Protocol

INTERNATIONAL JOURNAL OF SURGERY PROTOCOLS

OPEN

A new minimally invasive, nonexcisional, surgical browlift technique with minimal scarring: a protocol for a prospective observational study

Frank W. de Jongh, MD[a,*], Laurens B.R. Kooiman, MD[a], Elijah E. Sanches, MD[a], Sjaak Pouwels, MD, PhD[b,e,d], Koen J.A.O. Ingels, MD, PhD[c], Kim M.E. Wehrens, MD[a], Liang T. Tan, MD[a]

Background: The aim of this study is to prospectively evaluate the new minimal invasive (MINE) browlift technique with possibly superior results and minimal visible scarring.

Study design: A prospective observational study will be performed on all available data from patients who will undergo a browlift procedure in the HMC from 1 June 2021 till 31 May 2024. Our goal is to include at least 50 patients. Inclusion criteria are: patients with medical (i.e. brow ptosis and facial paralysis) or cosmetic indication, patients with sufficient understanding of the Dutch or English language and willingness to participate in extra study specific follow-up moments and filling in of questionnaires. Exclusion criteria are: less than 18 years of age and patients with previous brow or eyelid surgery. Patients will be photographed preoperatively and postoperatively using the VECTRA camera.

Outcome measurements: Scarring after procedure; functionality of eyebrow movement; amount of correction in brow ptosis, measured in VECTRA; longevity of procedure in months; aesthetic result as assessed by questionnaires and adverse effects of procedure will be measured.

Ethics and dissemination: The database management software 'Castor' will be used to store and collect the data from the questionnaire. The Medical Research Ethics Committee found this study not eligible to be submitted to the Dutch Medical Research Involving Human Subjects Acts (WMO). Written consent will be obtained from all patients.

Key words: browlift, minimally invasive, surgical technique, frontalis suspension, outpatient procedure, nonexcisional browlift

Background

Ptosis of the forehead or eyebrows is a common problem, especially among the elderly. With the muscles that move the eyebrows a lot of expressions can be communicated and, can be easily recognised. Laterally inclining eyebrows transmit sadness, medially inclining eyebrows transmit anger, low eyebrows transmit tiredness, drawn-up eyebrows transmit surprise and properly aligned eyebrows transmit an alert, rested state allowing the mouth to smile[1,2]. The position of the brow is affected by the corrugator supercilii, depressor supercilii, orbicularis oculi, and procerus (brow depressor muscles) and the frontalis muscle (brow elevator muscle)[3]. The motor innervation of these muscles is supplied by branches of the facial nerve. The temporal branch innervates the frontalis, the superior part of the orbicularis oculi, the transverse head of the corrugator supercilli and the superior part of the procerus muscles. The zygomatic branch innervates the inferior and medial parts of the orbicularis oculi, the inferior part of the procerus, the depressor supercilii, and the oblique head of the corrugator supercilii muscles.

Common complaints of brow ptosis are a tired and heavy feeling of the eyes; problems watching television and reading, increased tearing and a limited field of vision. Continuous activation of the scalp and forehead muscles may additionally cause tension headache and eyestrain[4]. On closer examination, the cause of this may be partly due to a too low position of the

HIGHLIGHTS

- This study is to prospectively evaluate the new minimal invasive (MINE) browlift technique.
- This technique might be associated with possibly superior results and minimal visible scarring.
- Results will be measured with the VECTRA 3D camera.
- Patient reported outcomes will be measured with validated questionnaires.

[a]Department of Plastic- Reconstructive- and Hand surgery, Haaglanden Medical Center, Den Haag, [b]Department of Intensive Care Medicine, Elisabeth-Tweesteden Ziekenhuis, Tilburg, [c]Department of Otorhinolaryngology, Head and Neck Surgery, Radboud University Medical Center, Nijmegen, The Netherlands, [d]Faculty of Health, Witten/Herdecke University, Witten and [e]Department of General, Abdominal Surgery and Coloproctology, Helios St. Elisabeth Klinik, Oberhausen, NRW, Germany

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

*Corresponding author. Address: Department of Plastic-, Reconstructive- and Hand surgery, Haaglanden Medical Center, P.O. Box 432, 2501 CK The Hague, The Netherlands. Tel.: +31 6 33782484. E-mail: f.de.jongh@haaglandenmc.nl (F.W. de Jongh).

