excitability was studied by collecting responses H, M and T, and the stiffness of the ankle in passive conditions measured by applying sinusoidal perturbations.

Results. – Spastic equinovarus foot is associated with reflex hyperexcitability (ratios Hmax/Mmax average: 0.73; and T/Mmax: 0.66) related to central hyperexcitability plus hyper solicitation of muscle receptors to stretching related to the increased stiffness of visco elastic structures of the ankle (ankle passive stiffness measured average at 64 Nm/rad). This increase in passive stiffness is most probably linked with changes in elastic properties of spastic muscle and also with increased muscle rest tone by increasing the number of residual actin-myosin bridges. Lidocaine block causes a clinical improvement of all parameters associated with a decrease in reflex excitability (ratios Hmax/Mmax average: 0.24; and T/Mmax: 0.12 after block) and a significant decrease in stiffness (measured in passive condition) of 17% on average. The dominant effect of lidocaine is on the Ia afferent fibers but also by an action on the spindle sensitivity and resting muscle tone. The lidocaine block reproduces the effect of selective tiabial neurtomy on all clinical and neuromechanical parameters.

Conclusion.– We validated a complete neuromechanical protocol to study the spastic equinus foot in which it would be interesting to add the gait analysis laboratory. We show the stable long-term effectiveness of selective tiabial neurtomy in the treatment of the spastic equinus foot and finally the predictivity of the lidocaine block.


CO16-003–EN

Evaluation of the relationships between spasticity, motor deficit, kinematics and function, during a reaching movement in hemiparetic patients


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Methods.– The dominant aim is to determine whether the velocity of reaching movements involving elbow extension is mainly determined by spasticity or the motor deficit.

Conclusions.– The results of this study will be useful for the evaluation of the best treatment in patients with hemiparesis, in particular for spastic hemiparesis with elbow flexor spasticity and active range of elbow extension of at least 30°.

Keywords: Reaching; Hemiparesis; Spasticity; Function; Kinematics; Isokinetic dynamometer

Objectives.– This study aims at evaluating the relationships between motor deficit, spasticity and kinematics of the upper limb in hemiparetic patients during reaching movements.

Methods.– Twelve patients with spastic hemiparesis, troublesome elbow flexor spasticity and active range of elbow extension of at least 30° will be included.

Results.– The relationship between elbow extension angular velocity in the reaching task, and stretch reflex threshold and flexor/extensor torque during passive and active isokinetic movements will be analysed using correlations.

The relationship between flexor and extensor torque produced during concentric isokinetic movements, angular position and elbow extension angular velocity will also be analyzed.

Discussion. – This preliminary work should give indications regarding the control of voluntary movements in hemiparetic patients. The collection of quantified data will assist in the appropriate adaptation of rehabilitation protocols, taking into account patient characteristics and should also help to specify indications for different rehabilitation techniques (physical, neuro-modulating and use of botulinum toxin or other pharmacological treatments).


CO16-004–EN

Ultrasound tracking for the identification of finger flexor muscles in the hemiplegic patient for a selective injection of botulinum toxin

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Objectives.– Our study aimed at assessing the feasibility of tracking flexor digitorum profundus and superficialis by ultrasound system in stroke patients.

Material and method.– Ten post-stroke patients with an Ashworth modified score of at least two on the main upper limb muscles and with the upper limb spontaneously placed with elbow flexion, pronation of the forearm and finger flexion were included. An ultrasound probe with a high frequency of 10 MHz was used for the ultrasonographic tracking.

Conclusions.– Tracking sonography was performed in each patient’s healthy side, in the anatomical position and then flexion and pronation of the elbow and finger flexion. Then, each patient underwent an ultrasound tracking in the hemiplegic side of the flexor digitorum superficialis and the flexor digitorum profundus.

Results.– The first set of ultrasounds allowed us to establish key benchmarks. Thus, from an axial section enabling to identify the biceps the brachial artery, then the pronator teres. The flexor digitorum superficialis was viewed from humerus, ulna and radius insertion. By moving the probe down, the flexor digitorum profundus could be identified. These two muscles, as well as the accompanying noble structures can be tracked until their distal end. For patients with moderate spasticity, this technique allows a precise anatomical location of the flexor superficialis and profundus muscles. However, for patients with high spasticity this technique requires an assistant’s help.

Discussion and conclusion.– This identification technique with ultrasound system is simple and allows us to consider highly selective and safe injections of finger flexor muscles. Patients with neuro-orthopedic deformities and therefore difficult access for botulinum toxin injections could benefit from this technique.


CO16-005–EN

Goal setting and attainment pertaining to upper and lower limb function in post-stroke spasticity (PSS) patients: The Botos® Economic Spasticity Trial (BEST)

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Introduction.– Hemiplegia is often associated with a pattern of upper limb spasticity with adduction, internal rotation and flexion of the shoulder, pronation, flexion of the elbow, wrist and fingers flexion making it difficult to identify and to treat flexor digitorum superficialis and profundus with botulinum toxin.

