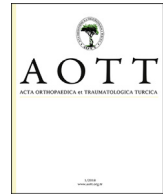


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Surgical correction of hallux valgus deformity in children with cerebral palsy

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ABSTRACT

Objective: This study aimed to present a treatment algorithm for the correction of the hallux valgus deformity in Cerebral Palsy (CP) patients and to discuss the outcomes based on our clinical and radiological results.**Methods:** 29 patients (45 feet) were included in the study. The mean age of the patients at the time of the surgery was 14 (range 6–22) years. The mean follow-up was 33 (range 22–59) months. A reconstructive procedure was performed on 19 patients (27 feet); a soft tissue surgery and exostectomy of the bunion in six patients (11 feet); and MTP joint arthrodesis in four patients (7 feet). The hallux valgus angle (HVA) and the anteroposterior intermetatarsal angle (IMA) were used for radiologic evaluation and the DuPont Bunion Rating Score was used for clinical evaluation.**Results:** The follow-up period was 36 (range 22–59) months in reconstructive group, 27 (range 24–29) months in soft tissue group, and 29 (range 23–41) months in MTP arthrodesis group. Significant improvements were detected in hallux valgus angle in three groups postoperatively but in soft tissue group correction loss was observed during follow up. Best results were achieved in arthrodesis group and worse in soft tissue group in terms of clinical evaluation.**Conclusion:** According to our results isolated soft tissue procedures are ineffective in CP patients. Soft tissue procedure combined with metatarsal osteotomy has satisfactory results. Level of evidence: Level IV, therapeutic study.© 2018 Publishing services by Elsevier B.V. on behalf of Turkish Association of Orthopaedics and Traumatology. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Hallux valgus is part of a complicated foot malalignment pathology that may affect patients with spastic cerebral palsy (CP) by causing functional disabilities.^{1,2} Surgical correction of the deformity is indicated to address disabilities, including pain, difficulty with shoe wear or use of orthotics, poor foot hygiene, skin breakdown, nail infection, and pathologic gait.^{3,4}

When surgical correction is considered, metatarsophalangeal joint (MTP) arthrodesis is accepted as a primary treatment

method. By contrast, reconstructive procedures, such as soft-tissue balancing or corrective osteotomies, are not very beneficial and recurrence rates are high.^{5–10} However, primary MTP joint arthrodesis hinders forefoot motion, which is essential for stair walking and for push-off for the heel-to-toe gait, and this leads to joint stiffness.⁸ In addition, non-union is a common complication of MTP joint arthrodesis.

The available literature lacks any treatment algorithm for hallux valgus deformity in children with CP. We argue that the correction of the hallux valgus deformity, together with the simultaneous correction of a foot malalignment and without hindering forefoot motion, would be effective in most of these cases.

The purpose of this study was to present our treatment algorithm for the correction of the hallux valgus deformity in CP patients and to discuss the outcomes based on our clinical and radiological results.

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Patients and methods

Patients with spastic CP who underwent operations between 2013 and 2015 for hallux valgus were evaluated retrospectively. In total, 29 patients (45 feet, bilateral in 16 patients) were included in the study. The mean age of the patients at the time of the surgery was 14 (range 6–22) years. The mean follow-up was 33 (range 22–59) months.

None of the patients had undergone a previous foot surgery. Of the 29 patients, 25 had undergone concomitant surgeries at the same extremity: 19 gastrocnemius recessions, 11 Achilles tendon lengthening, 36 lateral column lengthening in 21 patients, three subtalar arthrodesis surgeries in two patients for pes planovalgus, two talonavicular arthrodesis in one patient in conjunction with lateral column lengthening, one femoral varus-derotation osteotomy, one tibial derotation osteotomy, and six supracondylar femoral extension osteotomies in three patients.

The indication for surgical treatment was a hallux valgus deformity in the CP patient with pain over the forefoot and medial eminence after failed conservative treatment, such as wide shoes or orthosis. A reconstructive procedure was performed on 19 patients (27 feet); a soft tissue surgery and exostectomy of the bunion in six patients (11 feet); and MTP joint arthrodesis in four patients (7 feet).

The reconstructive procedures consist of a distal first metatarsal osteotomy according to Lindgren-Turan technique,¹¹ soft tissue surgery, and exostectomy of the bunion.¹² In the first stage, a three-cm dorsal longitudinal incision was centered in the first intermetatarsal web space. The adductor hallucis tendon was released from the base of the proximal phalanx. The transverse metatarsal ligament was then transected. At this point, the first MTP joint congruency was evaluated and the flexor hallucis brevis and lateral joint capsule were resected, if necessary. In the second step, a

medial incision was made in the midline between the midportion of the proximal phalanx and two cm beyond the medial eminence. A vertical capsular incision was made proximal to the base of proximal phalanx, and a second capsular incision was made 5 mm proximally and parallel to the first one. The medial eminence was then removed, with the bursa overlying the MTP joint, in a line parallel with the medial diaphyseal cortex of the first metatarsal. The medial joint capsule was repaired during the hallux and then placed in correct alignment. In the third stage, the periosteum was elevated around the first metatarsal as far distally as possible through the second incision. An osteotomy was done 1,5 cm proximal to the metatarsal head, with a lateral inclination of 30° with the metatarsal joint surface.¹¹ After the osteotomy, the distal fragment was displaced as far laterally as possible, and the tip of the proximal fragment was resected. The osteotomy was fixed with a cancellous cannulated bone screw or two Kirschner wires (Fig. 1).

The first MTP joint fusion involved a dorsal longitudinal incision along the great toe and the adjacent first metatarsal, along the medial edge of the extensor hallucis longus tendon. Cartilage was removed while preserving the contour of the metatarsal head and the base of the proximal phalanx. Internal fixation was performed with a transphalangeal intramedullary screw.

An ankle foot orthosis (AFO) with a toe plate was used for three weeks to protect the soft-tissue repair. The Kirschner wires (if used) were removed three weeks after surgery. At the sixth week after a bone procedure, full weight bearing was allowed if complete bone union was confirmed with radiographs. Patients were allowed full weight bearing immediately after an isolated soft tissue surgery.

Anteroposterior and lateral radiographs of the feet were obtained. The hallux valgus angle (HVA) and the anteroposterior intermetatarsal angle (IMA) were used. The radiographs were examined periodically for union at the site of the osteotomy. Bone



Fig. 1. Preoperative and postoperative radiographs of a patient.

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