International Journal of Surgery Protocols (2024) 28:31–36

Received 27 June 2023; Accepted 9 September 2023

Published online 16 November 2023

http://dx.doi.org/10.1097/SP9.0000000000000011

eyebrows. As a result, the skin of the upper eyelids is pushed down, as it were, so that it looks like there is too much skin there. In patients with brow ptosis, unintended emotions can be shown, which can be misinterpreted by others[5,6].

If the eyebrows are in a low position, a blepharoplasty alone makes little sense and sometimes no improvement occurs. It is better to first correct the cause of the deviation, the low position of the eyebrows, and then remove any remaining skin surplus from the upper eyelids. A wrong assumption is that the simultaneous treatment of blepharochalasis, and thus including a blepharoplasty procedure to the browlift procedure is not deemed beneficial. The added removal of upper eyelid skin in a single operation actually worsens the patient's appearance due to excessive traction of the skin, causing an increase in their brow ptosis giving the patient a tired, older and angry appearance[5,7,8]. Therefore, patients desire a difference in brow stance that is both long-lasting and appears natural. Other factors that are included in decision-making are the visibility of scars, the cost of the procedure, and practicality (procedure time, use of anaesthetics etc.).

Several techniques exist to treat ptosis of the eyebrows[5,9–18]. Some only treat brow ptosis, and other techniques are also used for treating a wide spectrum of facial aging changes. Direct browlift and the traditional fascial suspension technique tend to leave a very noticeable scar above the eyebrow[15–18]. Other options such as the (mid-) forehead browlift, coronal browlift can be used to elevate the brow in patients with deep creases who are not candidates for extensive surgical procedures, although still significant scars are made[19].

Foreheadplasty, or open browlift, techniques have also been used to lift the eyebrows, namely the forehead (pretrichial) incision, corobregmatic incision, vertex incision, lambdoidal incision, W-incisions, lambdoidal paddle incision and the interlocking M's[5]. These techniques take the same time as an endoscopic procedure and have the ability to adapt to various wrinkle, crease, and forehead hairline considerations[5]. Other techniques, such as the transblepharoplasty or transpalpebral approach, use an upper blepharoplasty to resect the corrugator muscles and divide the procerus muscle along with temporal incisions to elevate the lateral eyebrow[20,21].

In 1994 Vasconez *et al.*[22] first described the endoscopic browlift technique, which has been widely studied[10–12,14,23–32]. This is a popular technique since advantages include less scarring, alopecia, and numbness posterior to the scar. Despite a 70% satisfaction rate reported, the frequency of the endoscopic lift has been decreased in use by plastic surgeons[33]. The endoscopic browlift is also a costly and lengthy procedure that requires an operation theatre and cannot be performed on an outpatient basis. Also in endoscopic, as well as open browlift, reduced sensation has been described[34].

Although many options exist in the treatment of brow ptosis, there is of yet no golden standard. The technique developed by Dr L.T. Tan presented in our previous article[35] combines traditional browlift approaches, such as the incision sites of the pretrichial and direct browlift without excising skin, with the dissection of frontalis muscle from the periost as used in the endoscopic browlift. Our technique found high satisfaction rates on scars (72,4%) and symptom improvement (72,4%) with minimal complications (long-lasting pain ($n=4$), cosmetic deterioration ($n=3$), noticeable subcutaneous lump ($n=3$), photophobia ($n=1$), and numbness ($n=1$)) and, in addition, does not require an operation theatre since only local anaesthesia is used. Thus, our technique proves to be a more practical, cheaper alternative with an optimal functional outcome, and minimal scarring and therefore, an optimal cosmetic result, especially when compared to more traditional browlift techniques. The aim of this study is to further evaluate the clinical and cosmetic data from patients who will undergo this procedure in the future and provide for more accurate measurement of the surgical effects.

Aetiology and pathophysiology

The majority of the brow ptosis cases occur as weakening (e.g. involutional changes) or descent of the periorbital and/or facial soft tissue. This typically occurs at the temporal side of the brow first, mainly and the most temporal 1/3 of the eyebrow. Anatomically, the frontalis muscle raises the eyebrow and the frontal branch of the facial nerve is responsible for the innervation of this muscle. Normally, the frontalis muscle lifts the medial 2/3 of the eyebrow and with increasing age, the laxity of tissues (in particular collagen) combined with the descent of facial/periorbital soft tissue, patients develop lateral brow droop.

