

Management of the orbit during endoscopic sinonasal tumor surgery

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Background: The primary aims of the study were to report preoperative imaging characteristics and intraoperative management of the orbit during endoscopic resection of benign and malignant sinonasal tumors.

Methods: This study was a case series at an academic tertiary care center. Retrospective chart review and prospective imaging assessment was performed on 159 cases treated between July 2009 and December 2012.

Results: A total of 41 patients met predetermined inclusion criteria. Squamous cell carcinoma (17.1%) and inverted papilloma (31.7%) were the most common malignant and benign histology, respectively. Preoperative computed tomography (CT) scanning most commonly demonstrated erosion of the lamina papyracea (80.5%), whereas magnetic resonance imaging (MRI) most commonly illustrated loss of fat plane between tumor and extraocular muscle (53.1%). Endoscopic procedures to address the orbital interface included lamina papyracea resection (85.4%), dacryocystorhinostomy (26.8%), periorbital resection (26.8%), optic nerve decompression (7.3%), and orbital exenteration (2.4%). Oculoplastic surgery involvement was required in 31.7% of cases. Orbital complications included epiphora in

3 (7.3%) and diplopia in 2 (5.1%) patients. Postoperatively, no recurrences were noted in the benign group, whereas 6 (28.6%) recurrences were noted in 21 patients in the malignant group treated with intent to cure. Two patients died of disease due to distant metastases from mucosal melanoma and squamous cell carcinoma.

Conclusion: This represents the largest series to date on endoscopic management of the orbit in benign and malignant sinonasal tumors. A majority of these cases can be managed by a purely endoscopic approach with low complication and recurrence rates, although a subset still require adjunct open approaches for successful tumor extirpation.
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Key Words:

endoscopy; tumor; neoplasm; orbit; computed tomography; magnetic resonance imaging

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Sinonasal tumors remain a significant surgical challenge given their frequent advanced stage at presentation,

proximity to critical structures, and narrow confines of the paranasal sinuses. The advent of rigid endoscopes, refinement of surgical instrumentation, and introduction of image-guided surgery has facilitated the transition of the management paradigm from traditional open procedures to minimally invasive endoscopic approaches. Recent studies have demonstrated that endoscopic or endoscopic assisted resection results in less morbidity, faster recovery, better quality-of-life outcomes, and favorable oncologic outcomes when compared to open craniofacial resection in select patients.¹

Secondary extension of benign and malignant sinonasal tumors to the orbital interface continues to represent an important area of management dilemma. Benign sinonasal tumors typically do not invade the orbit, though inverted papilloma can encroach the orbit and/or lacrimal system and may present with proptosis, epiphora, or blurred vision.² For malignant tumors, the periorbital has long served as the point of reference to define orbital invasion and help refine the decision making process to preserve or exenterate

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the orbit.^{3–5} Preoperative ophthalmologic exam along with computed tomography (CT) imaging and magnetic resonance imaging (MRI) can help delineate the extent of involvement beyond the periorbital.^{3,6,7} Recent data suggests that tumors which have limited periorbital involvement and do not invade into the orbital fat, extraocular muscles, or optic nerve can be technically resected, while preserving the orbit with satisfactory local control and overall survival rates.^{8–10}

A majority of the data to date have focused on management of the orbit in the setting of open approaches. There is a relative paucity of data regarding the perioperative management of the orbit during endoscopic sinonasal tumor surgery. With this in mind, the current study was undertaken to report the management of the orbit in a large series of sinonasal neoplasms that used the endoscope as the primary surgical approach. Preoperative imaging, intraoperative management, and postoperative outcomes were determined.

Patients and methods

Retrospective chart review was performed at the University of Texas Southwestern Medical Center after approval by the Institutional Review Board. Patients undergoing surgery by (PSB) the senior author between July 2009 and December 2012 were identified by International Classification of Diseases, 9th edition (ICD-9) and Current Procedural Terminology (CPT) codes. This generated a cohort of 215 patients with benign and malignant sinonasal tumors for initial chart review. Criteria for exclusion included the following: (1) patients undergoing resection primarily by an open approach (5 cases); (2) patients in whom only a biopsy was performed (34 cases); and (3) patients with tumors primarily involving the sellar or parasellar region (17 cases). This yielded 159 patients who underwent more detailed chart and imaging review.

