

Modified Technique for One-Stage Treatment of Proximal Phalangeal Enchondromas With Pathologic Fractures

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Purpose To evaluate the treatment outcome for enchondromas of the proximal phalanx with pathological fracture.

Methods Between June 2008 and October 2012, we treated 9 patients with solitary proximal phalanx enchondromas and pathologic fractures by curetting the tumor, filling the void with a block of autogenous bone chip, and applying a low-profile miniplate. Postoperative follow-up included clinical assessment, pain evaluation, and radiographs.

Results Follow-up time ranged from 13 to 42 months (mean, 30 mo). No major complications such as notable malalignment, nonunion, infection, or tumor recurrence were observed. All fractures healed after a mean of 8 weeks postoperatively. Full motion was achieved in 5 patients and extension lag (5° to 10°) of the proximal interphalangeal joint persisted in 4. Function was excellent in all patients according to the Takigawa criteria. All patients reported they were pain free and had resumed presurgical function within 12 weeks after surgery.

Conclusions Tumor curettage, reconstruction of the bone defect with a block of autogenous bone chip, and low-profile miniplate fixation provided one-stage treatment with immediate rigid stabilization and good functional outcomes. (*J Hand Surg Am.* 2014;39(9):1757–1760. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic IV.

Key words Bone graft, enchondroma, internal fixation, pathologic fracture.

BONY TUMORS OF THE HAND ACCOUNT for 5% of all benign and malignant tumors of the skeleton. Ninety-six percent are benign,¹ of which 35% to 65% are enchondromas, which may be hamartomas arising from cartilaginous islands abutting the growth plates.²

Enchondromas expand and gradually become bulbous and vulnerable to trivial injury that results in pathologic fracture. Most enchondromas commonly present as pathologic fractures associated with pain, deformity, swelling, and loss of function, especially in the proximal phalanges of the ulnar rays.³ The optimal timing and treatment for enchondromas with pathologic fractures remain unclear. The goals are tumor removal and fracture stabilization. Because it is technically difficult to remove a tumor and stabilize a fracture in the finger in one procedure, the fracture is usually allowed to heal before tumor removal and bone grafting. Although effective, this results in a longer period of pain and function loss.⁴ Early curettage and fracture stabilization aid prompt histological diagnosis and pain relief.

Previous reports of one-stage treatment of enchondromas with pathologic fracture included tumor curettage and placement of cancellous bone graft or bone

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FIGURE 1: Plain radiographs of a 30-year-old woman. **A** Preoperative x-ray showed enchondroma with pathologic fracture at the base of the proximal phalanx of the left ring finger. **B** The fracture was stabilized with a miniplate and screws and the cavity was filled with a bone block and morselized cancellous chips. **C** Three months later, fracture union was present with excellent incorporation of the bone graft.

substitutes with or without pin fixation. The outcomes were not entirely satisfactory owing to complications, and delayed surgery has been generally advised. We modified this procedure with placement of a bone block and miniplate fixation.

MATERIALS AND METHODS

Between June 2008 and October 2012, we treated 9 patients with pathologic fractures of the finger resulting from a single enchondroma. None had Maffucci syndrome or Ollier disease. All the patients gave informed consent under the instructions of the ethical committee in our hospital. There were 6 women and 3 men whose age ranged from 21 to 45 years (median, 28 y). Proximal phalanges in 3 middle fingers, 4 ring fingers, and 2 little fingers were involved. All patients underwent surgery by the same surgeon within 1 week after diagnosis.

We evaluated functional outcomes according to the Takigawa criteria for appearance (skin and soft tissue mantle), grip and pinch (80% or more of the healthy side), active motion (80% or more of the healthy side), and radiographic results (shortening, deformation, osteoarthritis, or recurrence of the tumor). Achievement of all 4 criteria indicated an excellent result, 3 criteria was good, 2 was fair, and 1 or no criteria was poor.⁵ Bone union was confirmed by the disappearance of pain in the fracture area and radiographic evidence of bone trabeculae crossing the fracture site on both anteroposterior and lateral views. We used a pain visual analog scale to evaluate postoperative local pain. An independent examiner blinded to the surgical procedure performed clinical assessments and radiographic measurement during follow-up.

Surgical technique

A dorsal incision exposed the extensor tendon, which was split longitudinally and mobilized medially or laterally to expose the fracture site. The tumor was approached through the thinned cortex to minimize additional bone loss. A cortical window equal to the length of the longitudinal dimension of the tumor was used to expose the tumor and aid complete curettage, especially tissue concealed in the crevices and trabeculated pockets in the cavity walls of the cavity. After tumor excision, we harvested a bone block equal to the cavity from the iliac crest and inserted it with the aid of digital traction. Any gaps between the block and the phalangeal walls were filled with morselized cancellous bone. We used a T-shaped low-profile miniplate for internal fixation. The transverse arm of the plate was placed on the proximal portion of the phalanx and the longitudinal arm bridged the block (Fig. 1). Active motion was started 24 hours after the operation and a night orthosis for protection was applied. All the patients received hand therapy for 1 month.

RESULTS

Follow-up time ranged from 13 to 42 months (mean, 30 mo). No major complications such as malalignment greater than 5° of angulation, nonunion, infection, or tumor recurrence were observed during follow-up. No hardware or screw breakage occurred. Histopathological findings confirmed the diagnosis of enchondroma. All fractures healed within a mean of 8 weeks. We noted full range of motion in 5 patients at follow-up. Four patients had proximal interphalangeal joint extension lag up to 10°. Two of them received hardware removal and tenolysis 1 year after

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