In terms of differential diagnosis, brow ptosis can occur with the following diseases:

Paralysis or weakness of the frontalis muscle

- Facial nerve palsy: Bell's palsy, acoustic neuroma, surgical trauma, birth trauma, congenital[1]
- Myasthenia gravis
- Myotonic dystrophy
- Oculopharyngeal muscular dystrophy

Involuntary contraction of the orbicularis oculi.

- Blepharospasm
- Facial dystonias

Mechanical causes (which can result in the descent of the brow)

- Neoplasm:
  1. Basal cell carcinoma
  2. Squamous cell carcinoma
  3. Keratoacanthoma
  4. Melanoma.

Objectives

There is a need to provide relevant evidence in patient care in (aesthetic) brow surgery, since most browlift techniques are done from experience and not necessarily evidence based. So therefore, we took a number of key questions into account:

1. Will the browlift relieve complaints (worthwhileness)
2. What is the longevity of the procedure?
3. How natural will the forehead region appear after surgery?
   a. Shape of the forehead
   b. Visibility of scars
   c. Abnormal wrinkles are showing as a result of pulled-up frontal muscles.
4. Will there be any unforeseen adverse effects?
   a. Numbness

The primary objective of this study is to determine if our browlift technique is comparable to or superior to existing types of browlifts using facial observation questionnaires administered preoperatively and postoperatively.

- FACE-Q
  1. Pre-operative
     - Age appraisal VAS
     - Age Appearance Appraisal
     - Face Overall
     - Forehead and Eyebrows
     - Forehead Eyebrows Scalp
     - Lines Forehead
     - Psychological
  2. Postoperative
     - Age appraisal VAS
     - Age Appearance Appraisal
     - Decision
     - Face Overall
     - Forehead and Eyebrows
     - Forehead Eyebrows Scalp
     - Lines Forehead
     - Psychological
     - Outcome
- SF-36

Methods

Research design

A prospective observational study will be performed on all available data from patients who underwent a browlift procedure in the HMC from 1 June 2021 till 31 May 2024. This study has been approved by the Medical Ethical Committee Leiden Den Haag (LDD) (project number N21.009). Our goal is to include at least 50 patients.

Inclusion criteria

- Patients with medical (i.e. brow ptosis and facial paralysis) or cosmetic indications.
- Sufficient understanding of the Dutch or English language.
- Willingness to participate in extra study specific follow-up moments and filling in of questionnaires.
- Patients with extensive comorbidities (for example neurological or psychiatric conditions), will also be included, but will also be analysed subgroups (depending on the comorbidities).

Exclusion criteria

- Insufficient understanding of the Dutch/English language.
- Less than 18 years of age.
- Patients with previous brow or eyelid surgery.

Patient anamnesis and physical examination

History

Every patient that is presented with droopy eyelids and/or eyebrows should undergo a thorough medical and family history, including at least the following aspects:

- A slowly progressive onset of the symptoms, together with a positive family history can indicate myotonic dystrophy or oculopharyngeal dystrophy.
- Assessment of possible fluctuation of the symptoms or presence of fatigue (can be present in the case of myasthenia gravis).
- A detailed history of surgery and/or trauma may point in the direction of damage to the frontal nerve or muscle scarring.
- Symptoms that could indicate a facial palsy.
- A detailed oncological history, stroke, and/or head and neck tumours.

Physical examination

A complete plastic ophthalmic examination should be conducted in every patient.

- Visual acuity, pupillary examination, and extraocular motility should be investigated.
- Cranial nerve examination including facial nerve function.
- All distances as depicted in Figure 1 should be carefully measured and noted.
- Detailed skin examination (for example is the skin resting on the eye lashes).
- The brow position should be noted with the frontalis muscle relaxed (position at or below the superior orbital rim).
- The presence of prominent dynamic and static rhytids in the forehead (this could influence the surgical plan and possible incision placement.
- The location of the hairline: high or low (this could influence the decision for an endoscopic or pretricheal forehead lift approach).
- If paralytic brow ptosis is suspected, evaluate for aberrant regeneration, or signs of previous trauma-scarring, etc.

