

## MRT-BIOMECHANICAL AND MORPHOLOGICAL FACTORS OF THE SHOULDER PATHOLOGY IN CHILDREN WITH OBSTETRICAL BRACHIAL PLEXUS PALSY: IMPACT ON REHABILITATIVE THERAPEUTICS

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Obstetrical Brachial Plexus Palsy (OBPP) is the paralysis of one or both upper limbs. The incidence is around 1.5/1000 birth. It is most often caused by excessive traction on one or more cervical nerve roots and the first thoracic nerve root during a difficult birth. In almost one quarter of these cases, children have incomplete neurological recovery. These children have more severe nerve damage and will have long-term impairment, including loss of mobility leading to bony deformities, activity limitation and participation restriction. The loss of shoulder function is the main cause of morbidity. Bone deformities including posterior migration of the humeral head are described and known to be part of the shoulder dysfunction. Little data define the pattern of muscle atrophy and muscular imbalances leading to bone deformities. The aim of the thesis is to improve the comprehension of the shoulder pathology in children with OBPP using biomechanical and morphological data in order to assist in the choice of rehabilitative therapeutics. One study(1), using MRI shoulder scans in children with unilateral palsy, aimed to quantify shoulder muscle volumes and atrophy and evaluate muscle volume balance and the association between muscle volume and strength. It demonstrated muscle atrophy variation across all the main shoulder muscles leading to muscle volume imbalances and significant correlation between muscles volumes and strength. An individualized, comprehensive 3D musculoskeletal evaluation including muscle volume evaluation was required as a prerequisite for interventions in OBPP children. The slice by slice segmentation used to obtain muscle volumes in the first study was not applicable in clinical practice. After a systematic review of the literature, methods using a reduced number of slices were proposed(2) and are developed(3). Using the available literature and these data, one protocol aiming to prevent the increase of posterior subluxation of the humeral head in babies using botulinum toxin in the internal shoulder rotator muscles was written and will begin in 2018(4).