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**ON THE ROTATIONAL DEFORMITY OF THE SHOULDER  
FOLLOWING AN OBSTETRIC BRACHIAL PLEXUS INJURY**

**AKADEMISK AVHANDLING**

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av

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## **ABSTRACT**

An internal rotation deformity of the shoulder occurs very frequently in brachial plexus birth palsy. Even though surprisingly accurate descriptions of the deformity were already published at the beginning of the 1900s, the nature of the deformity is not well understood and there is no consensus regarding surgical treatment. This thesis was aimed at improving the scientific basis for surgical treatment of the deformity.

In study I the passive mechanical properties of single cells and muscle bundles were investigated in muscle biopsy specimens harvested from the subscapularis muscle in nine children with birth palsy who had undergone open surgery for shoulder contracture. Biopsy specimens from seven healthy subjects were used as controls. Single muscle fibres from patients with birth palsy displayed a shorter slack sarcomere length and linear deformation of the fibre within a wider zone of sarcomere length. There was a greater relative increase in stiffness for fibre bundles / single fibres compared to the controls.

Study II was an investigation of the histopathology of muscle biopsies harvested from the subscapularis muscle in 13 children operated on for brachial plexus birth palsy. The majority of the subscapularis muscle biopsy samples had an essentially normal morphology and showed a predominance of type I myosin heavy chain isoform (slow fibres), while one sample showed signs of fibrosis. The findings of studies I and II are interpreted to be consistent with the theory that the shortening of the subscapularis in a majority of patients is a result of altered muscular balance following the nerve injury.

Study III was an evaluation of the results at one year after surgical correction of internal rotational deformities in the shoulders of 270 patients with birth palsy, using open subscapularis elongation and latissimus dorsi-to-infraspinatus transfer, alone or in combination. Open relocation was performed on incongruent joints. Ninety-two per cent (97 of 105) of the incongruent joint could be relocated, with an upper age limit of 12 years for the subluxed joints and 5 years for dislocated joints. There was a substantial overall mean improvement in external rotation and the Mallet score following surgery and a notable decrease in the mean internal rotation for the relocated joints, but not for the congruent joints. The trumpet sign was corrected in 83%. Adding a latissimus dorsi transfer did not result in greater improvement in the mean external rotation compared with elongation of the subscapularis alone.

Study IV was an evaluation of the long-term effects in 118 of the patients from study III, using the same protocol. There was an overall moderate decrease in the mean rotational range compared with the results at one year post surgery, while abduction remained unchanged, as did the correction of the trumpet sign. One out of four patients with relocated joints had required additional surgery in order to adjust the range of rotation or to stabilise the joint.

In conclusion, the open subscapularis elongation produced a good long-term correction of the deformity with lasting elimination of the trumpet sign and reduction of incongruent joints and with a moderate mean loss of internal rotation. Long-term monitoring of the patients operated on is recommended because of the large individual variations and the need for additional surgery in selected patients.