SCIENTIFIC ARTICLE

# Outcomes of Opening Wedge Osteotomy to Correct Angular Deformity in Little Finger Clinodactyly

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**Purpose** To evaluate the outcomes and complications in a series of children with clinodactyly treated with opening wedge osteotomy of the abnormal phalanx.

**Methods** We performed a retrospective review of all children with clinodactyly treated at our institution with opening wedge osteotomy of the abnormal middle phalanx between 2003 and 2013. Patients with concomitant pathology or prior surgery in the affected finger were excluded. Preoperative and postoperative clinical angle, radiographic angle, digital range of motion, and pain were compared and complications were recorded.

**Results** We included 13 digits in 9 patients. All had greater than 20° of preoperative clinical angulation (mean, 36°). Mean age at time of surgery was 11 years; mean duration of follow-up was 25 months (range, 12–43 mo). All digits had significant improvement (mean, 32°) in clinical and radiographic angles after surgery. This improvement was maintained at final follow-up in 12 digits. Six patients had pain preoperatively and no patient had pain post-operatively. One digit had a recurrent deformity at final follow-up and 3 digits developed stiffness at the distal interphalangeal joint.

**Conclusions** Opening wedge osteotomy is an effective treatment for angulation in children with clinodactyly. We counsel families regarding the risk of distal interphalangeal joint stiffness.


**Type of study/level of evidence** Therapeutic IV.

**Key words** Clinodactyly, osteotomy, opening wedge, surgery.

Additional material is available online.

CLINODACTYLY IS AN ANGULAR deformity of a digit in the coronal plane usually caused by an abnormal phalangeal shape. The little finger middle phalanx is most commonly involved and has radial deviation owing to either a trapezoidal phalangeal shape (brachymesophalangism) or a longitudinal bracket epiphysis that unilaterally limits longitudinal growth. This results in a triangular or trapezoidal phalangeal shape (delta phalanx) (Fig. 1).[1–4] A familial form of clinodactyly has been described with a dominant pattern of inheritance and variable penetrance, most commonly involving the little fingers.[5] Over 60 syndromes are associated with clinodactyly, the most common of which is Down syndrome.[6] Clinodactyly can also be acquired through injury to the physis or phalanx. The angular deformity of the digit can result in an unsatisfactory appearance and can interfere with normal hand function.[4] Specifically, the angular deformity can result in scissoring that interferes with grip and activities requiring a high level of dexterity,

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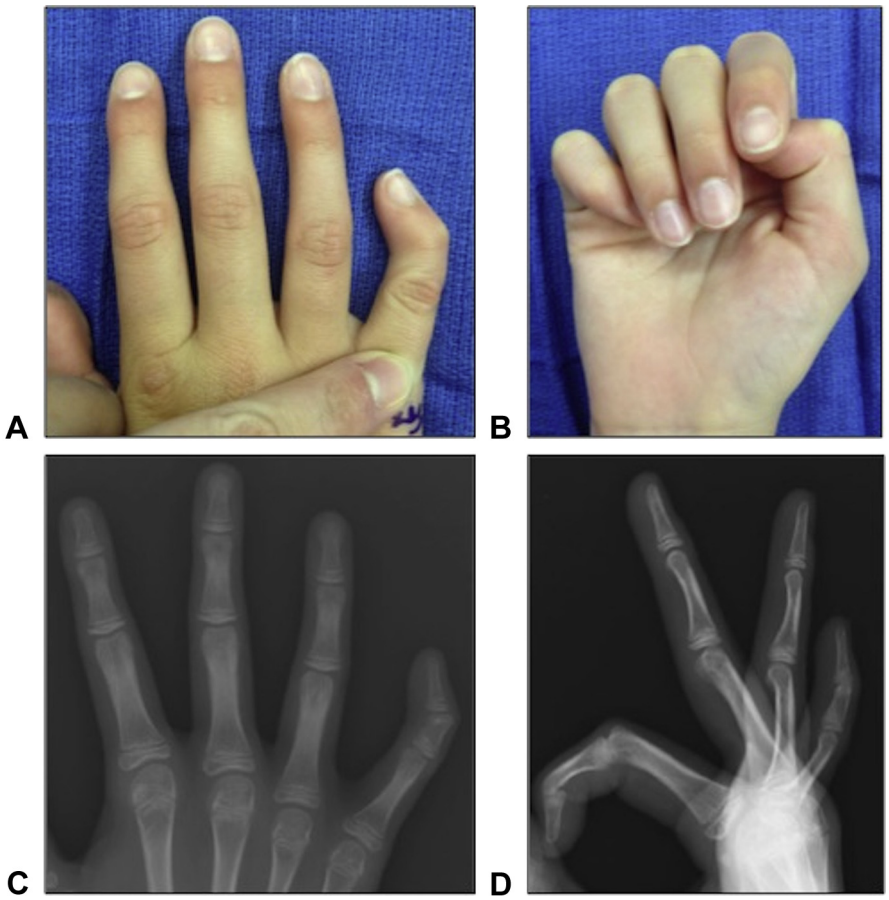


**FIGURE 1:** Clinodactyly. **A** Radial angulation of the little finger resulting from an abnormal middle phalanx. **B** Scissoring as a result of the angulation. **C** Posteroanterior radiograph shows the abnormal trapezoidal-shaped middle phalanx. **D** Lateral view of the little finger shows no sagittal plane deformity.

such as playing musical instruments or using the keyboard.

Most cases of clinodactyly are treated with observation and do not require surgical intervention. Surgery is considered when the angular deformity is severe and either function is altered or appearance is unacceptable to the patient or family. There is no consensus regarding the degree of deformity that merits surgical correction. Some groups have suggested that it should be greater than 20°.[7–9] Several surgical techniques have been described to treat clinodactyly. These include epiphyseal bar resection with fat interposition, closing or opening wedge osteotomies, and reverse wedge osteotomy.[1,7,9–12] Epiphyseal bar resection with fat interposition is performed in skeletally immature children with an identifiable bracket epiphysis. With removal of the tether, angular correction occurs gradually as the remaining physis grows.[9] For older children, corrective osteotomies can be used to address the deformity. The closing wedge osteotomy can appropriately correct the angulation but it causes further shortening of the digit, which is undesirable if brachydactyly is already present.[13] Reverse wedge osteotomy can be technically challenging in a small angular bone. An opening wedge osteotomy has the benefit of preserving length while allowing for correction of the deformity without pre-calculating wedge size.[1,12,14] The purpose of this study was to evaluate the clinical and radiographic outcomes and complications after opening wedge osteotomy for treatment of clinodactyly of the little finger.

## MATERIALS AND METHODS

After we obtained approval from our institutional review board, we performed a retrospective review of the medical charts and radiographs for all patients with isolated congenital clinodactyly of the little finger treated with opening wedge osteotomy. All patients were treated by a single surgeon (C.A.G.) at either St Louis Children's or St Louis Shriners Hospitals between 2003 and 2013. Indications for surgical treatment included an angle greater than 20° and specific functional limitations or dissatisfaction of the patient or