This is an Accepted Manuscript for *The Journal of Laryngology & Otology*
DOI: 10.1017/S0022215124002123

Surgical Treatment for Benign Tumors in the External Nose: An 18-Year Experience

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Abstract

Managing benign tumors of the external nose involves balancing optimal excision with the preservation of nasal function and aesthetics. This study aims to identify histologic diagnoses, surgical strategies, and postoperative outcomes. A retrospective cohort study was conducted from November 2006 to March 2023. All surgeries were performed by a single surgeon and included 24 patients with a mean age of 32.7 ± 19.2 years (range, 3 months to 65 years) at diagnosis. Tumors were predominantly located on the nasal dorsum (n = 11). Among the 11 histologic tumor types, hemangioma was the most common (n = 8). Most patients (70.8%) underwent open rhinoplasty approach. Recurrence occurred in 4 patients (16.7%). Benign tumors of the external nose exhibit diverse pathology. Partial tumor removal may be considered in extensive cases with skin involvement for preserving nasal aesthetics. A tailored surgical strategy is crucial for managing these rare tumors.

Keywords

Nose; Neoplasms; Histology; Rhinoplasty; Aesthetics.

https://doi.org/10.1017/S0022215124002123 Published online by Cambridge University Press

Introduction

Benign tumors affecting the external nose encompass a diverse range of pathologies, presenting diagnostic and therapeutic challenges in clinical practice. These benign nasal tumors pose difficulties due to their various locations, size, and adverse cosmetic effects on nasal aesthetics. Unlike other sinonasal pathologies, most external nasal tumors primarily manifest as visible mass lesions on the nasal tip and the dorsum. Therefore, the surgeon needs to simultaneously achieve better nasal aesthetics and tumor removal. These goals may be challenging in cases where tumors exhibit unclear boundaries or involve extensive surrounding tissues, occasionally necessitating the intentional retention of residual tumor components to achieve better cosmetic outcomes.

Due to the scarcity and diverse nature of benign tumors in the external nasal region, previous case reports are mostly anecdotal. Furthermore, to the best of our knowledge, no cohort studies have conducted a comprehensive analysis of benign tumors of the external nose. A comprehensive understanding of benign external tumors of the nose is difficult due to the relative paucity of literature. Therefore, this retrospective cohort study presents our 18 years of surgical experience in treating benign external tumors affecting the nasal region to provide useful information for diagnosing and managing such tumors. In the present study, the spectrum of these lesions is described, the surgical methods used for excision and subsequent reconstruction are outlined, treatment outcomes are evaluated, and factors correlated with tumor recurrence are analyzed.

Materials and methods

Patients Selection and Data Collection

This retrospective study includes 32 patients who underwent surgical intervention for benign tumors of the external nose at Asan Medical Center between November 2006 and March 2023. A single senior surgeon (YJJ) performed all surgeries for complete or partial resection with cosmetic maintenance. Patients were excluded from the analysis if the tumors simultaneously involved other areas of the external face, such as the cheek (2 cases), if they lacked final pathology results (1 case), or if the postoperative pathological report demonstrated malignancy (3 cases). A benign inflammatory lesion (2 cases) was not categorized as a benign tumor. A total of 24 patients were included in final analysis. The Institutional Review Board of Asan Medical Center approved this study (No. S2023-2738-0001).

Demographic information including patient age and gender, and tumor characteristics such as location and size, were extracted from electronic medical records. Slides of all surgical specimens were stained with hematoxylin and eosin (H&E) and underwent comprehensive immunohistochemical review to assess morphology according to established diagnostic criteria for the pathology. Details regarding the surgical procedures performed, including the approach used for mass removal, the extent of excision, reconstruction techniques, and any intentional retention of residual tumors, were analyzed.

