

Different characteristics of a single sinonasal inverted papilloma from sequential PET-CT

A case report

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Abstract

Rationale: Inverted papilloma (IP) is a benign tumor that should be monitored carefully because it frequently recurs and has the potential to become malignant.

Patient concerns : We report a case of a 59-year-old woman who presented with a mass which had been found incidentally on positron emission tomography computed tomography (PET CT).

Diagnoses: Using endoscopy and CT, the preoperative diagnosis was inverted papilloma. PET CT showed a mass with hot uptake in the left ethmoid and frontal sinus (maximum standardized uptake value (SUVmax) = 7.80).

Interventions: We performed endoscopic sinus surgery (ESS) using 4 mm 0° and 70° endoscopes under general anesthesia. After 15 months of follow-up, remnant masses existed in the left frontal and supraorbital ethmoid cells. In the second PET CT taken at this time, a mass with lower SUV compared to the preoperative PET was observed in the lateral side of the left frontal sinus (SUVmax= 1.71). Revision ESS was performed using the “above and below” technique.

Outcomes: Two years after initial surgery, follow-up CT showed there was no tumor recurrence in the frontal sinus or supraorbital ethmoid cell. There were no complications such as numbness in the forehead area after the operations.

Conclusion: If the tumor is located at a site that is difficult to reach with an endoscope alone, it is faster and less painful to choose a more convenient approach for the patient and it can avoid unnecessary cost burden. It should also be noted that the SUV of PET is not a tool to distinguish IP from other inflammatory polyps or cancer.

Abbreviations: CT = computed tomography, ESS = endoscopic sinus surgery, IP = inverted papilloma, MRI = magnetic resonance imaging, PET = positron emission tomography, SCC = squamous cell carcinoma, SUV = standardized uptake value.

Keywords: frontal sinus, inverted, papilloma, positron emission tomography, recurrence

1. Introduction

Inverted papilloma (IP) is a well-known benign tumor of the paranasal sinus and nasal cavity. Because of the potential to become malignant, the risk of tumor recurrence, and its local invasive nature, it is treated differently from other benign tumors such as osteoma or hemangioma. IP is usually found in the lateral wall of the nose, the medial maxillary sinus, but rarely in the

sphenoid sinus or frontal sinus. The endoscopic finding of grape clusters or hyperostosis on computed tomography (CT) is an important but not an accurate predictor of IP.^[1] Viewing the convoluted cerebriform phase (CCP) with magnetic resonance imaging (MRI) may be helpful in the diagnosis of IP and detection of its origin, but it is not always accurate.^[2] Histologic examination is the only definite diagnosis of IP. Positron emission tomography (PET CT) can be a useful diagnostic tool in some studies^[3,4]; however, some authors have pointed out that PET cannot distinguish malignant tumors from IP.^[5]

The most important aspect of the treatment is complete surgical resection of IP; however, it may be difficult to remove in one operation depending on its location. It is necessary to evaluate the site of origin of the tumor before surgery because it is important to plan the operation in advance to reduce the operation time and to prepare the surgical tools. In this study, we report a sequential PET CT changes in the case of a double operation in which the site of origin of the IP was difficult to access.

This study was approved by the institutional review board of Chonbuk National University Hospital, Korea. Informed consent was given by the patient.

2. Case report

A 59-year-old woman presented with a mass which had been found incidentally on PET CT. She had a history of hypertension

