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### Impact of injection-guiding techniques on the effectiveness of botulinum toxin for the treatment of focal spasticity and dystonia: A systematic review

A.I. Grigoriu (Dr)<sup>a,\*</sup>, M. Dinomais (Dr)<sup>b</sup>, O. Rémy-Néris (Prof)<sup>c</sup>, S. Brochard (Dr)<sup>c</sup>

<sup>a</sup> CHRU Brest, service de médecine physique et réadaptation, CNRNC "Dr. N. Robanescu", Bucarest, Roumanie, Brest, France

<sup>b</sup> CHU d'Angers, département de médecine physique et de réadaptation, LUNAM, université d'Angers

<sup>c</sup> CHRU de Brest, service de médecine physique et réadaptation, université Bretagne Occidentale

\*Corresponding author.

E-mail address: [an\\_ir\\_ra@yahoo.fr](mailto:an_ir_ra@yahoo.fr) (A. I. Grigoriu)

**Aim** To conduct a systematic review of the impact of different injection-guiding techniques on the effectiveness of BoNT-A for the treatment of focal spasticity and dystonia.

**Methods** Articles were identified through a comprehensive search of the following computerized databases: MEDLINE via Pubmed, Academic Search Premier, Pascal, the Cochrane Library, Scopus, SpringerLink, Web of Science, EM Premium and PsychINFO. Two reviewers (AG and MD) independently selected potential studies based on pre-determined inclusion criteria. The main data were extracted. Methodological quality was graded independently by 2 reviewers using the Physiotherapy Evidence Database (PEDro) assessment scale for randomized controlled trials (RCTs) and the Downs and Black (D&B) evaluation tool for non-RCTs. Level of evidence was determined using the modified Sackett scale.

**Results** Ten studies were included. Seven were randomized. There was strong evidence (Level 1) that instrumented guiding (Ultrasound [US], Electrical-stimulation [ES], Electromyography [EMG]) was more effective than manual needle placement for the treatment of spasmodic torticollis, upper limb spasticity and spastic equinus in patients with stroke and spastic equinus in children with cerebral palsy. A few studies provided strong evidence (Level 1) of similar effectiveness of US and ES for upper and lower limb spasticity in patients with stroke and spastic equinus in children with cerebral palsy, but there was poor evidence or no evidence available for EMG or other instrumented techniques.

**Conclusions** These results strongly recommend the use of instrumented guiding techniques for BoNT-A injection for the treatment of spasticity in adults and children (ES or US) and of focal dystonia such as spasmodic torticollis (EMG). No specific recommendations can be made regarding the choice of instrumented guiding techniques.

**Keywords** Botulinum toxin; Intramuscular; Guidance; Palpation; Electric stimulation; EMG; Ultrasound

**Disclosure of interest** The authors have not supplied their declaration of conflict of interest.

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### Efficacy of neuro-orthopaedic surgery for distal lower limb spastic deformities: A retrospective study about 161 patients

A.L. Seichepine<sup>a,\*</sup>, C. Fontaine (Prof)<sup>b</sup>, M.Y. Grauwin (Dr)<sup>b</sup>, N. Buisset (Dr)<sup>c</sup>, N. Nacheff<sup>b</sup>, M. Rousseaux (Dr)<sup>d</sup>, A. Thevenon (Prof)<sup>e</sup>, E. Allart (Dr)<sup>d</sup>

<sup>a</sup> CHRU de Lille, Lille, France

<sup>b</sup> CHRU de Lille, service d'orthopédie B

<sup>c</sup> CHRU de Lille, service de neurochirurgie fonctionnelle

<sup>d</sup> CHRU de Lille, service de rééducation neurologique cérébrólésion

<sup>e</sup> CHRU de Lille, service de MPR

\*Corresponding author.

E-mail address: [annelaure@seichepine.org](mailto:annelaure@seichepine.org) (A. L. Seichepine)

**Objective** Distal lower limb deformities are frequent after a central nervous system lesion, and have a significant impact on posture, gait and activity. This study aimed at analyse neuro-orthopaedics procedures performed in such indications, considering their timing, their main functional objectives and their global efficacy on gait and walking conditions.

**Methods** One hundred sixty-one adult patients were assessed at the spasticity multidisciplinary consultation of Lille University hospital and then operated on in 2012 and 2013. Data were analysed retrospectively and included disease history, main functional objectives, nature of surgical procedures and their timing of realization and finally a qualitative analysis of analytic and functional results at the end of the treatment (with a one year post-surgery period).

**Results** Patients presented with consequences of stroke (57.8%), traumatic brain injury (11.8%), cerebral palsy (9.3%); median post-lesion period was 3.5 years. The objective for patients was an improvement of gait (94.4%) and transfer (7,5%), and a reduction in walking aids (6.8%). Ninety-six patients (59.6%) were operated on twice; in this case, the first surgical phase consisted most of time in neurotomies, the second one in tendinous and articular procedures. At the end of the treatment, goals were totally reached in 2/3 of patients and at least in part in 30% of them. Kinematic abnormalities during gait (equinus, varus, valgus, toe claws) were clearly improved. Finally, the need of assistance when walking or making transfers and the need for orthotics were significantly reduced.

**Discussion** This study confirms the efficacy of neuro-orthopaedic treatment of distal lower limb spastic deformities on gait and walking conditions. Efficacy on activities, participation and quality of life remains to be studied.

**Keywords** Spasticity; Neurotomy; Tendon lengthening; Gait; Neuro-orthopaedic surgery; Stroke

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