AN ALTERNATIVE APPROACH TO MANAGING CROUCH GAIT IN THE ADOLESCENT

Benjamin Joseph

INTRODUCTION

The various abnormalities noted in children with long-standing crouch gait due to cerebral palsy include spasticity of the hamstrings, altered lengths of the hamstrings and quadriceps muscles\(^1\) and weakness of hip and knee extensors and ankle plantar flexors\(^2\). In addition, joint contracture and adaptive changes such as patella alta\(^3\) have been reported to be frequently seen in these children. In order to improve the gait pattern in children with severe crouch all these issues need to be addressed and it has been suggested that a combination of soft tissue and bony surgery followed by bracing may be required.\(^4\)

We treat older children and adolescents with severe crouch gait due to cerebral palsy with a combination of procedures specifically aimed at: 1. correction of the flexion deformity of the knee, 2. reduction in the power of the hamstrings and 3. augmenting the power of knee and hip extension.

TECHNIQUE OF SURGERY FOR THE KNEE AND POST-OPERATIVE CARE

With the patient in the supine position the distal third of the femur is exposed through a lateral incision. An osteotomy of the femur is performed in the distal third of the shaft and the proximal fragment is brought out of the wound as the knee was passively extended. The extent of overlap of the fragments that occurred is noted and that much of the femur is resected from the proximal fragment. The length of resected bone is usually between 2.5 cm and 3.5 cm; very occasionally in an adolescent with very severe deformity 5 cm may need to be resected. It is ensured that the same length of bone is resected from both sides to avoid limb length inequality. The shortened femur is fixed with a plate and screws. Care is taken to ensure that full extension of the knee is obtained before the fragments are fixed. In most instances full extension of the knee can be achieved by femoral shortening alone. If some residual flexion of the knee persists even after shortening of the femur, the distal fragment is tilted anteriorly sufficiently (~ 15 degrees) to obtain full knee extension and the fragments are fixed in this position.

The patella alta is then corrected by shortening the patellar tendon. The technique differs in skeletally mature and immature children. In skeletally mature children the patellar tendon is split longitudinally into three slips. The outer two slips are detached from the tibial tuberosity, pulled distally and buried under triangular flaps of periosteum raised from the medial and lateral surfaces of the tibia just distal to the tibial tuberosity. In skeletally immature children the lateral slips are detached from the lower pole of the patella, pulled proximally and sutured to the anterior surface of the patella. In all the children the central slip is not detached from either the proximal or distal attachment but is pulled proximally and the redundant fold is sutured onto the anterior surface of the patella. The limb is immobilized in a long leg cast for six weeks with the knee in extension.
The second stage surgery is performed with the child in the prone position six weeks after the first stage. Fractional lengthening of the biceps femoris and the semimembranous aponeurosis is done at two levels and the gracilis tendon is divided. The semitendinosus is divided close to its insertion and transferred to the back of the femur. The tendon is anchored to itself after passing it through a periosteal tunnel made close to the medial supracondylar ridge. The limb is immobilized in a long leg cast for a further period of six weeks. After cast removal physiotherapy to strengthen the quadriceps and to restore knee motion are begun. Once radiographic confirmation of sound union of the femoral osteotomy is noted, weight-bearing is permitted; no form of bracing is used thereafter.

In a cohort of patients who underwent this surgery, the gait improved and the quadriceps power and the range of knee motion increased. The flexion deformity and popliteal angle decreased significantly. Patella alta was corrected and fragmentation of the tibial tuberosity and fractures of the patella all healed. The Functional Mobility Scores and the ambulatory capacity increased in all the children. In no patient was there evidence of damage to the sciatic nerve. The results noted two years after surgery were maintained at the five year follow-up.

The method of treatment of severe crouch gait outlined here appears to be an effective and safe method of dealing with this difficult problem.