Salient information gathered from the chart review included demographics, tumor histopathology, subsite involvement, surgical approaches, and postoperative complications. Prospective imaging assessment was then performed by a neuroradiologist who was blinded to the histopathology, operative reports, and prior radiology reports to determine potential for anatomical involvement at the sinonasal-orbital interface. Preoperative assessment of orbital involvement on CT imaging was determined by erosion of the lamina papyracea and/or the nasolacrimal system. MRI assessment was categorized into 4 categories: (1) loss of fat plane between tumor and extraocular muscles; (2) irregular, nodular tumor margin along the periorbital; (3) invasion of extraocular muscles; and (4) invasion of the optic nerve. If 1 or more of these imaging characteristics were noted on MRI, then the patient was determined to be at “risk of invasion of periorbital.” Intraoperative endoscopic findings at the sinonasal-orbital interface served as the gold standard for orbital involvement ranging from lamina papyracea erosion to involvement of intraconal

soft tissues. This was used as the reference to determine sensitivity and specificity for CT and MR imaging. The site of tumor pedicle was ascertained in all cases.

All benign and malignant neoplasms were managed by image-guided endoscopic resection, in conjunction with the consulting ophthalmologist and/or neurosurgeon as deemed necessary. All malignant tumors were presented at the interdisciplinary tumor board conference to arrive at consensus on the optimal treatment strategy. Preoperative and postoperative orbital assessment including visual acuity and extraocular movements were performed either by the senior author or as documented by a consulting ophthalmologist.

Surgical technique

Endoscopic surgical access to the medial and inferior orbit was achieved through wide transnasal approach after maxillary antrostomy, total ethmoidectomy, and sphenoidotomy and/or frontal sinusotomy based on needed access. Tumors were carefully dissected to the orbital interface using 0-degree and 30-degree endoscopes. If the tumor had a pushing margin without lamina involvement, no surgical intervention at the orbital interface was performed. For benign neoplasms, if the tumor eroded and invaded the lamina papyracea, this was removed as the orbital margin. The periorbital was not involved in any benign cases and, thus, was not violated to minimize risk of seeding of the orbital compartment. If the tumor eroded and extended into the nasolacrimal system, an endoscopic dacryocystorhinostomy (DCR) was performed to adequately address the tumor.

For malignant tumors, if the tumor partly eroded and invaded the lamina papyracea, this was removed as the orbital margin. If the tumor extended through the lamina and involved the periorbital, then partial or full thickness periorbital was resected to achieve negative orbital margin. This strategy was employed in cases with limited to more extensive periorbital invasion but with limited to no orbital fat invasion in the setting of normal ocular function. Tumors with invasion into the intraconal orbit with impaired orbital function due to the neoplasm were treated with orbital exenteration. Tumor extension to the medial optic canal with erosion were managed with optic nerve decompression. Intraoperative frozen sections were performed in all malignant cases to aid in the decision-making process and confirm microscopic tumor control. Postoperative radiation therapy was used to improve local control in all cases.

In select cases, oculoplastic surgery provided external access by means of an orbitotomy. For benign neoplasms, this was used to assist in extirpation of ossifying fibroma (2) and venous angioma (1) with significant lateral extension into the orbit and inverted papilloma (1) with extensive involvement of the lacrimal sac. For malignant neoplasms, this approach was employed to protect intraconal structures when periorbital resection with or without limited fat resection was performed to clear the orbital margin.

TABLE 1. Tumor histopathology for the patient group

Pathology	n	%
Inverted papilloma	13	31.7
Squamous cell carcinoma	7	17.1
Melanoma	4	9.8
Olfactory neuroblastoma	4	9.8
Poorly differentiated carcinoma	2	4.9
Spindle cell carcinoma	1	2.4
Glomangiopericytoma	1	2.4
Juvenile ossifying fibroma	1	2.4
Venous hemangioma	1	2.4
Sinonasal undifferentiated carcinoma	1	2.4
Basal cell carcinoma	1	2.4
Adenoid cystic carcinoma	1	2.4
Mucoepidermoid carcinoma	1	2.4
Adenocarcinoma	1	2.4
Cementing fibroma	1	2.4
Sarcoma	1	2.4

Statistical analysis

Categorical data was summarized using frequency counts and percentages, whereas means were calculated for numerical values such as age at diagnosis. Comparisons of the benign vs malignant cases were carried out with chi-square contingency table analysis for categorical measurements and Student's *t* test for independent groups for the numerical measurements. Stepwise multiple logistic regression models were used to determine which factors were statistically related to the need for ophthalmology involvement. The model entry criteria were selected at 5%. The Hosmer-Lemeshow technique was used to assess the model fit. Statistical analysis was performed using SAS, version 9.3 (SAS Institute, Inc., Cary, NC), with a *p* value <0.05 being deemed statistically significant.

