

FNA CYTOLOGY OF THE HEAD AND NECK: DIAGNOSTIC APPROACH TO COMMON CASES

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Objectives

- ▣ Review some of the more common cytodiaognoses of the Head and Neck
- ▣ Establish an approach to some of the diagnostic dilemmas using a case based tactic
- ▣ Emphasized topics include lymph nodes, cystic neck masses, reactive reparative changes, and salivary gland lesions

Lymph Nodes

- ▣ In a bulk of cases FNAs of the neck are performed to investigate clinically suspicious lymphadenopathy (LAD)
- ▣ The primary differential diagnoses include:
 - Reactive/Infectious LAD
 - Metastatic Disease
 - Lymphoma

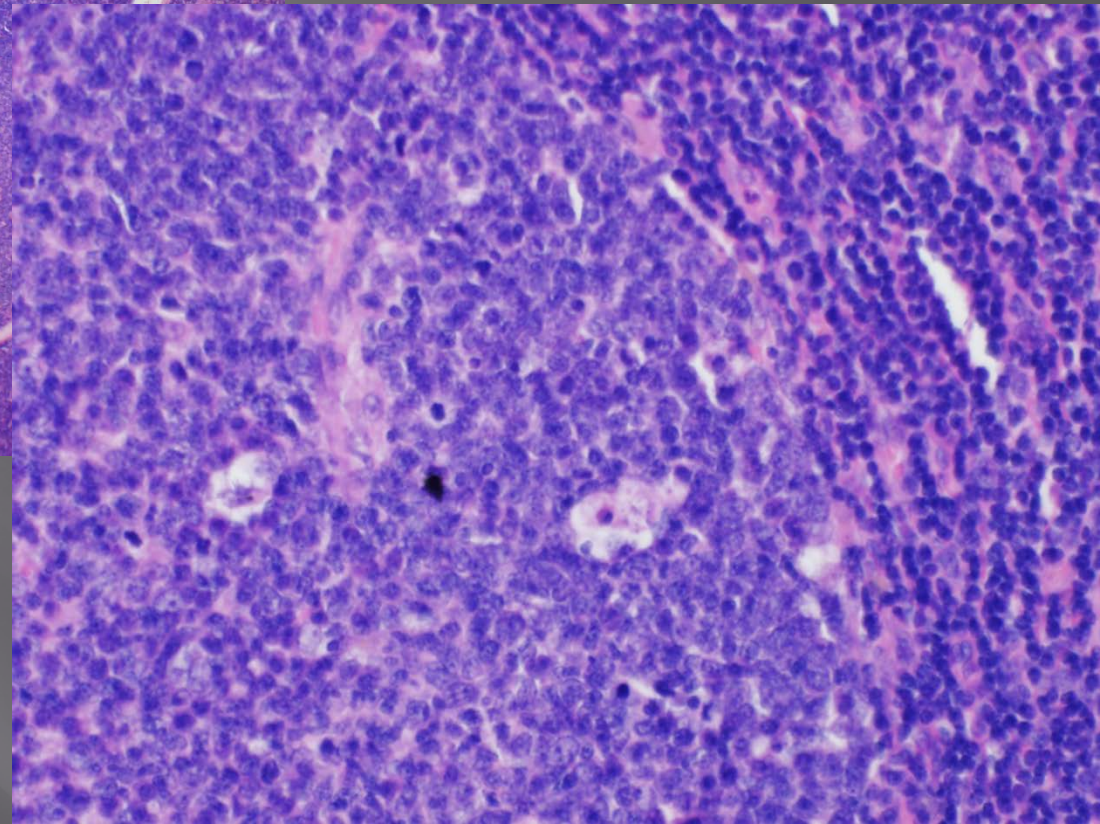
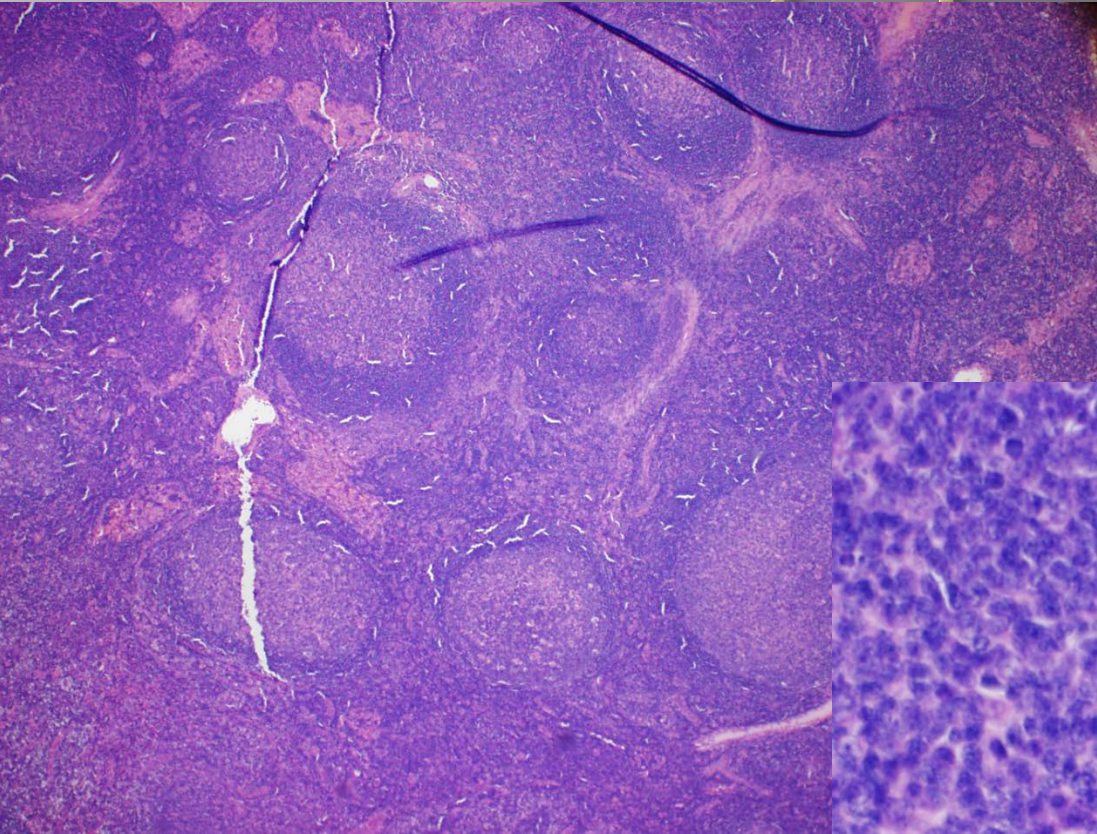
Reactive Lymphadenopathy

- ▣ De novo head and neck LAD in pediatric FNAs are frequently benign (65%)
- ▣ FNAC avoided additional surgical procedures in 61% of cases in one review
- ▣ The cytodiagnosis of reactive lymph nodes is most accurate in patients under 50 years (~5% risk of subsequent malignant diagnosis)
- ▣ A higher rate (29%) of subsequent open biopsy finding of malignancy occurs in patients over 50 following a benign cytodiagnosis

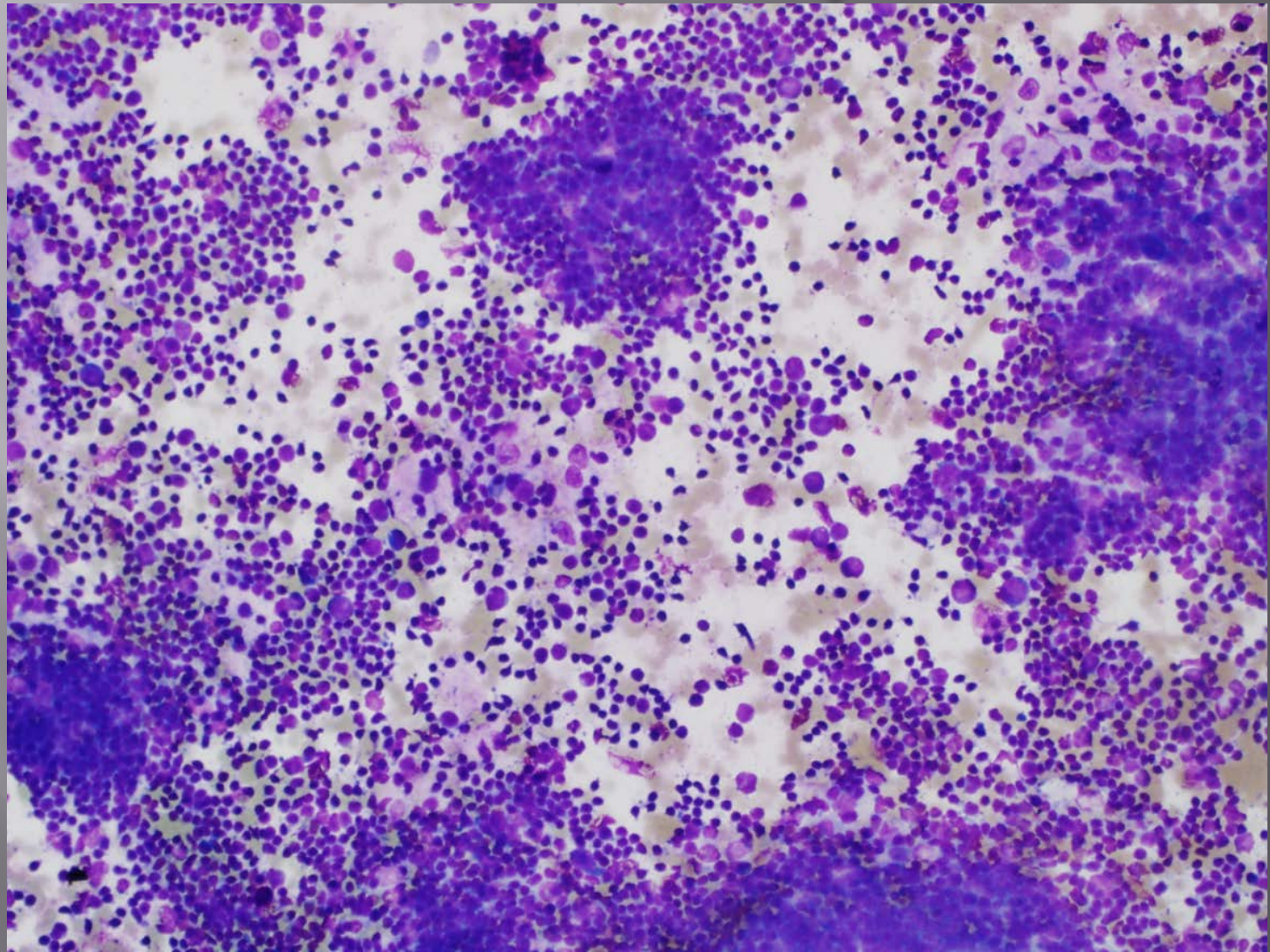
Assessing for the Possibility of Lymphoma

- ▣ To confirm material is adequate (in node) a small drop of the aspirate is placed onto slide(s) for immediate assessment
- ▣ The remainder is rinsed in a cell preservative (eg: RPMI-1640 Roswell Park, Buffalo, NY)
- ▣ Generally 10,000 cells are considered adequate for FC assessment (2 passes)

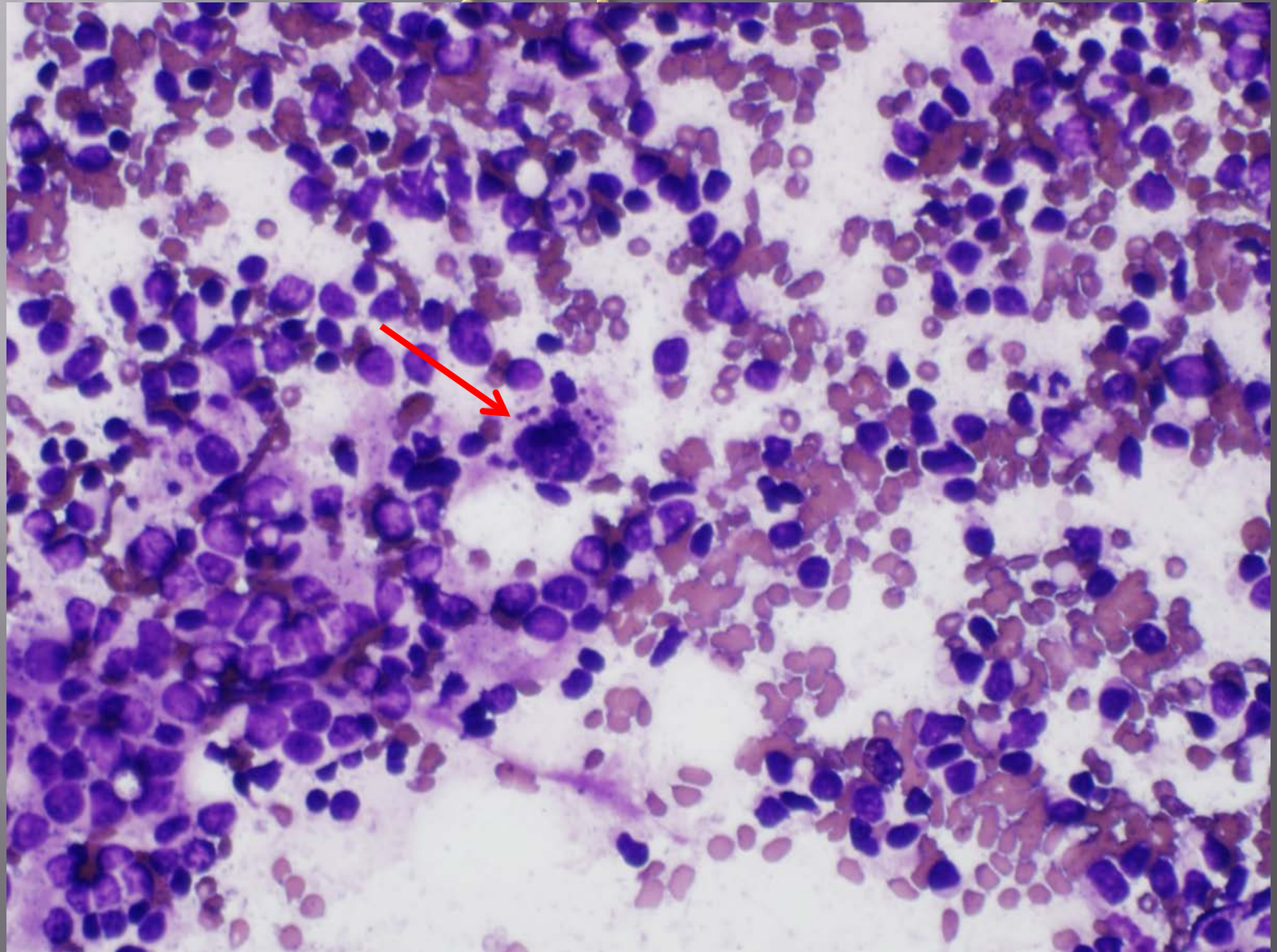
Reactive Lymphadenopathy



Reactive Lymphadenopathy (37 male with history of PTC)



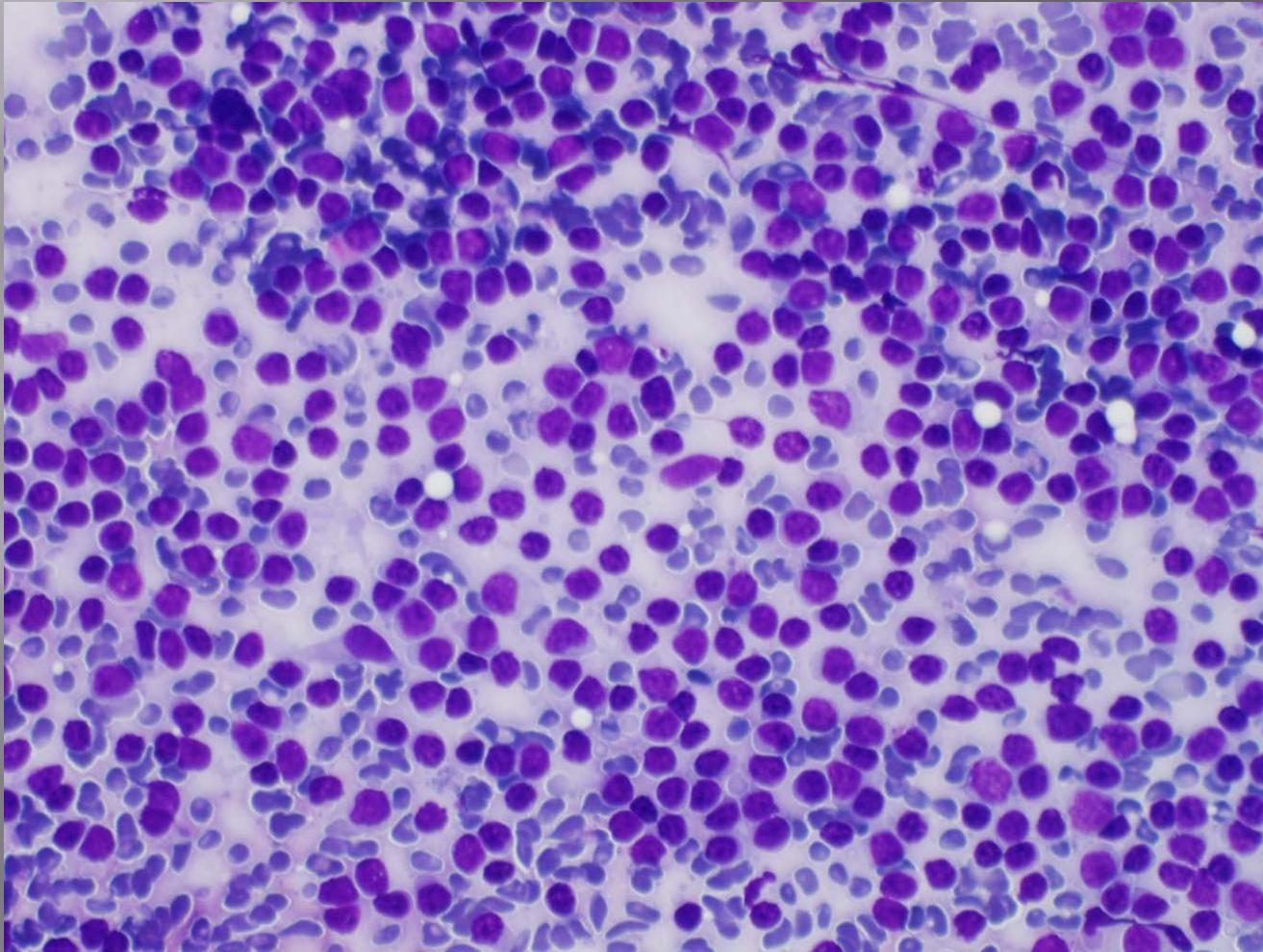
Reactive Lymphadenopathy



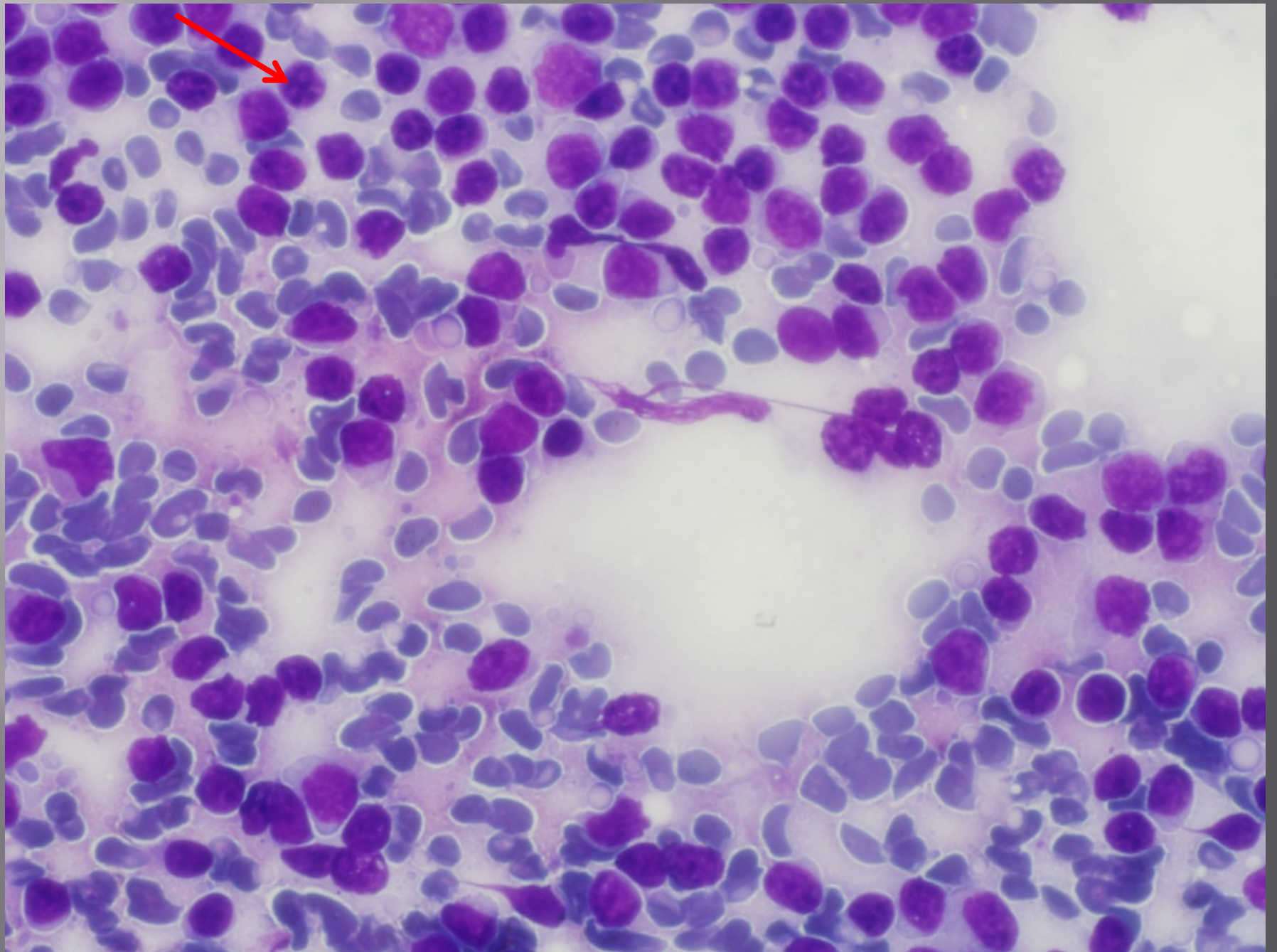
Cytologic Features of Lymphoproliferative Disorders

