The spastic foot: The perspective of the orthopedic surgeon

G. Gadbled *, S. Touchais , F. Gouin
Clinique chirurgicale orthopédique et traumatologique, place Alexis-Ricordeau, CHU de Nantes, 44000 Nantes, France

*Corresponding author.

Keywords: Spasticity; Surgery

Spasticity will induce changes on the contractile properties of muscle fibers: a predominance of red fibers type I, an atrophy of type II, white fibers and a decrease in the number of sarcomeres inducing a shortening of the muscle. Spastic equinovarus is best evaluated in a multidisciplinary neuro-orthopedic consultation with motor blocks to guide surgery. Surgery is indicated when significant functional impairment persists after well-conducted rehabilitation, establishing with botulinum toxin injections whether an antispastic treatment is useful or not. Surgery is the subject of a contract between the patient and the care team, with realistic goals.

Surgery may involve nerves, tendons, bones and joints. Nerve surgery aims to reduce spasticity of the muscle. The gain can be measured with motor blocks or botulinum toxin injection before surgery.

A microscope and a nerve stimulator are required to achieve selective neuromyotomies of three quarters of the motor fascicles of the spastic muscle in order to avoid overcorrection by the antagonist muscles. Tendon surgery is twofold. Tendon elongation is used for retracted muscles. Intramuscular lengthening (to the myo-tendon junction) is used when the retraction is about 2 cm. For greater retractions, intra-tendinous surgery is needed using Z-tenotomy, an open suture procedure avoiding overcorrection by the antagonistic muscles. Tenotomy may be necessary in specific situations. Tendon transfer surgery is designed to compensate for absent antagonists. Two types of bone and joint surgery can be proposed. Fusion, or arthrolysis, is rarely proposed because the deformations are extra-articular.

Arthrodesis is rarely proposed for the tibiotalar joint, generally after failure of fusion, or arthrolysis, which provides good results with few complications. A rigorous preoperative examination is essential to determine clear objectives and establish a treatment contract with the patient and family. Rigorous post-operative rehabilitation is also essential, especially adapted to the intrinsic muscles.

Keywords: Upper arm; Spasticity; Stroke; Upper arm surgery; Tenotomy

Introduction.– Most surgical procedures for spastic upper arm in stroke and traumatic brain injury patients are non functional ones. The purpose of this prospective study was to evaluate our results in terms of hygienic and esthetic objectives, but also to demonstrate the opportunity to restore some functional capacities.

Patients and methods.– Twenty-eight patients (19 men, mean age 47 years), who underwent a palliative procedure, were examined before and at least 3 months (mean 49) after surgery. For all the patients, the surgical procedure consisted in lengthening of the extrinsic hand and wrist muscles (28 transfers of FCS on FCP), associated with 11 wrist arthrodesis and nine wrist tenodesis. Twelve patients required surgical treatment of an intrinsic deformation of the fingers: tenotomy in six cases and selective neurectomy of the motor branch of the ulnar nerve in six cases.

Results.– Results concerning the correction of wrist deformity (flessum: 91° preoperative versus 2° postoperative) and the opening of the hand (palm-digital angle 3° preoperative versus 130°) were good. Palmar maceration, as well as difficulty in daily care of the hand and dressing dramatically decreased, with a Disability Assessment Scale (DAS) score passing from 10.1 to 0.8. We also observed some recovery of functional capacities for one-third of our patients, with a HOUSE score (from 0 to 8) moving from 1 to 3.5. Patients who underwent intrinsic surgery never improved the functional status of the operated hand. On the other hand, among the patients who did not have intrinsic surgery, nine developed an intrinsic deformity of the thumb or the fingers.

Discussion.– In all patients, this surgery led to a great hygienic improvement and transformed in 32% of the patients, a “not functional hand” into a “poor functional hand”.