Results

Patient and tumor characteristics

A total of 41 of 159 patients (25.8%) had tumor extension to the orbital interface and served as the focus of this study. The mean age was 57 years (range, 20–89 years) with a male:female ratio of 1.6:1. The mean follow-up was 21.2 months.

Tumor histopathology is listed in Table 1. The most common benign pathology was inverted papilloma in 13 (31.7%) patients, whereas the most common malignant pathology was squamous cell carcinoma (SCC) in 7

TABLE 2. Preoperative CT and MR imaging data*

	Benign (n = 17)	Malignant (n = 24)	Total (n = 41)
CT imaging (total)	17 (100)	24 (100)	41 (100)
Erosion of lamina	12 (70.6)	21 (87.5)	33 (80.5)
Erosion of lacrimal system	6 (35.3)	16 (66.7)	22 (53.7)
MR imaging (total)	10 (58.8)	22 (91.7)	32 (78.0)
Prediction of “risk of invasion of periorbital”	2 (11.7)	16 (66.7)	18 (43.9)
Loss of fat plane between tumor and EOM	2 (11.7)	15 (62.5)	17 (41.5)
Irregular tumor margin along periorbital	1 (5.9)	10 (41.7)	11 (26.8)
Invasion of EOM	0 (0)	3 (12.5)	3 (7.3)
Invasion of optic nerve	0 (0)	2 (8.3)	2 (4.9)

*Values are n (%).

CT = computed tomography; EOM = extraocular muscle; MR = magnetic resonance.

(17.1%) patients. Malignant tumors comprised 24 of 41 cases (58.5%).

CT and MR imaging characteristics

Preoperative CT and MR imaging characteristics at the orbital interface are summarized in Table 2. Preoperative CT scanning most commonly demonstrated erosion of the lamina papyracea (80.5%), whereas MR imaging most commonly illustrated loss of fat plane between tumor and muscle (53.1%). Preoperative imaging also demonstrated that neoplasms involved the ethmoid, maxillary, sphenoid, and frontal sinuses in 32 (78.0%), 26 (63.4%), 18 (43.9%), and 11 (26.8%) of the cases, respectively.

CT predicted involvement of the lamina papyracea with a sensitivity of 91% and specificity of 55%. Further, CT predicted involvement of the lacrimal system with sensitivity of 100% and specificity of 45%. MRI had a sensitivity of 93% and a specificity of 81% in determining involvement of the periorbital. Statistical analysis demonstrated that MRI characteristics predictive of “risk of invasion of periorbital” were statistically significant with malignant disease (*p* = 0.008). Irregular, nodular tumor margin along the periorbital on MRI was statistically significant for need of ophthalmology involvement (*p* = 0.035).

Surgical data and postoperative outcomes

Intraoperative findings and surgical pathology demonstrated tumor pedicle at the orbital interface as follows: lamina papyracea in 23 (56.1%), lacrimal in 10 (24.4%), periorbital only in 7 (17.1%), periorbital with orbital soft tissue in 6 (14.6%), and medial optic canal in 2 (4.9%) cases. The skull base (cribriform plate/ethmoid roof) was involved in 21 (51.2%) cases. Periorbital invasion was only

TABLE 3. Procedures performed in 41 patients*

	Benign	Malignant	Total
	(n = 17)	(n = 24)	(n = 41)
Endoscopic procedures			
Resection of lamina	12 (70.6)	23 (95.8)	35 (85.4)
Resection of periorbital	0 (0)	11 (45.8)	11 (26.8)
Endoscopic DCR	5 (29.4)	6 (25)	11 (26.8)
Optic nerve decompression	0 (0)	3 (12.5)	3 (7.3)
Orbital exenteration	0 (0)	1 (4.2)	1 (2.4)
Oculoplastic procedures			
Anterior orbitotomy	4 (23.5)	7 (29.2)	11 (26.8)
Orbital wall reconstruction	1 (5.9)	1 (4.2)	2 (4.9)
Orbital exenteration	0 (0)	1 (4.2)	1 (2.4)

*Values are n (%).

