Chapter 6. SUMMARIES.

Summary.

The importance of symmetry of the external appearance of humans and the rarity of morphologic asymmetry in the animal world are stressed in chapter 1. The outline of this study is presented.

Chapter 2 reviews the anatomy and physiology of the facial nerve and facial muscles. A few topographic data are mentioned.

Chapter 3 first mentions the variety of causes of facial paralysis, divided according to intracranial, intratemporal, and extratemporal locations. Next, the consequences of facial paralysis are discussed, and the examination of the patient. The problems of synkinesias and other anomalies after facial nerve reconstruction or spontaneous recovery are depicted to show that nerve repair is unlikely to ever lead to normal facial muscle function. Various methods of classification of the paralysis are finally reviewed to indicate how difficult it is to compare the results presented by various authors.

The methods of treatment available for patients with facial paralysis as described in the literature are classified and each category briefly discussed in chapter 4. The possibilities and limitations of free muscle transplantation and muscle transposition are widely discussed.

Twenty-nine patients with a unilateral facial paralysis or paresis were treated with free muscle transplants, or temporal muscle flaps. In chapter 5 the survey of these patients and the description of the operations performed, are given. Electromyography and judgment of photographs of the patients' faces are the major objective means to estimate the results of the operations. Free muscle transplants to the eyelids (11 patients) in general started to function early and had good results. Electromyography showed reinervation of the transplants of 7 patients within 3 months after the operation. Denervation potentials had ceased in all but 2 patients at 6 months. Review of the photographs revealed improved closing of eyelids in most patients, apparently not at the expense of eyelid opening.

Free muscle transplants to the lips (3 patients) were unsatisfactory as far as a significant dynamic gain is concerned. The limited number of electromyographic examinations shows reinervation in 1 patient, but no reinervation in another. The third did not wish to be followed-up. The photographs were judged 9 times as improved, and 3 times as unaltered.

Free muscle transplants to the cheek (10) patients) failed to have dynamic effects in patients with a paralysis. Denervation could not be demonstrated 6 months after the operation in 7 patients, and reinervation through the motor nerve of the transplant placed as a cross-face nerve graft, could not be demonstrated in the majority. Three patients of this group had a paresis only and in 2 a muscle transplant was placed without a cross-face nerve graft. These 3 patients all showed evidence of reinervation of the muscle through neurotisation from the homolateral facial nerve. Review of the photographs showed that strengthening paretic elevators was judged positive 9 times, negative 4 times, and no opinion 4 times.

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Pedicled transposition of a temporal muscle flap after cross-face nerve transplantation (8 patients) did have dynamic effects, although the involuntary contraction of the flap synchronous with elevators of the other corner of the mouth was never convincing. Denervation of the flaps could no longer be demonstrated after 6 months in 8 patients. The flaps in at least 4 patients had a mixed innervation in the long run, by their original trigeminal nerve as shown when the patients clenched their teeth, as well as through the cross-face nerve graft. The flap in only one patient did not obtain reinnervation by facial nerve fibres, and 3 appeared to be innervated by facial nerve impulses only. The photographs showed results which for the major part were considered as improved elevation of the corner of the mouth, whereas about as many positive as negative judgments were given on pursing of the lips.

The methods and results of a study performed on biopsies of extensor hallucis and digitorurn brevis muscles of 7 patients, before and 2 weeks after denervation are mentioned in chapter 5. The biopsies were examined histochromically, (electron)microscopically, and biochemically. All biopsies showed type-grouping as evidence of an earlier denervation-reinnervation process. Furthermore, it appeared that after 2 weeks of denervation, there were no significant changes in the number of myonuclei, nor in the activity of palmitate and pyruvate oxidation. Clear changes in the ultrastructure of muscle fibres, however, were considered evidence of denervation, as was a reduced activity of cytochrome c oxidase. These findings were considered enough reason to continue predenervation of free muscle transplants until further evidence precludes its necessity.

The following conclusions were drawn.
1. The method of free muscle transplantation described may be considered as a good way of treatment of paralytic lagopthalmos and of strengthening паретic elevators of the corner of the mouth. It is a dependable method, although certain principles should be adhered to. In motivated patients it certainly counterbalances the multiple operations required. However, it is concluded, that reinnervation of muscle transplants in the check with the motor nerve of the transplant as cross-face nerve graft does not occur, or at least has no dynamic effect, and that the method should be abandoned. Free muscle transplantation to the lips without an attempt at dynamic restoration of elevators of the corner of the mouth is not a treatment of choice.
2. The strength and contraction amplitude of muscle transplants probably only warrants application to paralyzed eyelids and паретic elevators of the corner of the mouth. However, transposed muscles may give satisfactory results in the dynamic correction of paralyzed elevators of the corner of the mouth. A muscle easier to denervate and with a greater amplitude than the temporal, probably earns preference.
3. The muscle transplants were readily neurotised from the orbicularis oculi with which they had contact. The transposed muscle flaps as well were generally neurotised by the cross-face nerve transplants.
4. Pre-denervation of muscle transplants in humans is necessary until further investigations prove the contrary.

Samenvatting.
Het belang van denervatie in de diagnostiek van het onderzoek in kort beste houdde N.facialis en de mens.