Surgical Techniques

Surgeries were performed under general or local anesthesia. The incisional approach was tailored to the tumor site and size, with the open rhinoplasty approach being the most common. Although the primary aim was complete resection, in cases where clear demarcation

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of the tumor was challenging, partial resection was performed using curettage or debridement using a microdebrider. Intentional retention of residual tumors was occasionally unavoidable for aesthetic considerations. In addition, some partial skin excisions were performed to manage skin redundancy overlying the tumor. Auricular conchal cartilage grafting was used for alar reconstruction when necessary, and diced septal cartilage was utilized to camouflage palpable deformities of the nasal dorsum.

Follow-up and Outcome Assessment

Post-operative patient data were collected to assess treatment outcomes, detect tumor recurrence, and monitor potential complications. Recurrence was evaluated through physical examination via inspection or palpation and imaging studies, particularly paranasal sinus MRI scans. Any instances of tumor recurrence and the consistency of surgical approaches with the primary procedures were systematically recorded and analyzed.

Statistical Analysis

Descriptive statistics were used to summarize patient demographics, tumor characteristics, surgical interventions, and treatment outcomes. Continuous variables are presented as mean ± standard deviation (SD), while categorical variables are presented as frequency. Statistical analyses were performed using SPSS 27.0 (SPSS Inc., Chicago, IL, USA). Associations between categorical variables were assessed using the chi-square test. All tests were two-sided, and statistical significance was defined as $p < 0.05$.

Results and analysis

Patient Characteristics

In this retrospective 18-year study focusing on the surgical management of benign external nasal tumors, 24 patients were included. The cohort consisted of 10 males and 14 females, with a mean age of 32.71 ± 19.18 years (range, 3 months-65 years). Tumor distribution showed comparable incidence on the right side (7 cases), left side (9 cases), and midline (8 cases). The most common tumor location was on the nasal dorsum (11 cases), followed by the nasal root (4 cases), nasal ala (4 cases), nasal tip (3 cases), and nostril (2 cases) (Fig.1). Patients self-reported an average duration of 3.67 ± 3.06 months between identification of the mass and their visit to the clinic. Five individuals reported delays of more than 4 years, extending up to 10 years before seeking medical attention.

Surgical Procedures and Tumor Characteristics

Mass removal in most cases (17 patients, 70.8%) involved a conventional open rhinoplasty procedure, utilizing trans-columellar inverted V and marginal incisions (Fig. 2A). The other 7 patients, in whom the tumor affected the nasal tip, nostril, or nasal ala, underwent tumor excision through direct incision over the lesion (Fig. 2B). In 3 patients where, extensive skin redundancy coincided with the underlying mass and one case with a mass in the alar area requiring treatment for nostril symmetry, partial skin excision was performed.

Fig. 3 shows intraoperative findings from a representative case involving direct incision over the tumor and partial skin excision. Partial excision of the skin was performed to control the redundancy of the overlying skin and subsequent deformity resulting from the tissue-expander-like effect of the tumor. Furthermore, 4 patients were treated with deliberate partial

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tumor resection because of ill-defined borders and to maintain aesthetic outcomes. Alar reconstruction was performed using auricular conchal cartilage in 3 patients. Crushed septal cartilage was used as a dorsal onlay graft to camouflage nasal bone defects in 3 other patients, resulting in enhanced cosmetic appearance. Multiple different tumor pathologies were identified, with vascular tumors (9 cases) and neural tumors (5 cases, Table 1) the most common types. Patients with vascular tumors were more likely to be female and be managed through an open rhinoplasty approach (Table 2).