- ▣ Monomorphic small lymphoid population (mature B cell lymphomas)
- ▣ Monomorphic medium-sized cells (Lymphoblastic lymphoma, Burkitt's lymphoma, Ewing sarcoma/PNET)
- ▣ Population of large lymphoid cells with convoluted nuclei +/- prominent nucleoli (Hodgkin lymphoma, Diffuse Large B-cell lymphoma, Anaplastic T-cell lymphoma)

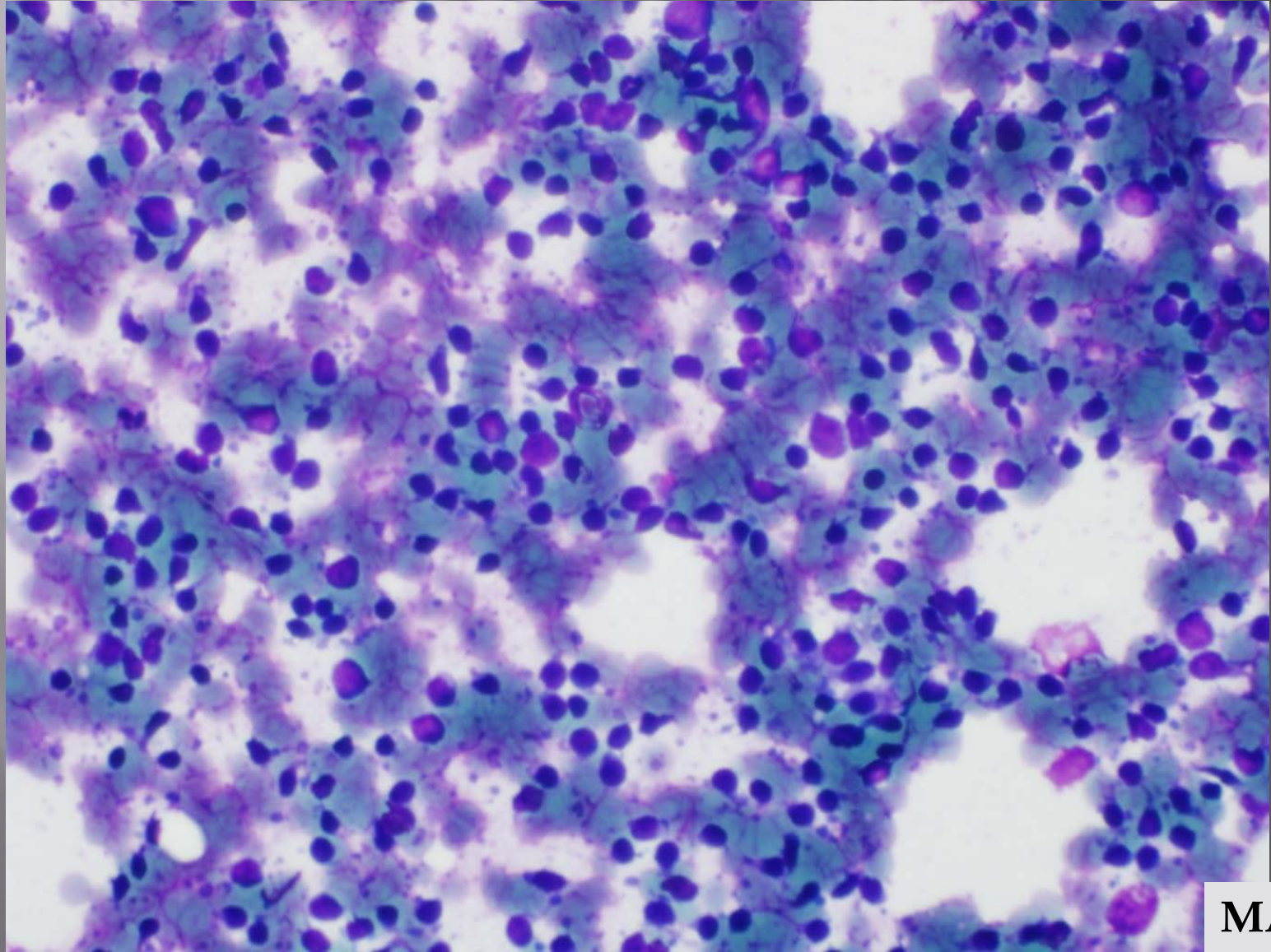
91 year old male with periparotid nodule



CLL

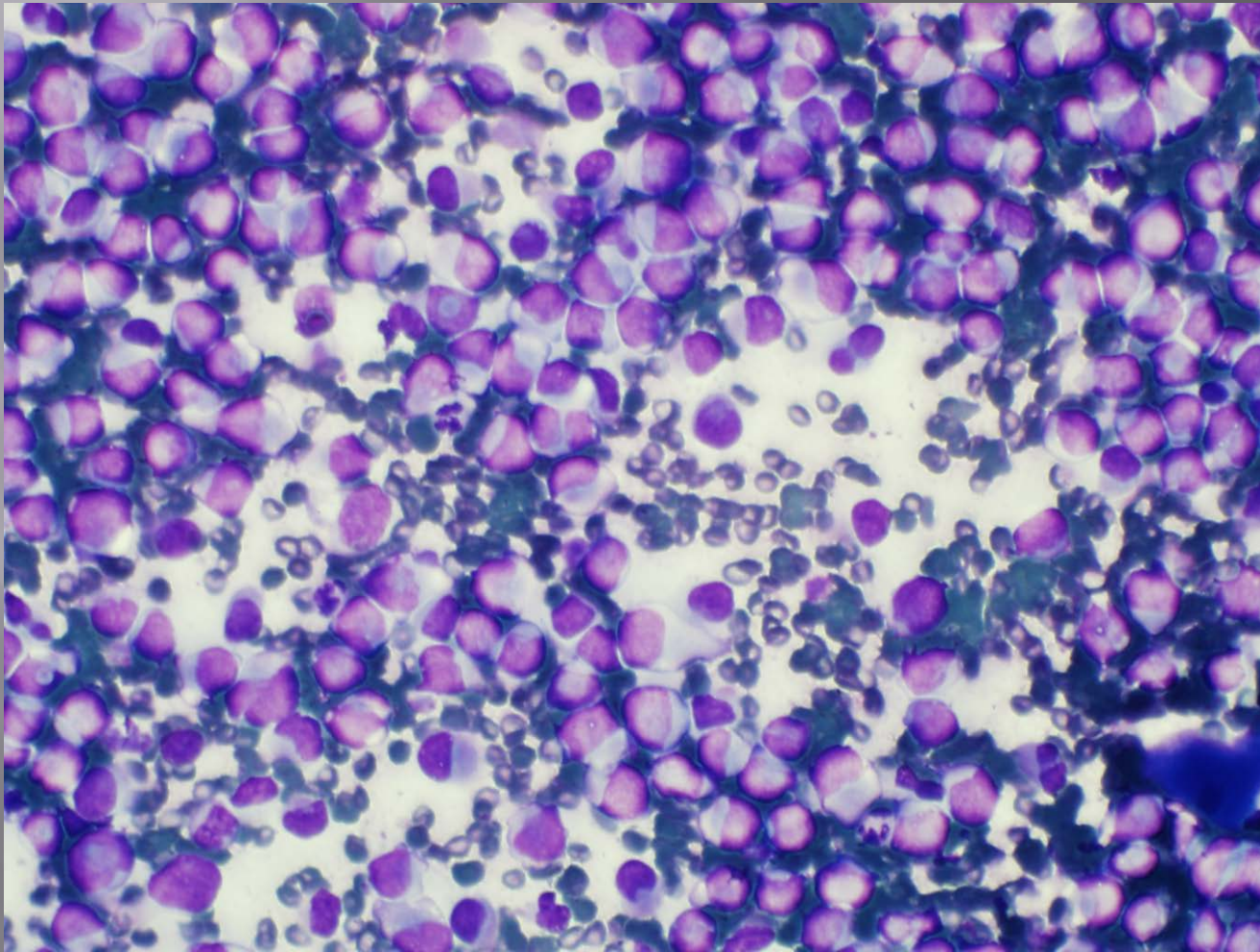


71 year old female with history of MALT now with cervical LAD

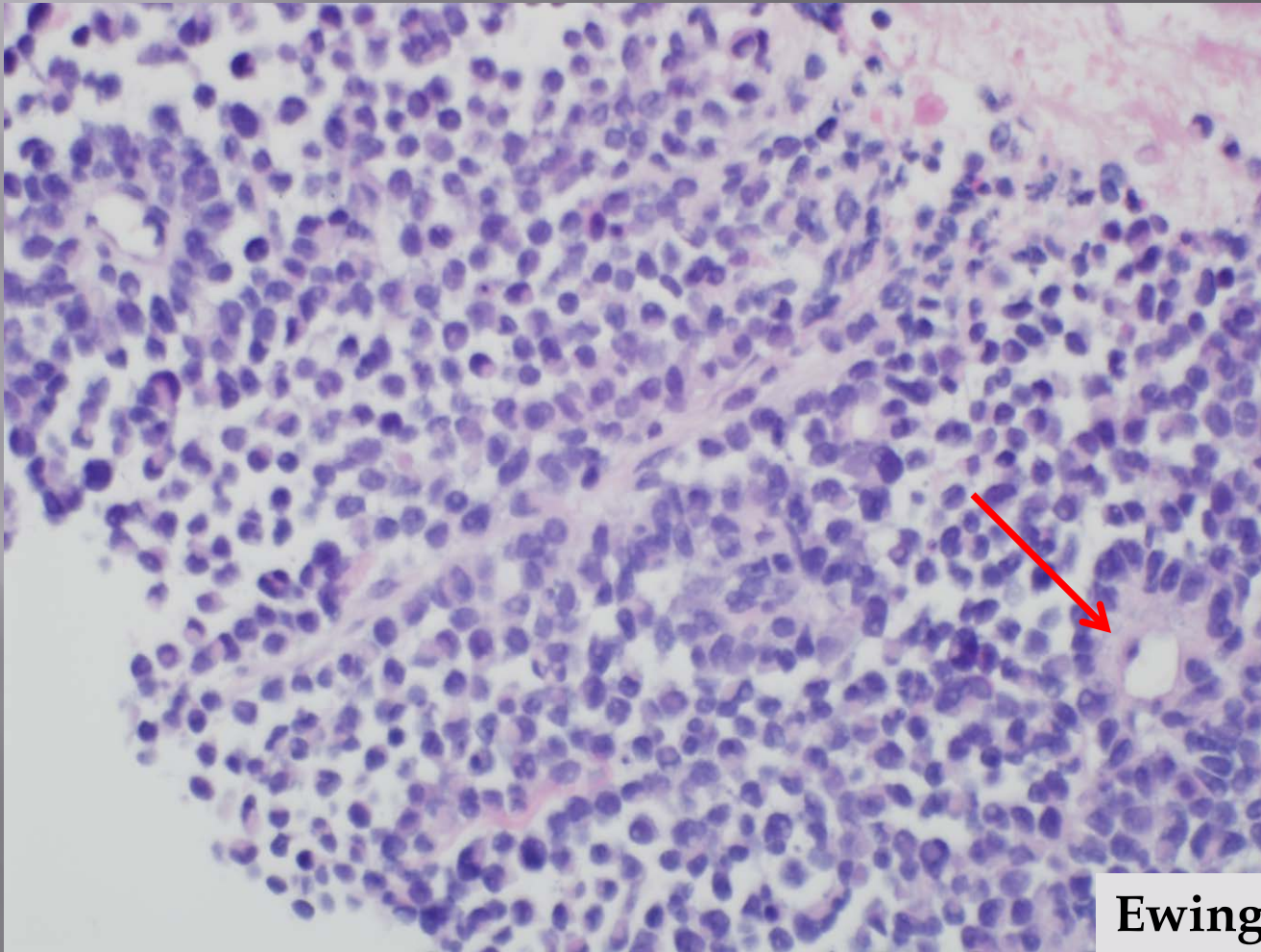


MALT

23 year old male with 3cm posterior neck soft tissue mass

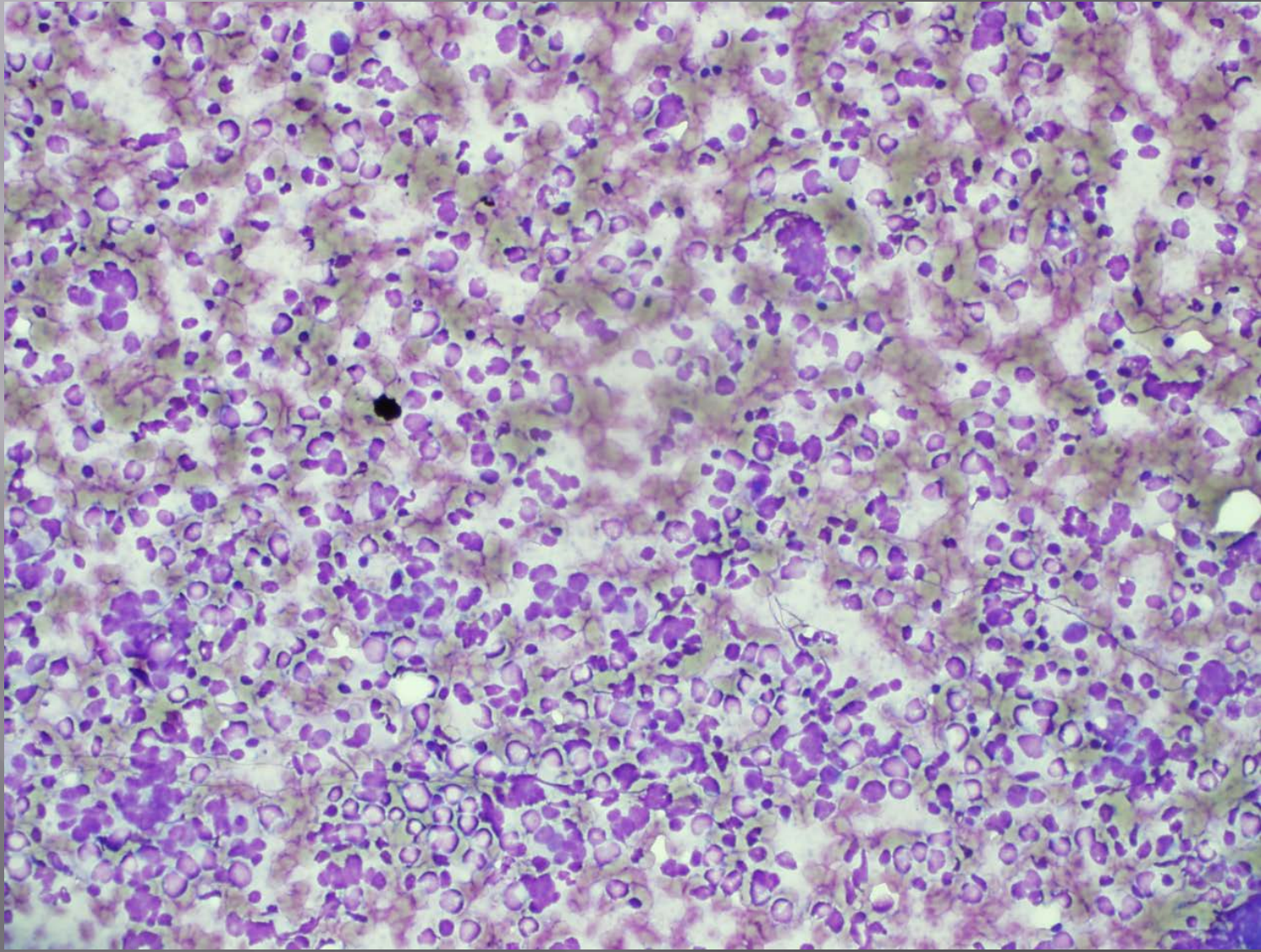


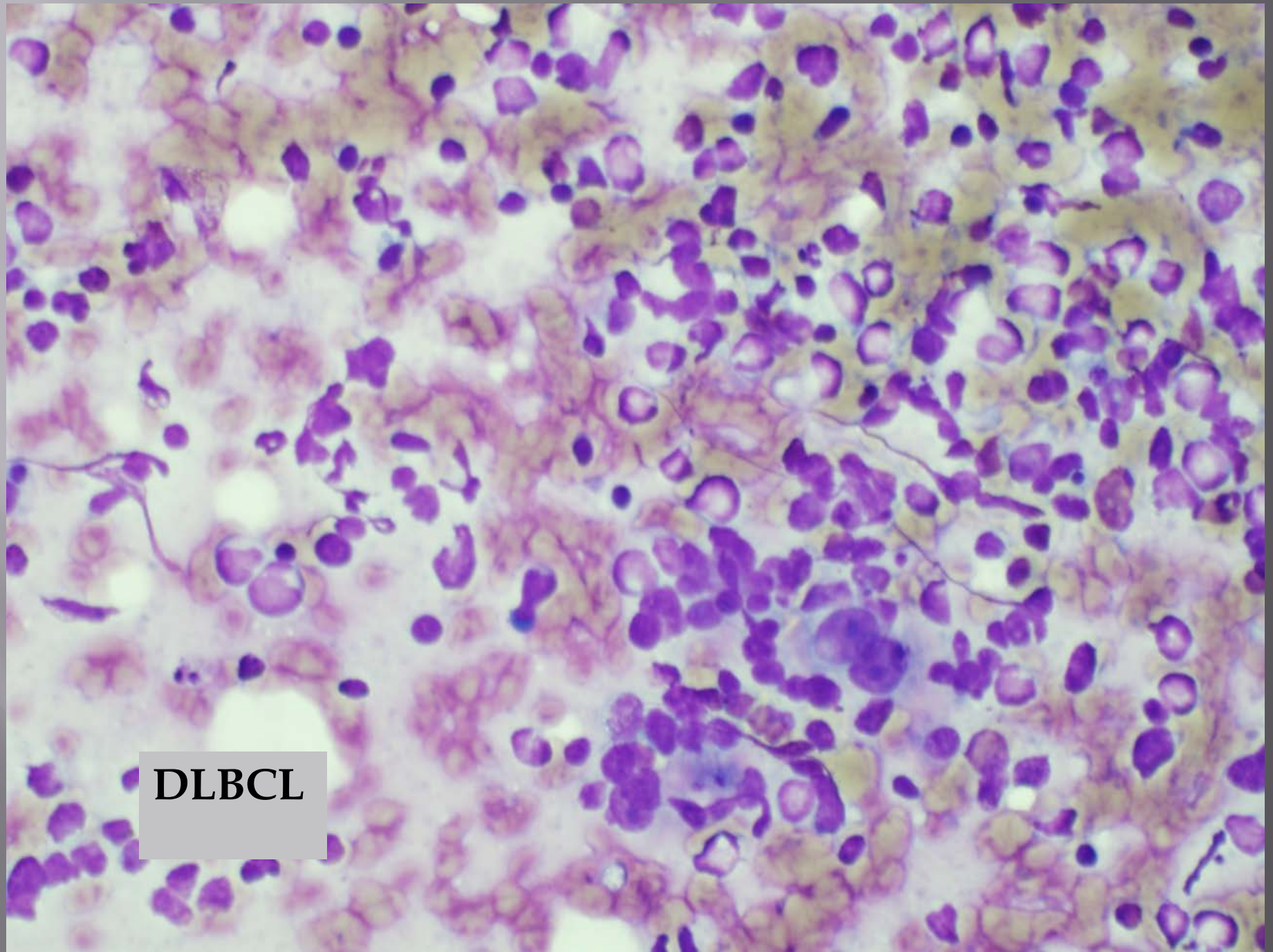
23 year old male with a posterior neck soft tissue mass (cell block)



