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Experience and anatomical study of modified lengthening temporalis myoplasty for established facial paralysis☆

Ayato Hayashi [a,*], Daniel Labbé [c], Yuhei Natori [a], Hidekazu Yoshizawa [a], Hiroyuki Kudo [b], Tatsuo Sakai [b], Hiroshi Mizuno [a]

[a] *Department of Plastic and Reconstructive Surgery, Juntendo University School of Medicine, 2-1-1 Hongo Bunkyo-ku, Tokyo 113-8421, Japan*
[b] *Department of Anatomy and Life Structure, Juntendo University School of Medicine, 2-1-1 Hongo Bunkyo-ku, Tokyo 113-8421, Japan*
[c] *Service de Chirurgie Maxillo-faciale et Plastique, Caen University Hospital, Avenue côte de Nacre, 14 033 Caen, France*

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Summary Lengthening temporalis myoplasty, reported by Daniel Labbé in 1997, is a unique and definite facial reanimation procedure that involves moving the whole temporal muscle anteroinferiorly and inserting its tendon directly into the nasolabial fold. In the present article, we report our experience in the use of his modified method of the procedure, which preserves the zygomatic arch by transecting the coronoid process through the nasolabial fold incision. We also describe our cadaveric study that aimed to elucidate a secure approach for coronoid process transection.

We performed this procedure in five patients with permanent facial paralysis. To improve facial symmetry, we also performed several additional static reconstructions such as T-shaped double-sleeve fascia grafts for lower lip deformities.

We were successful in achieving considerable static improvement at rest, immediately after the surgery, and the recovery of facial movement was apparent approximately 3 months after the surgery.

With regard to the cadaveric study, we noted that the entry to the buccal fat region, which is also the pathway of the temporal fascia, was a narrow space, and a short transection of the medial upper edge of the masseter fascia would make it easy to locate the coronoid process. Therefore, for a safe and secure access to the coronoid process from the nasolabial fold, we believe that we should first expose the cranial side and continue to dissect along the side

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* Corresponding author. Tel.: +81 3 3813 3111; fax: +81 3 5802 1225.
E-mail address: ayhayasi@juntendo.ac.jp (A. Hayashi).

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and lower edge of the maxilla to locate the medial upper edge of the masseter fascia. By transecting along its edge, we could easily access the coronoid process, located immediately behind it, and widen the pathway of the temporal fascia.

This modified method is less invasive and simpler compared to the original procedure, and understanding the detailed anatomy for dissection would help surgeons perform this procedure more confidently.

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Introduction

Dynamic facial reanimation in established facial paralysis is an extremely important surgical method that restores "the smile" — the most important emotional expression in humans. Following the innovation of microsurgery by Harii et al., in 1976,[1] free muscle transfer has become the most popular method for reanimation in patients with established facial paralysis.[2–5] This would be the ideal method if the patient were able to produce a spontaneous smile with the innervation from the contralateral facial nerve. However, obtaining stable results with a free muscle transfer is difficult due to the long period required for reinnervation and the unpredictable movement of the transferred muscle.[6] Terzis reported that 67% of the patients who underwent free muscle transfer required a revision.[6]

In 1997, Daniel Labbé (coauthor) developed the lengthening temporalis myoplasty (LTM), which involves moving the whole temporal muscle anteroinferiorly and inserting its tendon directly into the nasolabial fold.[7] As the advanced temporal muscle flap, which is pedicled and innervated, directly affects the shape and movement of the nasolabial fold, this procedure has several advantages such as sufficient and expected movement of the transferred muscle, early postoperative reanimation of the face, and static improvement immediately after the surgery.[8] Because of these advantages, this procedure has gained more attention worldwide; however, it has not been widely practiced in our country[9] because the surgical procedures involved in ensuring that the temporal fascia reaches the nasolabial fold, and the transection of the zygomatic arch and coronoid process, seem complicated and invasive.

In 2009, Labbé modified his method and reported a V2 version, which is quicker and less invasive.[10] The major differences between the original and V2 versions are the coronoid process transection through the nasolabial fold incision and the preservation of the zygomatic arch.[10] In addition, excision of the temporalis aponeurosis can be limited to its posterior half to provide vascularity from the attached anterior fascia; the deep surface of the whole temporal muscle can be dissected through the posterior-half incision.[10] This seems essential in cases in which the deep temporal artery cannot be relied upon for vascularization of the temporal muscle. However, this method involves blind dissection around the infratemporal crest and therefore requires a clear understanding of regional anatomy.[10]

Here, we describe our experience with modified LTM and a cadaveric study to elucidate a secure approach for coronoid process transection through the nasolabial fold incision.

Surgical method

A unilateral zigzag incision was made from the insertion of the helix at the temporal area, and the skin flap was elevated in the subgaleal plane. For the dissection of the temporal area, we followed Labbé's V2 version initially; the dissection was performed only above the posterior half of the temporal muscle and a posterior semicircle incision was made at the temporal aponeurosis.[9] However, even with the whole temporal muscle undermined and elevated, it is difficult to mobilize the coronoid process to the nasolabial fold without cutting the anterior half of the temporal aponeurosis. Therefore, we used the original method for dissecting the temporal area after all.

The remaining temporal dissection progressed in a plane between the superficial temporal fascia and the temporal aponeurosis until a point located 15—20 mm above the zygomatic arch. An incision to the temporal aponeurosis was made 30 mm above and parallel to the zygomatic arch, and the fat pad on the temporal muscle was carefully dissected off the muscle and placed on the side of the aponeurosis (Figure 1a). After detecting the position of the coronoid process and the mandibular edge under the zygomatic arch, we made an incision in the entire temporal aponeurosis, leaving a 1 cm strip at the temporal crest and elevating the whole temporal muscle to the infratemporal fossa (Figure 1b).

Thereafter, a 4 cm incision was made at the nasolabial fold and superficial undermining of the subcutaneous layer was performed 2 cm from the incision. Then, the dissection was deepened into the buccal fat pad and the coronoid process was located via gentle manipulation (Figure 1c). After isolating the coronoid process and protecting the adjacent area, the transection of the coronoid process was performed carefully toward the mandibular notch (Figure 1d) (Supplemental video content). We pulled the temporal tendon attached to the coronoid process toward the nasolabial fold and attempted to lengthen the temporal muscle itself gradually. After the muscle was sufficiently lengthened to easily reach the nasolabial fold, we unfolded and spread out the tendon, and fixed it at three key points, which were marked preoperatively for smile restoration (Supplemental video content). We assessed the form of the

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