

Endoscopic surgical management of sinonasal inverted papilloma extending to frontal sinuses

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ABSTRACT:

Objective: Sinonasal inverted papilloma has been traditionally managed with external surgical approaches. Advances in imaging guidance systems, surgical instrumentation, and intraoperative multi-visualization have led to a gradual shift from external approaches to endoscopic surgery. However, for anatomical and technical reasons, endoscopic surgery of sinonasal inverted papilloma extending to the frontal sinuses is still challenging. Here, we present our experience in endoscopic surgical management of sinonasal inverted papilloma extending to one or both frontal sinuses. **Methods:** We present 10 cases of sinonasal inverted papilloma extending to the frontal sinuses that were successfully removed by endoscopic median drainage (Draf III procedure) under endoscopic guidance without any additional external approach. **Results:** The whole cavities of the frontal sinuses were easily inspected at the end of the surgical procedure. No early or late complications were observed. No recurrence was identified after an average follow-up period of 39.5 months. **Conclusion:** The use of an endoscopic median drainage approach to manage sinonasal inverted papillomas extending to one or both frontal sinuses is feasible and seems effective.

KEYWORDS:

draf III, frontal sinus, inverted papilloma

INTRODUCTION

Sinonasal inverted papilloma is a commonly encountered benign tumor of the nasal cavity and paranasal sinuses. Surgical management of this lesion is often complicated because of its locally aggressive extension, high recurrence rate and potential for malignant transformation^{1–4} which occurs at rates of 1% to 5%.^{2,3} The most common attachment site (i.e. origin) of sinonasal inverted papillomas is the lateral wall of the nasal cavity.^{5,6} The standard treatment strategy is a complete, wide, local resection by an external approach. However, incomplete removal of the attachment site is the main reason for tumor recurrence.^{1–10} Recurrence rates range from 0% to 60%, depending on the surgical approach selected.^{2–4}

Several external surgical procedures, including the Denker, medial maxillectomy, lateral rhinotomy, osteoplastic flap and

midfacial degloving approaches have been used in advanced cases. Recently, endoscopic removal of benign tumors of the paranasal sinuses has increased in popularity.^{5–8} Advances in imaging, surgical instrumentation, intraoperative navigation systems and multi-angle visualization have led to a gradual shift from the external approach to endoscopic surgery. However, endoscopic surgery for sinonasal inverted papillomas extending to one or both frontal sinuses is still challenging because of the narrow working space, the angled, anatomically variable frontal recess and the proximity to the orbital tissue, olfactory fossa and anterior skull base. In the literature, there is still only a limited number of reports on endoscopic surgical treatment of patients with sinonasal inverted papillomas extending to the frontal sinuses.^{1–6} Here, we report on 10 patients with sinonasal inverted papillomas extending into one or both frontal sinuses whom we successfully treated with a combination Draf III approach (median drainage).

Our aim is to present our experience in endoscopic surgical management of this condition.

SUBJECTS AND METHODS

Patients

Ten consecutive patients with sinonasal inverted papillomas, who attended Tohoku Medical and Pharmaceutical University Hospital, Yamagata University Faculty of Medicine or our department at Yamagata City Hospital Saiseikan, Yamagata, Japan between 2008 and 2015, were enrolled in the study. The median age of these patients was 58.4 years (range 38 to 79 years) with a median disease duration of 39.5 months (range 19 to 54 months). Clinical features of the patients are shown in Table 1. The diagnosis was made on the basis of clinical data, imaging and histopathologic findings.

Surgical methods

Representative cases are shown in Figures 1 and 2. Case 1 occurred in a 47-year-old patient with no history of previous sinus surgery who presented with symptoms of chronic rhinosinusitis. Rhinoscopic examination demonstrated a soft, polypoid, white-coated mass in both nasal cavities. Preoperative axial plain computed tomography (CT) showed a total opacification of the anterior and posterior ethmoids, both frontal sinuses and both sides of the nasal cavity (Figure 1A). Tumor removal was performed under general anesthesia using 0° and 70° rigid scopes, a shaver and a curved cutting drill. After the lesion had been removed from the nasal cavity and the anterior ethmoids, bilateral full-house ethmoidectomy was performed.