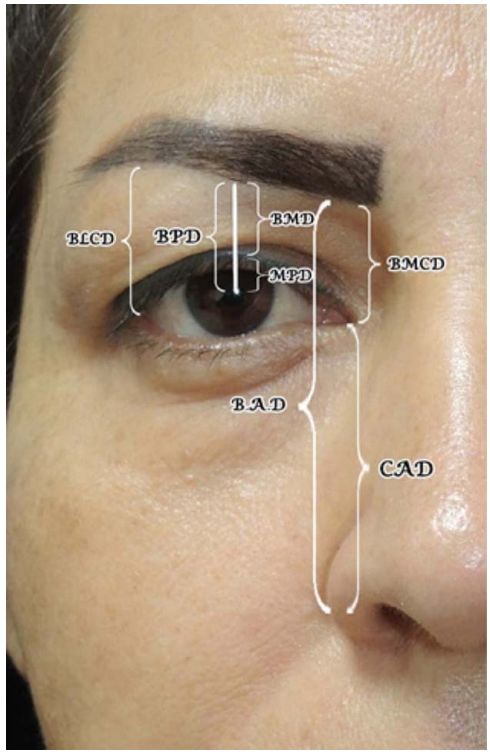

Figure 1. Photography of right eyelid and eyebrow for measurement of parameters. Measured with Emotrics software. *Informed consent was obtained for the usage of the patients photograph. BLCD, brow-lateral canthal distance; BMD, brow-lid margin distance; BAD, brow alar distance; BPD, brow-pupil distance; BMCD, brow-medical canthal distance, CAD, canthal-nasal alar distance; MPD, lid margin-pupil distance; PF, palpebral fissure height. All distances to the pupil are measured to the centre of the pupil.

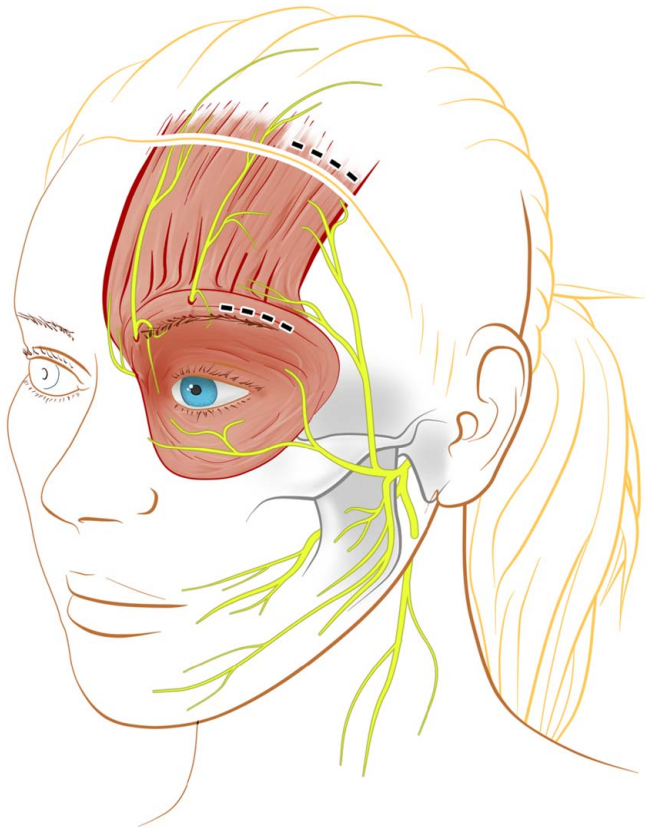

Figure 2. Graphical depiction of our technique, green lines depicts incision sites.

It is important to note that all patients with dermatochalasis and ptosis should be evaluated for concomitant brow ptosis. All patients considering blepharoplasty should be evaluated for brow repositioning surgery, and their brow ptosis should be treated concomitantly if necessary.

Surgical technique

Preoperatively the patient is informed about the procedure and information is given about (visible) scar formation, asymmetry, and postoperative pain.