Treatment Outcomes and Recurrence

The average follow-up time was 2.19 ± 4.02 years after the index resection. Twenty patients (83.3%) showed no recurrence or major complications. Importantly, these patients expressed subjective satisfaction with the aesthetic outcomes (Fig. 4). However, tumor recurrence was detected in 4 patients, identified via physical examination as a visible mass in 3 cases and through postoperative paranasal sinus MRI in 1 case. Recurrence occurred at an average interval of 3.21 ± 2.93 years following initial surgery (Table 3). Among the recurrences, 3 cases occurred in pediatric patients and, only 1 case in an adult patient. All 3 pediatric patients were diagnosed with the lesion at birth or within their first year of life. The histologic diagnoses for these patients were hemangioma, nasal dermoid sinus cyst, and neuroma. Among 4 recurrences, only 1 was initially treated with intentional partial excision. Complete excision was attempted for the other 3 patients. Revision surgeries were performed using the same approach, open rhinoplasty versus direct incision over the tumor, as the primary surgery in all cases.

Discussion

Benign tumors of the external nose are a rare and challenging condition. The primary objective in managing this uncommon clinical entity is to effectively remove the tumor while preserving both the functional aspects and aesthetic appearance of the nose. The present study provides a comprehensive overview of various histologic diagnoses associated with benign tumors of the external nose, covering a spectrum of types including vascular (hemangioma, vascular malformation), neural (neurofibroma, schwannoma), dermoid cysts (nasal dermoid sinus cyst), soft tissue variants (nodular fasciitis, granuloma, angioleiomyoma, trichofolliculoma), and other benign tumors (glomangioma, xanthogranuloma). The nasal dorsum was the most commonly affected anatomical site, accounting for 45.8% of the 24 cases, although tumors can arise at different locations on the external nose such as the nasal root, tip, alar, nostril, or columella.[1] In the present study, vascular tumors of the nose were more common in females, in agreement with previous reports.[2]

The most common chief complaint was a mass-like lesion or swelling on the external nose. Symptoms and signs associated with these tumors often vary based on the specific location of the growth. Nasal obstruction, facial pain, and epistaxis were previously noted as common accompanying nonspecific nasal symptoms.[3] Although a preoperative needle biopsy could offer a definitive histological diagnosis, not all enrolled patients underwent this procedure due to the suggestive nature of benign pathology based on the history and physical characteristics of the lesion. This was particularly influenced by the indicative benign histology revealed in radiological studies including well-defined margins, smooth and regular shape, absence of irregularities or invasive features, and homogeneous density or signal

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intensity.[4, 5] Radiological examinations, notably CT scans and MRI, serve as crucial imaging modalities to determine the size and extent of a tumor and are essential for planning subsequent surgical interventions.

The existing literature regarding benign tumors of the external nose has primarily consisted of anecdotal case reports, contributing to a lack of comprehensive information on the incidence and characteristics of these tumors compared with other sinonasal pathologies. In our study, hemangioma was the most prevalent type, followed by neural tumors such as neurofibroma and schwannoma. Hemangiomas, predominantly observed in pediatric patients, are estimated to occur in 4%-10% of infants and can manifest in adults.[2] In adults, approximately 60% of hemangiomas localize in the head and neck region, with around 15.8% affecting the nose.[6] Schwannomas and neurofibromas are the predominant types of peripheral nerve sheath tumors. Roughly 25%-45% of schwannomas occurring outside the cranial cavity are found in the head and neck area, with approximately 4% originating from the sinonasal tract.[7, 8] Neural tumors on the external nose involving schwannomas and neurofibromas are exceptionally rare, with only a few documented cases reported in the English literature.[1, 5, 9-15]

Surgical excision remains the primary modality of treatment. In the present study, most individuals sought medical attention promptly within the first year upon noticing changes in the shape of their noses. However, a subset of patients delayed seeking hospital care, with 5 individuals presenting to the clinic 4-10 years after initially detecting changes in their nose's appearance, consistent with previously reported cases.[1, 12] Benign lesions that are small, asymptomatic, and do not cause any cosmetic or functional concerns may be managed with regular monitoring.