At the time of surgery, the site of origin of the lesion was found to be located inside the right frontal recess and anterior ethmoid sinus. After perforation of the upper part of the nasal septum, the frontal sinus was entered in the midline and the bony bridges covering the right and left frontal recesses were drilled down with a 0.5-mm cutting burr. The residual part of the upper nasal septum was removed and the median drainage procedure completed. The tumor origin was finally detected on the medial wall of the right frontal sinus and anterior ethmoid sinus. The bone underlying the tumor origin was drilled down with a cutting bar. The whole cavities of both frontal sinuses were easily inspected with the 0° and 70° rigid scopes at the end of the surgical procedure. Intraoperative and permanent histopathological examination revealed a sinonasal inverted papilloma. One year postoperatively, endoscopic examination revealed a

nicely epithelized mucous membrane in the frontal sinuses with no signs of recurrence. (Figure 1B and C).

The next representative case (case 7) was seen in a 67-year-old male with a history of recurrent sinonasal inverted papilloma. This patient had undergone multiple polypectomies. After sinonasal inverted papilloma was finally diagnosed, a right medial maxillectomy via the sublabial approach had been performed. Four years after the last operation, endoscopic examination demonstrated an easily bleeding, white-coated residual mass in the middle turbinate. A biopsy was conducted and recurrence of sinonasal inverted papilloma was confirmed histopathologically. CT showed a total opacification of the right frontal sinus and marked thickening of the bone at the medial right intersinus septum of the right frontal sinus (Figure 2A). A median drainage (Draf III) procedure was performed with 0° and 70° rigid scopes under general anesthesia. The tumor was mobile, elastic and adherent to the mucosa of the upper part of the right frontal recess and the mucosa of the ethmoid sinus. Postoperative endoscopic examination and CT performed 1 year after the procedure revealed no signs of recurrence of the tumor (Figure 2B and C).

DISCUSSION

Involvement of one or both frontal sinuses in cases of sinonasal inverted papillomas is relatively rare and varies from 1.6% to 15% of cases.^{9),10),11)} Complete surgical resection is vital because of the tumor's locally aggressive nature, which can lead to local recurrence after incomplete resection, carrying the risk of future malignancy. Owing to the complex anatomy of the frontal sinuses and the high risk of complications and potential recurrence, a purely endoscopic approach has not been used routinely in cases of frontal sinus involvement. Traditionally, extended sinonasal inverted papilloma involving one or both frontal sinuses has been managed with a Denker, medial maxillectomy, lateral rhinotomy, osteoplastic flap or midfacial degloving procedure and with a combination of open and endoscopic approaches. These methods, however, can be associated with external scarring from facial or gingival incisions, loss of bony nasal or anterior maxillary support, infraorbital nerve paresthesia and postoperative facial swelling.

The introduction of irrigated angulated cutting burrs facilitated extended frontal sinus approaches such as Draf IIB and Draf III (median drainage). The Draf III procedure, also known as the modified endoscopic Lothrop procedure, enables visualization of the whole cavities of both frontal sinuses, making removal of the lesion originating from one or both frontal sinuses feasible in most cases.^{12)–16)}

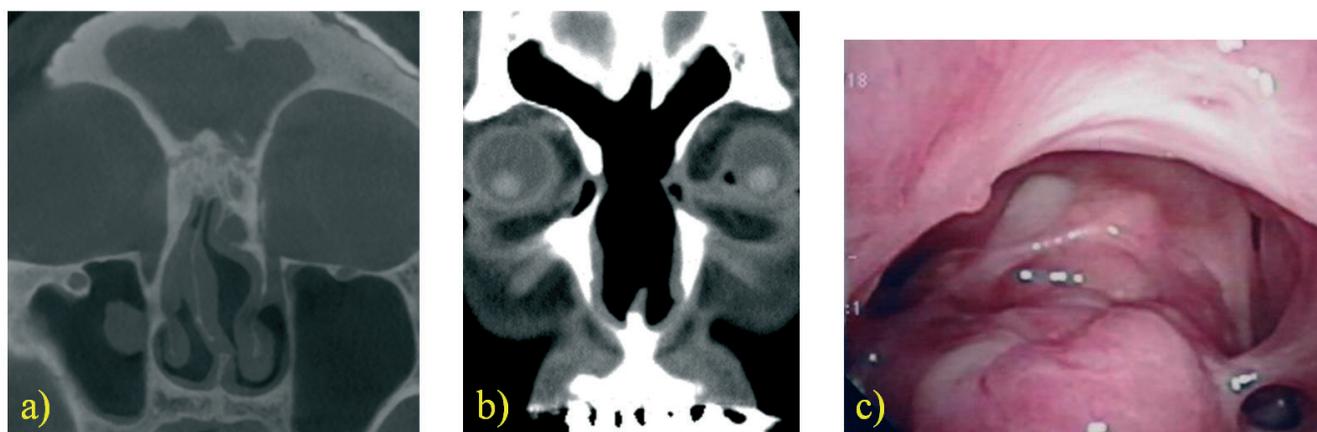


Fig. 1. (a) Preoperative axial plain CT scan shows a soft-tissue-density lesion in the right and left frontal sinuses. (b) Axial plain CT scan shows no lesions in the right or left frontal sinus one year after surgery. (c) This endoscopic view, recorded 1 year postoperatively, shows a nicely healed common opening into the two frontal sinuses.



