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Clinical effects of submucosal middle turbinectomy for eosinophilic chronic rhinosinusitis

Kosuke Akiyama *, Yasushi Samukawa, Satoshi Takahashi, Youhei Ouchi, Hiroshi Hoshikawa

Department of Otolaryngology, Faculty of Medicine, Kagawa University, Kita-gun, Miki-cho, Ikenobe 1750-1, Kagawa 761-0793, Japan

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ABSTRACT

Objective: The preservation or resection of the middle turbinate (MT) during endoscopic sinus surgery (ESS) currently remains a matter of debate. The present study aimed to investigate the effects of submucosal middle turbinectomy (SMT) in ESS for eosinophilic chronic rhinosinusitis (ECRS).

Methods: The study included 38 ECRS patients (63 sides) who had undergone full-house ESS with SMT and 20 ECRS patients (40 sides) without SMT as a control group. Post-operative middle turbinate lateralization (MTL), synechia formation, and the patency grade of the olfactory cleft (OC) were assessed as the primary outcomes 3 months after surgery. CT scans and the T&T test were performed on the SMT group 3 months after surgery and assessed as secondary outcomes.

Results: MTL and synechia formation rates were slightly higher in the control group than in the SMT group (20% vs. 7.9%, $p = 0.072$, 17.5% vs. 9.5%, $p = 0.235$), although neither reached statistically significance. The mean patency score of OC was significantly better in the SMT group than in the control group (0.5 ± 0.6 vs. 1.3 ± 0.7, <0.001). CT findings and T&T test scores showed good improvements after SMT combined with ESS. No major adverse events occurred due to SMT.

Conclusion: We demonstrated the potential advantages of SMT for ECRS patients. This method may avoid physiological functional loss through its preservation of the mucosa and structure of the MT.

1. Introduction

In Europe and the United States, chronic rhinosinusitis (CRS) has been classified into CRS with (CRSwNP) and without (CRSsNP) nasal polyps based on their presence or absence [1]. In Japan, the incidence of CRSwNP in combination with eosinophilic-dominant infiltration has increased in recent years, and is referred to as eosinophilic CRS (ECRS) [2]. A multicenter, extensive survey called "The Japanese Epidemiological Survey of Refractory Eosinophilic Chronic Rhinosinusitis (JESREC) study" was performed in 2015 [3], and its findings revealed several clinical characteristics and diagnostic criteria of ECRS. High rates of complications including bronchial asthma or aspirin-exacerbated respiratory disease (AERD) are one of the clinical characteristics of ECRS, and hyposmia or anosmia also frequently develop in ECRS patients [3,4]. The number of cases showing early recurrence after endoscopic sinus surgery (ESS) or requiring multiple re-operations is significantly high [3]. The main purpose of ESS is to enlarge and maintain the patency of each sinus ostia in order to allow for good sinus aeration [5], and this concept is more important in ECRS. Furthermore, maintaining the patency of the olfactory cleft (OC) is an important factor because the

* Corresponding author.
E-mail address: kakaka@med.kagawa-u.ac.jp (K. Akiyama).

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incidence of olfactory disorders in patients with ECRS is high, and it often recurs in the early period following ESS [6].

One of the most common complications of ESS is middle turbinate lateralization (MTL) and synechia formation, which may obstruct the middle meatus and ostiomeatal complex (OMC) [7–9]. Edema or swelling is frequently detected in the MT during exacerbations, resulting in the closure of the OC. Therefore, the surgical management of the MT is an important factor in ESS; however, appropriate management of the MT remains controversial [10]. In the present study, we performed submucosal middle turbinectomy (SMT) for ECRS in combination with ESS in order to ensure the post-operative patency of the middle meatus and OC, and evaluated its efficacy and post-operative complications.