Ewing Sarcoma

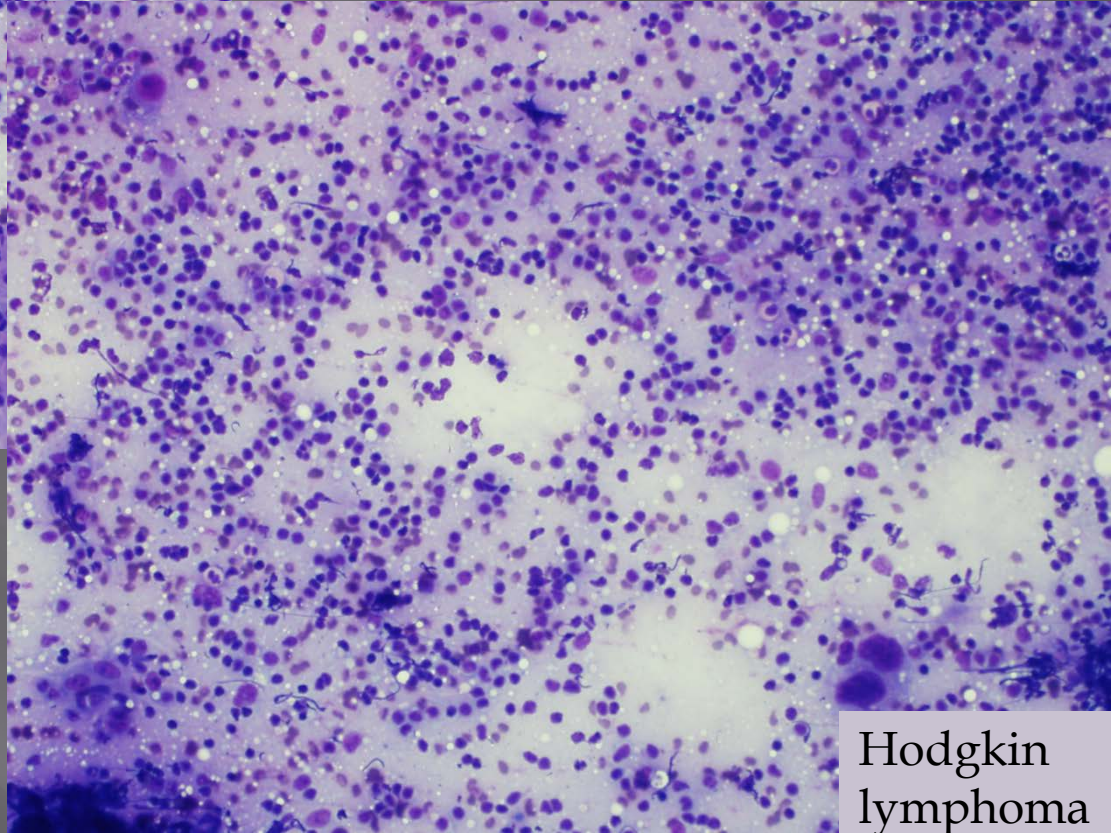
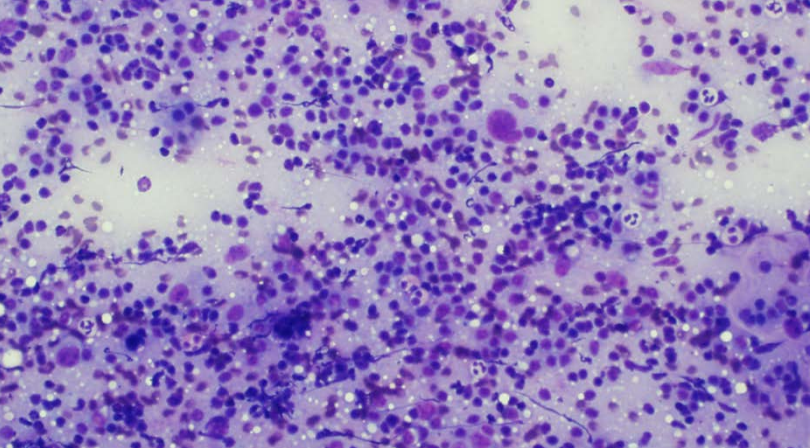
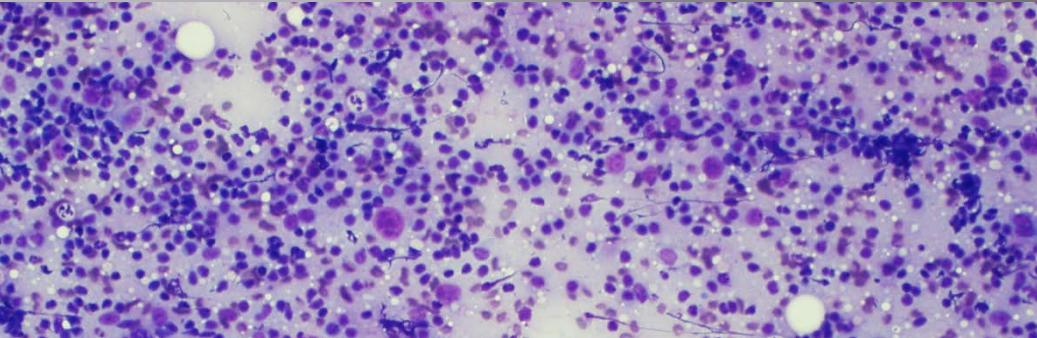
65 year old female with multifocal LAD



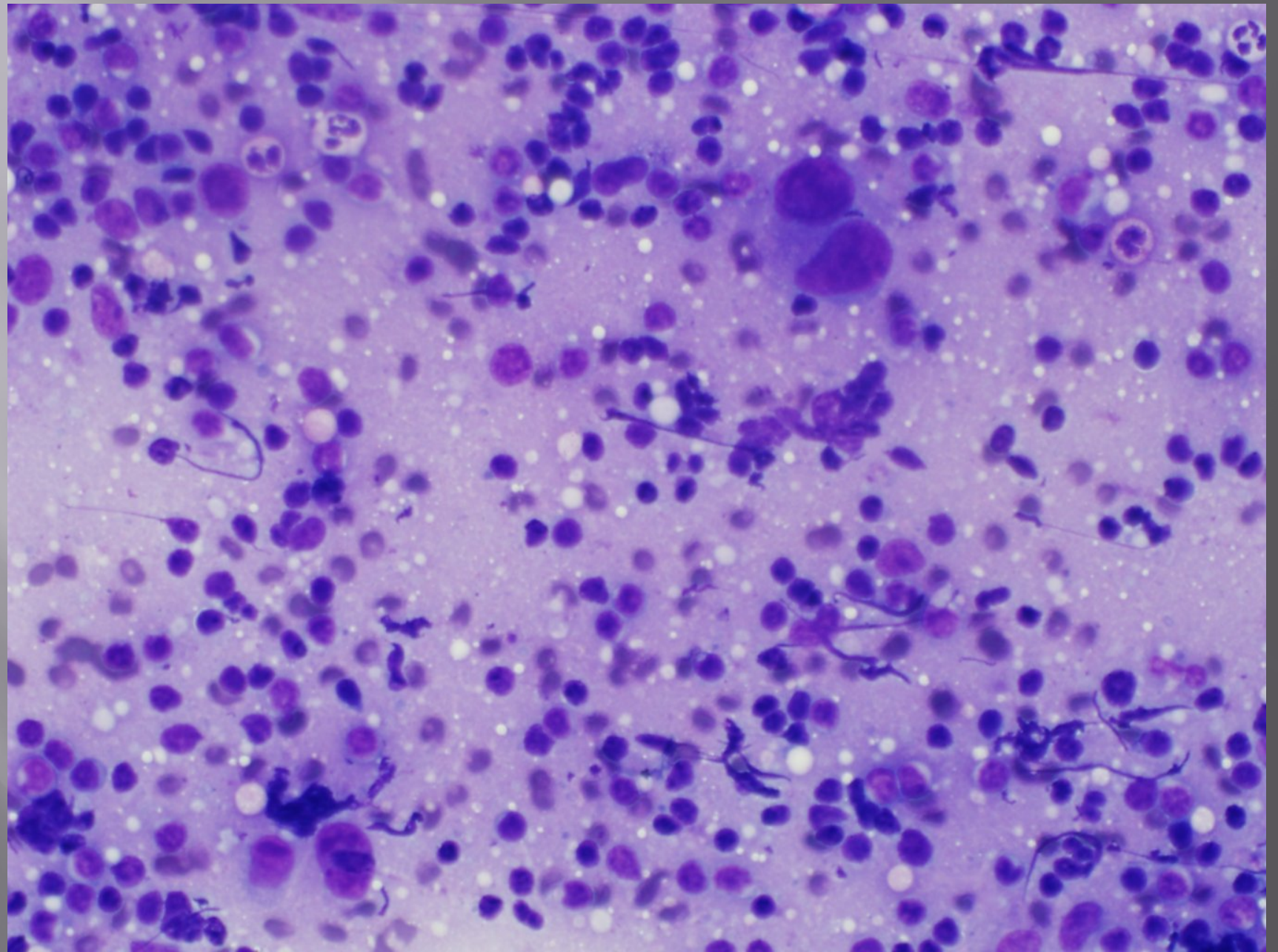


DLBCL

31 year old female with cervical LAD



Hodgkin
lymphoma



Cervical Lymph Nodes: Metastatic Disease

- ▣ Diagnostic accuracy of FNA for metastatic disease ranges from 83-97%
- ▣ Cervical LAD is the most common presenting sign of malignant disease elsewhere in the head and neck
 - Squamous cell carcinoma (90% after age 40)
- ▣ 75% of branchial cysts occur in patient age 20-40

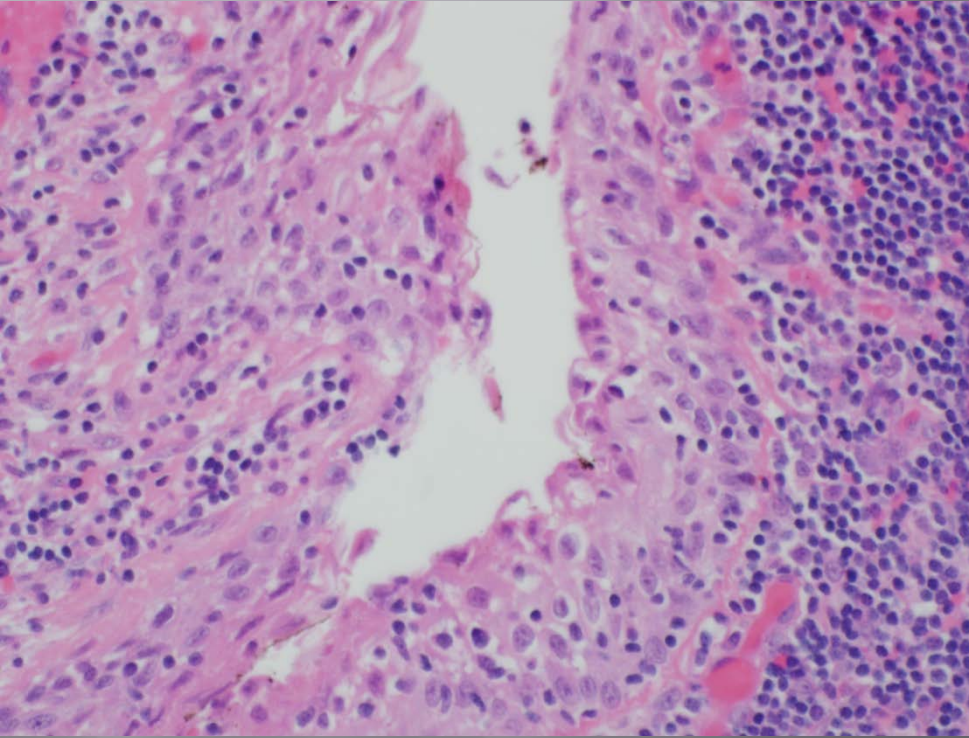
Classic FNA Cytomorphology: Benign Squamous Cysts versus SCCA

Benign Squamous-Lined Cysts	Squamous Cell Carcinoma
Abundant inflammation (PMNs)	Large number of squamous elements
Few squamous epithelial cells	Occasional nuclear hyperchromasia
Bland nuclear features in squamous cells	Occasional nuclear membrane irregularity
Crystals	High N/C ratio

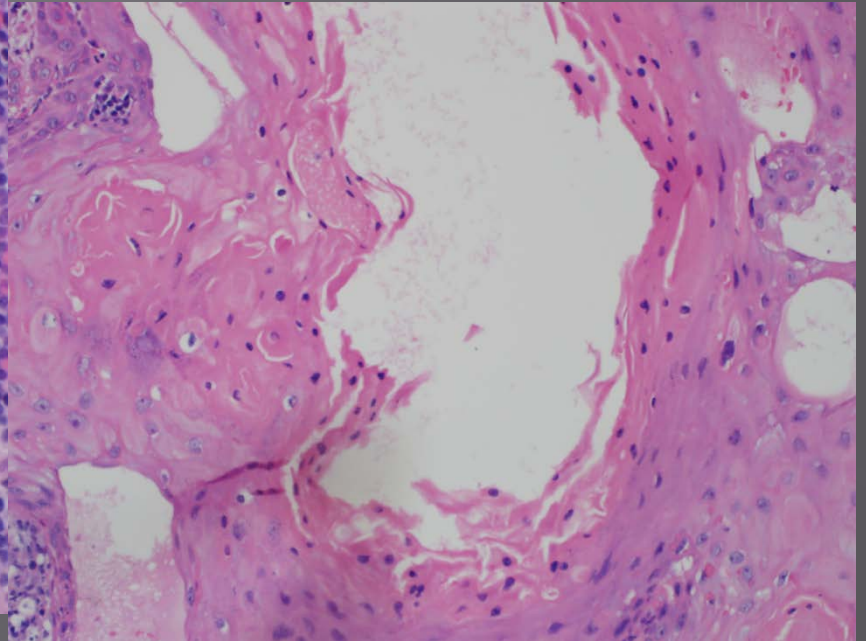
**These classic features don't
hold up in many cases**

