Volar locking plate versus k-wiring fixation of distal radius fractures in 20-65 year olds

Kiernan C, Brennan SA, McInerney N, Jadaan M, Kearns SR, O’Sullivan M.

University College Hospital Galway, Ireland
chkerna@tcd.ie

Introduction

Fractures of the distal radius are one of the most common injuries encountered in orthopaedic practise. Despite large volumes the optimal management for these injuries remains controversial. Whilst it has been shown that radiographic reconstruction does not correlate with functional outcome in the elderly, it is unclear if this applies to younger higher demand patient populations. The aim of this study was to compare outcomes in those treated with volar locking plate to those undergoing manipulation and kirschner wire fixation in the 20-65 year population.

Methods

A retrospective comparative study of 321 distal radius fractures treated in our level 2 trauma centre over a 4 year period was conducted. 151 patients were treated with a volar plate and 170 patients underwent manipulation and k-wire fixation. Radiographic parameters including radial inclination, radial length, volar tilt, ulnar variance and osteoarthritic changes were compared between groups. Functional outcome was assessed using the Disabilities of the arm, shoulder and hand (DASH) score and the patient-rated wrist evaluation (PRWE) score. Higher scores indicate more pain and disability. Mann Whitney U test were used to compare non parametric data. Fisher’s exact test was used to compare categorical data.

Results

The mean patient age was 46.6 years. The mean length of follow up was 31.3 months. According to the OTA classification system there were 160 type A fractures, 118 type B fractures and 43 type C fractures. The mean age, sex and fracture pattern was matched between groups. At final follow up the radiological reconstruction was significantly better in the volar plate group compared to the k-wire group: radial inclination 22.1° v 21.3° (p=0.09), volar tilt 4.2° v 1.7 ° (p=0.07), ulnar variance -0.5 mm v 0.1mm (p=0.03), radial length 10.9mm v 10.4mm (p=0.01). 4% (6/151) of patients in the volar plate group were radiologically unacceptable versus 13% (22/170) in the k-wire group (p=0.03).

The mean functional outcome measures scores showed no difference between the volar plate group and k-wire groups: DASH 12.8 v 12; PRWE pain 12 v 8.8; PRWE function 9.9 v 10.6; PRWE total 21.9 v 19.4. Complications such as tendon rupture and superficial infection were similar between the two groups.

Discussion

Radiographic results (dorsal tilt, radial inclination, ulnar variance and radial shortening) after distal radius fractures are significantly better in patients treated by ORIF using a volar plate compared to those treated with manipulation and k-wire fixation. At a mean of 31 months follow up the outcomes of pain and function as assessed by the PRWE and DASH questionnaires did not show a difference between the two methods of treatment.

The use of volar locking plates for distal radial fractures (DRF) has become increasingly popular although there is little in-vivo data to confirm superiority over other techniques. Whilst a prospective randomized study shows that there are short term advantages to using volar plates compared to k-wires there is no evidence to suggest that these advantages are maintained in the medium and long term.

K-wire fixation is relatively cheap, minimally invasive, takes less operative time and requires less skill compared to volar plating techniques. The potential disadvantages lie in the fact that the hardware is not rigid and in patients with poor bone stock the fracture may be liable to collapse into an unacceptable position with time. Another disadvantage is that patients will usually require 6 weeks of cast immobilization.

In contrast volar plating is expensive, invasive, consumes more operating theatre time and requires more operative skill. It does however create a rigid construct and patients are usually allowed to mobilize earlier, potentially leading to less post-operative stiffness.

Our study demonstrates that volar plating of these fractures leads to a better reconstruction of the distal radius compared to manipulation and k-wiring. Only 4% of patients in the volar plate group had an unacceptable radiographic outcome. In contrast 13% of the k-wire group had unacceptable radiographs at final follow up. This poorer reconstruction did not translate into a worse functional outcome.

Significance

Volar plate fixation of distal radius fractures results in superior reconstruction compared to k-wires fixation. This however does not translate to a better functional outcome or less pain at 2.5 years follow up.

Key words

Distal, radius, fracture, plate, k-wire.