

A Modified Technique of Transposition of Temporalis Muscle in Selected Cases of Longstanding Facial Paralysis

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Abstract: The authors present a modified technique of temporalis muscle transposition technique in cases of longstanding facial paralysis. Slips of the temporalis fascia were passed through the tunnels to reach the contralateral para-median plane. The procedure provides 2 point of fixation to the transferred muscle. Local flaps were used for temporal hollow obliteration and for temporalis muscle elongation.

This case series included 11 patients. The modified technique was performed for all patients to reanimate the lower face while gold weight impanation in the upper eye lid was used for re-animation of the eye in 9 patients. By the end of follow up, the procedure was considered successful in 9 patients. Eight patients expressed their satisfaction and 7 patients were happy with the regained facial movement.

The modified temporalis muscle transfer technique might be a valuable option in cases of longstanding facial paralysis. The lips would be camouflaged, non-stretched and would move with the whole mid-face.

Key Words: Facial reanimation, modified technique, temporalis muscle transfer

Temporalis muscle transposition technique (TMT) to reanimate the face (in longstanding facial palsy) had been well described since early last century and had been effective through the years.¹⁻⁵ Patient/surgeon concerns had been mentioned; hence modifications were described aiming to improve the outcomes of the procedure.^{2,3,6-8}

The aim of this work was to present a modified technique of temporalis muscle transposition technique (MTMT) in selected cases of longstanding facial paralysis. Slips of the temporalis fascia (attached to the transposed temporalis muscle) were passed through preformed labial tunnels to reach the contralateral para-median plane. The procedure provides 2 points of fixation to the transferred muscle so as to lessen stretching of the lips.

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METHODS

This study was conducted at the ORL-HN Surgery department, Zagazig University Hospitals, from January 2008 to May 2017. It included patients with complete (House Brackmann-6) unilateral lower motor neuron facial paralysis (LMNL) of longstanding duration (more than 4 years).¹ The institutional review board approved the research methodology.

After patients' consents, local facial examination included: status of the eye, integrity of the trigeminal nerve, corneal reflexes, and power of the temporalis muscle (TM). Electromyography (EMG) on facial muscles (frontalis and orbicularis oris) was done for all patients.

Surgical Technique

The procedure was performed (as described in the literature^{2,3,5,6}) under general anesthesia. Simple suture tarsorrhaphy was done for corneal protection. Figure 1 demonstrates the basic design of the procedure; Figure 2 A, B, C, D illustrates the basic steps of MTMT;

Scalp Incision

The scalp incision was made just in front of the helix and extended superiorly (and slightly posteriorly) to the parietal region of the skull; it was made down to the superficial temporalis fascia (STF; which is continuous with the superficial musculo-aponeurotic system [SMAS] in the face). The STF was then elevated from the deep temporal fascial layer in a superior to inferior (pedicled on the superficial temporal artery). The flap was rotated posteriorly and protected with wet gauze (Fig. 3 A).

Temporalis Muscle Dissection

The TM covered with its deep temporal fascia (DTF) was exposed, a cutting cautery was used to outline the flap (the middle third section of the TM was used; about 2–3cm-wide) and to sharply separate the muscle from the fascio-periosteal attachment superiorly.



FIGURE 1. Illustrative basic design of the procedure.

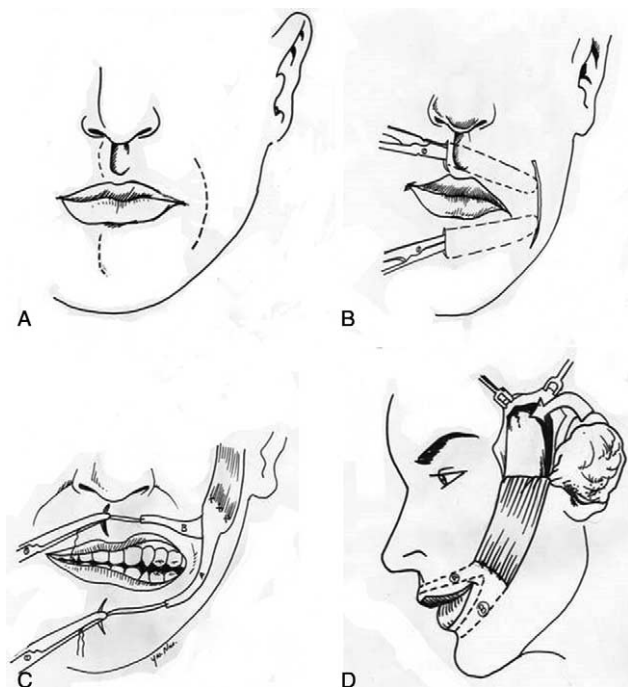


FIGURE 2. Illustrated Operative steps. A) Incisions; B) Upper and lower labial tunnels; C) Deep temporal fascial slings pulled to the contralateral philtrum; D) Final suturing and temporal hollow filling.