Discussion and conclusion.– This identification technique with ultrasound system is simple and allows us to consider highly selective and safe injections of finger flexor muscles. Patients with neuro-orthopedic deformities and therefore difficult access for botulinum toxin injections could benefit from this technique.
**Methods**

**Objectives.**—To describe rehabilitation goals and attainment of upper (UL) and lower limb (LL) function in focal PSS patients, using goal attainment scaling.

**Setting.**—Inpatient rehabilitation centre.

**Design.**—Eighteen stroke patients, interval 4–6 weeks, non-functional upper limb (UL), Fugl-Meyer UL score (FM, 0–66) = 20, beginning finger flexor spasticity, randomly allocated to group A or B.

**Interventions.**—In A-patients 150 units BTX-A (Xeomin) injected into the deep novarus foot is the main cause of gait abnormalities. The efficiency of botulinum toxin type A (BoNT-A) + standard care (SC) or placebo + SC for up to 2 treatment cycles, followed by an open-label phase up to a total of 52 weeks. Eligible patients were BoNT-A naïve, demonstrated preserved function in the limb to be treated, and were considered likely to benefit from the intervention. For each patient, a principal active functional goal was defined as well as a secondary active or passive goal and the principal goal attainment was measured at the end of the randomised period.

**Subjects.**—The intent-to-treat population comprised 273 patients recruited in Canada, Germany, Sweden and the UK (59% male; mean age: 61.5 years; median time since stroke: 22.8 months). In total, 165 patients had a principal or secondary active goal concerning UL function (respectively 116 and 49), 222 patients had either a principal or secondary active goal concerning LL function (respectively 157 and 65), and 158 patients had a secondary passive goal.

For patients with an active goal pertained to UL function, the main goal categories were: ability to grasp and hold objects with either gross or fine movements (31.5%), feeding (23.6%), dressing (16.4%), and improved upper limb range of movement (12.7%). For those patients whose principal active goal pertained to LL function, most were associated with walking/mobility (89.2%) including improvements in speed, distance, gait and ability to climb stairs.

Active goals pertaining to UL were achieved by 39.5% of patients receiving BoNT-A + SC and 30.7% of patients receiving placebo + SC and active LL goals were achieved by 41.9% of patients receiving BoNT-A + SC and 45.1% of patients receiving placebo + SC. Secondary passive goals were achieved by 60.6% of the patients receiving BoNT-A + SC and 38.6% of patients receiving placebo + SC.

**Conclusion.**—More patients treated with Botox® + SC achieved their UL active goals and passive goals compared to placebo + SC.

Co16-007–EN

**Validation study of subjective spasticity questionnaire**

**Objective.**—To test the validity and reliability of a subjective questionnaire for evaluation of spasticity during daytime, sleep and activities of daily living (ADL).

**Subjects and methods.**—Our sample consisted of 50 subjects (30 male) with mean age 48.2 ± 15.3 years (ranging from 21 to 84 years). The questionnaire was constructed based on the functional classification of disability according to WHO (2001) and it is self-administered. It consists of 12 domains (Likert scale) for evaluation of the effect of pain, involuntary movement and spasticity on ADL such as sleep quality, hygiene, routine activities, social life, driving, orthosis wear and gait. Reliability was tested via Cronbach’s α coefficient. The item discriminant validity test was performed according to the severity of complaints based on clinical evaluation of spasticity via modified Ashworth scale. The construct validity was tested via item-scale correlations.

**Results.**—More than half of the patients reported that spasticity, accompanying pain and involuntary movements were getting more intense during night. Medium to severe spasticity, accompanying pain and involuntary movements were reported by 80.4%, 52.9% and 60% of the subjects, respectively. Most of the complaints were noted during walking. Internal consistency was measured by Cronbach’s α, which was found 0.96 for questions concerning pain, 0.98 for questions concerning involuntary movements and 0.97 for spasticity. The more severe the clinical grade of spasticity, the more troublesome complaints were reported by the patients in a number of questions. The Pearson correlation coefficients ranged mostly from medium (r > 0.4) to high (r > 0.6), indicating medium to high reproducible scales, respectively.

**Conclusion.**—The questionnaire is a promising, new instrument for evaluation of the subjective feeling of spasticity during night and ADL. It comes up forward to fill in the gap in the field of spasticity and it is useful for recording the effectiveness of spasticity treatment outcome and rehabilitation program.

Co16-008–EN

**Botulinum toxin for the treatment of spastic equinovarus foot in adults: Effect on gait parameters. Comparative randomized double-blind trial versus placebo**

**Objective.**—To evaluate the effects of an injection of botulinum toxin type A, compared with placebo, on gait parameters.

**Methods.**—This was a multicenter, randomised, double-blind, versus placebo study. To be included, patients had to suffer from a hemiplegia with an equinovarus foot due to stroke. A medical examination (physical examination, gait analysis using a GAITRite® system...) was performed before and 4 to 6 weeks after the injection.

**Results.**—We included 49 patients, randomised in two groups: treatment with botulinum toxin type A (n = 23) and placebo (n = 26). No significant difference at T6. Among the secondary, the disability score, namely the items pain and passive nail trimming, was less in group A at T1 and T6.