Clinical and radiological results of calcium phosphate cement-assisted balloon osteoplasty for Colles’ fractures in osteoporotic senile female patients

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Abstract

Background. Distal radius fractures in osteoporotic senile female patients often used to be complicated with residual deformity, stiffness, and pain. Recently, however, adequate usage of a palmar locking plate or external fixation has led to fewer subsequent complications. The method proposed here deserves consideration because it is less invasive and more cost-effective.

Methods. A total of 11 Colles’ type fractures (AO type A2) in 11 patients (all female; mean age 78 years) were treated. After a closed reduction, the fractures were fixed by percutaneous pinning, as Kapandji previously described. Through a 5-mm longitudinal skin incision on the dorsoulnar aspect of the fracture site, the barrel of a disposable 1-ml syringe was inserted into the fracture site as a port. Next, a pediatric urodynamic balloon was introduced into the fracture site and inflated by contrast medium. The balloon inflation enlarged the void of the fracture site. A compression bandage around the fracture site was applied before calcium phosphate cement injection with a cement gun through the port under an image intensifier. The functional and radiological results were evaluated. The mean follow-up period was 16 months (range 12–25 months).

Results. All results were graded as good or excellent within 3 months, and all were graded as excellent at the final follow-up. The average duration of immobilization was 4 weeks with a short forearm cast. The overall postoperative correction loss in ulnar variance was 1.7 mm. Radial inclination and volar tilt showed no postoperative correction loss. The final volar tilt, radial inclination, and ulnar variance were comparable to those of the nonaffected side.

Conclusions. Calcium phosphate cement-assisted balloon osteoplasty is a less invasive procedure and can be clinically justified as a therapeutic option for a Colles’ fracture in osteoporotic senile female patients.

Introduction

Fracture of the distal radius is one of the most common skeletal injuries in senile female patients. Given the general conditions of these patients, quite often an invasive surgical method should be avoided. The key problem is continuous correction loss inside the cast after reduction during conservative treatment. Residual deformity leads to disabling stiffness and pain of the wrist.

Calcium phosphate cement (CPC) is an injectable biocompatible bone substitute that has been used for various applications in orthopedic surgery and has proven effective as a bone filler in the orthopedic field.1,2 However, its mechanical properties do not provide solid mechanical strength for rigid fixation, so proper internal fixation, cast, or external fixations3,4 are usually required. Hidaka et al. reported their clinical and radiological results after usage of CPC in distal radius fractures.2 Their data showed mild correction loss in middle-aged women after a 1-year follow-up. Because we frequently deal with elderly patients, we tried to inject CPC into the enlarged fracture cavity after using a pediatric urodynamic balloon. The purpose of this study was reassessment of the usefulness of CPC for distal radius fractures in elderly female patients.

Patients and methods

Between September 2004 and August 2007, CPC-assisted balloon osteoplasty was performed for Colles’ fractures in 11 osteoporotic senile female patients. All patients met the following criteria: (1) more than 12 months of follow-up; (2) age >60 years; (3) availability of complete data of the physical examination and radiography; and (4) operation and follow-up performed by a single surgeon (S.I.). Informed consent was obtained from all patients. The patients were all female, with an
average age of 78 years (range 61–93 years). All frac-
tures occurred as a result of a fall from a standing height. All were dorsally displaced fractures of the distal aspect of the radius and classified as Colles type fractures (AO type A2).

Operative technique

The patient was placed in the supine position under axillary anesthesia without a pneumatic tourniquet. With the affected side of the shoulder abducted 90° and the affected elbow fully extended, a countertraction pad was placed under the axilla area. A Chinese finger trap was then applied to the thumb, index, and middle fingers; and traction was manually applied. Reduction was confirmed by portable fluoroscopy.

A small longitudinal stab skin incision was made on the dorsoradial aspect of the fracture site for the first pin, which was a 1.6-mm Kirschner wire. A small artery forceps was then used to dissect the tissue down to the fracture site, as Kapandji previously described. Next, using the same technique, a second 1.6-mm Kirschner wire was inserted into the volar-radial aspect of the fracture site. Although good reduction was obtained, a void or cavity usually appeared at the fracture site (Fig. 1a).

![the nozzle of the cement gun](image)

Fig. 1. a Postreduction image showing the fracture void. b The barrel of a 1-ml syringe was shortened to about 4 cm, inserted via a small stab skin incision into the fracture cavity, and then used as a port for the procedures. c Radiological image shows a pediatric uromatic balloon that was introduced into the radiological void and inflated with contrast medium. About 2 cc of contrast medium was required to inflate the balloon fully to create the cavity. d Image shows the void of the fracture site enlarged by balloon inflation just before injection of calcium phosphate cement (CPC). The radiopaque hollow tubular structure is the nozzle of the cement gun. It was passed through the syringe into the fracture cavity.