The patient is evaluated in the upright position. The degree of ptosis and position of the hairline is noted and compared with the contralateral side. Manual elevation of the brow to the ideal position will help to determine how much of the visual field deficit is secondary to the brow ptosis alone. Since exuberant brow lifting may compromise eye closure, attention should be paid to any degree of lagophtalmos if present. Secondly, injections with xylocaine + adrenalin 1:100.000 are administered into the dermis and subdermal until the periost of the lateral frontalis muscle region for adequate local anaesthesia. Two horizontal incisions (~1–1,5 cm) are made, just above the lateral 1/3 of the eyebrow and the other just cranial to the hairline (if possible) in line with the frontalis muscle. These locations are chosen to avoid injury to the frontal nerve (Fig. 1). Secondly, the frontalis muscle is bluntly dissected from the underlying periost. The frontalis muscle is then suspended 2–5 mm and fixated at the cranial site to the periost of the frontal bone using a 3-0 (Ethilon) suture. Then the muscle is also suspended 2–5 mm at the caudal site using a 3-0 (firstly Ethilon, later Prolene) suture fixing it to the periost of the frontal bone. Attention is paid to achieve perfect symmetry between both sides. Finally, the skin is closed with Ethilon 5-0 sutures. The head is than wrapped with a bandage for 24–48 h. The duration of the procedure is 20–30 min. For a graphical depiction of technique, see Figure 2.

Complications

Surgical complications are relatively uncommon. However, bleeding, numbness and tingling, injury to the facial nerve resulting in paralytic brow ptosis, infection, and postoperative asymmetry have been described in browlift studies and will be documented accordingly.

Data collection

Patients with an indication for brow correction will receive information to review study specific information. After 2 weeks patients will be included in our study, see Table 1 and Table 2 (for patient assessment moments and the ways of assessment).

Demographic features of patients will be acquired, for example: patient age, race, sex, surgical indication, and level of brow depression.

Vectra XT

The Vectra XT 3D-imaging device produced by Canfield can be used for a wide variety of medical indications where accurate measurements can provide clear and clinically relevant information for both the practitioner and the patient.

A 3D-image can be easily made with the Vectra XT by correct positioning of the patient in front of the device. The device provides standard outlines; so correct positioning can be achieved relatively easy.

The device and its accompanying software subsequently provide the practitioner with some standard measurements, which can be supplemented with additional measurements.

Additionally, the Vectra XT software can automatically provide before and after surgery differences in facial measurements by overlaying the produced photographs within one patient file.

Outcomes

Since this surgery is a newer technique we chose for objective measurements (VECTRA) and PROMS (Patient Reported Outcome Measures), like the FACE –Q.

1. Scarring after the procedure.
2. Functionality of eyebrow movement.
3. Amount of correction in brow ptosis, measured in VECTRA.
4. Longevity of the procedure in months.
5. Aesthetic result as assessed by questionnaires.
6. Adverse effects of the procedure.

Methods of data analysis

Since there are no studies addressing the FACE-Q in patients with brow ptosis operated on with our technique we estimate that a 3-point difference on could be detected (before and after surgery), with a power of 80% and a significance level of 5%. Therefore, we calculate that each group should consist of 50 participants.

Table 1

Patient assessment moments.

	Time +/–	Time interval	Research actions
Preoperative	Indication statement	T-2	Provision of study information and start patient review period
Inclusion	2 weeks after indication statement	T-1	Questionnaire, Photo, Measurements (VECTRA)
Peroperative	0	T	Filming of procedure
Postoperative	1 week	T1	Stich removal and assessment of wounds
	6 week	T2	Questionnaire, Photo, Measurements (VECTRA)
	6 months	T3	Questionnaire, Photo, Measurements (VECTRA)
	12 months	T4	Questionnaire, Photo, Measurements (VECTRA)
	24 months	T5	Questionnaire, Photo, Measurements (VECTRA)
	36 months	T6	Questionnaire, Photo, Measurements (VECTRA)
	48 months	T7	Questionnaire, Photo, Measurements (VECTRA)
	60 months	T8	Questionnaire, Photo, Measurements (VECTRA)

Table 2

Photography positions and distance to patient.

