS:

Forty-six patients in this group were randomly divided into two groups, both of which were treated with cannulated lag screw internal fixation. There were 20 cases in the longitudinal cannulated screw internal fixation group (group A), including 18 males and 2 females; aged from 20 to 62 years old, with an average of 43.9 years old; 6 cases on the left side and 14 cases on the right side; 6 cases were thumb and 2 cases were index finger, 6 cases of middle finger, 2 cases of ring finger, 4 cases of little finger; 16 cases of machine crush injury, 4 cases of traffic injury. There were 26 cases in the oblique cannulated screw internal fixation group (group B), including 23 males and 3 females; aged 19-65 years, with an average age of 40.7 years; 10 cases on the left side, 16 cases on the right side; 4 cases were thumb, and 12 cases were index finger, 6 cases of middle finger, 2 cases of ring finger, 2 cases of traffic injury. Inclusion criteria were closed proximal phalanx fracture; fracture line does not involve the interphalangeal joint and metacarpophalangeal joint surface; fracture line is transverse; no neuromuscular injury; simple fracture (two-part fracture). Exclusion criteria were open or old fracture; fracture line involving the interphalangeal joint or metacarpophalangeal joint surface; non-transverse fracture line; neuromuscular injury; comminuted fracture (three-part fracture and above); pathological fracture. The follow-up time, range of motion of interphalangeal joint, range of motion of metacarpophalangeal joint, postoperative complications, and functional evaluation results were compared between the two groups.

RESULTS:

The follow-up time of group A was 18 to 24 months, with an average of 20.8 months; the follow-up time of group B was 19 to 24 months, with an average of 20.3 months. There was no significant difference in the follow-up time between the two groups (P > 0.05). A. The range of motion of interphalangeal joint was $(76.5\pm6.6)^{\circ}$ in group A and $(82.2\pm2.4)^{\circ}$ in group B. Group A was less than group B, and the difference was statistically significant. The range of motion of metacarpophalangeal joint was $(73.5\pm11.7)^{\circ}$ in group A and $(73.4\pm11.9)^{\circ}$ in group B. There was no significant difference between the two groups. The fractures of the two groups achieved primary healing. There were no complications such as fracture of internal fixation, wound nonunion, bony nonunion, and malunion.

DISCUSSION AND CONCLUSION:

In this study, the longitudinal cannulated screws used in group A were torsion-resistant screws, and the oblique cannulated screws used in group B were fixed as compromise screws, which had both compression resistance and torsion resistance. In this study, each fracture was fixed with only one cannulated screw, and the fracture healed well without related complications. At the last follow up, the range of motion of the interphalangeal joints in group A was significantly worse than that in group B, which may be caused by the damage to the articular surface of group A when the cannulated screw was screwed longitudinally from the proximal phalanx head. Small bone debris from cannulated drilling may also remain in the proximal interphalangeal joint space, affecting joint motion. Although the X-ray film of group A did not show obvious articular surface injury at the last follow up, the articular surface cartilage was not visualized on the Xray film. This affects the range of motion of the interphalangeal joints. In addition, when the cannulated screw was screwed longitudinally from the proximal phalanx head, the extensor tendon and capsular ligament would also be damaged, which may be one of the reasons for the poor mobility of the interphalangeal joints in group A. There was no significant difference in the range of motion of the metacarpophalangeal joint between the two groups. Although the cannulated screw in group B may damage the collateral ligament of the metacarpophalangeal joint, it did not significantly affect the range of motion of the metacarpophalangeal joint. The excellent and good rate of functional assessment was also significantly higher than that of group A. Therefore, we believe that the obligue cannulated screw is more effective than longitudinal cannulated screw in the treatment of proximal phalanx transverse fractures.