Lymph Nodes: Differentiating SCCA from Benign Epithelial Cysts

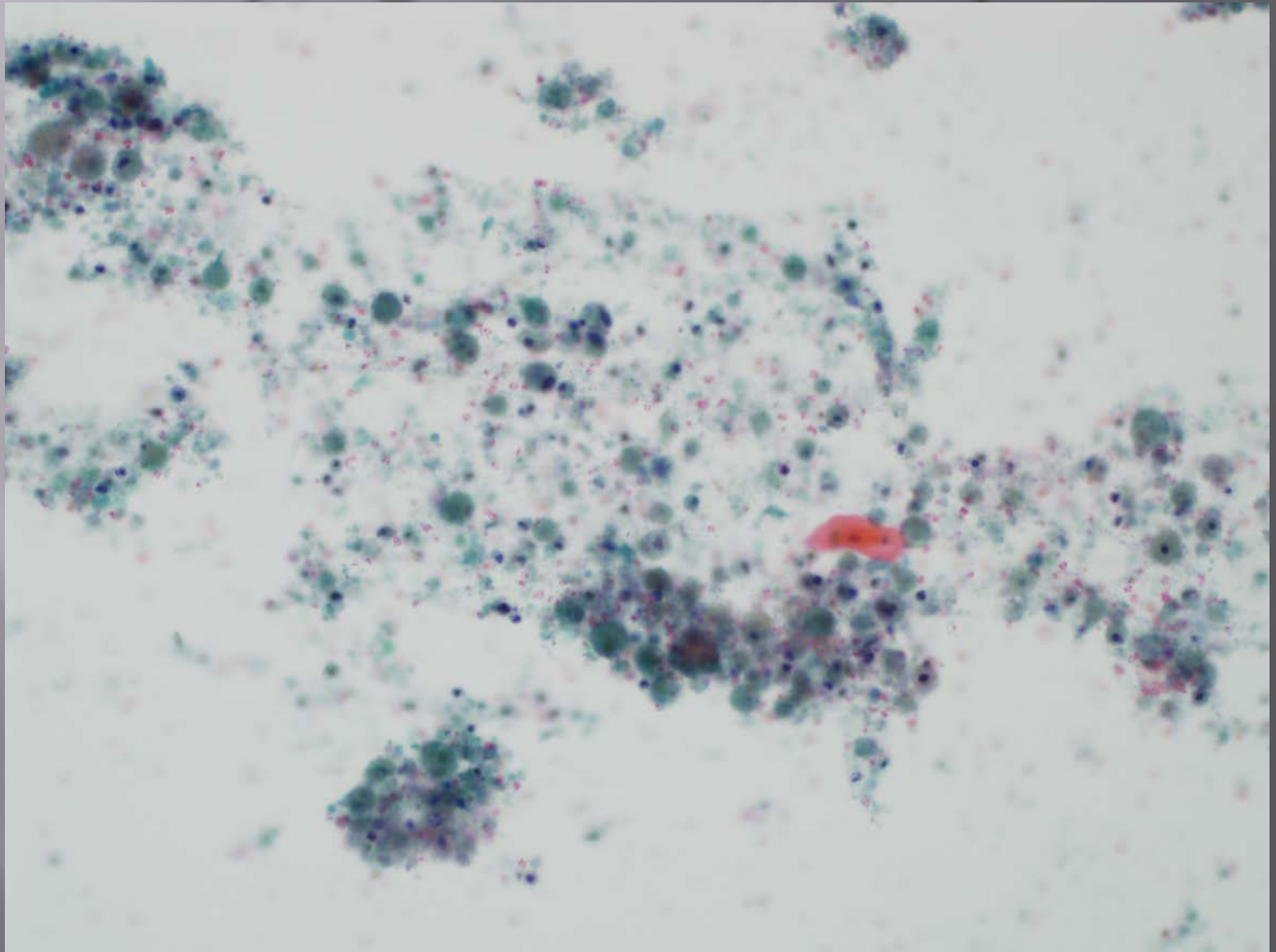
Branchial Cleft Cyst



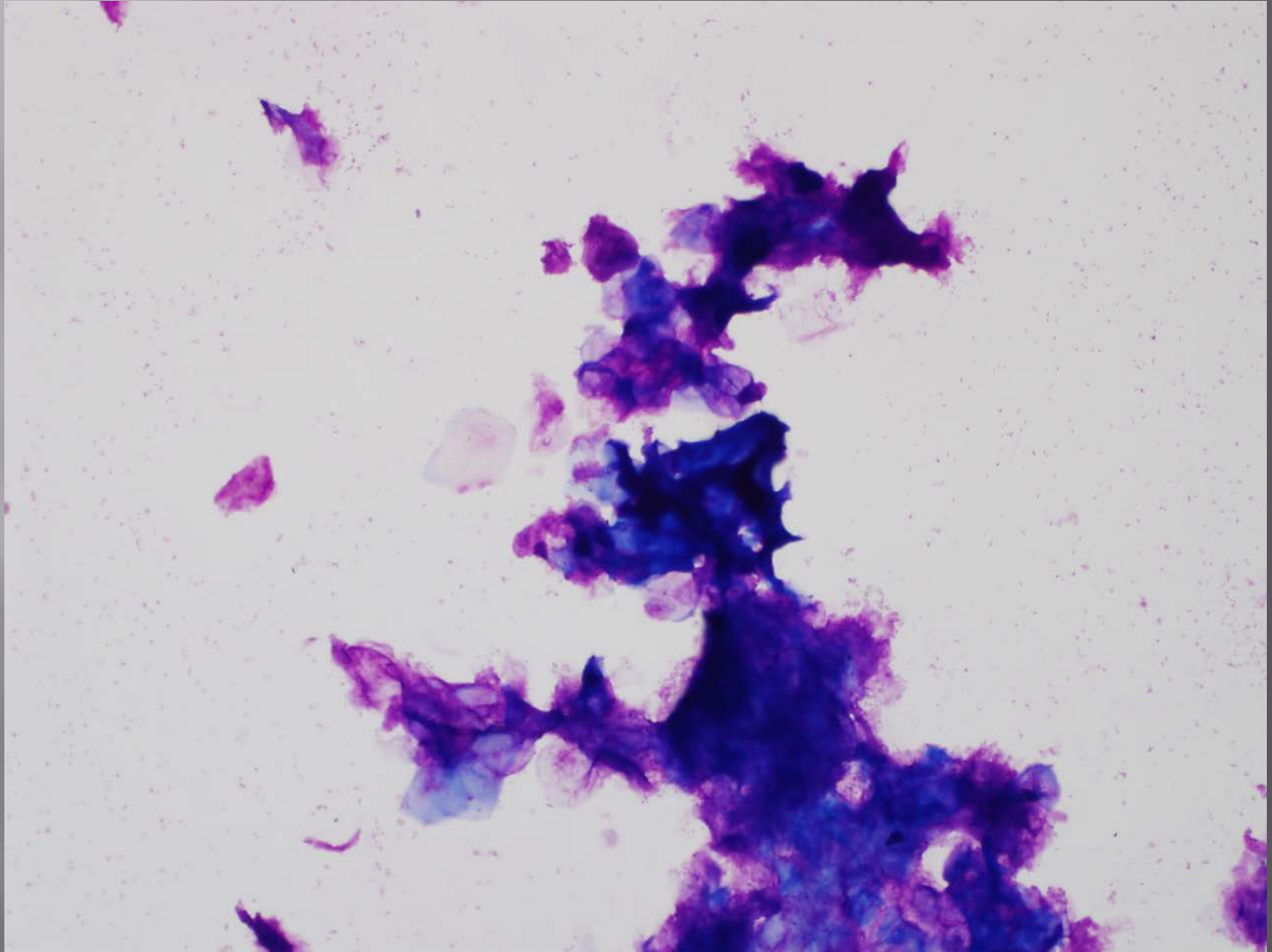
Metastatic SCCA

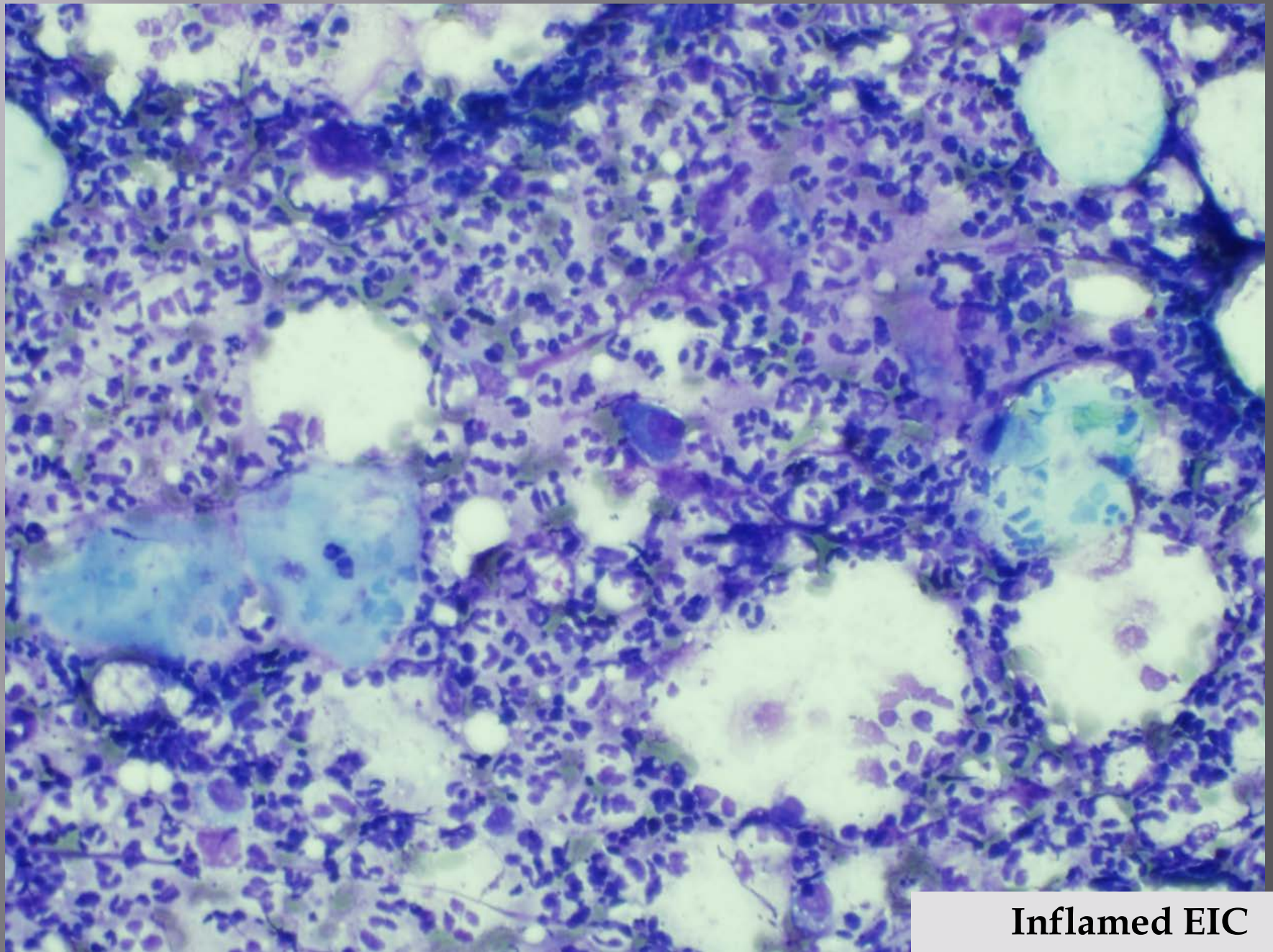


Thyroglossal Duct Cyst



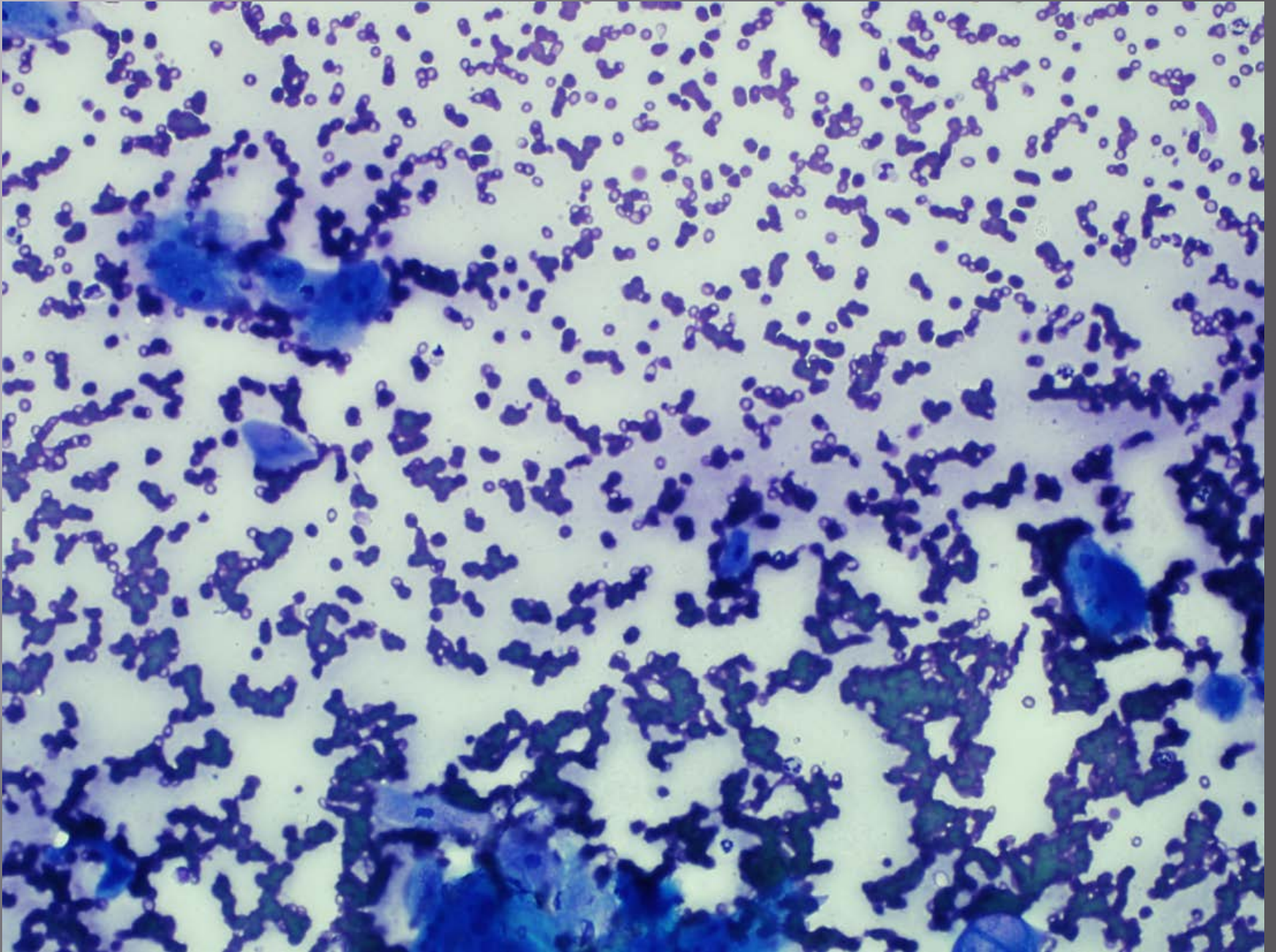
Epidermal Inclusion Cyst



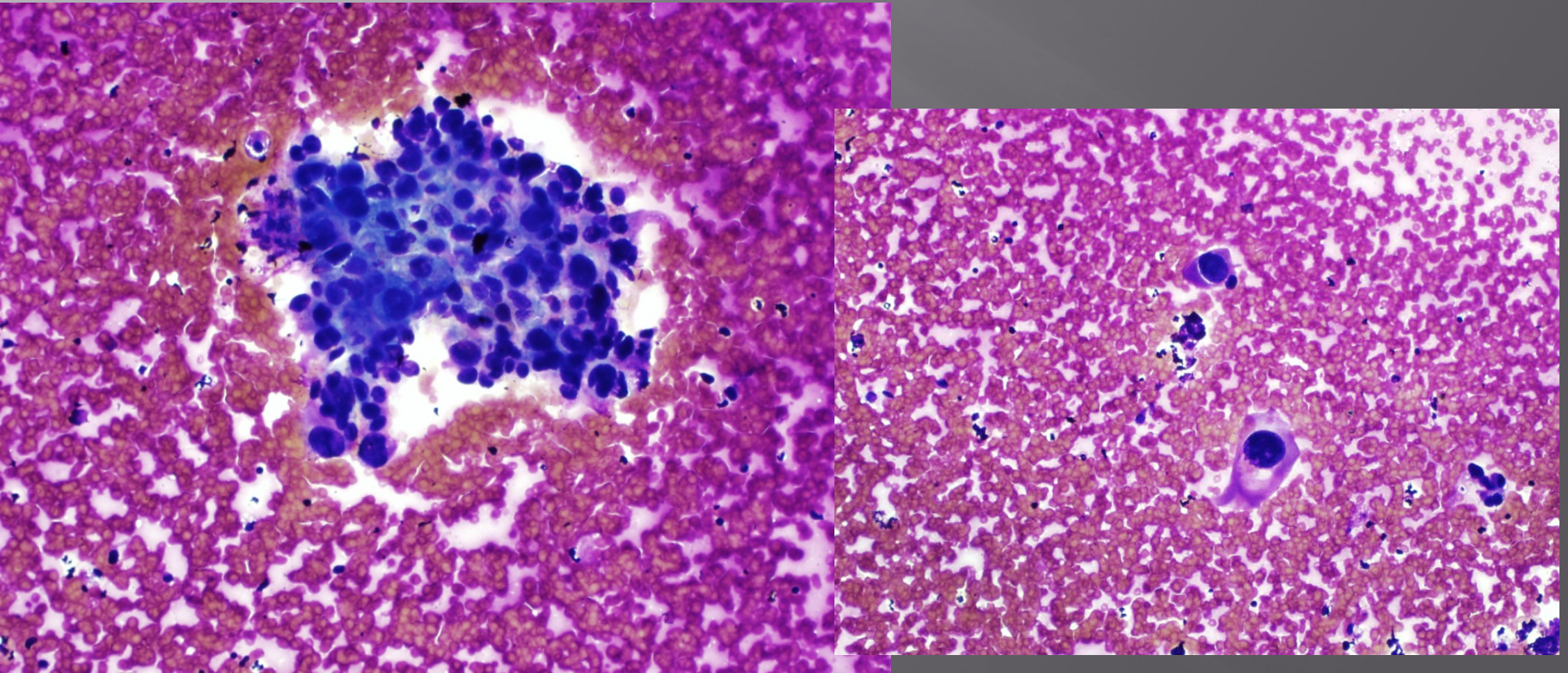


Inflamed EIC

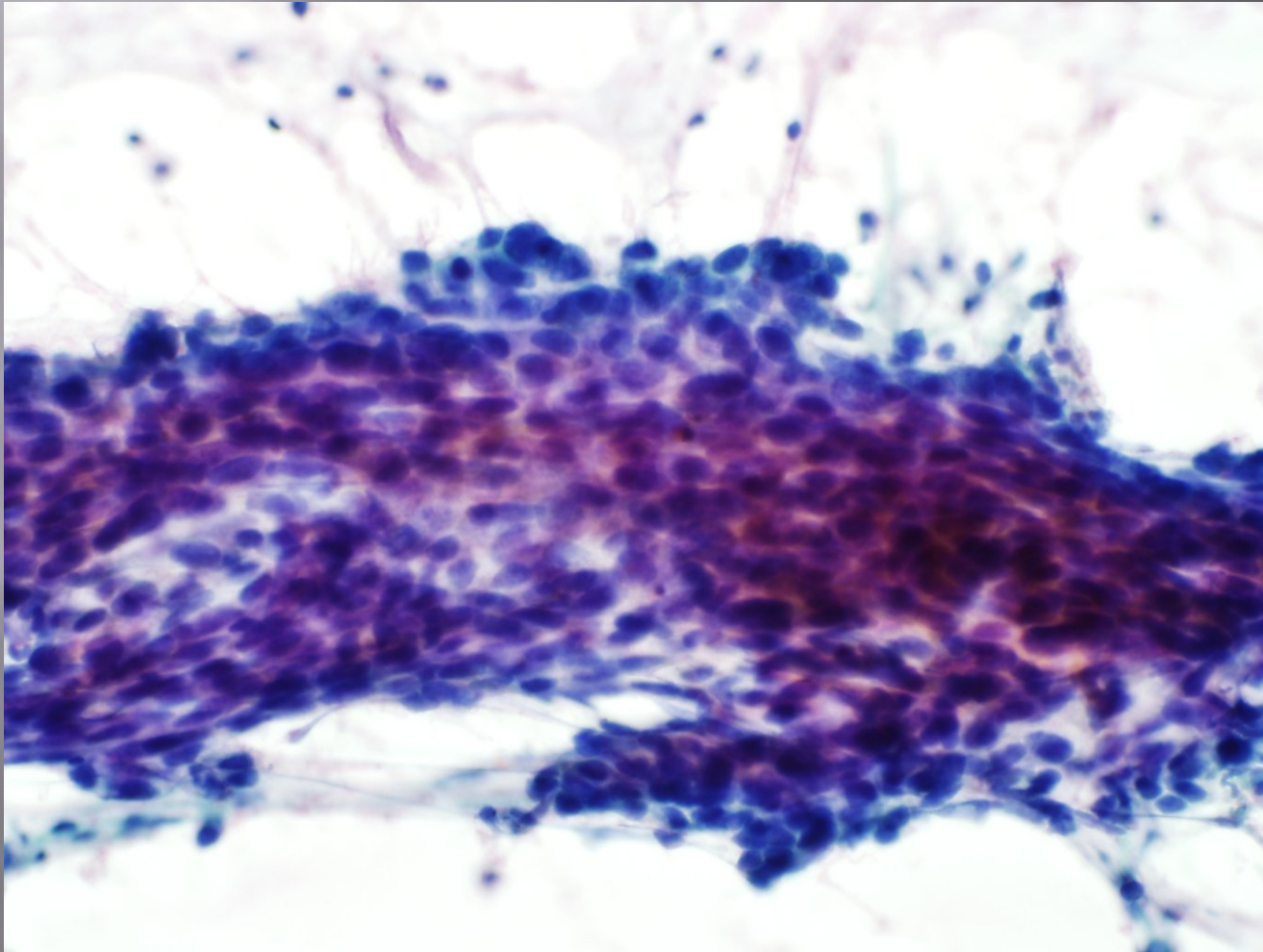
Well-Differentiated SCCA



Easy to Identify SCCA



HPV-Associated SCCA of the Head and Neck



Options for Needle Rinse

- ▣ Patients with FNAs showing SCCA with no clinical evidence of a head and neck primary might benefit from HPV testing
- ▣ Currently ~75% of oropharyngeal SCCAs are associated with HR-HPV (particularly type 16)
- ▣ Patient's with HPV-related tumors show a greater response to radiation and overall improved survival compared to patients with non-HPV tumors

Jarboe EA et al.
Diagnostic
Cytopathology.
2012;40(6):491-497

Options for Needle Rinse to Assess for HPV Status

- ▣ Rinse for cell block with immunohistochemical staining for p16
- ▣ Rinse for cell block for HPV DNA in situ hybridization (ISH)
- ▣ Rinse for cell block for HPV RNA in situ hybridization (ISH) – indicates transcriptionally active virus
- ▣ Rinse into Thin-Prep® Pap Test PreservCyt® solution for either Hybrid Capture II or Cervista™ HPV HR testing

