Obstetric Brachial Plexus Lesions

– a framework for therapy –

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Aim and outline

The aim of this thesis is to provide a conceptual framework for treatment of infants with an obstetric brachial plexus lesion (OBPL).

OBPL is a closed traction injury of a complex peripheral nerve network resulting in function loss of the upper limb which may be permanent. A large number of papers and books have been published on the subject. These papers, however, do not provide an unequivocal set of guidelines for treatment. Although progress has been made over the past years, many unanswered questions remain. The most important primary questions are 1) can nerve surgery improve functional outcome of OBPL patients, 2) how should OBPL patients be selected for nerve surgery, and 3) which surgical strategy will lead to the best result.

In order to answer these three primary questions, a number of secondary questions first need to be addressed: a) what is in actual fact the natural history of OBPL, b) can ancillary investigation, in particular electromyography, aid in selection for surgery, c) what is the value of intra-operative electrodiagnostics, d) what are the detailed results of currently performed nerve surgical techniques, e) is a specific nerve reconstruction technique superior compared to another.

The results presented in this thesis are largely based on research into our own patient cohort carried out at the Leiden University Medical Centre's Department of Neurosurgery which serves as a tertiary referral centre in the Netherlands. Each year, 50-70 new infants with OBPL are evaluated at the outpatient clinic by a multidisciplinary team. Of these, 25-35 are treated with nerve surgery. This thesis presents an analysis of the LUMC experience.

Part 1 consists of three chapters. First, a general introduction to nerve lesions, nerve surgery and OBPL. Second, a historical overview of OBPL and its surgical treatment. Third, a critical analysis of the criteria advocated by different surgeons for selecting OBPL patients for nerve surgical treatment. Part 2 looks at the origin of the lesion and its natural history. Obstetric factors related to the severity of OBPL in the LUMC patient cohort are described. In addition, a systematic literature review of the natural history is presented. Part 3 evaluates the use of electrodiagnostic studies in the preoperative and intra-operative assessment of lesion severity and its caveats. Part 4 consists of four outcome studies of nerve surgery. Three chapters describe results of the LUMC patient cohort, and one chapter presents the results of an innovative technique performed by Prof Gilbert, one of the OBPL pioneers.

In Part 5, all chapters will be summarized and discussed against the scientific background.