DCR = dacryocystorhinostomy.

seen in 13 malignant cases. Seven of these patients had involvement of periorbital only without invasion into the orbital soft tissue. The remaining 6 had periorbital involvement with orbital soft tissue invasion, with extraconal and intraconal extension in 2 and 4 cases, respectively.

Endoscopic orbital procedures included resection of lamina papyracea in 35 (85.4%), endoscopic DCR in 11 (26.8%), periorbital resection in 11 (26.8%), optic nerve decompression in 3 (7.3%), and orbital exenteration in 1 (2.4%) patient (Table 3). Oculoplastic surgery was involved in 13 of the 41 (31.7%) procedures. Transcaruncular anterior orbitotomy was the most common with 11 (26.8%) cases, orbit wall reconstruction in 2 (4.9%), and orbital exenteration in 1 (2.4%) case.

Postoperative orbital complications included 2 cases of diplopia (5.1%). In both cases, extensive frontoethmoid resection was performed for stage T4N0M0 frontal sinus squamous cell carcinoma and frontal ossifying fibroma, respectively, resulting in subjective diplopia without gaze restriction. The patient with ossifying fibroma underwent management with prisms with resolution of diplopia, whereas patient with advanced SCC eventually died from progression of distant disease. All 3 cases of epiphora resulted after radiation for sinonasal malignancy and were not attributed to the original procedure. All were managed with staged DCR with resolution of epiphora. There were no reported cases of change in visual acuity, enophthalmos, or orbital hematoma.

No postoperative recurrences were noted in patients with benign neoplasms. Twenty-one of 24 patients (87.5%) with malignant neoplasms were treated with an intent to cure (ITC). Two patients were treated by palliative resection given distant metastases at presentation, whereas one patient refused proper treatment recommended by the

tumor board (orbital exenteration and postoperative radiation therapy). Six (28.5%) recurrences were noted in the ITC group, including 4 local and 2 distant recurrences. One patient with squamous cell carcinoma developed recurrence in the frontal sinus and superior orbit responded to chemoradiation whereas 1 skull base recurrence from radiation induced sarcoma was salvaged with endoscopic resection and re-radiation. One patient each with mucosal melanoma and SCC with distant metastases died from their disease. At the time of last follow-up, outcomes for the ITC group were as follows: 16 (76.2%) no evidence of disease, 2 (9.5%) alive with disease, 2 (9.5%) died of disease, and 1 (4.8%) died of other causes.

Discussion

The present study represents the largest series to date reporting management of the orbit in the endoscopic paradigm of sinonasal tumor surgery. Several important observations stem from the current analysis that should help shed light on this important management dilemma. Overall, 41 of 159 cases (25.8%) had extension to the orbit, thus necessitating surgery to clear the sinonasal-orbital interface. Preoperative CT imaging demonstrated erosion of the lamina papyracea and lacrimal apparatus in 80.5% and 53.7% of cases, respectively. Further, MRI demonstrated loss of the fat plane between the tumor and extraocular muscle and irregular tumor margin along the periorbital in 53.1% and 34.4% of cases, respectively. The most common intraoperative intervention included resection of the lamina papyracea (85.4%), followed by DCR (26.8%) and periorbital resection (26.8%). In all cases of benign pathology, a dissection plane was developed along the periorbital with successful tumor removal. By contrast, 13 of 24 malignant cases had involvement of the periorbital with or without frank extension into the orbital soft tissues. Periorbital resection sufficed clearing the orbital disease in a majority of these cases, with only 2 patients requiring orbital exenteration for successful tumor extirpation.

CT and MR imaging has been used to provide complementary information for preoperative assessment of orbital invasion. Eisen et al.³ reported radiographic-pathologic correlation for evaluating tumor invasion of the orbit with both MR and CT imaging in 17 patients. Multiple different criteria were selected to determine the relationship of the tumor with periorbital, orbital fat, extraocular muscles, and the nasolacrimal system. Extraocular muscle involvement on MRI (100%) and orbital fat obliteration (80% MRI, 86% CT) had the highest positive predictive values. CT was noted to be more accurate than MRI in 7 of 9 criteria. Kim et al.⁷ evaluated CT and MR findings of the periorbital in 10 patients with paranasal sinus malignancies. They concluded that MRI was more effective for detecting orbital invasion; T2-weighted images showed mild hyperintensity beyond the periorbital in the orbital fat.