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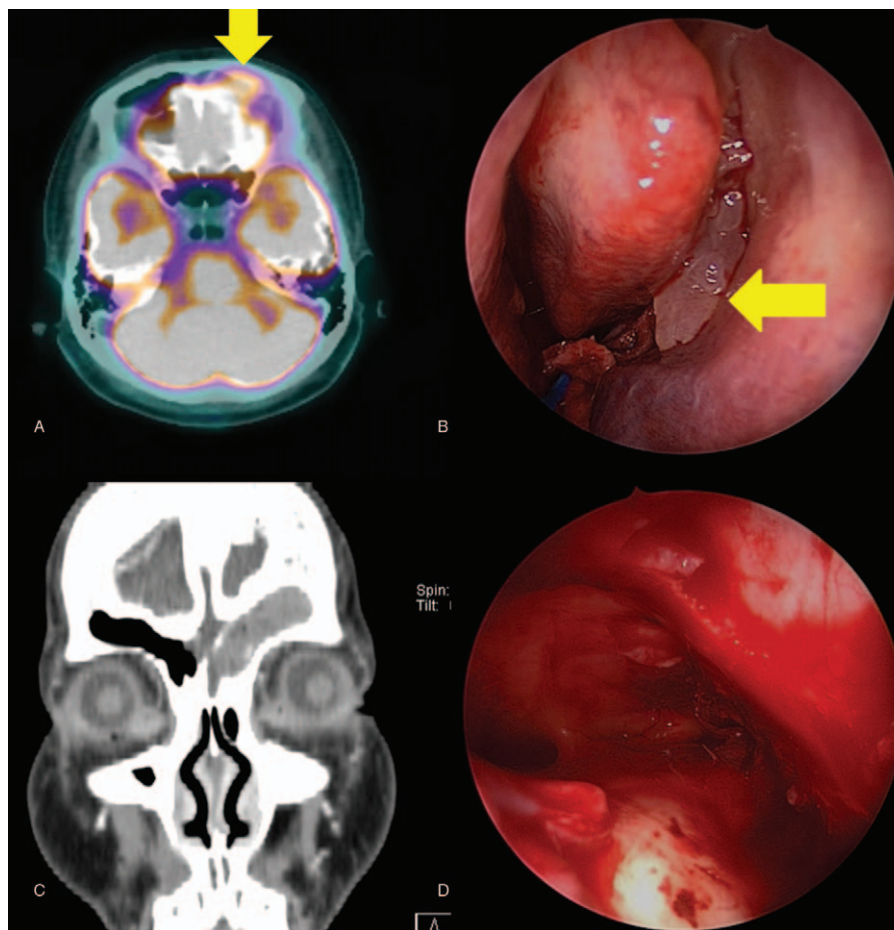


Figure 1. (A) PET CT showed a mass (yellow arrow) with hot uptake in the left ethmoid and frontal sinus (SUVmax=7.80). (B) On nasal endoscopy, a polypoid mass (yellow arrow) was observed between the left bulla and uncinata process. (C) CT revealed a soft tissue density filling in the left frontal and ethmoid sinus with calcification. (D) Endoscopic surgery was performed as far as possible on the left frontal area. CT=computed tomography, PET=positron emission tomography, SUV=standardized uptake value.

and, 6 years earlier, had been diagnosed with a 4 mm size well defined solitary pulmonary nodule. Three years later, CT-guided biopsy was performed and histopathologic examination showed adenocarcinoma in situ. The patient underwent left upper lung lobectomy under general anesthesia. In the course of follow-up, she underwent PET CT at 2-year intervals. This showed a mass with hot uptake in the left ethmoid and frontal sinus (SUVmax = 7.80) (Fig. 1A).

On nasal endoscopy, a polypoid mass was observed between the left bulla and uncinata process, and a biopsy was performed in the outpatient setting, resulting in diagnosis of an inflammatory polyp (Fig. 1B).

There were no specific symptoms for diagnosis of nasal disease. CT, revealed a soft tissue density filling in the left frontal and ethmoid sinuses with calcification; however, we were not certain that the mass was IP because it did not show cerebriform appearance or contrast enhancement (Fig. 1C).

The patient underwent endoscopic sinus surgery (ESS) under general anesthesia using 4 mm 0° and 70° endoscopes. In the frozen biopsy sent out during the operation, IP was diagnosed with a diffuse origin in the left ethmoid and frontal sinus. Left frontal sinusotomy, ethmoidectomy, and maxillary antrostomy

were performed. Endoscopic surgery was performed as far as possible on the left frontal area and electrocautery of the primary site was completed (Fig. 1D). We tried to remove the whole IP in the frontal sinus; however, we were not convinced that the lateral aspect of the frontal sinus was removed completely.

After 15-month follow-up, remnant masses were present in the left frontal and supraorbital ethmoid cells. In the second PET CT taken at this time, a mass with decreased uptake compared to the preoperative PET CT was observed in the lateral side of the left frontal sinus (SUVmax= 1.71) (Fig. 2A). The masses appeared to originate from the entire lateral aspect of the left frontal sinus and the supraorbital ethmoid cell (Fig. 2B and C).

