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Key Publications

Addition of a Suture Anchor for Coracoclavicular Fixation to a Superior Locking Plate Improves Stability of Type IIB Distal Clavicle Fractures

Publication Excerpt

"CC fixation adds stability to type IIB distal clavicle fractures fixed with plate and screws when loaded to failure."

Journal Abstract

Purpose

The purpose of this study was to determine the effect of coracoclavicular (CC) fixation on biomechanical stability in type IIB distal clavicle fractures fixed with plate and screws.

Methods

Twelve fresh-frozen matched cadaveric specimens were used to create type IIB distal clavicle fractures. Dual-energy x-ray absorptiometry (DEXA) scans ensured similar bone quality. Group 1 (6 specimens) was stabilized with a superior precontoured distal clavicle locking plate and supplemental suture anchor CC fixation. Group 2 (6 specimens) followed the same construct without CC fixation. Each specimen was cyclically loaded in the coronal plane at 40 to 80 N for 17,500 cycles. Load-to-failure testing was performed on the specimens that did not fail cyclic loading. Outcome measures included mode of failure and the number of cycles or load required to create 10 mm of displacement in the construct.

Results

All specimens (12 of 12) completed cyclic testing without failure and underwent load-to-failure testing. Group 1 specimens failed at a mean of 808.5 N (range, 635.4 to 952.3 N), whereas group 2 specimens failed at a mean of 401.3 N (range, 283.6 to 656.0 N) (P=.005). Group 1 specimens failed by anchor pullout without coracoid fracture (4 of 6) and distal clavicle fracture fragment fragmentation (1 of 6); one specimen did not fail at the maximal load the materials testing machine was capable of exerting (1,000 N). Group 2 specimens failed by distal clavicle fracture fragment fragmentation (3 of 6) and acromioclavicular (AC) joint displacement (1 of 6); 2 specimens did not fail at the maximal load of the materials testing machine.

Conclusions

During cyclic loading, type IIB distal clavicle fractures with and without CC fixation remain stable. CC fixation adds stability to type IIB distal clavicle fractures fixed with plate and screws when loaded to failure.

Clinical Relevance

CC fixation for distal clavicle fractures is a useful adjunct to plate-and-screw fixation to augment stability of the fracture.

Reference

Madsen W, Yaseen Z, LaFrance R, Chen T, Awad H, Maloney M, Voloshin I. Addition of a suture anchor for coracoclavicular fixation to a superior locking plate improves stability of Type IIB distal clavicle fractures. *Arthroscopy: Journ Arthro Relat Surg.* 2013;29(6):998-1004.

Comparison of Treatment of Acute Unstable Distal Clavicle Fractures Using Anatomical Locking Plates with Versus without Additional Suture Anchor Fixation

Publication Excerpt

"use of an anatomical locking plate with CC augmentation has better functional and radiographic outcomes than treatment without CC augmentation. Therefore, a combination of anatomical locking plate and CC ligament augmentation is a reliable treatment option for unstable distal clavicle fractures."

Journal Abstract

Background

Surgical managements were recommended for unstable distal clavicle fracture owing to the high incidence of nonunion. The present study compared the efficacy of anatomical locking plate with versus without additional suture anchor fixation for the treatment of unstable Neer type II distal clavicle fractures.

Material/Methods

Between January 2013 to January 2015, 28 consecutive patients with unstable Neer type II fractures were treated by using anatomical locking plate with or without additional suture anchor fixation. The patients were divided into anatomical locking plate group (group A) and anatomical locking plate combined with suture anchor group (group B) according to the surgical method. The operative-related parameters such as operation time, blood loss, length of hospitalization, union time, functional outcomes (Constant score, UCLA score and DASH score) and CC distance were compared.

Results

The mean follow-up period of the 28 patients was 19.60 months (21.80 versus 18.39 months, respectively). No statistical differences in general and peri-operative parameters were found between 2 groups. The group B had significant higher Constant score than group A (P=0.004, 91.67 versus 83.10). While no statistical differences were reached in the UCLA score and DASH score between 2 groups (P=0.112 and 0.163, respectively). The group A had longer CC distance than group B (11.67 versus 8.94 mm), while no statistic difference was found (P=0.067).

Conclusions

For the treatment of acute unstable Neer type II distal clavicle fractures, both surgical methods could offer satisfactory outcome. However, anatomical locking plate combined with additional suture anchor fixation had a better functional and radiographic outcome than that without additional suture anchor fixation.

References

Fan J, Zhang Y, Huang Q, Jiang X, He L. Comparison of treatment of acute unstable distal clavicle fractures using anatomical locking plates with versus without additional suture anchor fixation. *Med Sci Monit.* 2017;23:5455-5461.

Treatment of Neer IIb Distal Clavicle Fractures Using Anatomical Locked Plate Fixation With Coracoclavicular Ligament Augmentation

Publication Excerpt

"In this study, all patients obtained bone union and satisfactory clinical outcomes using anatomical locking plate fixation with suture anchor augmentation of CC ligament for type IIb fractures."

Journal Abstract

Purpose

The purpose of this study was to evaluate the clinical and radiographic outcomes of Neer type IIb distal clavicle fractures treated with anatomical locking plate fixation combined with coracoclavicular ligament augmentation.

Methods

Twelve patients with Neer Type IIb distal clavicle fractures treated with anatomical locking plate fixation combined with suture anchor augmentation of the coracoclavicular ligament, were retrospectively studied. Clinical outcomes were assessed using the Constant score and the Disabilities of the Arm, Shoulder, and Hand (DASH) score. Coracoclavicular distance was measured on plain radiographs.

Results

All patients were reexamined at a mean follow-up of 26.3 months (range, 25–30 months). Bony union occurred in all cases within 12 weeks and no major complications were encountered. At the final follow-up, the mean Constant score was 94 (range, 87–100) and the DASH score was 10.4 (range, 2–20). The mean postoperative coracoclavicular distance on the injured side was decreased by 40% compared with the preoperative status.

Conclusions

Surgical fixation of Neer type IIb distal clavicle fractures using anatomical locking plate fixation combined with suture anchor augmentation of the coracoclavicular ligament was associated with a satisfactory functional outcome and low complication rate.

References

Han L, Hu Y, Quan R, Fang W, Jin B, Huang L. Treatment of Neer IIb distal clavicle fractures using anatomical locked plate fixation with coracoclavicular ligament augmentation. *J Hand Surg Am.* 2017;42:1036.e1–e6.

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