In the present study, the intricate location of the tumors posed a significant challenge in determining the optimal surgical approach to achieve complete resection while ensuring favorable aesthetic outcomes. First, the open rhinoplasty approach showed distinct advantages when managing tumors located on the nasal dorsum or sidewall. This approach enabled successful lesion excision while preserving the upper and lower lateral alar cartilages, facilitating extensive surgical exposure and direct access for potential reconstructive procedures when necessary. In addition, direct incision over the tumor was used in cases where the tumor involved the nasal columella and nostril margin. Second, when tumors affect nasal structures, such as altering nostril shapes or alar contours, skin excision plays a crucial role in establishing and preserving nostril or alar symmetry. Furthermore, partial excision of the redundant skin caused by the expansile effect of the tumor was crucial for managing skin redundancy and subsequent external nose deformity. Notably, only removing the tumor beneath redundant skin might not adequately address resulting nasal deformities. Conversely, deliberate partial resection of benign tumors on the external nose, if not significantly affecting aesthetics, is occasionally suggested as a practical option rather than complete surgical removal. The cases reported herein provide valuable insights into surgical techniques tailored for benign external nasal tumors, considering their multifaceted characteristics.

The surgical management of benign tumors on the external nose necessitates meticulous planning to achieve optimal aesthetic and functional outcomes. The timing of nasal reconstruction remains controversial. Among 3 patients who underwent single-stage reconstruction using autologous auricular cartilage for alar grafting, 1 patient experienced recurrence 10 months after the operation (as shown in the second case in Table 3). Consideration for a 2-stage operation is essential when a high risk of recurrence or potential

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malignant transformation exists. Among the 12 patients with benign tumors located on the nasal dorsum, 3 patients required crushed autologous cartilage post-tumor removal to manage the resulting aesthetic defect. Significantly, none of these patients experienced a recurrence. Therefore, when managing benign tumors in the external nose, cosmetic outcomes should be considered, especially the necessity for reconstructive procedures. The current study cases showed favorable subjective aesthetic outcomes from the single-stage reconstruction of tip and dorsal aesthetics. If the benign tumor was excised with clear resection margins, a 2-stage operation may not be mandatory, avoiding patient inconvenience associated with delayed reconstruction.

The present study had a few limitations in the present study. Retrospective studies are inherently susceptible to bias, and data collection relies on electronic medical records, potentially leading to missing or incomplete information. Furthermore, the relatively small number of patients included in this study reflects the rarity of benign tumors affecting the external nose, limiting the generalizability of the results and highlighting the challenges in assembling larger patient cohorts. In addition, the authors acknowledged instances of patients being lost to long-term follow-up. This limitation hinders the ability to assess the durability of treatment outcomes, including recurrence rates or complications over an extended period.

Conclusion

In this retrospective cohort study, different pathologies in benign nasal tumors were described, with hemangioma as the predominant type. The open rhinoplasty approach can be used to effectively remove the tumor, preserve nasal aesthetics, and allow for structural grafting when necessary. The deliberate choice of partial tumor removal or partial skin excision in specific cases underscores the delicate balance between complete excision and maintaining aesthetic integrity. Our findings emphasize the need for individualized treatment strategies tailored to the pathology and anatomical location of these rare external nasal tumors.

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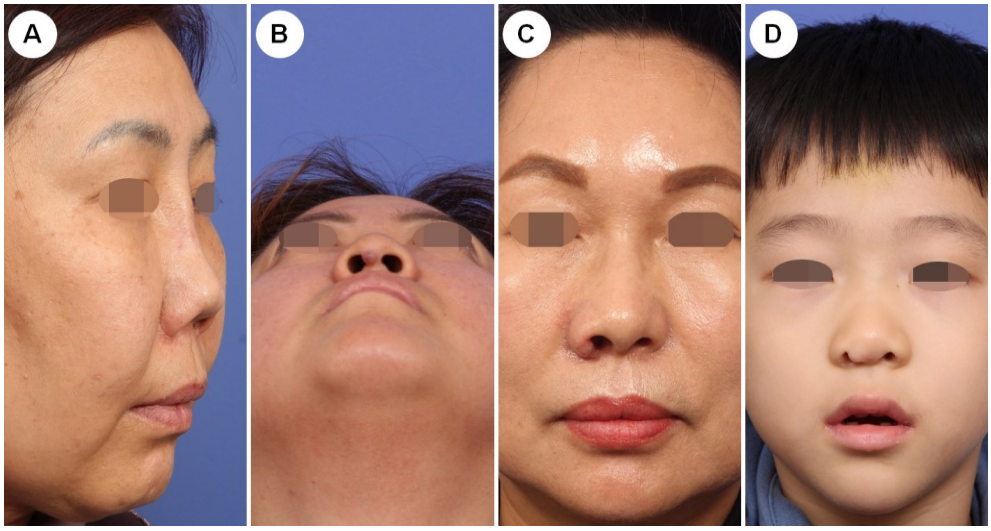