Revision ESS was performed and trephination of the frontal sinus using a 3 mm diamond drill was carried out using the “above and below” technique. The mass in the lateral recess observed through the frontal trephination is shown in Figure 2D. The masses in the frontal sinus and supraorbital cell were completely removed through the trephination site using a frontal curette (Fig. 3A and B). There were no complications such as numbness in the forehead area after the operation. At 2 years after revision surgery, follow-up CT

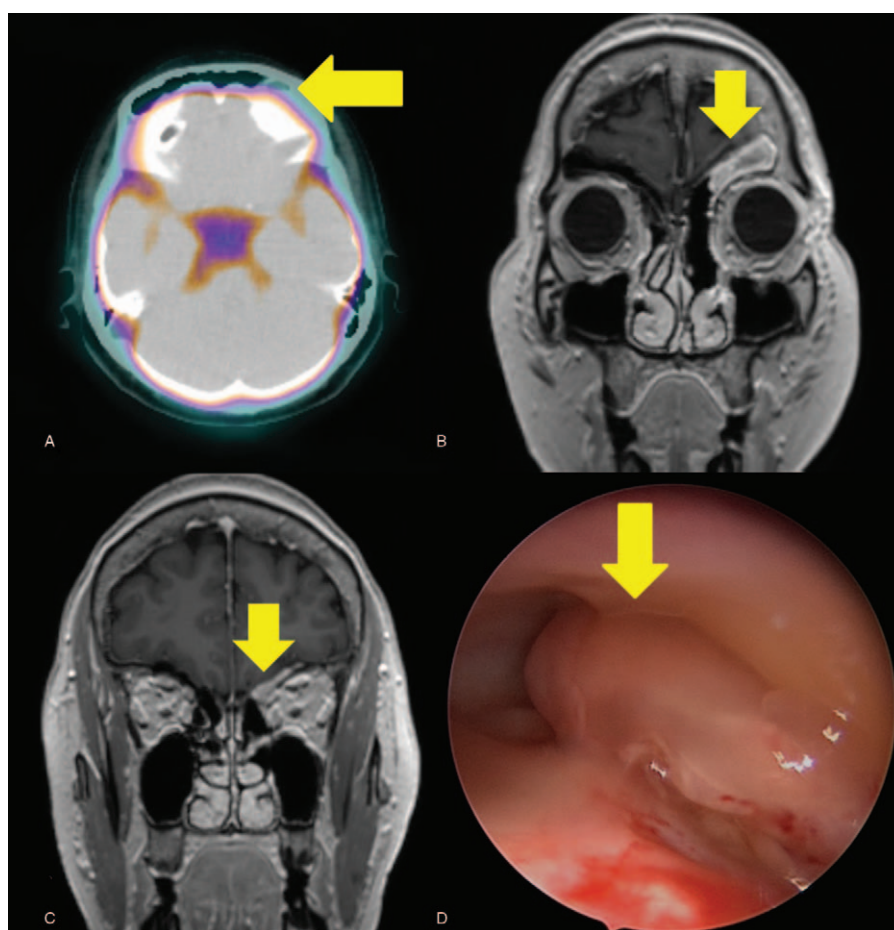


Figure 2. (A) Mass with decreased uptake compared to the preoperative PET (yellow arrow) was observed in the lateral side of the left frontal sinus (SUVmax=1.71). (B) In T1-enhanced weighted image, the mass (yellow arrow) appeared to be originating from the entire lateral aspect of the left frontal sinus. (C) In T1-enhanced weighted image, the mass (yellow arrow) appeared to be originating from the left supraorbital ethmoid cell. (D) The mass in the lateral recess of the frontal sinus was observed (yellow arrow) through the frontal trephination site. PET=positron emission tomography, SUV=standardized uptake value.

showed that there was no tumor recurrence in the frontal sinus or supraorbital ethmoid cell (Fig. 3C and D).

3. Discussion

In the treatment of IP, an external approach was used before the development of endoscopy. Since 1990, endoscopy was introduced and endoscopic sinus surgery is now widely used. In fact, a recent meta-analysis has shown that ESS reduces IP recurrence by 44%.^[6] However, in that paper, the authors reported that the higher the Krouse staging, the higher the IP recurrence rate when using the endoscopic method alone.

One of the peculiarities of the IP setting in our patient was that it originated from the frontal sinus and supraorbital ethmoid cell, which are the most difficult locations to access surgically among the lowest incidence areas.^[7] An external approach, such as an osteoplastic approach, is required where multiple origins are present or where conventional endoscopic approaches are difficult.^[8] In our case, the primary site was removed by inserting an endoscope and surgical instrument through the trephination site on the frontal sinus.

Thus, in nasal surgery, for an S-shaped pathway where access for endoscopes or tools is limited and visibility is difficult (e.g., the lateral aspect of the pneumatized frontal sinus or supraorbital cell), existing rigid 30° or 70° endoscopes can be used by drilling a hole in the frontal bone via an external approach. It is possible to access both the frontal lateral side and the supraorbital cell with the 30° or 70° endoscopes via the trephination site.