Ryc. 2. (a) Preoperative axial plain CT scan shows a soft-tissue-density lesion in the right frontal sinus. (b) CT scan shows no lesion in the right sinus one year after surgery. (c) This endoscopic view, recorded 1 year postoperatively, shows a nicely healed common opening into the two frontal sinuses.

If the lesion is limited to the frontal recess and opacification of the frontal sinus is due to mucus retention, Draf IIa or IIb is the most convenient approach. However, if the tumor origin is bilateral or multifocal and located in one or both frontal sinuses, the median drainage (Draf III) seems to be most appropriate for endoscopic treatment. Median drainage (Draf III), which involves a complete removal of the frontal sinus floor and superior septum bilaterally, provides sufficient endoscopic access to the large part of both frontal sinuses. Although intranasal surgery can be effective in most cases, anatomical variants, such as small anteroposterior dimension of the frontal recess, can make it impossible^{17,18}. The feasibility of radical intranasal removal of sinonasal inverted papillomas extending to the frontal si-

nuses can be adequately assessed preoperatively. However, median drainage has several disadvantages in patients with disease extending to the lateral wall of a well-pneumatized frontal sinus or to the anterior wall as well as in cases of multifocal attachment.

The efficacy of endoscopic surgical management of sinonasal inverted papillomas has been supported by a systematic review of the literature which showed low recurrence and morbidity rates.^{8,9-16} In cases where the tumor is multifocal or where there are complications, the osteoplastic flap method may need to be used. For this reason, all patients should be informed preoperatively about the potential need to use an osteoplastic flap.

Tab. I. Clinical characteristics

CASE	AGE	SIDE	SYMPTOMS	ATTACHMENT SITE	PREVIOUS SURGERY	STAGE	OUTCOME	STAGE	OUTCOME
1	47M	B	Obstruction	FR, ethmoid	0	T3b	recurrence(-)	T3b	recurrence(-)
2	60M	R	Obstruction	FR, frontal	0	T3b	recurrence(-)	T3b	recurrence(-)
3	38F	B	Obstruction	FR	2	T3b	recurrence(-)	T3b	recurrence(-)
4	54F	L	Obstruction	FR, frontal	1	T3b	recurrence(-)	T3b	recurrence(-)
5	67M	R	Obstruction	FR, ethmoid	1	T3b	recurrence(-)	T3b	recurrence(-)
6	79F	B	Obstruction	ethmoid, frontal	0	T3b	recurrence(-)	T3b	recurrence(-)
7	67M	R	Obstruction	ethmoid, frontal	2	T3b	recurrence(-)	T3b	recurrence(-)
8	28F	B	Foreheadache	FR, frontal	2	T3b	recurrence(-)	T3b	recurrence(-)
9	58M	L	Obstruction	FR	1	T3b	recurrence(-)	T3b	recurrence(-)
10	61F	L	Obstruction	FR, ethmoid	1	T3b	recurrence(-)	T3b	recurrence(-)

M: male; F: female; R: right; L: left; B: both sides; FR: frontal recess; ethmoid: ethmoid sinus; frontal: frontal sinus; obstruction: nasal obstruction

In all of the cases in our series, during planning of the procedure we expected that multifocal involvement would present because of the patients' common history of multiple previous procedures. The frontal recess is the most common attachment site of inverted papillomas extending to the frontal sinuses. The advantages of median drainage (Draf III) are the lack of external scarring, no infraorbital nerve paresthesia, shorter hospital stay, less intense postoperative pain, smaller postoperative facial swelling, lower blood loss and a low morbidity rate.

CONCLUSIONS

We found here that sinonasal inverted papillomas involving the frontal sinuses could be treated effectively with a median drainage procedure. The need for an open approach is limited to cases with a massive involvement of the frontal or supraorbital cells. Median drainage (Draf III) avoids facial scarring and provides better intraoperative visualization of the tumor's site of origin. It is also associated with low rates of surgical morbidity.

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