In our present study, CT imaging was used in 100% of cases, whereas MR imaging was used in 78% to assess

anatomic involvement of the orbit. Given that sinus CT imaging was typically performed with a bone algorithm, it afforded limited information to determine invasion into and beyond the periorbital interface. Its primary utility was to determine encroachment of the orbital interface when bone erosion along the lamina papyracea and/or lacrimal system was noted. This subsequently required follow-up MRI to better delineate extension into the periorbital or orbital soft tissues. Presence of 1 or more MR findings, including appreciable loss of fat between the tumor and extraocular muscle, irregular tumor margin along the periorbital interface, or invasion of the extraocular muscle, was strongly predictive of invasion of periorbital interface with high sensitivity at 93% and moderate specificity at 81%. On the other hand, CT was highly sensitive when erosion of the lamina papyracea (93%) or lacrimal apparatus (100%) was noted; however, these findings were not specific for orbital involvement (55% and 45%, respectively).

The technological refinements and surgical advances in endoscopic sinus and skull base surgery have facilitated the ability to address the medial and inferior margins of the sinonasal-orbital interface by a minimally invasive approach. Several previous case series have demonstrated successful resection of both benign and malignant lesions with an acceptable safety profile.^{11–13} Murchison et al.¹³ reported endoscopic management of 18 benign and malignant neoplasms and infectious/inflammatory processes involving the orbital apex and periorbital skull base. Transnasal endoscopic approach and combined endoscopic and transcaruncular approach was employed in 67% and 28% of cases, respectively. Complications were noted in 4 cases, including decreased visual acuity (2), worsening diplopia (1), and cerebrospinal fluid (CSF) leak (1). The present study builds on this previous experience and reports a larger series of cases exclusively addressing benign and malignant tumors involving the orbital interface. Similar to this study, ophthalmologic involvement for adjunct open approaches was required in 31% of cases in the current series. The complication rate was slightly lower at 12.2% with 2 cases of diplopia and 3 cases of epiphora post-radiation therapy. Both studies attest to the efficacy of the endoscopic approach for surgical removal of a majority of the pathology with an acceptable complication rate. Despite the low morbidity, orbital complications, such as decreased visual acuity or persistent diplopia, can have a significant impact on long-term patient quality of life. This underscores the importance of careful patient counseling in the preoperative period.

A majority of the benign neoplasms in this series were inverted papillomas (13) and ossifying fibromas (2). Despite their benign nature, locally aggressive behavior within the sinonasal confines can result in tumor pedicle on the lamina papyracea or lacrimal system. Resection of the lamina and DCR generally sufficed to address disease at the orbital interface (Fig. 1A, B). In select cases, one can develop a dissection plane between the tumor and lamina while staying beneath the basement membrane of the tumor.