Unusually, due to the history of lung cancer, this patient had sequential PET CT images. When PET was initially performed, SUVmax on PET CT was as high as 7.80. After initial ESS, the histological results confirmed IP without squamous cell carcinoma (SCC). The residual mass in the lateral aspect of the frontal sinus showed SUV as low as 1.71. This is the first report of a serial and significant change in SUV from PET CT in the same lesion and in the same patient. According to the previous literature, it was possible to distinguish IP and SCC from an inflammatory polyp using PET-CT.^[3] However, it was difficult to distinguish IP from an inflammatory polyp or SCC using only the SUV value.

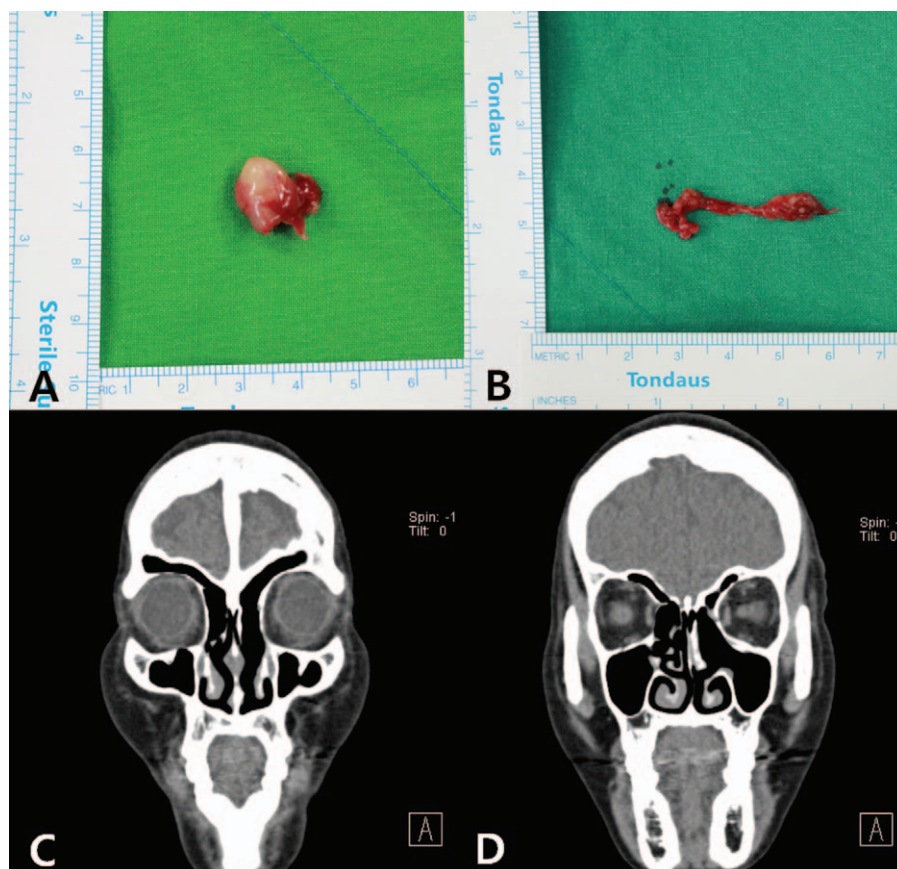


Figure 3. (A) A 1.5×1.1 cm sized well-defined mass in the frontal sinus was completely removed using a frontal curette. (B) A 3.5×0.3 cm sized well-defined mass in the supraorbital ethmoid cell was completely removed using a frontal curette. (C, D) At 2 years after revision surgery, follow-up CT showed there was no tumor recurrence in the frontal sinus (C) or supraorbital ethmoid cell (D).

4. Conclusion

Although the endoscopic technique and tools are now well developed, due to the S-shaped pathway, the lateral aspect of a well-pneumatized frontal sinus or supraorbital cell can only be properly approached endoscopically through trephination of the frontal sinus. It should also be noted that, even in the same IP, the SUV of the tumor may vary over time in sequential PET images.

If the tumor is located at a site that is difficult to reach with an endoscope alone, it is faster and less painful to choose a more convenient approach for the patient, and it can avoid an unnecessary cost burden. It should also be noted that the SUV of PET CT is not a tool to distinguish IP from other inflammatory polyps or cancer.

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