Position	Degrees	Distance	Command
Anatomical (frontal)	0	50 and 90 cm	The photo needs to capture the upper limit of the head till the 'jugular notch'. If it is possible a grid function could be useful making the photos. For close-up the photo needs to capture the upper limit of the head till the 'nasal bridge'
Oblique left	45 left	50 and 90 cm	The patient's body needs to turn 45 degrees and the patient needs to look straight forward. Only turning the face is incorrect
Oblique right	45 right	50 and 90 cm	The patient's body needs to turn 45 degrees and the patient needs to look straight forward. Only turning the face is incorrect
Lateral left	90 left	50 and 90 cm	The patient's body needs to turn 90 degrees and the patient needs to look straight forward. Only turning the face is incorrect
Lateral right	90 right	50 and 90 cm	The patient's body needs to turn 90 degrees and the patient needs to look straight forward. Only turning the face is incorrect

For analyses, we will use descriptive statistics and inferential statistics. A Kolmogorov–Smirnov test, a Q-Q plot and Levene's test will first test all the data for normality. Categorical variables will be expressed as *n* (%). Continuous normally distributed variables will be expressed by their mean and SD, not normally distributed data by their median and interquartile range for skewed distributions. To test groups, categorical variables will be tested using the Pearson's χ^2test or Fisher's exact test, when appropriate. Normally distributed continuous data will be tested with the independent samples Students *t*-test and in the case of skewed data, with the independent samples Mann–Whitney *U*-test. Not normally distributed data by a Log rank test. When appropriate, for testing multiple possible factors for survival, a Cox proportional hazards analysis will be used.

Handling and storage of data and documents

The local data originating from the HMC-population will be coded. Each subsequent included and eligible case will be given a number, which is linked to the identifying patient details. The key to translate the code will be held by the main investigator in het HMC, Drs de Jongh. The coded data will be stored by the before mentioned local investigators of this study in a spreadsheet that is secured by a password only known by these investigators. Only they will therefore have access to this data. The data will be kept in storage for 15 years.

Public disclosure

The results of this study will be presented at scientific meetings and published in peer-reviewed medical journals.

Ethical approval

METC Leiden, Den Haag, Delft has approved this study. Reference number N21.009.

Consent

Oral and written informed consent will be obtained.

Sources of funding

Vectra and BAPMedical supported this research with a research grant.

Authors contribution

F.d.J., S.P., K.W., and L.T.: idea for the study; F.d.J., S.P., L.K., E.S., K.I., K.W., and L.T.: developing study design with appropriate outcome measurements; F.d.J., L.K., and E.S..: in hospital logistics; F.d.J., L.K., E.S., S.P., K.I., K.W., and L.T..: draughting the protocol; F.d.J., L.K., E.S., S.P., K.I., K.W., and L.T.: final approval.

Conflicts of interest disclosures

None.

Research registration unique identifying number (UIN)

researchregistry9197.

Guarantor

FW de Jongh.

Data availability statement

No data are associated with this manuscript.

Provenance and peer review

This paper was published as pre-print on the F1000 Research website. https://f1000research.com/articles/11-207