Fig.1

Preoperative external photographs showing various regions of the external nose, including nasal root and dorsum (A), nasal columella (B), nasal ala (C), and nostril (D).

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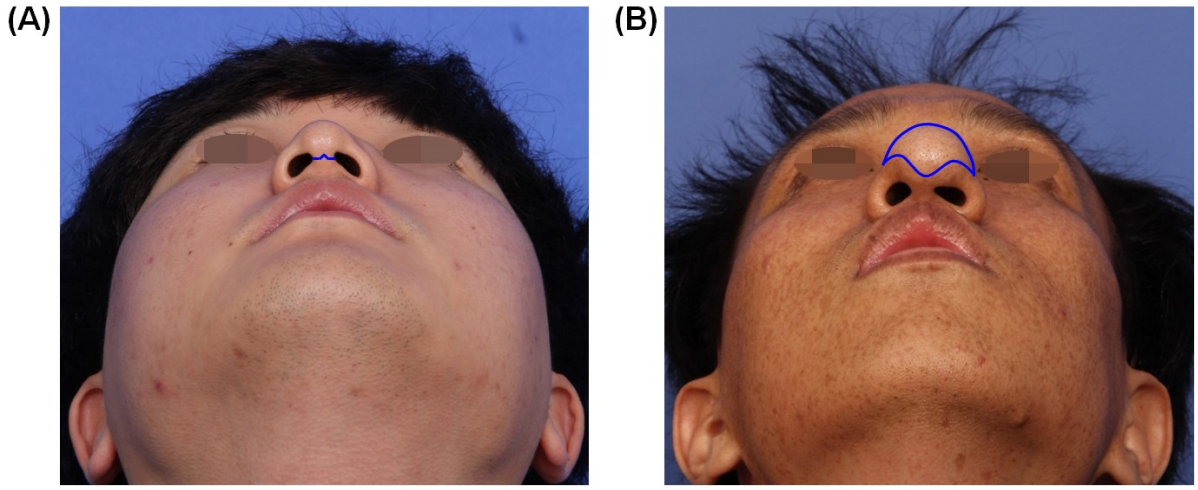

Fig.2

Representative preoperative external photographs displaying the conventional open rhinoplasty approach (A) and direct incision on the lesion (B), both marked by a blue incision line in the preoperative basal view.