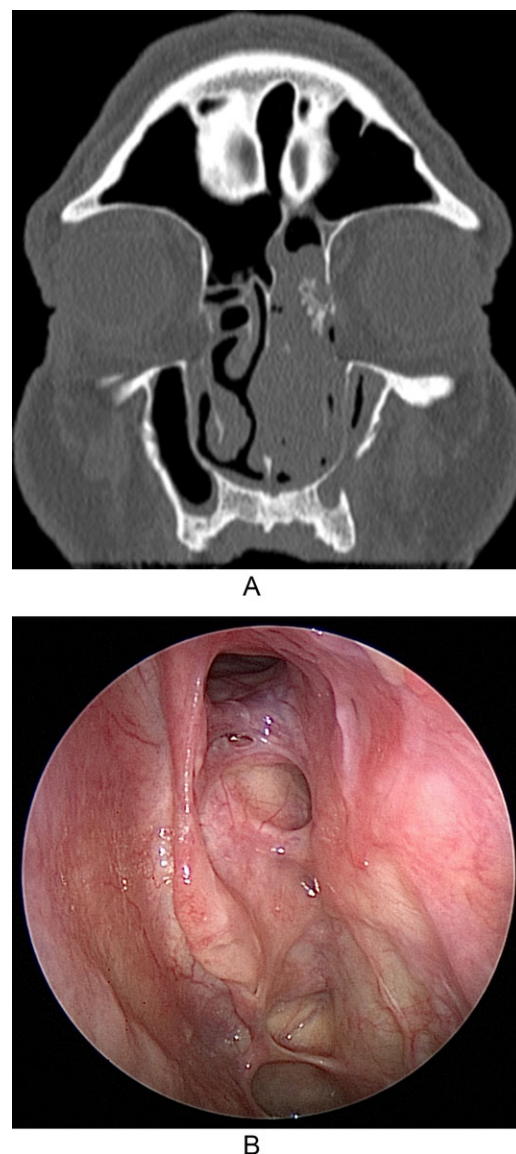


FIGURE 1. (A) CT image of left ethmoid inverted papilloma with erosion of the lamina papyracea and lacrimal system. Patient underwent image guided tumor resection with lamina removal and DCR. (B) Postoperative endoscopy at 12 months demonstrates a healed ethmoid cavity with mucosalized periorbital interface. CT = computed tomography; DCR = dacryocystorhinostomy.

Alternatively, the hyperostotic bone at the point of attachment of the tumor may be drilled with a diamond burr to ensure tumor removal while preserving the bony barrier. However, extensive bony involvement required resection of the lamina papyracea for complete tumor removal. None of the benign lesions invaded the periorbital interface. This underscores the importance of preserving this important barrier in cases of benign neoplasms. If the periorbital interface is aggressively removed or inadvertently violated in these scenarios, any future potential recurrence may occur within the orbital compartment.

In the present study, malignant tumors frequently attached to the lamina papyracea. In fact, to ensure complete tumor removal at the orbital interface, lamina resection

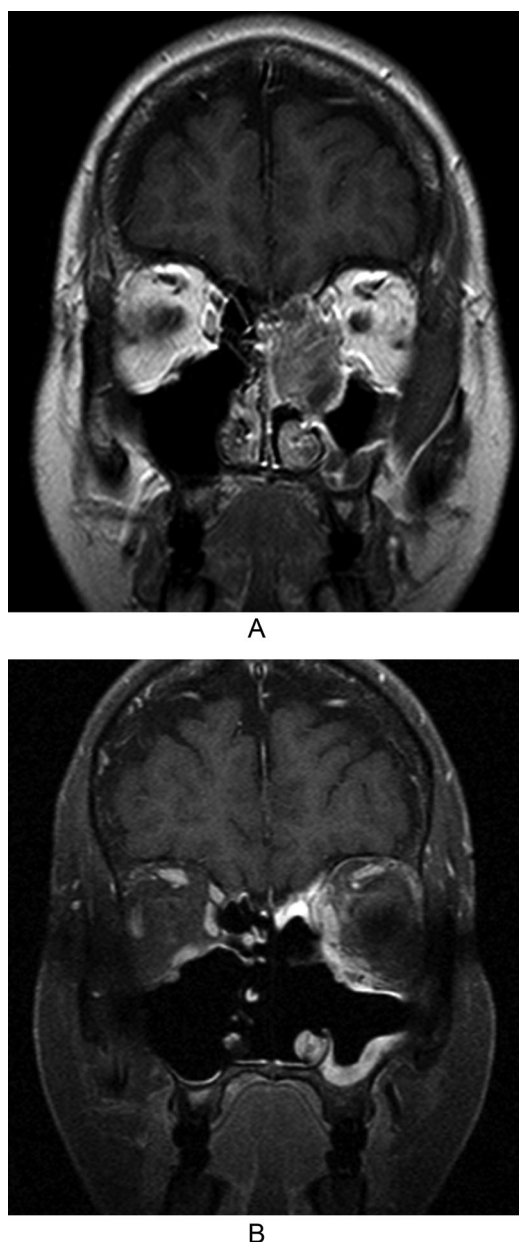


FIGURE 2. (A) T1-weighted MRI with gadolinium shows T4AN0M0 moderately differentiated squamous cell carcinoma involving the left ethmoid sinuses with orbital extension. Intraoperatively, the lesion had limited periorbital involvement that was resected endoscopically with negative margins. Biopsies of the underlying fat were negative. (B) T1-weighted MRI with gadolinium at 2 years post-chemoradiation demonstrates minimal signal enhancement in the ethmoid region. Negative PET imaging confirmed tumor-free status. MRI = magnetic resonance imaging; PET = positron emission tomography; T4AN0M0 = tumor/necrosis/metastasis (TNM) stage T4A, N0, M0.