References

[1] Ellenbogen R. Transcoronal eyebrow lift with concomitant upper blepharoplasty. Plast Reconstr Surg 1983;71:490–9.
[2] Ellenbogen R. Medial brow lift. Ann Plast Surg 1980;5:151–2.
[3] Lee TS, Wang L, Han R, *et al*. Options in repositioning the asymmetric brow from paralysis and trauma. Facial Plast Surg 2017;33:627–38.
[4] Finsterer J. Ptosis: causes, presentation, and management. Aesthetic Plast Surg 2003;27:193–204.
[5] Sundine MJ, Connell BF. The open browlift. Facial Plast Surg 2018;34: 128–38.
[6] Connell BF, Marten TJ. The male foreheadplasty. Recognizing and treating aging in the upper face. Clin Plast Surg 1991;18:653–87.
[7] Flowers RS, Ceydeli A. The open coronal approach to forehead rejuvenation. Clin Plast Surg 2008;35:331–51.
[8] Matarasso A. Endoscopically assisted forehead-brow rhytidoplasty: theory and practice. Aesthetic Plast Surg 1995;19:141–7.
[9] Troilius C. A comparison between subgaleal and subperiosteal brow lifts. Plast Reconstr Surg 1999;104:1079–90.
[10] Dayan SH, Perkins SW, Vartanian AJ, *et al*. The forehead lift: endoscopic versus coronal approaches. Aesthetic Plast Surg 2001;25:35–9.
[11] McKinney P, Sweis I. An accurate technique for fixation in endoscopic brow lift: a 5-year follow-up. Plast Reconstr Surg 2001;108:1808–10.
[12] Jones BM, Grover R. Endoscopic brow lift: a personal review of 538 patients and comparison of fixation techniques. Plast Reconstr Surg 2004;113:1242–50.
[13] Sidle DM, Loos BM, Ramirez AL, Kabaker SS, Maas CS. Use of BioGlue surgical adhesive for brow fixation in endoscopic browplasty. Arch Facial Plast Surg 2005;7:393–7.
[14] Papadopulos NA, Eder M, Weigand C, *et al*. A review of 13 years of experience with endoscopic forehead-lift. Arch Facial Plast Surg 2012;14: 336–41.
[15] Rafaty FM, Goode RL, Fee WE Jr. The brow-lift operation. Archiv Otolaryngol (Chicago, Ill: 1960) 1975;101:467–8.
[16] Johnson CM Jr, Anderson JR, Katz RB. The brow-lift 1978. Archiv Otolaryngol (Chicago, Ill : 1960) 1979;105:124–6.
[17] Lewis JR Jr. A method of direct eyebrow lift. Ann Plast Surg 1983;10: 115–9.
[18] Ueda K, Harii K, Yamada A. Long-term follow-up study of browlift for treatment of facial paralysis. Ann Plast Surg 1994;32:166–70.
[19] Angelos PC, Stallworth CL, Wang TD. Forehead lifting: state of the art. Facial Plast Surg 2011;27:50–7.
[20] Knize DM. Limited-incision forehead lift for eyebrow elevation to enhance upper blepharoplasty. Plast Reconstr Surg 1996;97: 1334–42.
[21] Knize DM. Limited incision forehead lift for eyebrow elevation to enhance upper blepharoplasty. Plast Reconstr Surg 2001;108:564–7.
[22] Vasconez LO, Core GB, Gamboa-Bobadilla M, *et al*. Endoscopic techniques in coronal brow lifting. Plast Reconstr Surg 1994;94:788–93.
[23] de la Fuente A, Santamaría AB. Endoscopic forehead lift: is it effective? Aesthet Surg J 2002;22:113–20.
[24] Iblher N, Manegold S, Porzelius C, *et al*. Morphometric long-term evaluation and comparison of brow position and shape after endoscopic forehead lift and transpalpebral browpexy. Plast Reconstr Surg 2012; 130:830e–40e.
[25] Graf RM, Tolazzi AR, Mansur AE, *et al*. Endoscopic periosteal brow lift: evaluation and follow-up of eyebrow height. Plast Reconstr Surg 2008; 121:609–16.
[26] Graf R. Discussion: morphometric long-term evaluation and comparison of brow position and shape after endoscopic forehead lift and transpalpebral browpexy. Plast Reconstr Surg 2012;130:841e–2e.
[27] Javidnia H, Sykes J. Endoscopic brow lifts: have they replaced coronal lifts? Facial Plast Surg Clin North Am 2013;21:191–9.
[28] Jones BM, Lo SJ. The impact of endoscopic brow lift on eyebrow morphology, aesthetics, and longevity: objective and subjective measurements over a 5-year period. Plast Reconstr Surg 2013;132:226e–38e.
[29] Behmand RA, Guyuron B. Endoscopic forehead rejuvenation: II. Long-term results. Plast Reconstr Surg 2006;117:1137–43.
[30] Guyuron B. Endoscopic forehead rejuvenation: I. Limitations, flaws, and rewards. Plast Reconstr Surg 2006;117:1121–33.
[31] Ramirez OM. Why I prefer the endoscopic forehead lift. Plast Reconstr Surg 1997;100:1033–9.
[32] Stanek JJ, Berry MG. Endoscopic-assisted brow lift: revisions and complications in 810 consecutive cases. J Plast Reconstruct Aesth Surg 2014; 67:998–1000.
[33] Chiu ES, Baker DC. Endoscopic brow lift: a retrospective review of 628 consecutive cases over 5 years. Plast Reconstr Surg 2003;112:628–33.
[34] Guillot JM, Rousso DE, Replogle W. Forehead and scalp sensation after brow-lift: a comparison between open and endoscopic techniques. Arch Facial Plast Surg 2011;13:109–16.
[35] De Jongh FW, Sanches EE, Kooiman L, *et al*. A new minimally invasive surgical browlift technique with minimal scarring. J Plast Reconstruct Aesth Surg 2021. Submitted.