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Sympathetic ganglionectomy for facial blushing using application of laser speckle flow graph

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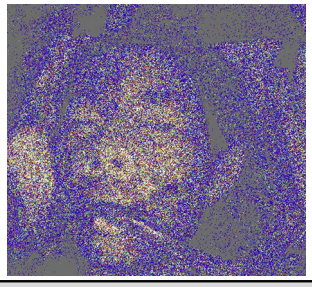
ABSTRACT

Objective: Endoscopic thoracic sympathectomy at the second rib level is considered effective as a therapeutic treatment for facial blushing. However, 10% to 15% of patients do not benefit from this intervention. No additional procedure has been developed for this disorder. Recently, ganglionectomy using application of laser speckle flow graph has been evaluated for the treatment of compensatory sweating. We report our results of ganglionectomy for facial blushing as a redo surgery.

Methods: Between August 2012 and April 2017, 8 patients with facial blushing who underwent an initial sympathectomy reported symptom recurrence. Seven patients had undergone transection of the sympathetic trunk at the second rib and 1 patient had undergone transection of the sympathetic trunk at the second and third ribs. These patients were treated using ganglionectomy guided by application of laser speckle flow graph. After temporary decreases in facial skin blood perfusion were confirmed by stimulating the sympathetic ganglions, ganglionectomy was performed.

Results: All patients' symptoms improved. There were no side effects, including deterioration of compensatory sweating, worsening of gustatory sweating, or Horner syndrome. There were no cases of mortality or conversion to open surgery.

Conclusions: This study shows the effectiveness of ganglionectomy for the treatment of facial blushing, representing a new treatment option for this condition. Considering the mechanism of facial blushing, it is important to recognize that ganglionectomy is effective after the interception of the sympathetic trunk on the cranial side. (J Thorac Cardiovasc Surg 2018;■:1-6)



Decreased skin blood flow can be seen with electrical stimulation of the sympathetic nerve.

Central Message

This study shows the effectiveness of ganglionectomy for the treatment of facial blushing, representing a new treatment option for this condition.

Perspective

Endoscopic thoracic sympathectomy at the second rib level is considered effective as a therapeutic treatment for facial blushing. However, 10% to 15% of patients do not benefit from this intervention. We report our results of ganglionectomy for facial blushing as a redo surgery. In this case series, all patients' symptoms improved with no intra- or postoperative complications.

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THOR

Facial blushing is a devastating condition that affects patient's quality of life. The effectiveness of sympathectomy for facial blushing, a redness of the face brought on by emotional or social stress, has been reported.[1,2] However, there are 10% to 15% of patients who do not benefit from currently available treatments.[1,2] Some patients report recurrence of symptoms within a short period, and others show no improvement immediately after sympathectomy.[1,2] Further complicating patient outcome, the effect of sympathectomy appears on only 1 side of the face, similar to Harlequin syndrome.[3] Sympathectomy has been known to induce compensatory sweating as a severe side effect. Thus, patients who have no amelioration of facial blushing have the possibility of developing only adverse effects after treatment. Some patients without improvement of facial blushing experience moderate to severe compensatory sweating. Almost all of

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Abbreviations and Acronyms

B = both
F = female
G2 = the second ganglion
G3 = the third ganglion.
G4 = the fourth ganglion
L = left
LSFG = laser speckle flow graph
M = male
Mo = moderate
Mi = mild
R = right
ROI = region of interest
S = satisfied
Se = severe
T2 = transection on the second rib
T3 = transection on the third rib
V = very satisfied

these patients desire to achieve a decrease in facial blushing by any means.

We have performed more than 12,000 sympathectomies to date, and very well understand the mechanism of facial blushing. The sympathetic neuron circuit of facial blushing is thought to lie in the sympathetic chain on the second rib; thus, the interruption of the sympathetic chain using knife dissection, clip appliance, laser ablation, or electrocautery was reported to be effective treatment. However, patients with no amelioration of facial blushing after sympathectomy of the second rib might have a sympathetic neuron circuit at another position. When the correct position of the neuron circuit is identified, improvement in facial blushing can be achieved with appropriate resection. We retrospectively examined the results of the reoperated patients while observing for intraoperative skin blood perfusion of the face.

METHODS

Between August 2012 and April 2017, 8 patients with facial blushing who showed insufficient results after first sympathectomy were included in this study under approval of the institutional review board at Yamamoto-Hidehiro Clinic. These patients underwent the first sympathectomy between July 2000 and August 2012. Six patients underwent simple transection of the sympathetic trunk at the second rib and 2 patients underwent transection of the sympathetic trunk at the second and third ribs. Improvement of facial blushing disappeared between 2 weeks and 1 year after sympathectomy in all patients, and all patients developed moderate to severe compensatory sweating.

All patients received a detailed consultation to evaluate personal, professional, and social handicaps related to facial blushing. Preoperative chest computed tomography imaging was performed to exclude lung or pleural disorders. All patients were assessed for the amount and area of compensatory sweating after the first sympathectomy. Additionally, a detailed medical history, including demographic data and clinical status, was documented. Informed consent was obtained in writing at least 1 day before surgery after careful explanation of the surgical procedure.

SURGICAL PROCEDURE

Ganglionectomy was performed for all patients unilaterally. On the basis of the evaluation of facial blushing and compensatory sweating, each procedure was performed with an interval of >6 months, including the summer season. The procedure was performed under general anesthesia using single lung ventilation. The patient was placed in a half-sitting position with arms abducted. Equipment included a thoracoscope, 2 mm in diameter (2-mm MiniSite Gold Laparoscope, United States Surgical Corporation, Norwalk, Conn, or 2-mm K11605AA Miniature Straight Forward, Karl Storz, Tuttlingen, Germany) and needle surgery devices consisting of 2 or 3 pieces used in the manner described by Yamamoto et al.[4,5]

A 3.0-mm skin incision was made on the midaxillary line in the armpit. After temporary disconnection of the endotracheal tube, the device was inserted, and saline solution or air was passed through the inside tube by means of a 10-mL syringe. When the tip of the central tube reached the pleural cavity, loss of resistance to the syringe was felt. Then, the central tube was removed, and the thoracoscope was inserted. The sympathetic chain and ganglions were identified at the level of the second, third, fourth, and fifth costal heads using intraoperative chest x-ray. When pneumo-pleural adhesions were found, all adhesions were divided at the location nearest to the lung as possible. When intraoperative monitoring using laser speckle flow graph (LSFG; described below) indicated the position of the target, ganglionectomy was performed. In ganglionectomy, the sympathetic ganglion must be sufficiently lifted and completely removed. Because there are many blood vessels approaching the ganglion, care must be taken to avoid excessive bleeding. All the lateral branches must be confirmed meticulously and dissected at their origin (Video 1).

After confirmation of the absence of bleeding and air leaks, the lung was inflated by the anesthetist. Air in the pleural space was expelled through the lumen of the scope sheath and the scope itself was then removed from the scope sheath. Sufficient expansion of the lung was confirmed with a second placement of the scope, and then the scope and scope sheath were fully removed. Thoracotomy tubes were not used, and the wound was closed with sterile surgical tape. All patients were discharged on the day of surgery.

INTRAOPERATIVE MONITORING

LSFG devices (LSFG-ANW, Soft Care Co, Ltd, Fukuoka, Japan or OZ-2, Omegawave, Tokyo, Japan) were applied to identify the correct position of the sympathetic nerve and ganglion associated with facial

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