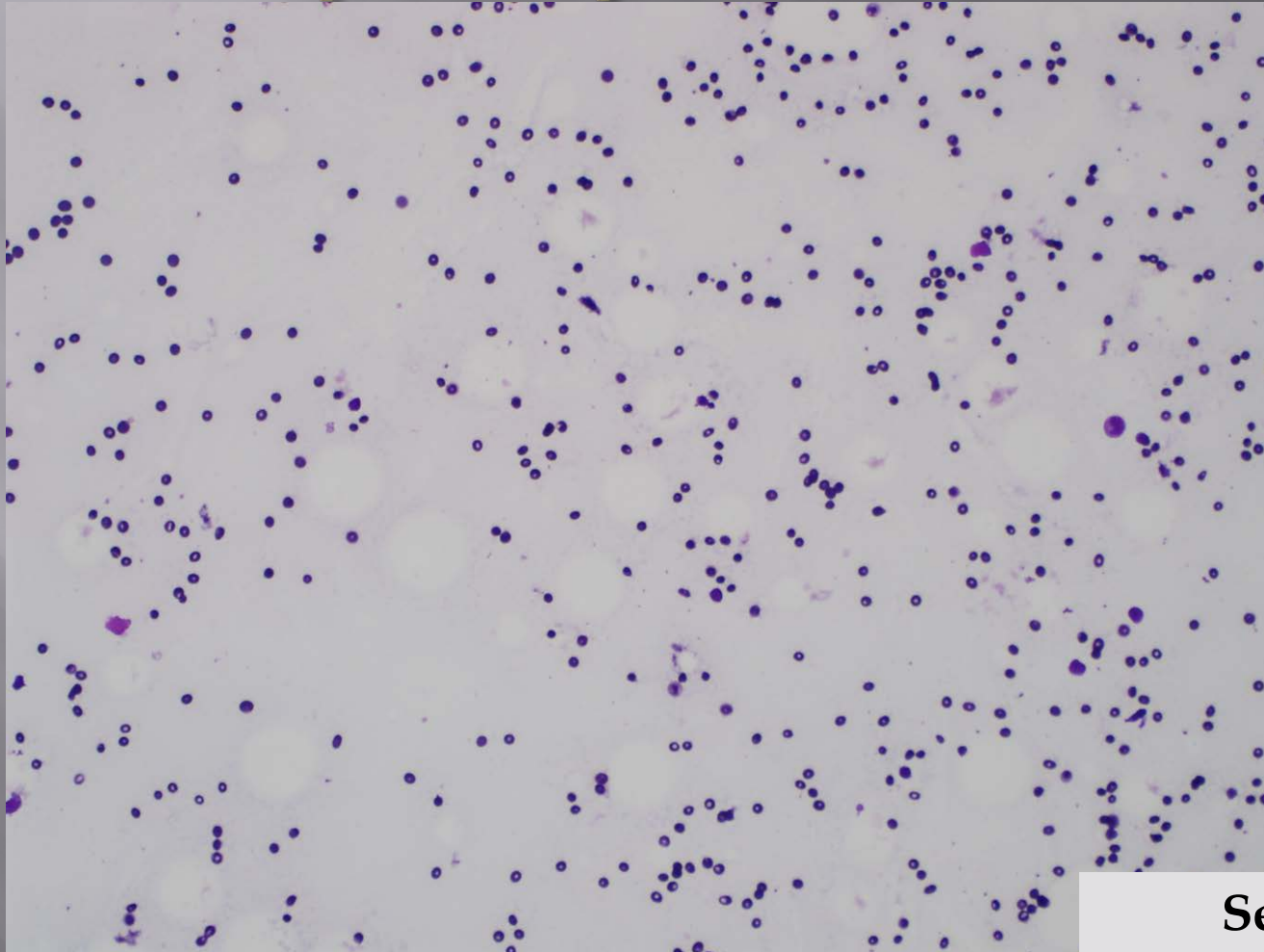
Recommendations

- ▣ Positive HPV testing in cases that are nondiagnostic on cytomorphology should be treated with caution
- ▣ Adult patients with aspirates showing squamous elements; recommend excision liberally
- ▣ Don't forget about other metastatic sources

Reactive/Reparative Versus Mesenchymal Neoplasm

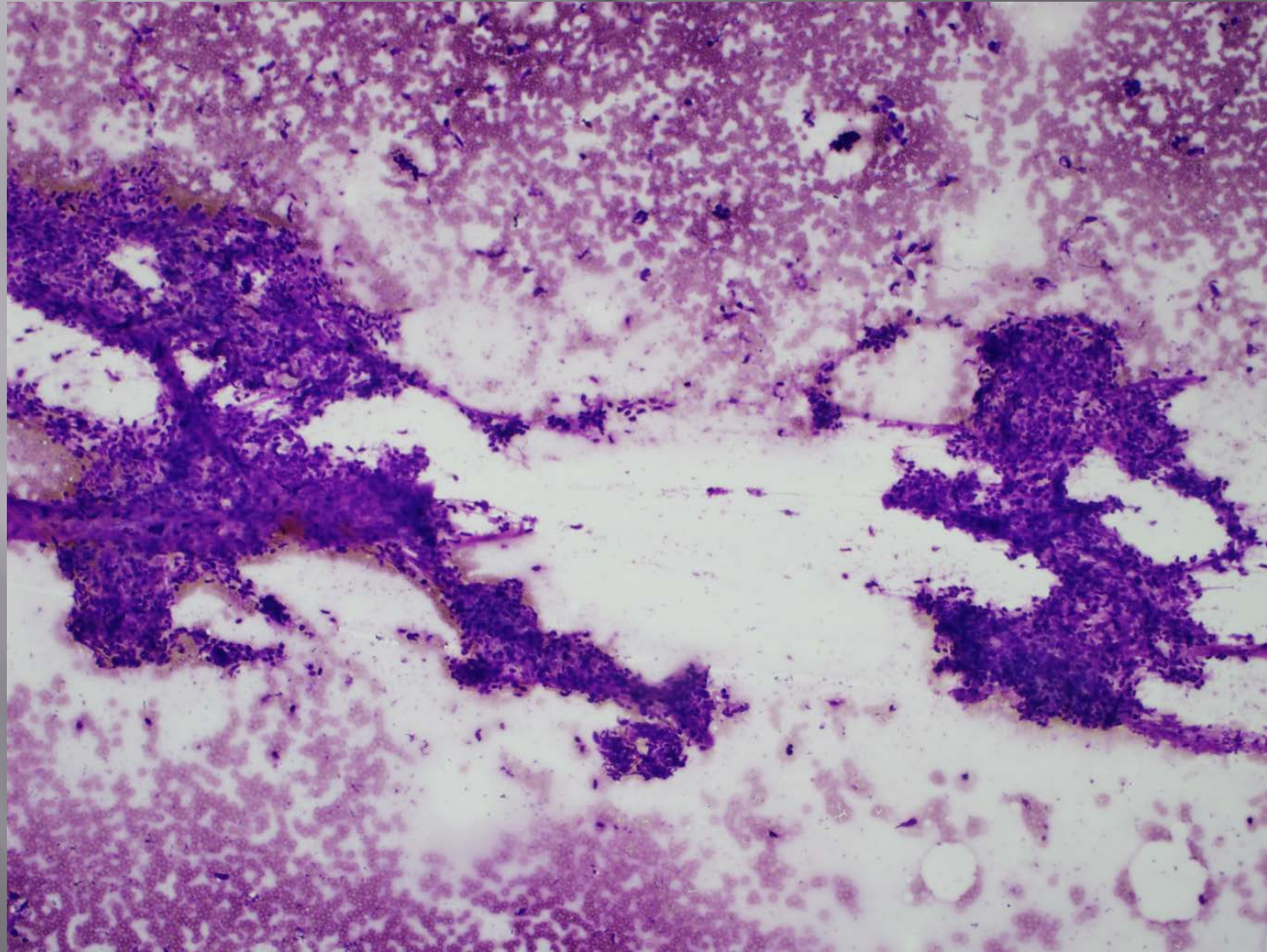
- ▣ Many patients evaluated for head and neck FNAs have had prior surgery or chemo-radiation treatment
- ▣ A variety of benign and malignant mesenchymal neoplasms involve the soft tissues of the head and neck
- ▣ **Thus a common diagnostic dilemma occurs with respect to spindle cell lesions**

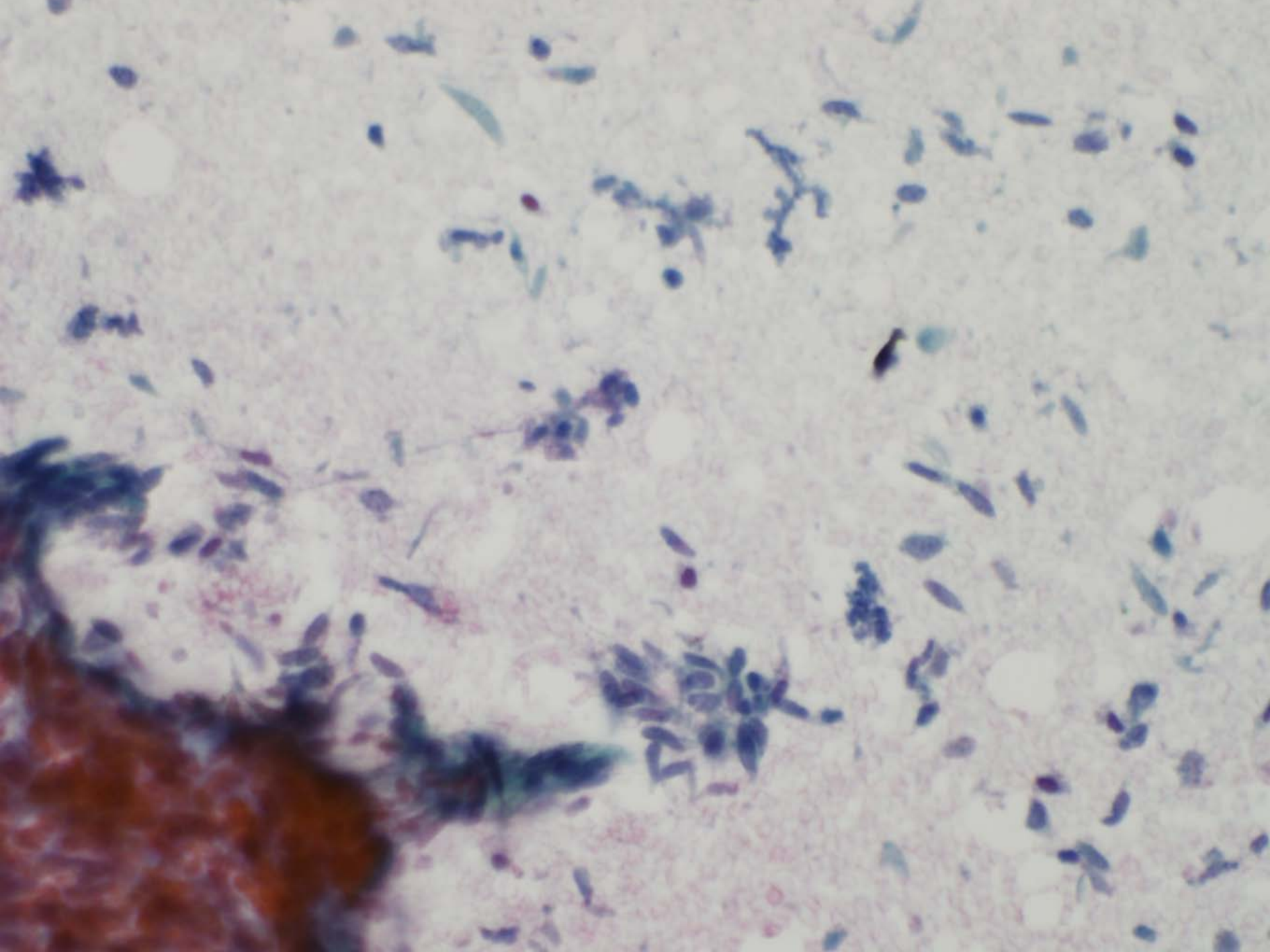
Sometimes it Really is Nothing: 2 cm nodule 10 days postoperative

