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Lingual nerve injury II. Observations on sensory recovery after micro-neurosurgical reconstruction

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Abstract. The aim of this study was to report on neurosensory recovery after micro-surgical lingual nerve repair, and to evaluate the effect on recovery of age, delay in repair and gender of the patient. Seventy-four patients entered the study. The micro-surgical repair performed was direct nerve suture ($n = 71$), external neurolysis ($n = 2$) and excision of neuroma without nerve coaptation ($n = 1$). A standardized neurosensory examination was employed in all patients before surgery and during follow up. Recovery was significant for perception of all tested stimuli: feather light touch, pin prick, pointed/dull discrimination, warm, cold, location of touch, and brush stroke direction, pain perception and two-point discrimination. The rate of recovery was highest during the first 6 months. Females were more often affected than males, but recovery was not influenced by gender. The distribution of neurogenic discomfort (paraesthesia, etc.) remained essentially unchanged. Disregarding cases with poor recovery, delay of surgery had a small but significant influence on the regain of neurosensory function of the lingual nerve whereas age had no such effect. None of the patients recovered to normal. Lingual nerve injury seriously affects the quality of life of patients, and micro-surgical repair is beneficial in the absence of spontaneous recovery.

Key words: lingual nerve; nerve injury; micro-neurosurgery; nerve repair; neurosensory recovery.

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Lingual nerve (LN) injury is an unexpected complication of oral and maxillofacial surgery that may compromise sensation and taste. Patients with loss of LN function are in general seriously handicapped by recurrent tongue bite lesions, unilateral numbness, neurogenic discomfort such as paraesthesia or dysaesthesia, difficulty with pronunciation, difficulty with chewing, and loss of gustatory function in the side of the lesion. Some patients may even suffer from episodic or constant neuralgic pain (allodynia) that may be spontaneous or evoked by function, temperature changes, etc.

Some LN lesions have the potential for healing with functional regeneration dependent on the nature and extent of the injury[9,21]. A number of LN injuries tend to recover with time to an improved functional level, and some may even recover to normal or near normal function[2,3,9,12,23]. Since almost all LN injuries are discovered subsequent to termination

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of the surgery causing the injury, an exact diagnosis of the extent of the injury cannot be reached immediately. Reliable assessment of impaired neurosensory function is dependent on repeated neurosensory examinations to determine the exact degree of sensory loss[5,17].

As a general rule, nerve function in recovery should be monitored and observed over time. Micro-neurosurgical repair comes into question when nerve function has been proven to be permanently gone, and the injury may be classified as a Sunderland grade 4 or 5 lesion[20].

Several studies have concluded that LN repair is a rewarding procedure in clinical situations with a total or subtotal and persistent loss of nerve function. Disappointing[1] as well as over-optimistic neurosensory recovery has been reported[13]. More recent follow-up studies provide a more factual and detailed view[4,10,14–16,18,23]. Selected follow-up studies are summarized in Table 1.

Results of different studies may be difficult to compare, and factors with a conceivable influence on nerve recovery have not been fully clarified, such as gender, age and time elapsed from injury to repair, the use of a healing conduit, etc.

The aims of this study were to explore and describe:

- neurosensory recovery after micro-neurosurgical repair of the injured LN;
- neurosensory malfunctions associated with the injury and their change over time;
- a possible influence of age, gender and time lag between injury and surgery on neurosensory recovery.

Patients and methods

Patients that had undergone micro-neurosurgery to repair LN injury meeting the criteria mentioned below were drawn from a database of 449 injuries to oral branches of the trigeminal nerve collected consecutively during the period 1987–2005[8]. Of these, 261 were LN injuries of various aetiologies, and 86 patients suffering a total or near total loss of function underwent LN repair.