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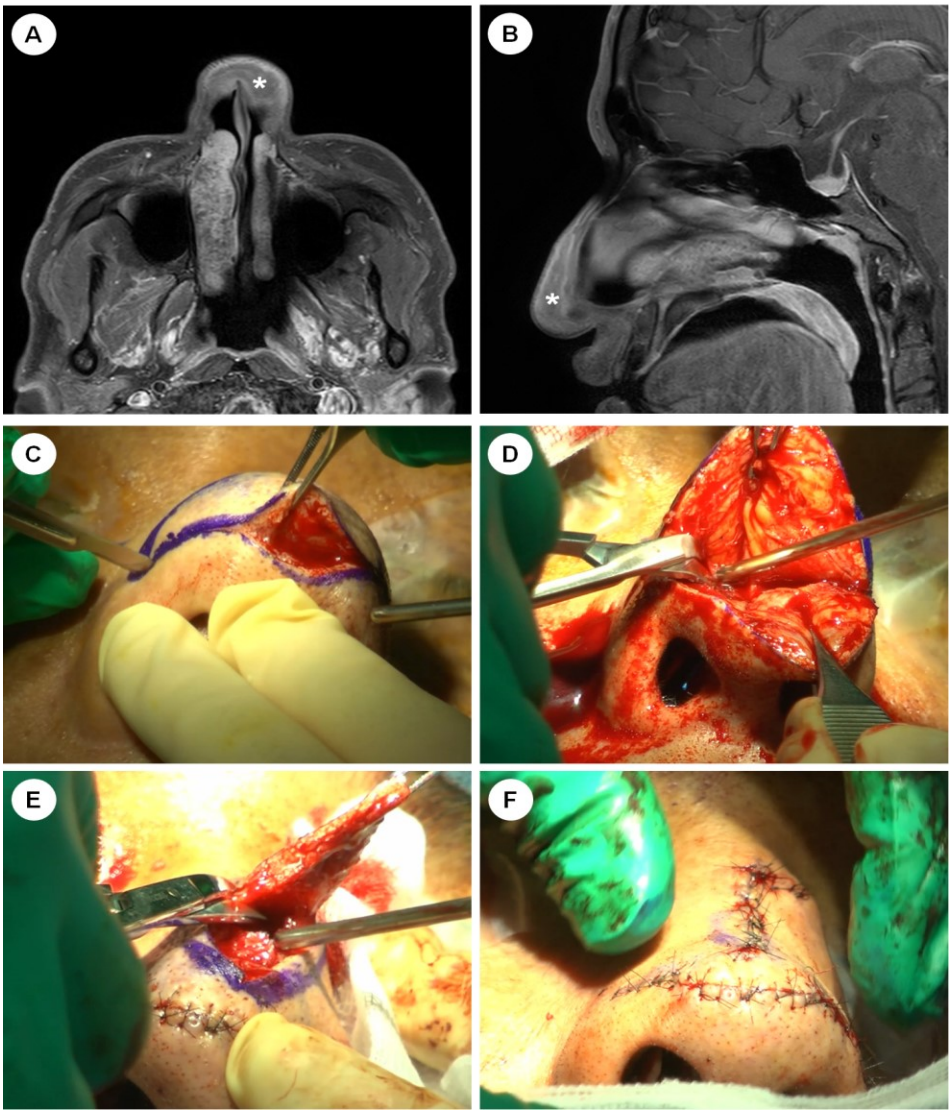

Fig.3

Preoperative axial (A) and sagittal (B) images on T1-enhanced paranasal MRI, with the asterisk indicating the tumor location. Intraoperative photographs depict the following stages: (C) direct incision on the lesion, (D) meticulous dissection for complete tumor excision, (E) partial excision of redundant skin caused by the tissue-expander-like effect of the tumor, and (F) primary skin suture performed at the end of the operation.