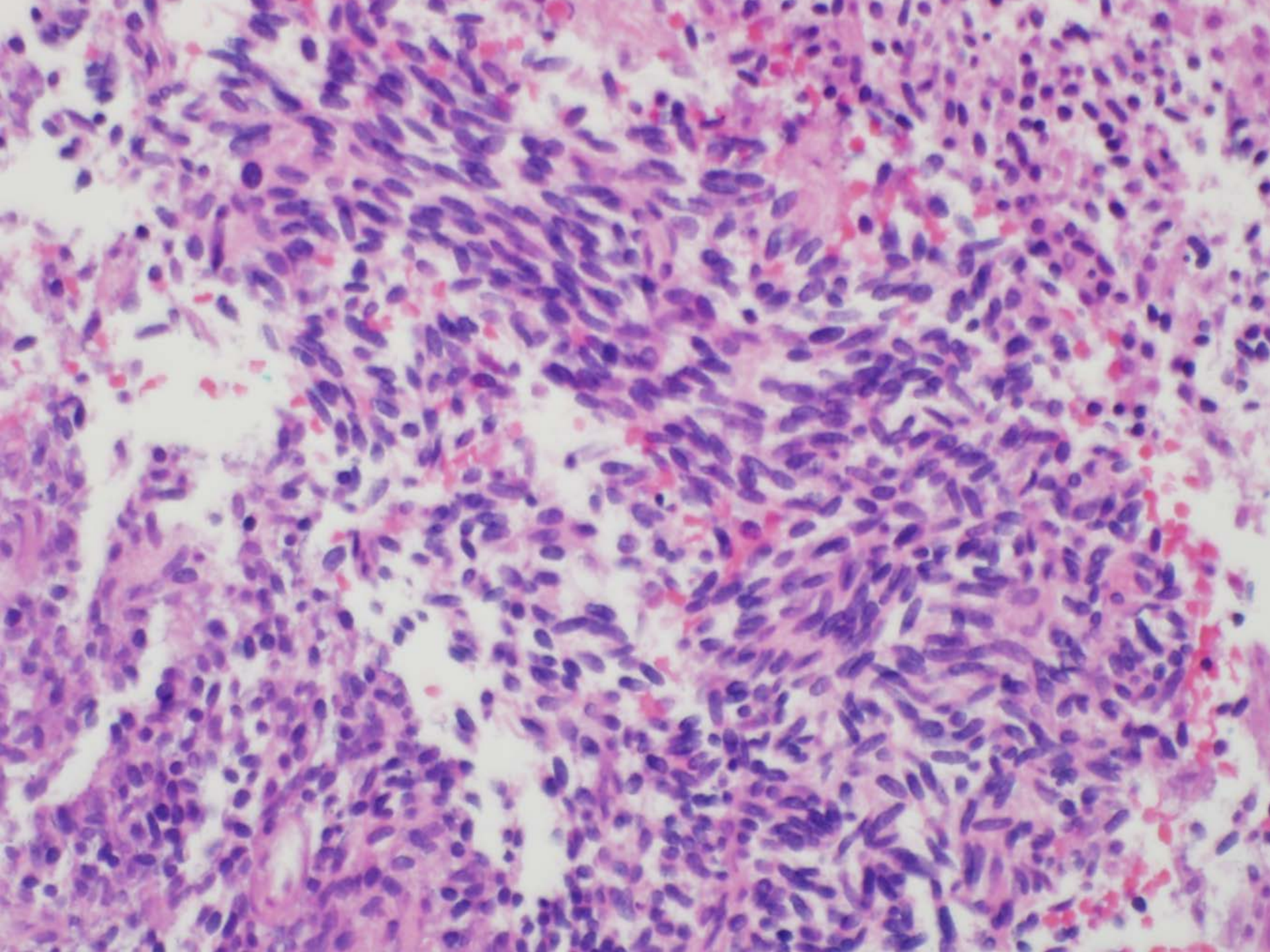


Seroma

30 year old male with left parapharyngeal neck mass



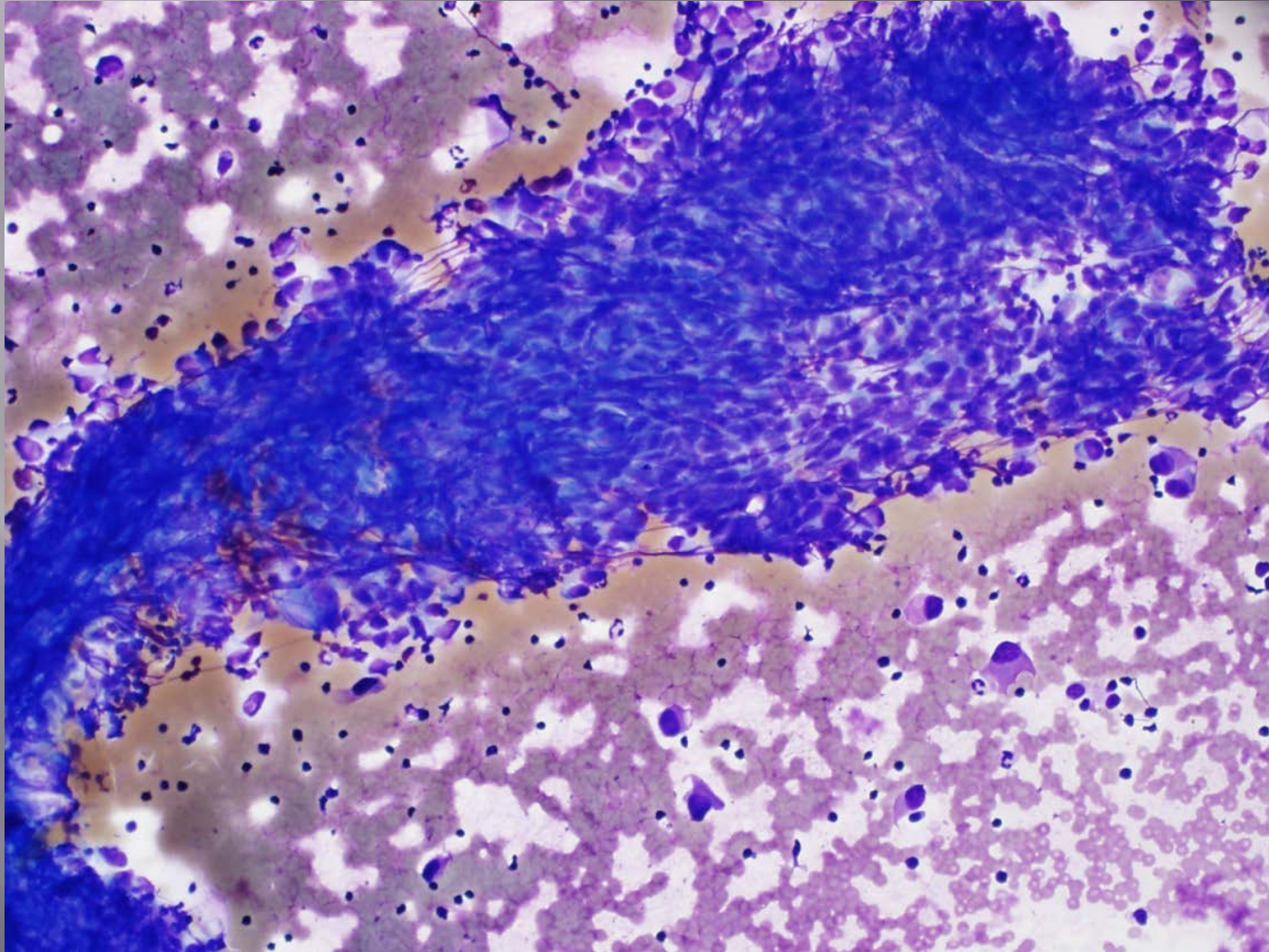




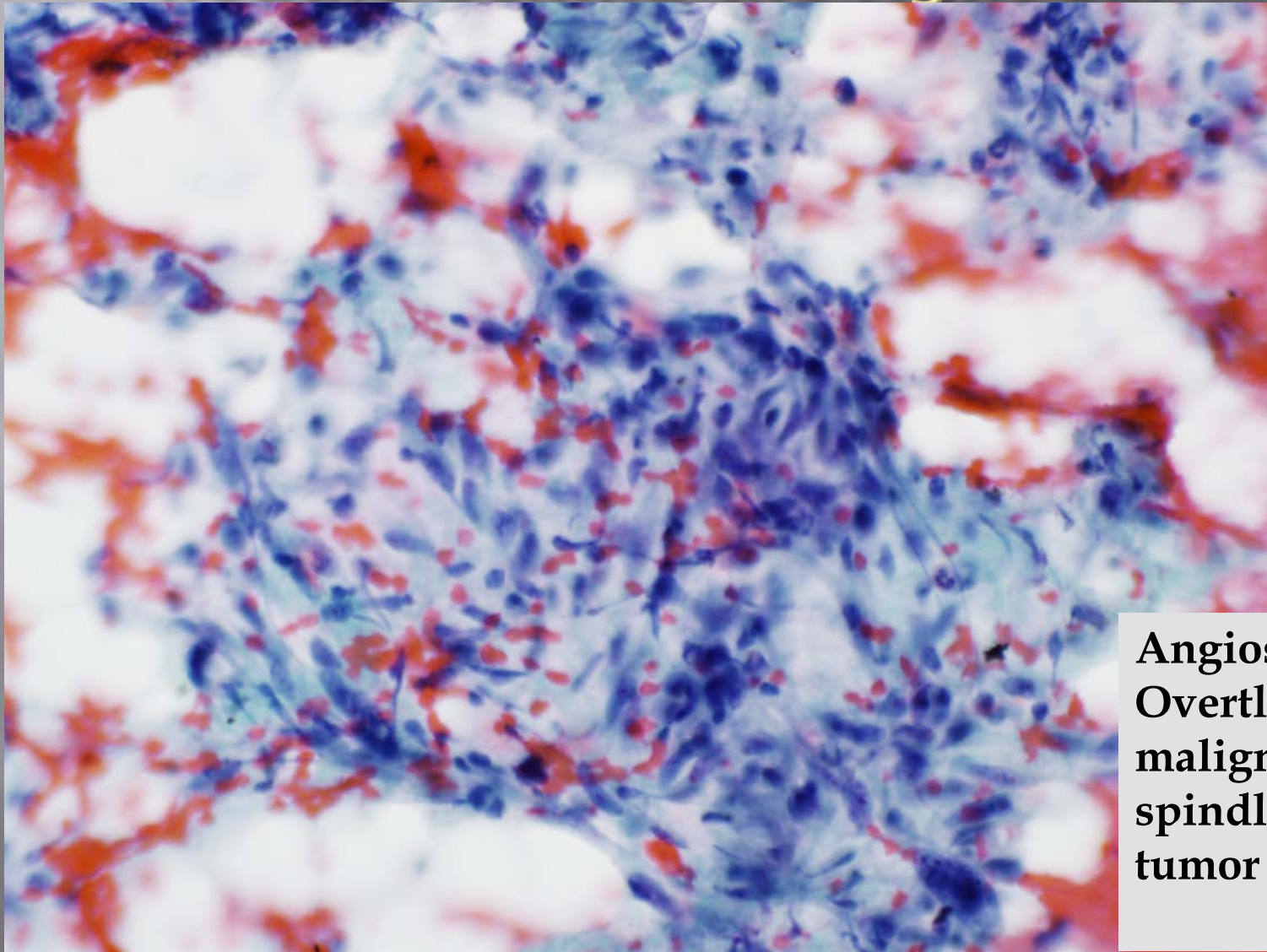
Synovial Sarcoma

- ▣ 9% present in the head and neck (AFIP series); second most common site after the extremities
- ▣ **Hypercellular** smears demonstrating both cohesive and dispersed patterns
- ▣ Majority are monophasic/spindled
- ▣ Chromatin is finely granular and cell size is small to medium
- ▣ Look for mitoses
- ▣ **Cell block for IHC and/or FISH needed**

77 year old male with a 3.0 cm blue nodule behind the right ear

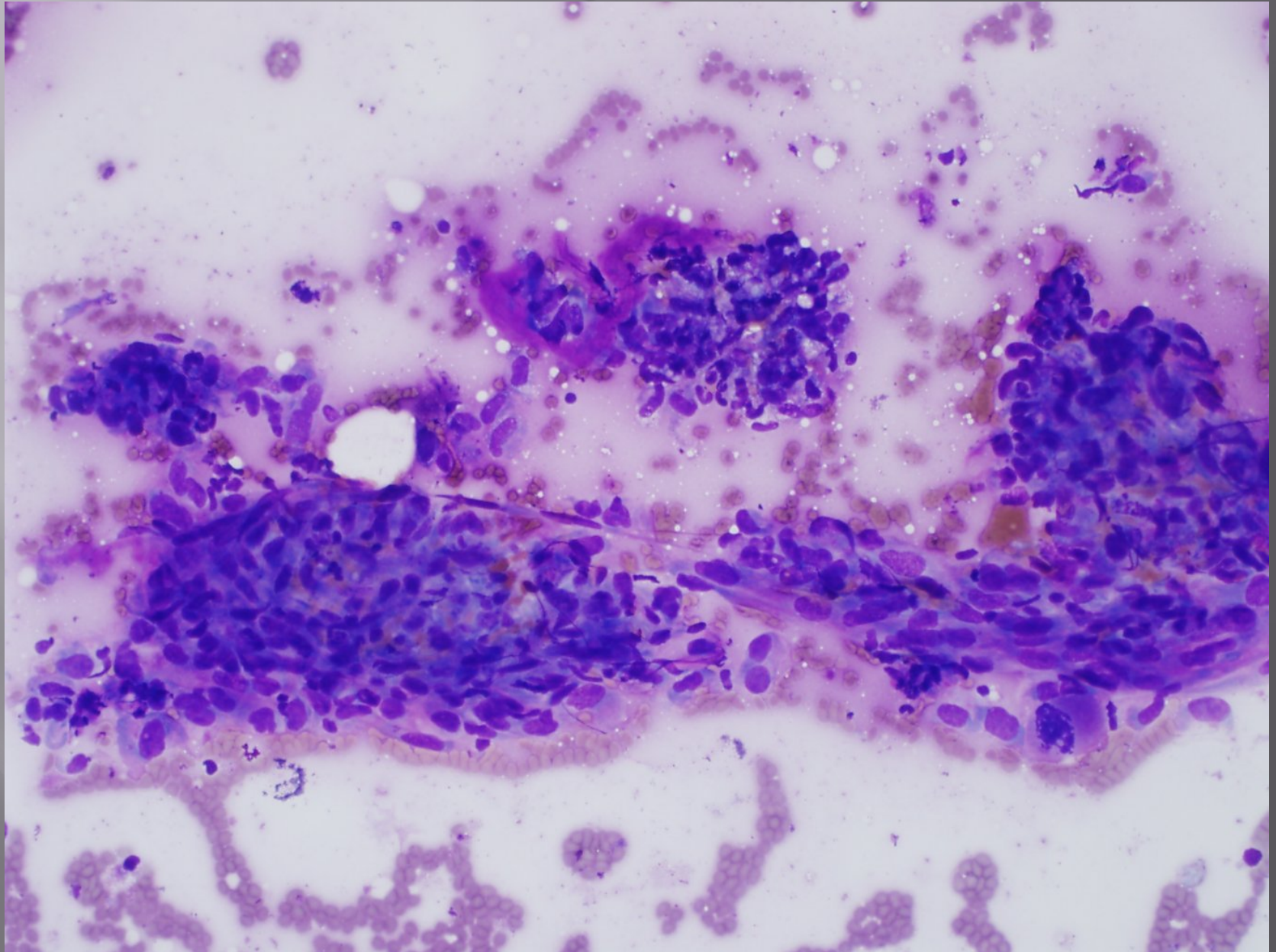


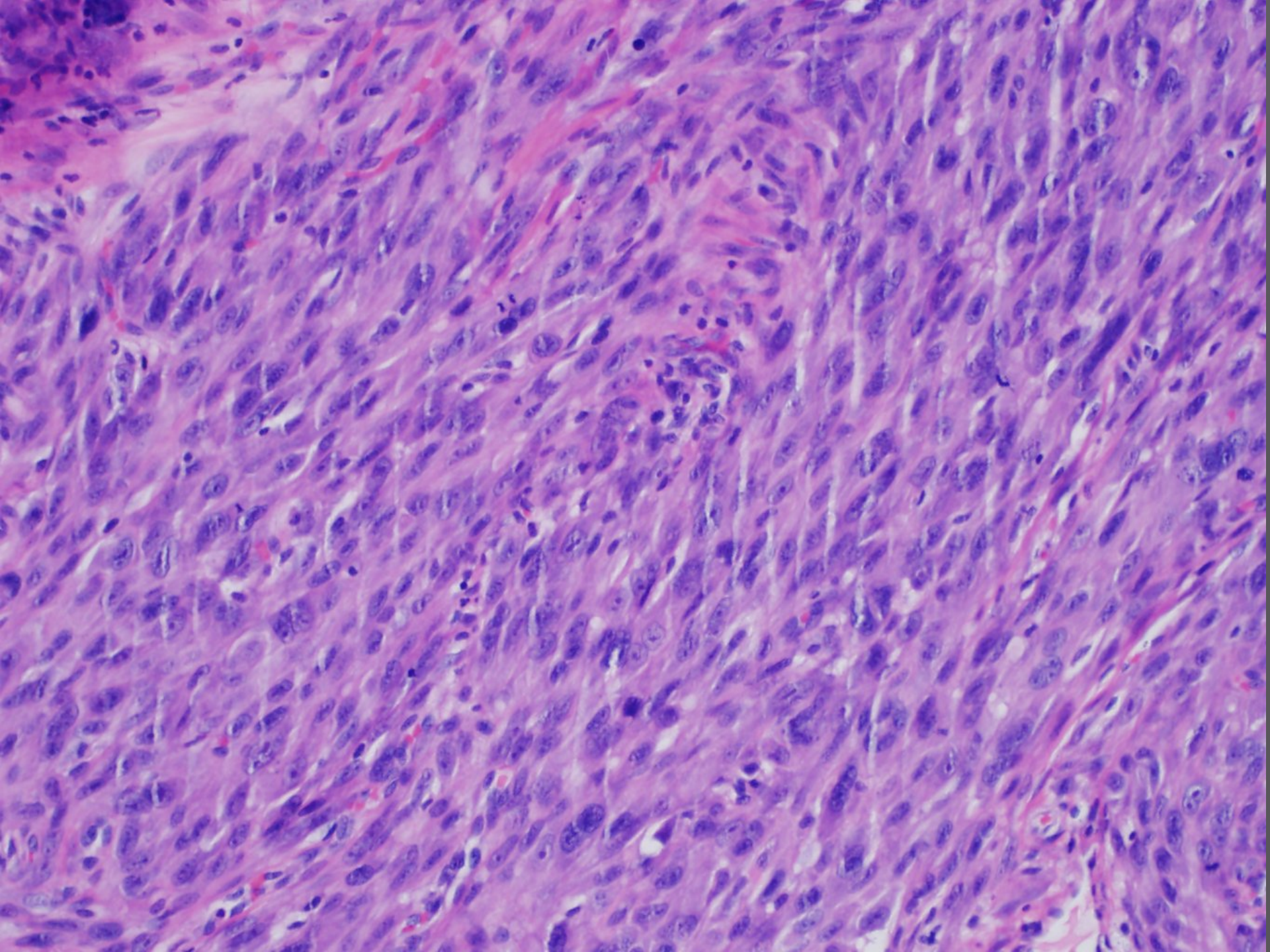
77 year old male with a 3.0 cm blue nodule behind the right ear



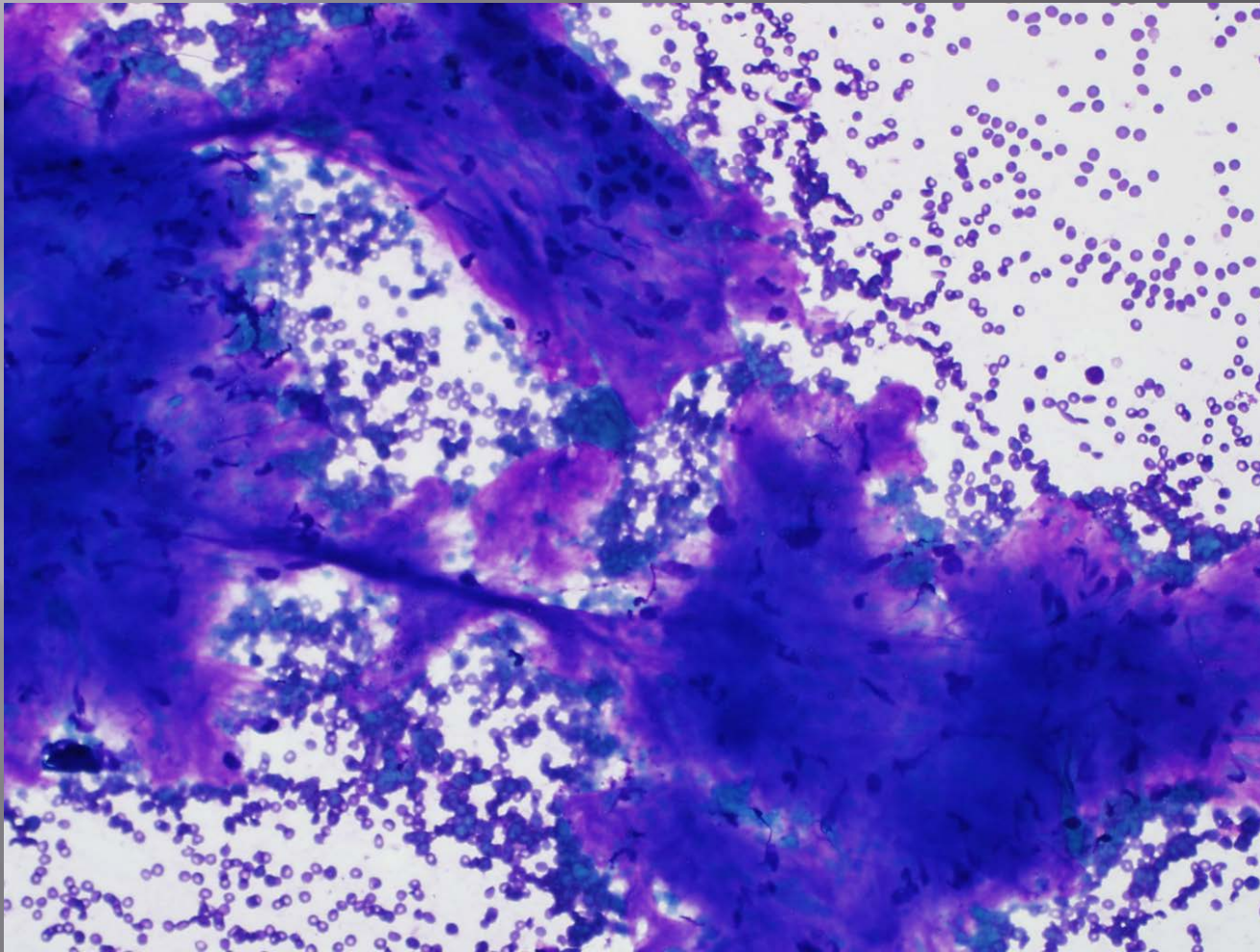
**Angiosarcoma:
Overtly
malignant
spindle cell
tumor**