The DTF was sharply cut from TM at the level of the zygomatic arch (ZA) and then dissected in an inferior to superior direction till the upper fourth of the muscle. 3 to 5 Vicryl sutures (0) were applied through the fascia and muscle, for proper fixation of DTF to the muscle. DTF was then bisected for a distance of 2 cm from its tip and two 2/0 prolene sutures were placed in a figure-of-8 fashion through the end of each fascial pedicle.

Blunt dissection of the TM was carried out, to elevate the muscle from the lateral skull in a superior to inferior direction. At the lower limit of the muscle, the boundary of STF with the subcutaneous tissue (of the face) was identified and a cheek (facial) pocket to receive the TM flap was created between the STF and subcutaneous tissue (of the face) with a scissors.

Lip-Cheek Incision

Next, the incision in the lip-cheek crease was made as usual. The location for this incision was identified by the surgeon placing a finger in the corner of the mouth on the operative side and lifting the lips laterally to create a smile. The “smile fold” (or lip-cheek crease) that then appeared was the lip-cheek crease incision line; this incision was extended through the skin to the peri-orbicularis oris muscle and to the sub-mucosa. Moving back to the scalp incision, the cheek pocket was widened and a tunnel was formed with a scissors and fingers (Fig. 3 B).

The 2 fascial sutures were pulled down through the facial tunnel (with Kelly’s clamps) followed by the deep fascia and the TM.

Labial Incisions

Two vertical labial incisions were made; the first one was made in the upper lip just lateral to the contralateral philtrum while the second incision was made in the lower lip on the contralateral side of the midline (opposite the first incision); both incisions were extended vertically for about 0.5 to 1 cm through the skin and the subcutaneous tissue. Then, dissection started from the labial

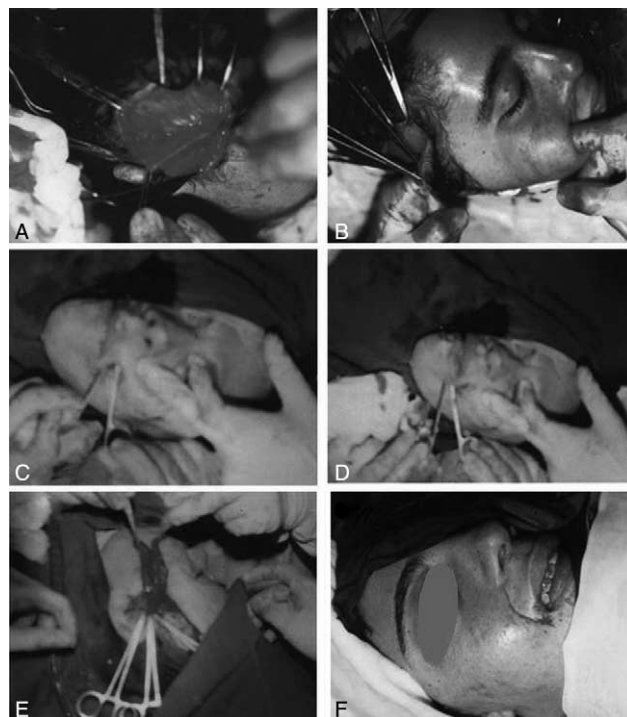


FIGURE 3. Operative steps. A) Superficial temporalis fascia flap; B) Widening of the facial tunnel; C) Upper labial tunnel; D) Lower labial tunnel; E) Deep temporal fascia slips; F) Final overcorrection.

incision (of the upper lip) using scissors through the sub-dermal plane of the lip towards the lip-cheek incision (creating the upper lip tunnel); the lower lip tunnel was created in the same fashion. Both tunnels were made wide enough for the coming fascial strips to lie flat without puckering (Fig. 3C, D, E). The TM was stabilized using 3–0 prolene sutures at 3 to 5 points (along the lateral border of the orbicularis oris muscle). The deep temporal fascia strips (attached and fixed to the transposed TM) were grasped and decussated; the upper strip was then passed through the lower lip tunnel and sutured to the dermis of the labial incision while the lower strip was passed through the upper lip tunnel and sutured to the dermis of the upper lip incision (5/0 prolene sutures). Both transfers should be set at as tight a tension as possible. At this step, TM had been sandwiched between the sub-mucosa and the subcutaneous layer of tissue with its fascial strips extended subcutaneously to the contralateral philtrum; thus we had 2 fixation points: 1 at the contralateral philtrum (upper and lower lips) and another 1 at the corner of mouth. The corner of the mouth must be overcorrected at the time of surgery (Fig. 3 F).

The Temporal Hollow Care and Final Suturing

The temporal hollow was covered with STF which was sutured to the posterior and anterior remaining parts of TM. Hemostasis was checked before inserting the suction drain and skin closure. A bulky compressive dressing was applied for the first 48 hours postoperatively. The operative time was defined as the time taken for completion of MTMT (the time of eye care was not included). The follow-up period ranged from 21 to 32 months.

Postoperative Care

Patients received a soft diet for 10 to 14 days and were advised to minimize chewing and biting. Movement at the corner of the mouth was reported within the first 2 weeks.