2. Patients and methods

2.1. Study population

This prospective study was conducted between February 2015 and May 2017. Eligible subjects were 59 adult patients who had been diagnosed with ECRS and underwent ESS in Kagawa Medical University. All patients were scored according with the JESREC scoring system [3] and underwent nasal polyp biopsy prior to surgery or intra-surgery. ECRS was diagnosed if more than 70 eosinophils per HPF were observed in an average of three eosinophil-rich portions based on the criterion of the JESREC study [3]. Patients diagnosed with ECRS underwent complete pansinectomy and SMT. Septoplasty and/or submucosal inferior turbinectomy were performed where necessary. Patients who underwent at least unilateral SMT were included in this study; however, patients for whom it was not possible to perform bilateral SMT for various reasons, such as the presence of a highly thinning MT, large concha bullosa, and MT deficits or severe adhesions from previous surgeries, were excluded. Other exclusion criteria were as follows: aged 20 years or younger, patients who dropped out of the study before the 3-month follow-up, and patients with no post-operative video endoscopic recordings during the follow-up period. Documents provided to subjects and the study design were approved by the Institutional Review Board, Faculty of Medicine, Kagawa University (approval No. Heisei 26-049). Subjects were provided with informative documents, and written informed consent was obtained after they sufficiently understood the explanation of the study by an investigator. We also retrospectively evaluated 20 ECRS patients who underwent complete pansinectomy without SMT between 2012 and 2014 and were followed up for >3 months as a control group.

2.2. Surgical procedure and peri/post-operative interventions

The surgical procedure performed was as follows: bilateral or unilateral SMT was performed at the beginning of surgery. The forepart of the MT mucosa was vertically incised using a sickle knife, and the MT bone was elevated under the periosteum with a suction elevator. The superior portion of the bone (approximately one fourth of the upper end of the vertical lamella) was intentionally preserved. The inferior portion of the MT bone was removed when hypertrophy was observed. Following bone removal, the mucosa was moved back to its original position and no sutures were necessary (Fig. 1, Video 1 in Supplementary material). If polyps or edematous mucosa were present in the MT, they were shaved with a microdebrider, and the SMT procedure was then performed. Most unilateral SMT procedures were performed in less than 5 min with only a small amount of blood loss. Bilateral ESS, including complete speno-ethmoidectomy, frontal ostial opening, maxillary sinus, and superior meatal antrostomy, so-called full-house ESS [11], was performed on all patients. When polyps were present at the OC, lesions were carefully removed using a microdebrider until sufficient OC patency was obtained. Septoplasty or/and submucosal inferior turbinectomy were performed where indicated. Nasal packing was inserted into the middle meatus for 2 days, and an absorptive gelatin sponge (Gelfoam®, Pfizer Holdings, Tokyo, Japan) was placed at the OC if the surgical treatment was performed there. An ESS

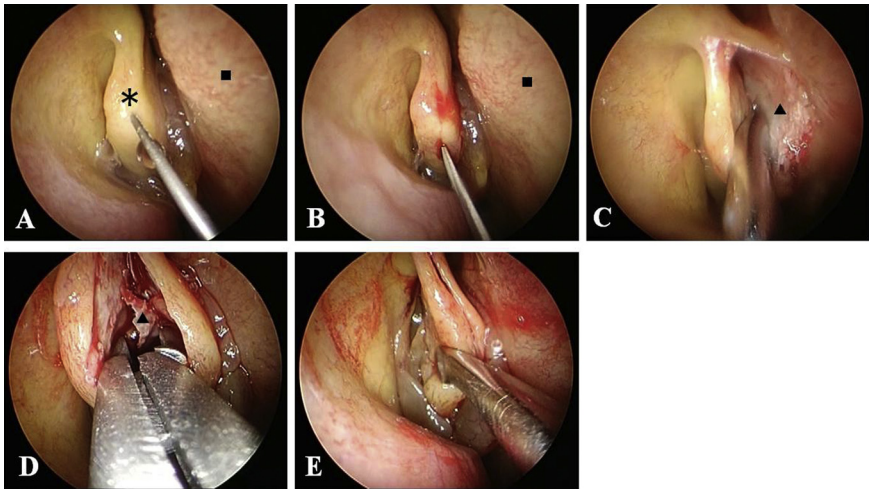

Fig. 1. During surgery. (A) Right nasal view with a rigged endoscope before starting surgery. (B) The middle turbinate mucosa was vertically incised using a sickle knife. (C) The middle turbinate bone was elevated under the periosteum with a suction elevator. (D) The bone was removed piece by piece. (E) The mucosa was moved back to its original position. The right middle meatus was more clearly observed from before surgery. *: the right middle turbinate; ■: the nasal septum; : the right middle turbinate bone.

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