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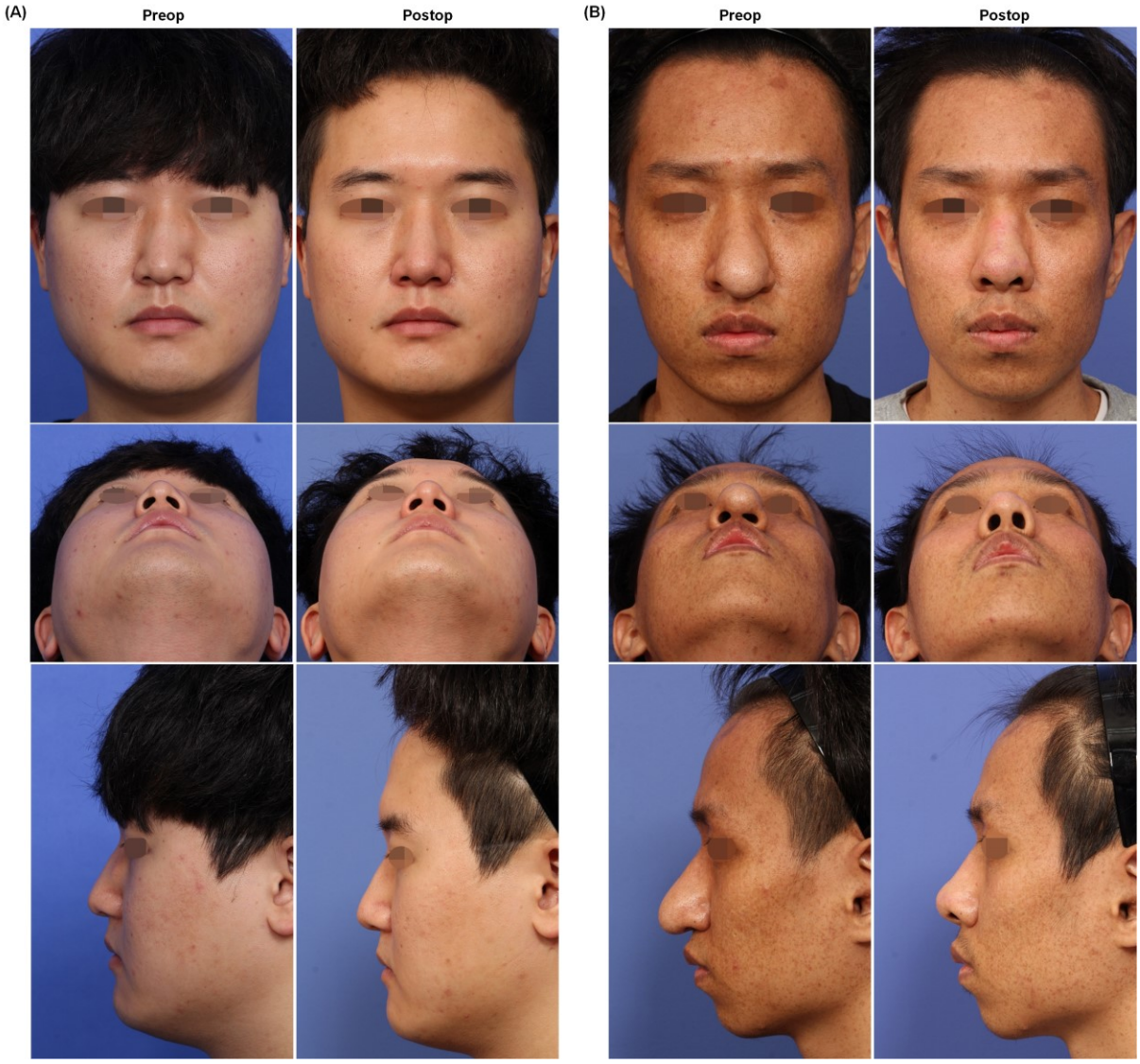

Fig.4
Representative photographs exhibiting postoperative nasal contour enhancements at 1 year. (A) Open rhinoplasty approach. (B) Direct incision over the tumor.

https://doi.org/10.1017/S0022215124002123 Published online by Cambridge University Press

Acknowledgments

Funding
This work was supported by the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education [Grant numbers: 2022R1C1C1004860 to YJJ].

Declaration of Conflicting Interests
The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

Ethics Approval
This study was approved by the Institutional Review Board of Asan Medical Center (No. S2023-2738-0001).

