A rare case of metastatic lung cancer to the ethmoid sinus and orbit.

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Abstract:
Significance: Adenocarcinoma of the paranasal sinuses is a rare pathologic diagnosis associated with inherent diagnostic delay significantly influencing morbidity and prognosis.

Findings: Imaging (CT, MRI, PET-CT) and nasal endoscopy with biopsy remain critical in the early diagnostic assessment of oncology patients manifesting signs of facial, orbital or intracranial pathology.

Conclusion: The paranasal sinuses and orbit remain potential sites for distant spread of primary cancers of the kidney, breast and lung.

Narrative:
We present the case of a 56 year old African-American female who presented to the Hematology/Oncology service with progressively deteriorating vision bilaterally for 10 days, associated with a worsening headache, bilateral orbital swelling and photophobia. She was treated one-year previously with chemotherapy and radiotherapy for metastatic non-small cell lung cancer with metastasis to the frontal bone, femur and leptomeninges.

On examination, the patient was distressed but afebrile. She was unable to open her left eye; when the lid was raised, visual acuity was absent. Bilaterally there was intense scleral injection with prominent erythema and proptosis. Pupillary response to light was minimal bilaterally. Eye movement permitted only restricted lateral gaze on the right side.

An urgent CT scan of the orbits and sinuses demonstrated opacification of the frontal, ethmoid and sphenoid sinuses, with an air-fluid level in the right maxillary sinus. Intense boney sclerosis was also present. Partial dehiscence of the lamina papyracea was noted bilaterally with associated soft tissue thickening in this region. Bilateral subperiosteal abscesses were diagnosed radiologically, albeit with minimal soft tissue stranding. See Figures 1A and 1B.

Figures 1A and 1B: CT sinus with contrast demonstrating complete ethmoid opacification and bilateral medial orbital enhancement with partial right lamina papyracea bony dehiscence.
She received intranasal decongestants and high dose intravenous steroids immediately prior to being taken to the operating room (OR) for incision and drainage of the presumed bilateral abscesses. A 2cm incision was made on the right medial upper eyelid. Despite extensive exploration, an abscess cavity was not identified. Nasal endoscopy revealed an edematous and intensely inflamed sinonasal cavity, without mass, polyp or purulence.

Postoperatively, an MR scan with gadolinium was performed which demonstrated thrombosis of the left superior ophthalmic vein, with extensive soft tissue edema of the superior oblique and medial rectus muscles in the superior orbit, extending back to the orbital apex, with perineural edema and enhancement in this area. Bony metastases to left posterior wing of sphenoid and clivus were also evident. See Figures 2A and 2B.

The patient returned to the OR and underwent bilateral middle meatal antrostomy and total ethmoidectomy. Again no purulence was identified, but tissue from the ethmoid sinus was sent for histology which confirmed metastatic small cell carcinoma (Figures 3 – 6). Stage IV small cell lung cancer (T4N2M1b) was determined based on 2010 American Joint Committee on Cancer (AJCC) 7th edition TMN staging. See Figures 3-6.
Discussion

Sinonasal malignancies comprise approximately 3% of head and neck cancers, with sinonasal adenocarcinoma accounting for about 10-20% of cases. Classically, these tumors have been associated with environmental causative agents such as hardwood dust and occupational exposure to glues/adhesives and formaldehyde; paints, varnishes, and lacquers are also identified as causative agents. These tumors typically involve the ethmoid sinus, nasal cavity or maxillary sinus. Locally aggressive tumors have been known to spread to the orbit, infratemporal/pterygopalatine fossae and into the cranial cavity. Adenosquamous cell carcinoma of the lung is a rare type of non-small cell lung cancer that makes up 3% of all lung cancers. This type of carcinoma typically demonstrates aggressive growth and metastatic spread. The most common distant sites of metastatic spread include liver, bone, brain and adrenal gland.

Classically, primary sinonasal adenocarcinoma is been divided into two subtypes: salivary-type and non-salivary. Nonsalivary adenocarcinomas are further subdivided into intestinal-type adenocarcinoma and non-intestinal. Further, nonsalivary non-intestinal adenocarcinoma present with papillary growth and are classified as low versus high-grade. The most common location for nonsalivary adenocarcinomas is the ethmoid sinus followed by the nasal cavity and maxillary antrum. However, salivary gland-type adenocarcinomas usually occur in the maxillary sinus and nasal cavity. Immunohistochemistry is used to differentiate the subtypes of adenocarcinoma.

The rarity of sinonasal adenocarcinoma had created difficulty in long term follow up until recent years. Large case series have since concluded that craniofacial resection followed by postoperative radiotherapy are associated with good local control rates. The absence of intracranial invasion or sphenoid involvement, lower staging, and low-grade histology are critical features for a favorable prognosis.
Metastatic spread to the sinonasal tract is an even less common pathologic entity, typically originating from malignancies in the kidney, breast or lung. Fewer than twenty cases of sinonasal adenocarcinoma manifesting from primary lung cancer have been previously reported in the world literature. This case, however, is the first to report non-small cell lung cancer metastasizing to the orbit and sinonasal tract in the United States. In the case presented above, Mucin, CK 7, CK20 (commonly seen in intestinal-type adenocarcinoma) and TTF1 (specific for tumors arising from the lung) were all positive while p63, PAS, and silver stains were negative. The scarcity and high mortality of such cases have prevented evaluation of new therapeutic advances.

In summary, this case report highlights the rare presentation of non-small cell adenocarcinoma metastasizing to the sinonasal tract and orbit, and highlights the combined diagnostic importance of both early imaging and endoscopic biopsy.

References