Head Neck Pathol Radiology Pathology Classics

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Sinonasal Schneiderian papillomas (SSP) are benign neoplasms arising primarily in the nasal cavity but they may also arise in the paranasal sinuses. These papillomas arise from the Schneiderian mucosa which lines the nasal cavity and paranasal sinuses. Schneiderian mucosa is of ectodermal derivation in contrast to the mucosal lining of the nasopharynx which is endodermally derived. Three variants of SSP are classically described: (1) exophytic/fungiform, (2) inverted and (3) cylindrical cell. The variants are defined by location (septal, lateral nasal wall), gross/endoscopic appearance and histologic features. Overall, however, the clinical features and biologic behavior are similar. They occur over a wide age range but in general are not common in children. Symptoms vary and are dependent on location. They may include nasal obstruction, epistaxis, rhinorrhea, pain (i.e., headaches) and the presence of a “mass” lesion. There is some evidence suggesting a relationship to human papilloma virus (HPV) infection. HPV types 6 and 11 (low risk type) have been most commonly identified using *in situ* hybridization (ISH) or polymerase chain reaction (PCR) techniques; HPV-types 16, 18 have been identified rarely. The presence of HPV

does not appear to increase the risk of malignant transformation, at least in the current studies available.

Radiographically, Schneiderian papillomas have a rather bland appearance on computed tomography (CT) and magnetic resonance imaging (MRI) and the variants cannot be reliably defined by their imaging appearance alone. On CT, the tumors are usually isoattenuated compared to normal nasal mucosa and usually lack inherent calcifications. Remodeling of the adjacent osseous structures from pressure erosion effects is characteristic but not specific. The most common variant, inverted papilloma, is typically located along the lateral aspect of the nasal cavity or paranasal sinuses, a helpful clue to suggest the diagnosis. CT evidence of focal hyperostosis in inverted papillomas has recently been reported to be a reliable indicator of the site of tumor origin. On T1-weighted MR imaging, inverted papillomas are iso-to-hyperintense to muscle whereas they are hyperintense to muscle on conventional T2-weighted imaging. Septations or striations within the mass are commonly noted (50%) but are not specific. Enhancement is almost always intense and homogeneous but less than that of surrounding mucosa. These features are not specific, being shared with both benign and malignant neoplasms of the nasal cavity and paranasal sinuses (Figs. 1, 2).

The fungiform/exophytic type typically arises on the nasal septum and is often referred to as the “septal” type. Grossly, this variant displays a papillary or exophytic growth with a fleshy, pink-tan color and firm consistency and is attached to the mucosal surface by a stalk. Histologically, one can see the papillary growth pattern with the papillary fronds lined by a well-differentiated stratified squamous epithelium with a somewhat transitional-type appearance. Often there is some keratinization. The stromal component is composed of delicate fibrovascular cores.

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Fig. 1 Sagittal T1-weighted MR images without (left) and with (right) contrast enhancement. A large polypoid mass fills the nasal cavity with extension into the ethmoid and sphenoid sinuses and causes uplifting of the cribriform plate. The mass demonstrates intense enhancement on the post-contrast image

Fig. 2 Left: Post-contrast coronal T1-weighted MR image shows same nasal mass with bilateral extension into ethmoid sinuses, causing lateral bowing of the medial orbital walls and inferior extension to the level of the left inferior turbinate with obstruction of the left maxillary infundibulum. Right: On gross examination this sinonasal Schneiderian papilloma, inverted type, has a somewhat fleshy, translucent quality. This is an example of one where there are surface irregularities with a polypoid, almost “exophytic” growth appearance

Mucocytes and intraepithelial mucous cysts can be seen but are not as abundant as in the other two variants. The main differential diagnosis on a histologic basis is squamous papilloma. An intranasal or paranasal sinus location (i.e., arising from Schneiderian mucosa) should lead one to the correct diagnosis of Schneiderian papilloma, exophytic type.

The inverted and cylindrical cell types characteristically arise on the lateral nasal wall and paranasal sinuses. On endoscopic and gross examination the inverted types may be bulky lesions with a somewhat translucent quality. They

Fig. 3 This Schneiderian papilloma shows an “endophytic” growth pattern on histologic examination for this “inverted type” papilloma

may be flat with surface irregularities, polypoid or a papillary/exophytic growth may be seen (Fig. 2, right). On histologic examination the surface epithelium is seen to be growing in an “inverted” or endophytic growth pattern (Fig. 3). The surface component may show respiratory epithelium with cilia. The inverted component is a stratified squamous epithelial proliferation, again with a somewhat transitional appearance. The thickened squamous epithelial nests are seen growing down into the stroma which may range from a fibrous stroma to myxomatous/edematous tissue. The squamous proliferation displays increased cellularity but maintains polarity and nuclear uniformity; mitotic activity may be seen but is usually limited to the basal and parabasal layers (Fig. 4).

Fig. 4 Note the transitional quality of the squamous proliferation with nuclear uniformity and retention of nuclear polarity; intraepithelial cysts (arrowheads) are characteristic; mitotic figures are highlighted by the arrows in the basal and parabasal layers

Mucocytes and intraepithelial cysts are common (Fig. 4). Clear cell features indicative of glycogen content along with acute inflammatory cells and macrophages may be seen. Seromucous glands are typically lacking. The presence of surface keratinization and/or dyskeratosis is an atypical feature and should raise suspicion for the possibility of malignant transformation, in situ or invasive squamous cell carcinoma. The primary differential diagnosis for inverted papilloma on histologic basis is sinonasal inflammatory polyp, non-keratinizing respiratory carcinoma, verrucous carcinoma and READ (respiratory epithelial adenomatoid) hamartoma.

In the cylindrical cell variant the epithelial proliferation is a multilayer columnar cell type with well-defined cell borders. Most cases have a prominent eosinophilic, granular, “oncocytic” cytoplasm; however, occasionally cases will lack the oncocytic cytoplasm and will display a less distinctive slightly granular to clear cytoplasm. There may be a papillary or inverted growth pattern. The intraepithelial mucous cysts are prominent in this variant and lead to the differential diagnosis of these lesions to include rhinosporidiosis. Seromucous glands may be present in the underlying stromal component. One should also include sinonasal low-grade papillary adenocarcinoma in the differential diagnosis of these lesions.

The treatment of choice for SSP is conservative yet complete surgical resection with clear margins. The long term prognosis of SSP with complete surgical resection and no evidence of in situ or invasive carcinoma is excellent. These lesions have a tendency for recurrence when

incompletely excised and recurrences may develop in up to 60% of cases. The inverted type seems to have a higher recurrence rate than the exophytic type. Recurrences usually develop with 5 years of initial presentation. With recurrence the risk of malignant transformation increases.

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