The criterion for inclusion was patients with LN micro-surgical repair ($n = 86$). The criteria for exclusion were: patients previously published ($n = 7$)[10], patients with injuries caused by other than third molar surgery (osteotomy) ($n = 2$), and patients with a follow up less than 3 months ($n = 3$). Among the latter patients, two did not respond to recalls (dropped out), and in one patient realignment of the nerve was technically not feasible due to neuroma and scar tissue where the magnitude of damaged tissue to be excised did not allow a reunion of the dissected nerve stumps. Thus, 74 patients entered the study and were allocated to groups according to type of surgical intervention.

- Group A: Lingual nerve coaptation (direct suture), $n = 67$.
- Group B: Direct lingual nerve suture + re-operation, $n = 4$.
- Group C: External neurolysis, $n = 2$.
- Group D: Excision of neuroma without realignment of the nerve, $n = 1$.

The outcome of surgery is described for each group.

Method of surgery

An incision is placed in the lingual gingival crevice from the mandibular canine to the ipsilateral second molar, and further from the disto-buccal corner of the second molar 1 cm towards the mandibular ramus. The mucoperiosteal flap is raised in its whole length to expose the structures of the floor of the mouth. The proximal stump normally presents itself with a neuroma adherent to the periosteum, and an incision of the periosteum proximal to the neuroma will enable the dissection of the proximal nerve stump including the neuroma. The distal nerve stump may be more difficult to find but usually presents itself between the scar tissue associated with the neuroma and the sublingual gland, and for the most part appears to fuse with the scar tissue. The nerve stumps are dissected in a proximal and distal direction to obtain sufficient mobility. The neuroma on the proximal stump is resected to a level of visible fascicles, and the distal stump is resected at a level without scar tissue. From this point a channel retractor resting on the medial cortex of the mandible is useful to provide space for instrumentation. The nerve stumps are brought together with a holding suture (7-0 monophilic nylon) if appropriate to overcome tension, and 6–8 epineural 8-0 monophilic nylon sutures complete the repair (Fig. 1).

Method of neurosensory assessment

All patients were examined by a standard procedure described in detail elsewhere[8–10]. Patient records included date and mode of injury, an interview addressing the patients' subjective assessment of reduced sensory function of the injured LN, and neurogenic malfunctions (paraesthesia, etc.). The perception of tactile (feather light touch, pin prick, pointed/dull discrimination), thermal (cold, 0–20 °C and warmth, 45–50 °C) and location (location of touch and brush stroke direction) sti-

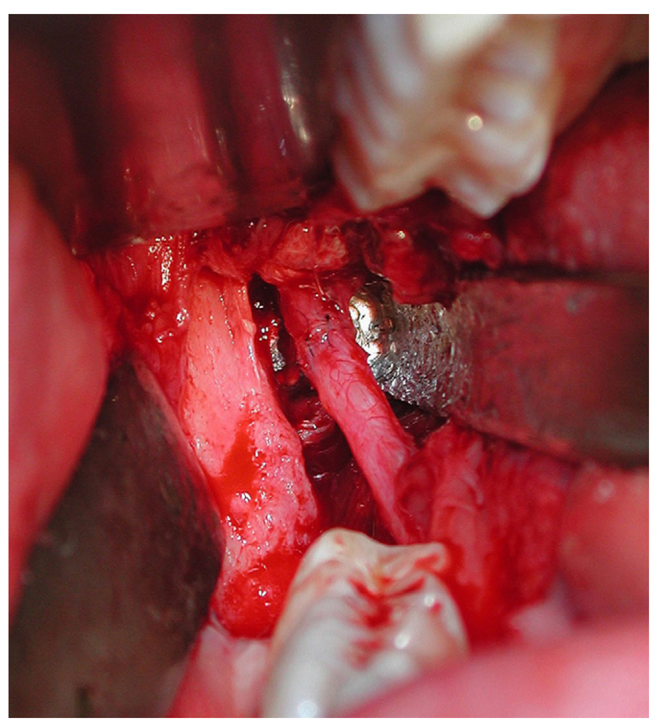

Fig. 1. Sutured LN medial to mandibular ramus.