Informed Patient Consent
Patients provided written consent for the use of their images

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Tables

TABLE I
Clinical characteristics and surgical details of patients (n=25)

Characteristics	**Number**
Age	32.71 ± 19.18 years
Gender distribution	
Male	10
Female	14
Side	
Right	7
Left	9
Midline	8
Location	
Nasal dorsum	11
Nasal root	4
Nasal tip	3
Nasal ala	4
Nostril	2
Size (longest length on CT scan)	1.32 ± 0.65 cm
Subjective symptom related to tumor	
Rhinorrhea	3
Nasal obstruction	6
Nasal or facial pain	6
Epistaxis	2
No symptoms	7
Anesthesia	
General	21
Local	3
Surgical approach	
Open rhinoplasty	17
Direct incision over the tumor	7
Type of pathology	
Vascular tumors	
Hemangioma	8
Vascular malformation	1
Neural tumors	
Neurofibroma	2
Schwannoma	3
Dermoid cysts	
Nasal dermoid sinus cyst	3

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Soft tissue tumors	
Nodular fasciitis	2
Granuloma	1
Angioleiomyoma	1
Trichofolliculoma	1
Other benign tumors	
Glomangioma	1
Xanthogranuloma	1
Type of excision	
Total extracapsular dissection	16
Intracapsular dissection (curettage or debridement)	9
Range of excision	
Complete	20
Partial	4
Reconstruction	
Alar cartilage graft	3
Dorsal only graft	3
Mean duration of follow-up	2.19 ± 4.02 years
Recurrence (Follow-up time)	4 (3.21 ± 2.93 years)

Abbreviations: CT, computed tomography.

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TABLE II
Associations between patient characteristics and tumor pathological types along with surgical technique

Variable	**Vascular tumor**	**Neural tumor**	**Soft tissue tumor & Others**	**Total**	**$\chi 2$ (p)**
Sex					6.766* (0.034)
Male	1	4	5	10	
Female	8	1	5	14	
Age					1.659 (0.436)
≥19	8	3	7	18	
<19	1	2	3	6	
Side					0.800 (0.670)
Midline	2	2	4	8	
Lateral	7	3	6	16	
Surgical approach					6.091* (0.048)
Open rhinoplasty	9	3	5	17	
Direct incision over the tumor	0	2	5	7	
Type of excision					2.145 (0.342)
Total extracapsular dissection	4	4	7	15	
Intracapsular dissection	5	1	3	9	
Total	9	5	10	24	

Values are presented as number. *p < 0.05

TABLE III
Case series of revision surgery

Case	Sex	Age (years)	Location	Side	Size (cm)	Primary pathology	Approach	Partial resection	Recurrence (years)	Recurrence Site
1	F	5	Nasal root	Right	1.6	Nasal dermoid sinus cyst	Direct incision over the tumor	N	0.78	Nasal dorsum
2	M	6	Nostril	Right	0.6	Neuroma	Direct incision over the tumor	N	0.85	Nostril
3	F	11	Nasal dorsum	Left	2.2	Intramuscular hemangioma	Open rhinoplasty	Y	6.78	Nasal dorsum
4	F	38	Nasal tip	Midline	0.6	Glomangioma	Direct incision over the tumor	N	4.46	Nasal vestibule

https://doi.org/10.1017/S0022215124002123 Published online by Cambridge University Press

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Bullet Point Summary

- Benign tumors of the external nose are rare and exhibit a variety of pathological types.
- There have been isolated case reports of benign tumors of the external nose, but no cohort studies have conducted a comprehensive analysis.
- In 24 patients with benign tumors of the external nose, 11 cases were predominantly located on the nasal dorsum, and hemangioma was the most common type, occurring in 8 cases.
- The open rhinoplasty approach is preferred for tumor resection as it provides extensive exposure and direct access to potential reconstructive procedures. Direct incision over the tumor is favored for tumors involving the nasal columella or nostril margin.
- Intentional partial tumor removal or partial skin excision can be considered for optimal aesthetic outcomes.
- A tailored approach and individualized treatment strategies are important for preserving nasal aesthetics while managing benign external nasal tumors.