Physical therapy (started on the 20th postoperative day, after wound healing) was directed to work on the resting/smiling symmetry. Facial evaluation was revised at 3, 6 to 9, and 12 months, then every 6 months till the end of follow up period as follows: excellent results (patient could voluntarily create a smile that exposed the teeth), good, fair and poor results (if the corner of the mouth on the paralyzed side drooped). Results of eye reanimation procedures were evaluated as described.² Three independent judges were employed. The procedure was considered successful when results were either excellent/good and were unsuccessful with fair/poor results. Patient/relative satisfaction was reported on a 4-degree scale where 1: unsatisfied, 2 to 3: satisfied and 4: satisfied and happy.

Technical Notes

- Before creation of cheek pocket, saline solution was injected lateral to the STF in the temporal area and into the subcutaneous tissue in the face to elevate the subcutaneous tissue from the SMAS.
- The facial tunnel was enlarged to accommodate 2 fingers: wide enough for the transposed TM to lie comfortably flat.
- The electric burr (with copious saline irrigation) was applied on the ZA to reduce its thickness; thus it would adapt the coming transposed muscle and would make the zygomatic bulge (and temporal hollow) less obvious.
- The corner of the mouth should be overcorrected at the end of surgery: TM should be sutured so the first bicuspid tooth is exposed.

RESULTS

Eleven patients with longstanding LMNL (and electrical silent EMG) were included in this study; patients' basic data are presented in table S1 (see Supplemental Digital Content, <http://links.lww.com/SCS/A766>).

Outcome

The MTMT was conducted in a period of 65 to 90 minutes (mean=70±6). In the early postoperative period, no significant complications were reported. The results of transposing TM were evident 3 to 6 weeks postoperatively.

At 4 to 6 months postoperatively, mouth function was considered successful in 7 patients (63.64%). Fair results were reported in 3 patients and 1 patient had poor results. Three patients underwent revision procedures (after 13–15 months); 2 patients to tighten the muscle, and 1 to revise the facial scar.

By the end of follow up, MTMT was considered successful in 9 patients. Eight patients expressed their satisfaction (grade 3–4) and 7 patients were happy with the regained facial movement. Seven patients (of gold weight implants) were satisfied.

DISCUSSION

Long-standing facial paralysis is a catastrophic emotional ordeal with continuous negative impacts on socioeconomic/psychological status of the individual patient's life.^{1–5} Unfortunately, normal facial look had never been normally restored by any surgical technique.^{6–12} Regional muscle transfers are preferred techniques; however a tendency towards TMT among surgeons is obvious. TMT had withstood the test of time and could be considered as a reference technique.^{7,11–13}

With wide employment, TMT had reported disadvantages:

- a mass facial movement;
- it used pericranial extensions; fascia lata (or other synthetics) to provide enough length;

- it required extensive dissection of the whole muscle belly;
- a deep temporal hollow was left in the donor temporal fossa with an obvious bulge over the ZA;
- asymmetry of the mouth with lip stretching was noticed after TMT; it might be assumed to stretching forces working on the paralyzed half (the muscle force of the healthy side and the transposed temporalis muscle).^{3–5,10,11}

The MTMT could avoid obvious lip stretching as it could provide 2 points of fixation of the transferred TM: 1 at the smile fold and the other 1 at the contralateral philtrum; thus the lips would be camouflaged, non-stretched and would move with the whole mid-face; MTMT would add more thickness and viability to the lip.

The current modified technique followed previous efforts in TMT.^{1–6} It had reported less obvious temporal hollow, less obvious zygomatic bulge and used local flaps only; the STF to obliterate the temple hollow and the DTF for lengthening of the transferred TM. No fascia lata or synthetics had been used. The MTMT provided high level of patient's satisfaction.

Special Comments

- This study faced the usual difficult problem to objectively appreciate the results with no unanimous criteria.
- Because the results of muscle transposition could be enhanced by the patient's learning to activate the transposed muscle by voluntary effort, the results of the procedure were best in patients who were motivated to learn the necessary motor-sensory coordination techniques.
- The psychic relief of male patients was better than females; moreover, males showed a higher level of satisfaction than females.
- Younger patients were more cooperative and motivated than old patients.
- It is important to mention here, that patient's satisfaction was not correlated with the degree of success of the operative procedure. It means that the mere regain of facial movement could provide a good level of patient's satisfaction whatever the surgical grading is excellent, good or fair.
- No patient had demonstrated a spontaneous emotional smile response, as this procedure involves a trick movement.
- Although MTMT might look simple and easy, we advise young surgeons to practice it under senior supervision. As is often true with a new surgical modification, the technique has a learning curve; once the basic idea, concept, and steps of the procedure are refined, experience shows up, develops and practice becomes easier over time. The learning curve of MTMT was rapid.

CONCLUSION

The modified temporalis muscle transfer technique might be a valuable option in cases of longstanding facial paralysis. The lips would be camouflaged, non-stretched and would move with the whole mid-face.

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