was performed in 23 of 24 cases. Further, periorbital invasion was noted in 13 cases of sinonasal malignancies. In 11 cases, an orbital preservation strategy was employed, allowing successful clearance of the malignancy at the periorbita in a majority of cases, with involvement of oculoplastic surgery in 7 cases (Fig. 2A, B). Orbital exenteration to clear the orbital disease with negative margins was only required in 2 cases. Another 2 cases would have required

orbital exenteration to clear the orbital disease; however, a conservative strategy was used given the presence of distant metastases at the time of initial presentation.

Despite the refinement in open and endoscopic techniques to address the orbit, the necessity for orbital exenteration vs orbital preservation in the setting of periorbital invasion has been a longstanding area of debate in the literature. Prior to the 1980s, malignant sinonasal tumors in close proximity to the orbit were generally treated with radical excision with orbital exenteration.^{14,15} Subsequently, there has been a trend toward eye preservation in a majority of these cases, with orbital exenteration being reserved for cases with obvious orbital soft tissue infiltration. This conservative strategy has yielded acceptable oncologic outcomes.^{4,5,8,16} Imola and Schramm⁸ reported on 66 cases of sinonasal malignancy encroaching the orbit; orbital preservation was achieved in 54 cases. The rate of local recurrence was quite comparable at 30% in the orbital preservation group and 33% in the orbital exenteration group. Rajapurkar et al.⁹ further showed that orbital preservation can be performed in cases with limited periorbital and orbital soft tissue involvement. They concluded that complete dissection from the orbital fat and surrounding orbital contents, negative margins, and appropriate adjuvant treatment were key to local control. The current series further lends credence to this appropriately aggressive oncologic strategy that strives to preserve the orbit whenever possible, yet achieves acceptable margins.

The present study attests to the efficacy of the endoscopic approach for management of benign and malignant tumors with orbital extension. A majority of these cases can be managed by a purely endoscopic approach, facilitating unparalleled visualization of the anatomy in great detail and involved tissue planes. The endoscopic technique provides detailed assessment of the periorbita at the sinonasal-orbital interface and can aid in confirming invasion with directed intraoperative frozen section biopsies. This, in turn, can avoid the need for more invasive open orbital and skull base approaches. Moreover, the endoscopic approach can improve cosmesis, minimize collateral tissue damage, decrease postoperative hospital stay, and may allow for more rapid adjuvant therapy due to quicker postoperative healing time. Nonetheless, open procedures by oculoplastic surgery were required in almost one-third of cases. In fact, these can serve as an important adjunct in these complex cases affording simultaneous access to the neoplasm through a separate incision, especially in cases involving the anterior orbit and superior nasolacrimal system that are difficult to access by a purely endoscopic approach. The adjunct orbital approach can also provide the ability to place a malleable retractor to protect deeper orbital contents, whereas the endoscopic approach can better resect periorbita and underlying orbital fat. Close collaboration between rhinology and ophthalmology is a prerequisite to optimally manage these cases.

Important limitations of this study must be acknowledged. The retrospective nature of the data can lead to recall bias and introduce inaccuracies to the study. Although 41

patients represents a large series on this topic, inclusion of a greater number of cases, preferably with a uniform pathology, may allow for a more robust analysis. In addition, imaging evaluation was not standardized for every patient. Patients with benign disease typically underwent CT imaging and only had MR imaging in select cases only. By contrast, cases of sinonasal malignancies consistently underwent both CT and MR imaging. Last, the decision to consult ophthalmology was individualized based on a variety of factors, including tumor location, pathology, surgeon preference, and patient referral pattern.

Conclusion

The present study represents the largest series to date documenting the endoscopic management of the orbital

interface in benign and malignant sinonasal tumors. CT and MR imaging provided complimentary information for assessment of tumor extension at the orbital interface. A majority of these cases are amenable to a minimally invasive endoscopic approach, although select cases are better managed in conjunction with ophthalmology via an accessory anterior approach. The overall rate of complications is low, with a majority of patients preserving their ocular function. 🌐

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