72 year old male with scalp nodule: History of
Leiomyosarcoma

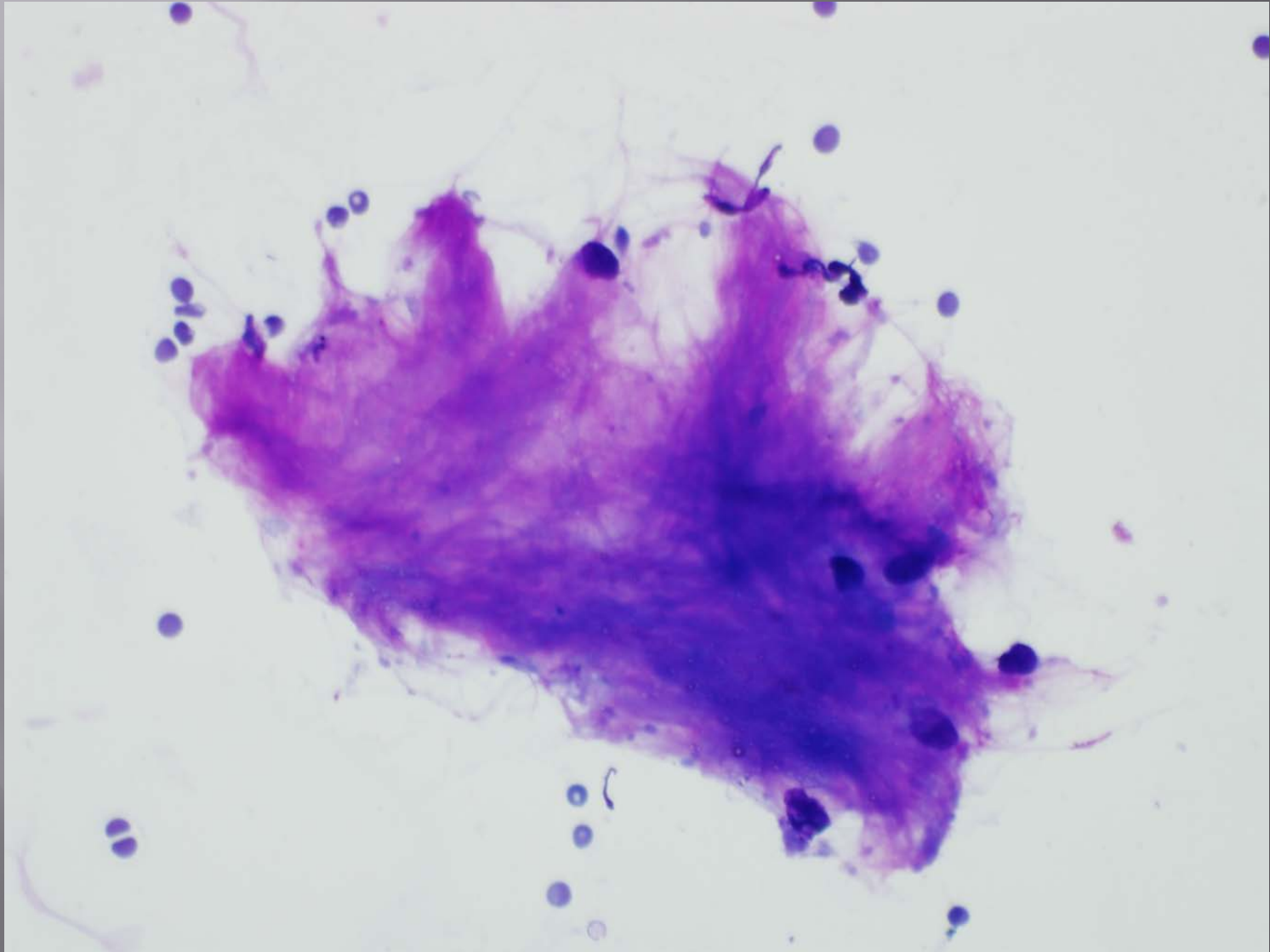




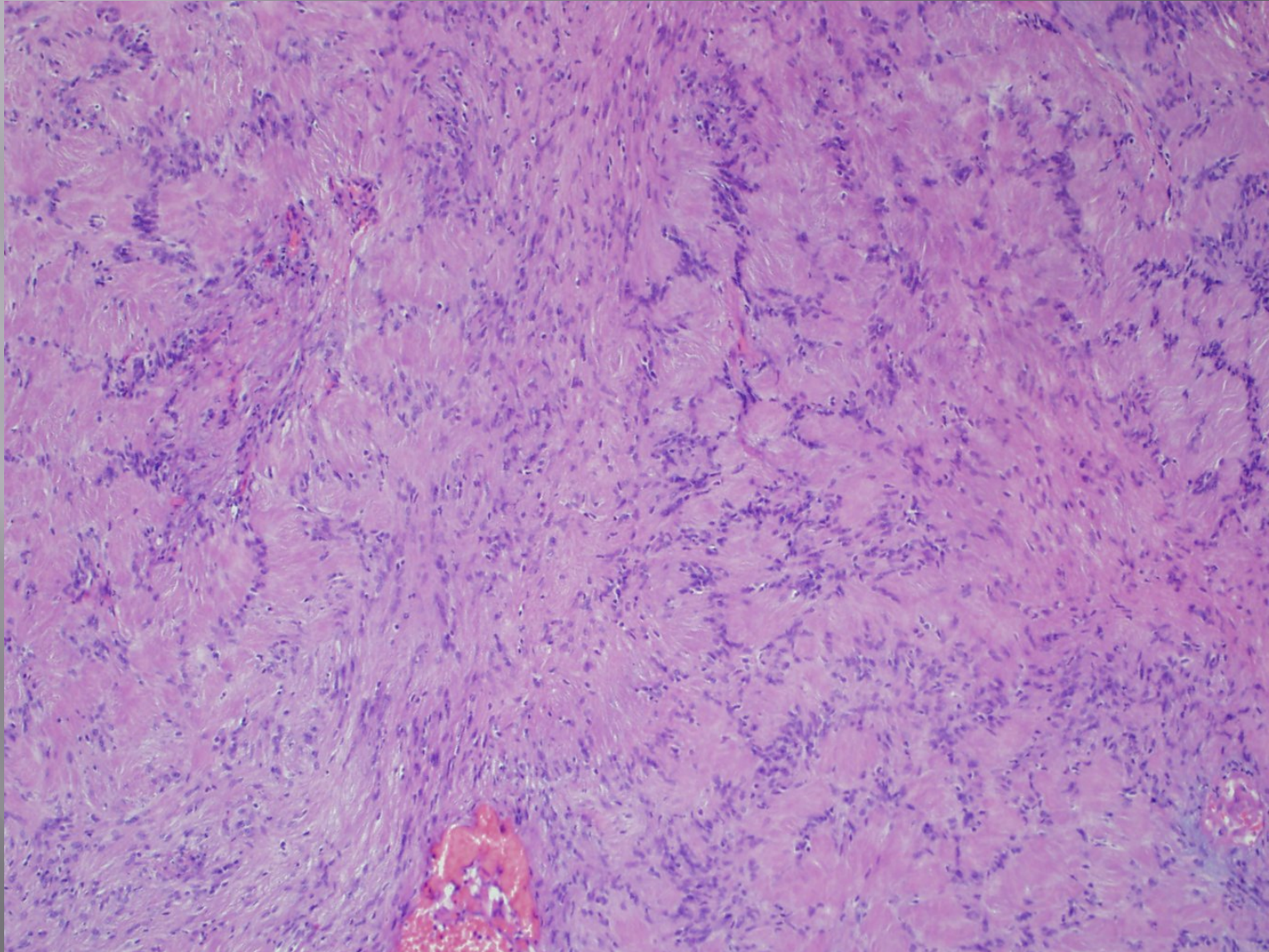
24 year-old with a 4 cm paratonsillar mass



24 year-old with a 4cm para-tonsillar mass



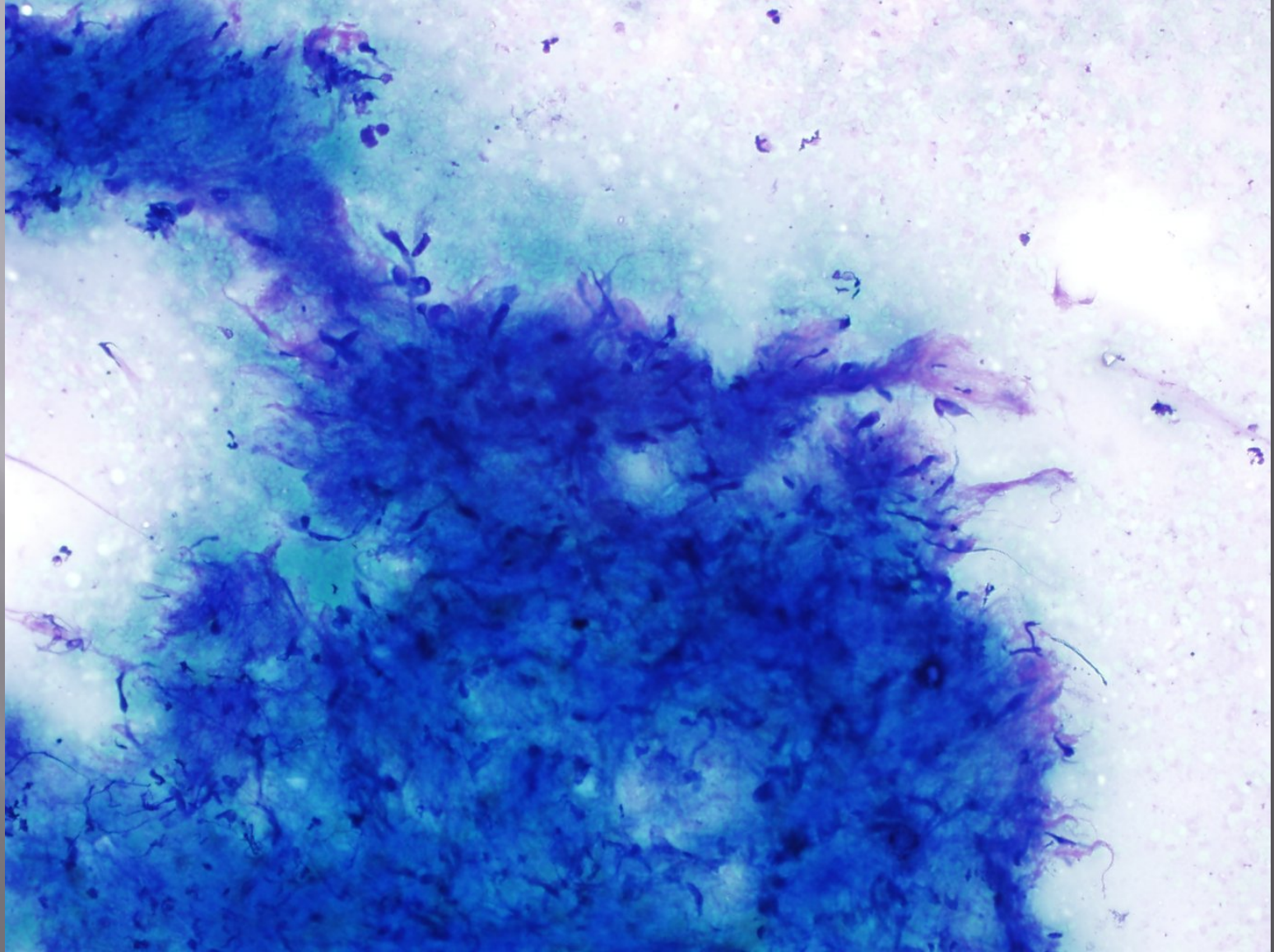
Schwannoma

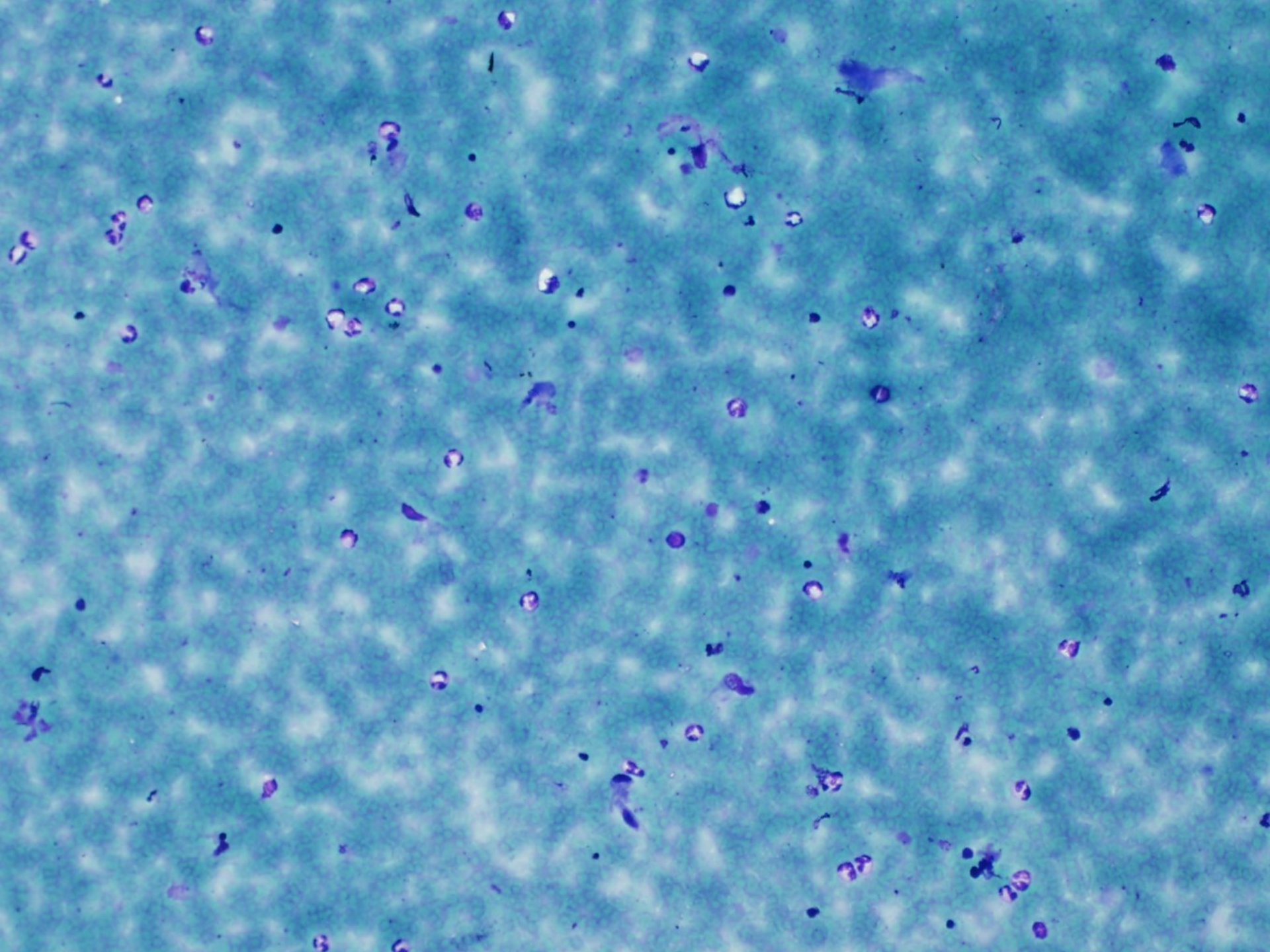


Schwannoma

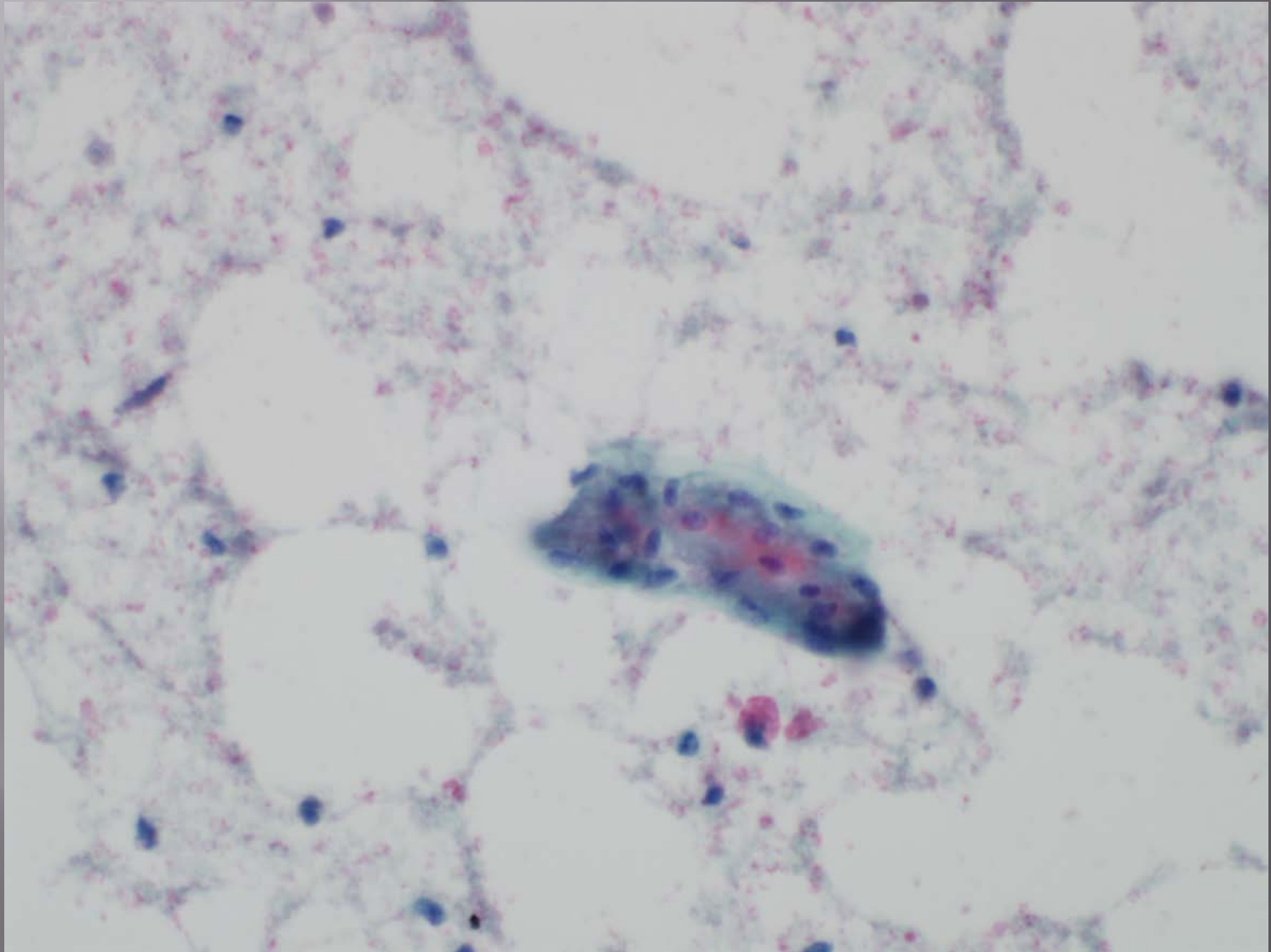
- ▣ The tumors have a predilection for the head and neck
- ▣ Cytomorphology:
 - Variable cellularity
 - Most typical is the fibrillar appearance of the stroma in fragments
 - Nuclei are long, slender, with pointed ends (fishhook)
 - Can be moderate pleomorphism but not hyperchromatic
 - Pain during FNA procedure can be a good clue to nerve sheath tumor

