between both limbs at the second peak. This situation points out a persisting asymmetry ($p = 0.02$).

Podobarometric results show only a decreasing in the anterior pressure of the injured limb ($p = 0.09$). Stabilometric analysis reveals an increase in longitudinal swingings of the COP (m/s) along the *Y* axis which is significantly higher in operated subjects compared to healthy group ($p = 0.03$) with an evidence of lower control of anterior–posterior oscillations.

Discussion: The results of our study underline the long-term outcome effectiveness of percutaneous technique with Tenolig. This could be proved by the functional recovery of the gait patterns, which can be reached without a supervised continuous rehabilitative protocol. No complications has been described by the patients who seems to be fully satisfied from the treatment with a completely recovery of previous activities keeping a weakness feeling in the affected limb. However the elongation and strength loss of the triceps produce long-term compensatory motor strategies. These abnormalities produced an adjustment in biomechanics behavior such as a reduction of propulsion phase. Stabilometric analysis confirms our previous study. The COP (centre of pressure) swings along the *Y*-axis are significantly increased ($p = 0.0384$). These could be related to the proprioceptive impairment [3] but they could also derive from the tendon elongation, which is described from other authors [4] and confirmed by our study.

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http://dx.doi.org/10.1016/j.gaitpost.2012.12.024

C7

Quantitative kinetic and kinematic gait variables after percutaneous achilles tendon repair: Indications for rehabilitation

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Introduction: Achilles tendon rupture has become increasingly common in recent decades, especially in amateur sports. The continuing improvement of the mini-open surgical techniques has minimized the complications and permitted an early recovery of walking with patient satisfaction. However, other gait analysis studies underline the persistence of qualitative changes that could justify the persistence of the phenomenon of fatigue. Some authors [1,2] also stress that the recovery of only the biomechanical properties of the triceps muscle itself would not be qualitative indicators of its activation at different stages of the step. Therefore, the purpose of our study was to prove the effectiveness of two different rehabilitation's pathways in post-surgical recovery in the long period.

Materials and methods: We enrolled 22 subjects (21M 1F, age 42.81 ± 7.91a), which underwent percutaneous suture tecnique with Tenolig. They received the same indications for post surgical recovery (self-administered exercises at home) for a follow-up of 24 months. We identified 10 subjects who, for themselves decision, did a physiotherapy program (20 sessions). Two groups were then formed (Group A self exercises and Group B + physiotherapy) kinetic gait analysis. Data were compared with an homogeneous group of healthy subjects ($n = 19$). The study used an experimental scheme in which they were examined both limbs of each group and the results compared between the limbs of the various groups.

Results: The spatial and temporal gait parameters were comparable between the three groups. Some differences arise between the three groups in the clinical evaluation, in terms of increased ankle dorsiflexion ($p = 0.007$). Also the baropodometric analysis reveled some differences with a reduced forefoot load ($p = 0.029$) and an increased taligrada phase ($p = 0.012$). In both groups, A and B, there was a plantigrade phase reduction with a decrease of the maximum pressure peak during the toe-off. Kinematic data shows a lower plantarflexion, at toe off, in both groups compared with controls but only in the group B plantarflexion is significantly reduced ($p = 0.007$). The altered plantarflexion persists only in group B ($p = 0.002$) even comparing the angular values differences of the ankle between limbs of the two groups compared with controls. Kinetic analysis of ground reaction force (GRF) shows an increased difference between the limbs in anterior posterior force (fx), in group B, compared to the control group ($p = 0.012$) and to the group A ($p = 0.032$). This confirms a reduced compensation between the operated limb and the healthy one.

Discussion: Our data confirm, in terms of static and dynamic parameters, the effectiveness of surgery and the recovery path, while some alterations, already cited in literature [1,2] remains. Comparing the group undergone to physiotherapy with the group that did only self-administered exercises, arise significant differences in clinical, kinematic and kinetic data. However, the alterations are present in both groups, but they are more evident in patients who underwent physiotherapy. The altered phases of support is also confirmed by baropodometric examination. The increased dorsiflexion and then the muscle elongation in the rehabilitated subject could be one of causes of this difference. The study's results, even with the limitations of a low sample size, suggest that gold standard of the rehabilitation program is the recovery of the triceps surae in the propulsion phase of walking and weight control in the antero-posterior plane.

