Distal Hamstring Tendon Release in Knee Flexion Deformity

H. Grujic and T. Aparisi

Department of Orthopaedic Surgery, Karolinska Hospital, Stockholm, Sweden

Summary. Hamstring tendon release was performed in thirty-one children for correction of true knee flexion deformity due to neurological disease. The long-term results in the thirty cases (55 knees) available for review were encouraging. Functional walking capacity and independence improved in nearly all cases. No complication occurred and there was no recurrence of the deformity despite an average follow-up period of five years. The results suggest that distal hamstring tendon release can be recommended in the management of true knee flexion deformity in selected cases of cerebral palsy and meningomyelocele.

Résumé. L'allongement des tendons des muscles ischio-jambiers a été réalisé chez 31 enfants pour la correction d'une attitude vicieuse du genou en flexion, causée par un déficit neurologique. Les résultats à long terme dans les trente cas (55 genoux) qui ont pu être revus étaient encourageants. La capacité fonctionnelle de la marche ainsi que l'indépendance des malades ont été améliorées dans presque tous les cas. Aucune complication n'a été constatée. Malgré une période moyenne de cinq années d'observation aucune récidive n'a été enregistrée. Ces résultats permettent de penser que l'allongement des tendons distaux des muscles ischio-jambiers peut être recommandé pour traiter le fléssum du genou dans des cas sélectionnés d'infirmité motrice cérébrale et de spina bifida.

Key words: Cerebral palsy, Hamstring tendon release, Knee flexion deformity, Meningomyelocele

Knee flexion deformity is common in children with cerebral palsy, meningomyelocele and other neurological diseases that cause imbalance of muscle power. The causes are various but there is frequently an associated deformity of the hip and ankle joints. In patients with cerebral palsy significant hamstring spasticity associated with relative weakness of the quadriceps muscle is the common cause of deformity. In contrast, a patient with meningomyelocele has at least partial loss of voluntary muscle activity in the lower limbs and the residual muscle activity may be sufficient to cause the contracture. Reports on the surgical treatment of this kind of flexion deformity are few and the results contradictory. In patients with cerebral palsy, Silfverskiöld [14] recommended transfer of the origin of the hamstrings to the subtrochanteric region of the dorsal part of the femur, thus converting a 'two-joint muscle' to a 'one-joint' muscle. Green [7] advised lengthening the hamstring mechanism by a sliding lengthening of the tendon at one or more levels. In 1952 Eggers presented his original technique of hamstring release by transferring the insertion of the hamstring muscles to a point above the knee, thus again converting a 'two-joint muscle' into a 'one-joint muscle'. A modified version of the technique was presented by Evans and Julian [6]. Eggers' original technique in some cases caused genu recurvatum, loss of knee flexion power, decreased pelvic stability and accentuation of the lumbar lordosis [5]. Distal hamstring tenotomy was favoured by Keats and Kambin [8] whilst Seymour et al. [13] performed proximal hamstring division in cases with hamstring tightness without fixed flexion deformity of the knee. Drummond et al. [3] treated knee flexion deformity in spastic children by total release of the hamstrings from their origin. Reimers [12] compared the results of three different procedures; a modified Egger's operation, proximal...
lengthening of the hamstrings when the fixed flexion of the knee did not exceed 5° and distal lengthening of the hamstrings when more than 5° of knee flexion was present. He found that the latter two simpler procedures had several advantages over the more complicated Eggers’ operation which he subsequently abandoned.

Patients and Methods

Between 1967 and 1978 a total of thirty-three patients were operated upon for correction of knee flexion deformity, at the Department of Orthopaedic Surgery, Karolinska Hospital. Thirty patients were available for review, three having been lost to follow-up. Twenty-five patients had undergone bilateral operations and five unilateral operations, making a total of fifty-five operated knees. In twenty-four patients the primary diagnosis was cerebral palsy (CP), and in the remaining six patients meningomyelocele (MMC).

The patients’ age at the time of operation ranged from four years to twenty-two years, with a mean age of eleven years (Fig. 1). The average follow-up interval was five years, with a range from one year to twelve years.

The indication for operation was a true hamstring contracture which was measured as the angular deficit from full extension of the knee when the ipsilateral hip was flexed to 90° [12]. The knee flexion deformity thus measured ranged from 20–90° (average 45°).

In all patients with cerebral palsy any concomitant hip deformity was corrected prior to operation upon the knee, but in three of these patients a co-existing equinus deformity of the ankle was corrected at the same time as the knee operation. In four of the meningomyelocele patients an adduction and/or flexion contracture in the hip joint was corrected at the same time as the knee surgery.

Seven knees were operated upon using Eggers’ original technique. In the remaining cases selective hamstring lengthening was the preferred management, comprising Z-lengthening of the semitendinosus and gracilis tendons together with incisions of the semimembranosus fascia. Some residual flexion deformity was accepted in those cases where the neurovascular structures did not allow complete extension of the knee. The patients were treated with a plaster cast for four to six weeks post-operatively and physiotherapy was used routinely after removal of the cast.

Results

Results of operation were assessed by an analysis of the overall function of the patient, including walking ability, gait pattern, distance walked and the necessity for walking aids.

The patients were classified into three groups according to their pre-operative function. The first group, the ‘non-functional walker’, was unable to walk alone and walking was practised only as part of physiotherapy. The second group, the ‘independent indoors walker’, was able to walk indoors and for short distances outdoors with or without a walking aid. The third group, the ‘community walker’, was able to walk independently for several hundred metres outdoors either with or without aids (Fig. 2).

Cerebral Palsy Patients

In Group I (non-functional walkers), five patients became independent indoor walkers following operation and four community walkers. One of