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http://dx.doi.org/10.1016/j.gaitpost.2012.12.025

C8

Surgical correction of talus foot in patients with cerebral palsy

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Introduction: The most common and thus best-known deformity in cerebral palsy (CP) is equinus foot, but in akinetic tetraplegia or in type-2 diplegia — according to Ferrari and Cioni's 2009 classification [1] — the opposite deformity occurs, i.e. talus foot. A talus foot can be a result also of excessive (iatrogenic) lenghthening of the triceps surae. The most frequent causes of excessive dorsiflex-

ion are lack of foot posture, i.e. lack of support reaction, weakness of plantarflexors, especially of the soleus, and excessive length of triceps surae (post-surgical, post-toxin o due to structural failure). The excessive length of triceps surae affects the plantar flexion — knee extension mechanism to extend the knee, which may result in quadriceps failure and finally in crouch gait with high fatigue.

Methods: We selected three children with type-2 diplegia and with the following clinical and instrumental (gait-analysis) characteristics: delay of heel-off in terminal stance, absence of push-off; reduced speed with shorter steps, reduced knee extension under load, resulting in crouch gait due to impairment of the foot plantar flexion and knee extension mmechanism. Segmental analysis: reduced activity of the triceps surae (M1/5), normal passive ankle ROM, absent active ankle ROM in plantarflexion, inability to raise on the toes. Orthoses used: Anti-talus AFOs from cast, in Estruse. The patients underwent surgical shortening of the Achilles tendon; one with bilateral procedure and two with unilateral procedure. The surgical technique consists in a full cut of the Achilles tendon approximately in the middle. Both edges are then overlapped and grasped with heavy sutures, keeping the ankle in a 20° plantar flexion [2]. Post-surgical treatment consists of a lower leg cast in equinus without weight bearing for 6 weeks. Weight bearing is resumed with a second walking cast made at 90°, to be worn for 4 weeks, followed by AFO.

Results: We reviewed the patients 6 months after the surgical procedure. Post-surgical gait-analysis (after 6 months) did not show significant differences from pre-surgical assessment concerning foot progression, delayed heel lift in terminal stance and weight-bearing knee extension deficit. The only difference was an increased gait speed and length. The activity of the triceps surae (M3/5) had recovered clinically, the active ROM in plantar flexion was improved, as was the ability to raise on the toes with support. As a consequence, anti-talus AFOs were abandoned.

Discussion: The literature describes various surgical techniques which may be used to shorten the Achilles tendon. These make use of the same procedures suggested for a traumatic tendon lesion of a previously normal muscle. We know that in CP muscles can be spastic and weak at the same time, and that surgical procedures can also be influenced by the tenodenic effect. A period of only 6 months was probably insufficient to highlight significant changes between pre-surgical and post-surgical gait-analysis. We could nonetheless assess a clinical and functional improvement highlighted by an increased active ROM in plantar flexion and abandonment of AFOs.

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http://dx.doi.org/10.1016/j.gaitpost.2012.12.026

C9

Effects of unilateral pedunculopontine stimulation on electromyographic activation patterns during gait in individual patients with Parkinson's disease

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Introduction: In Parkinson's disease (PD), the effects of deep brain stimulation of the pedunculopontine nucleus (PPTg-DBS) on gait has been object of international debate [3–6]. Some evidence demonstrated that, in the late swing-early stance phase of gait cycle, a reduced surface electromyographic activation (sEMG) of tibialis anterior (TA) is linked to the striatal dopamine deficiency in PD patients [1,2].

Methods: In the present study we report preliminary results on the effect of PPTg-DBS on electromyographic patterns during gait in individual PD patients. To evaluate the sEMG amplitude of TA, the rootmean square (RMS) of the TA burst in late swing-early stance phase (RMS-A) was normalized as a percent of theRMS of the TA burst in late stance-early swing (RMS-B). We studied three male patients in the following conditions: on PPTg-DBS/on L-dopa, on PPTg-DBS/off L-dopa, offPPTg-DBS/on L-dopa, off PPTg-DBS/off L-dopa. For each assessment the UPDRS III was filled in.

Results: We observed no difference between on PPTg-DBS/off L-dopa and off PPTg-DBS/off L-dopa in UPDRS III scores. In off PPTg-DBS/off L-dopa, patient A (right implant) showed absence of the right and left RMSA, respectively, in 80% and 83% of gait cycles. Patient B (right implant) showed absence of the right RMS-A in 86% of cycles. RMS-A of the patient C (left implant) was bilaterally normal. In on PPTg-DBS/off L-dopa, no patient showed reduced RMS-A.

Discussion: Although the very low number of subjects we evaluated, our observations suggest that PPTg plays a role in modulating TA activation pattern during the steady state of gait.

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