37 year old male with central neck
mass adjacent to central line

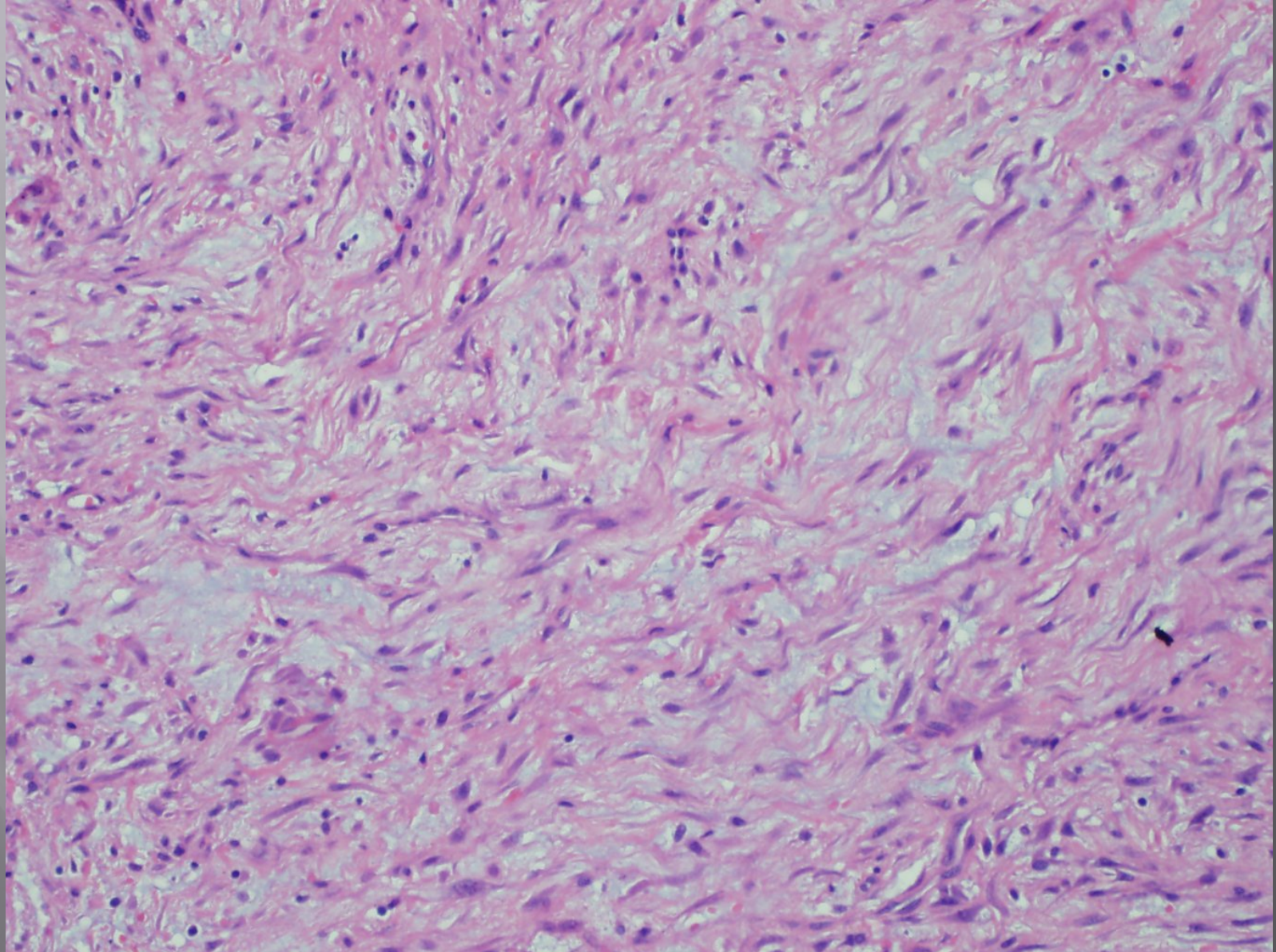




37 year old male with central neck mass adjacent to central line



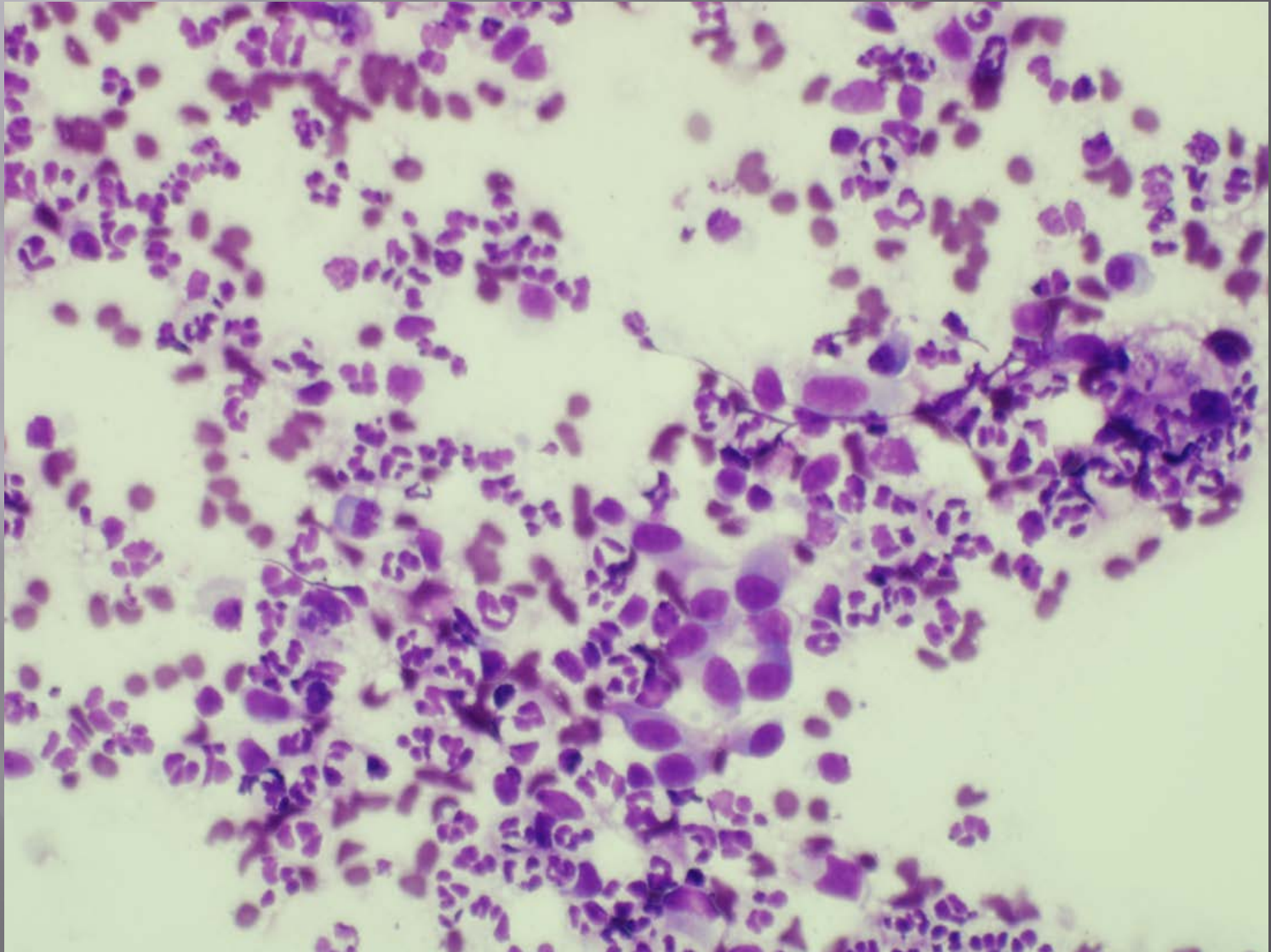
Nodular Fasciitis



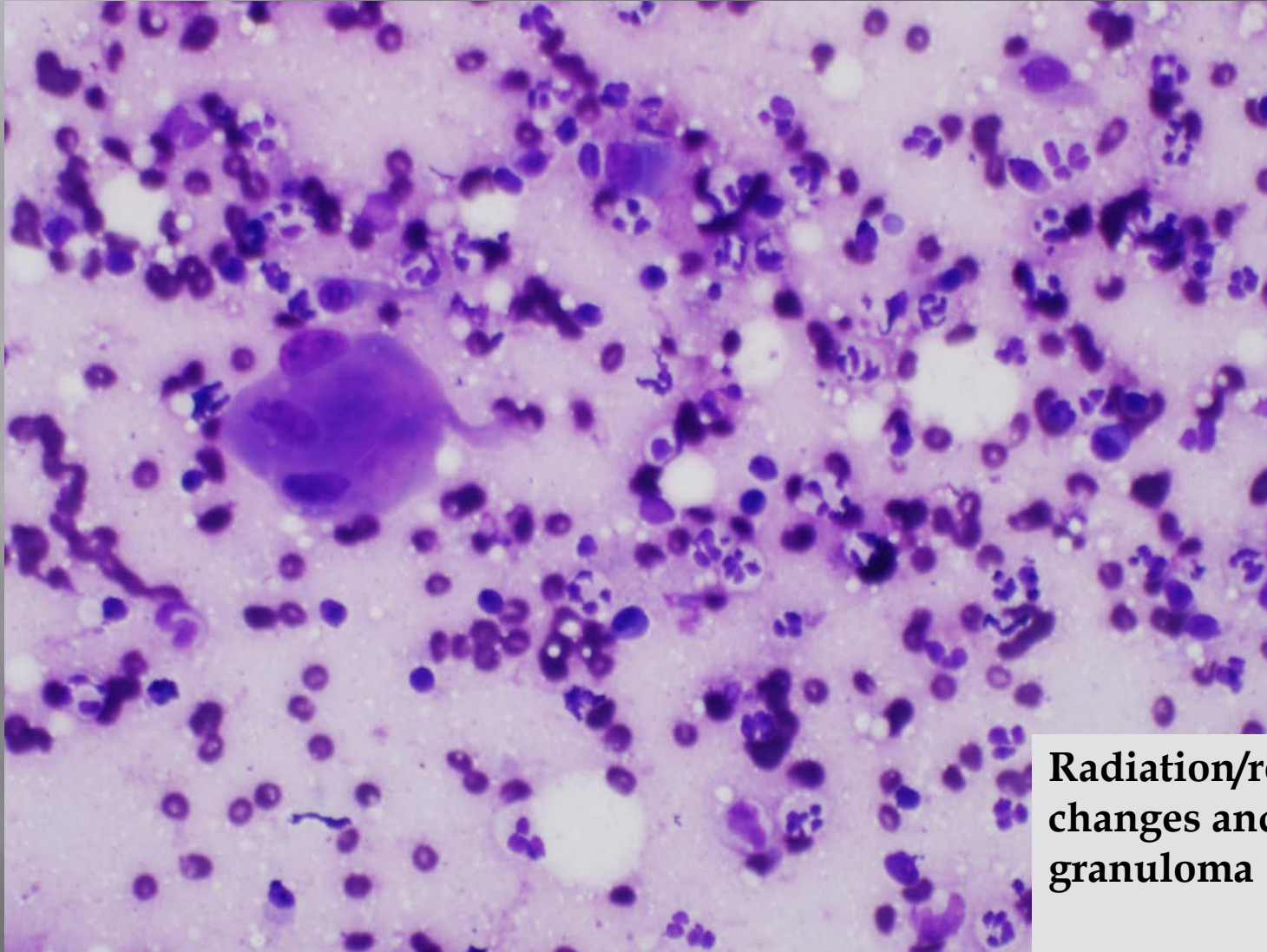
Nodular Fasciitis

- Head and neck (including the salivary gland) is among the most common sites
- Typical cytomorphology:
 - moderately cellular smears with grouped bland spindle cells
 - myxoid background
 - abundant cytoplasm with tapering ends and ill-defined cell borders
 - lack of hyperchromasia
 - inflammatory cells
 - branching vessels
- The key to diagnosis is often suggested by the clinical presentation (rapidly growing subcutaneous mass smaller than 2 cm) and predominantly bland spindle cell aspirate
- Cytomorphologic overlap with Pleomorphic Adenoma

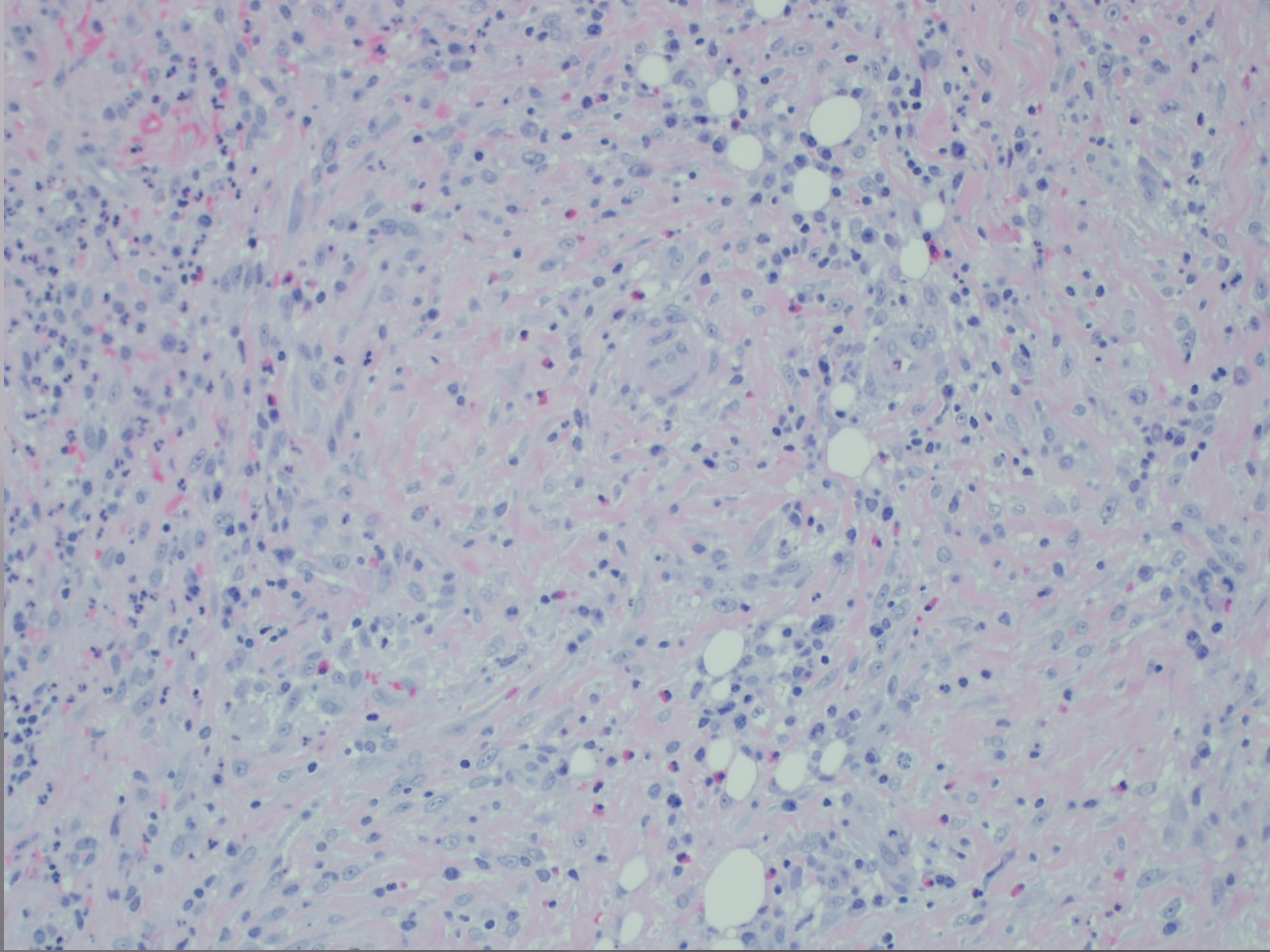
38 year old female s/p thyroidectomy and radiation for PTC; now central neck lesion



38 year old female s/p thyroidectomy and radiation for PTC; now central neck lesion



Radiation/reparative changes and suture granuloma



Reactive/Reparative Changes

- ▣ Benign fibrous proliferations can have a spectrum of appearance
- ▣ If prior radiation may have large cells with irregular nuclei, multinucleation, **with retention of a low N/C ratio**
- ▣ With resolution the inflammatory background may diminish
- ▣ Over time (healing) the plump myofibroblasts become slender with less conspicuous nucleoli
- ▣ **The presence of significant pleomorphism, hyperchromasia, and atypical mitotic figures suggests malignancy**

Spindle Cell Lesions: My Advice

Overtly malignant



Sarcoma (possible cell block to exclude other malignant categories)

Not overtly malignant



Low cellularity with inflammation



Consistent with benign/reactive reparative



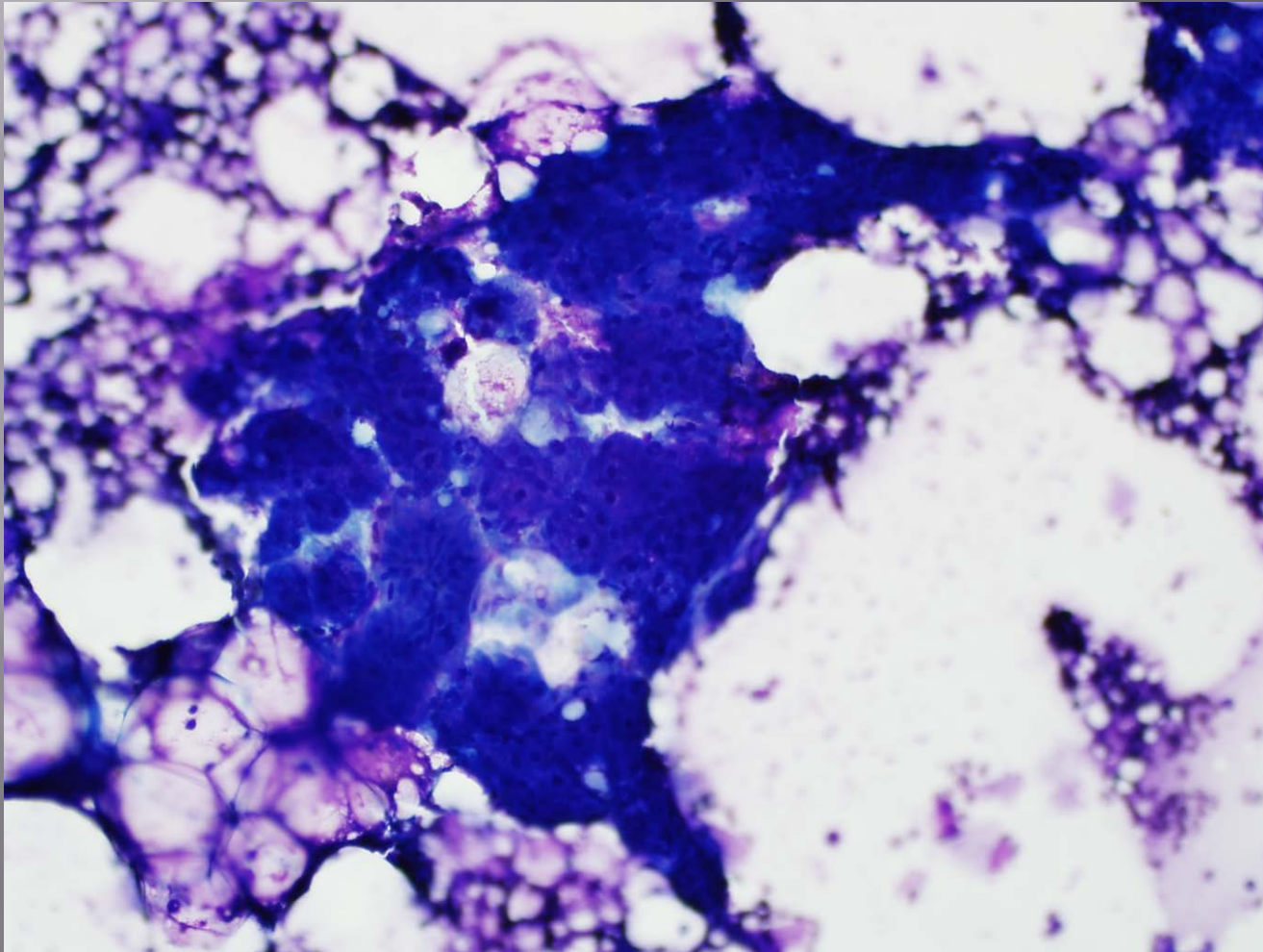
Moderate to high cellularity with no inflammation



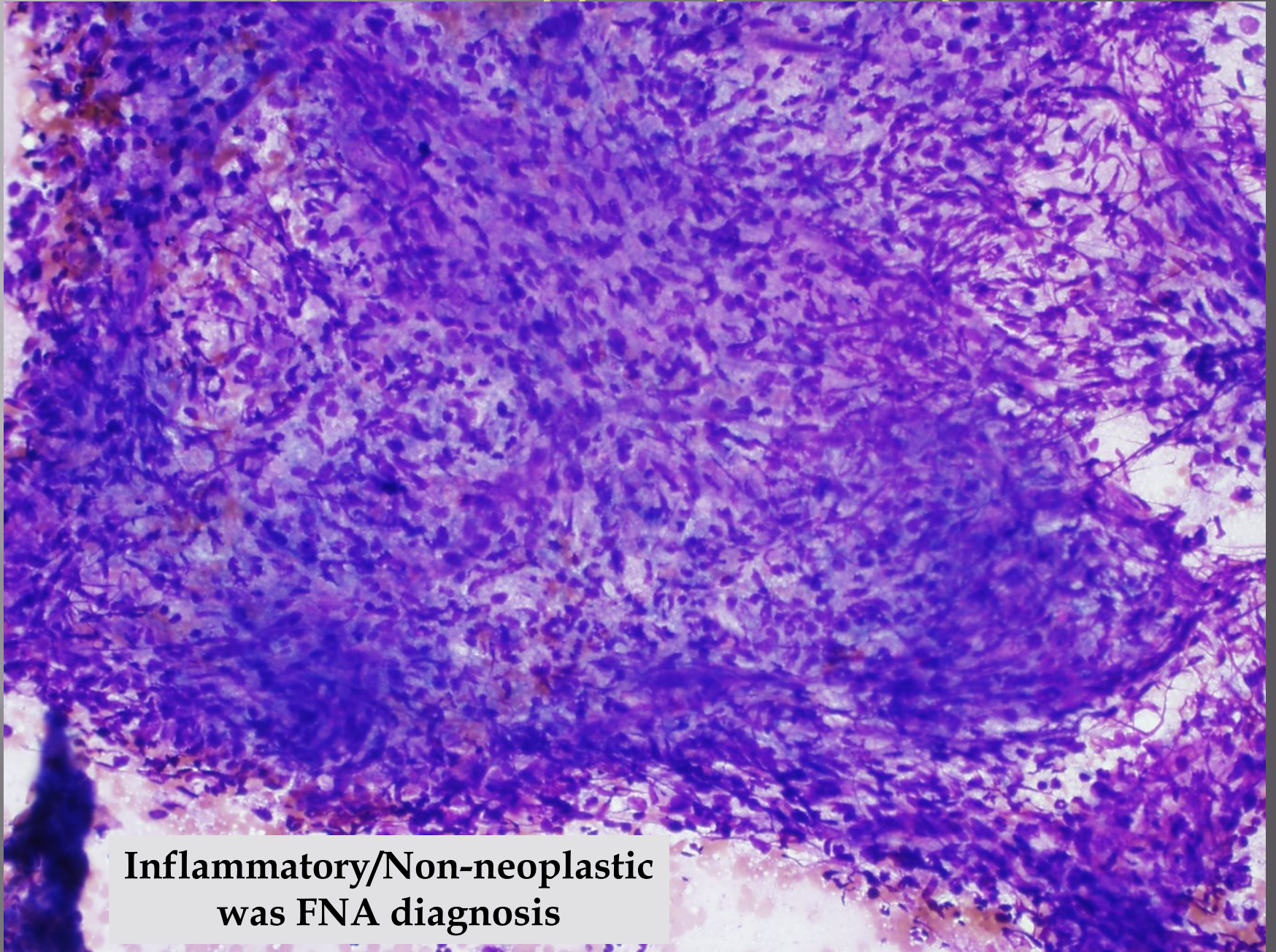
Consistent with spindle cell neoplasm (cell block to better categorize)

Nodular fasciitis can be the rule breaker in terms of cellularity

Salivary Gland Lesions

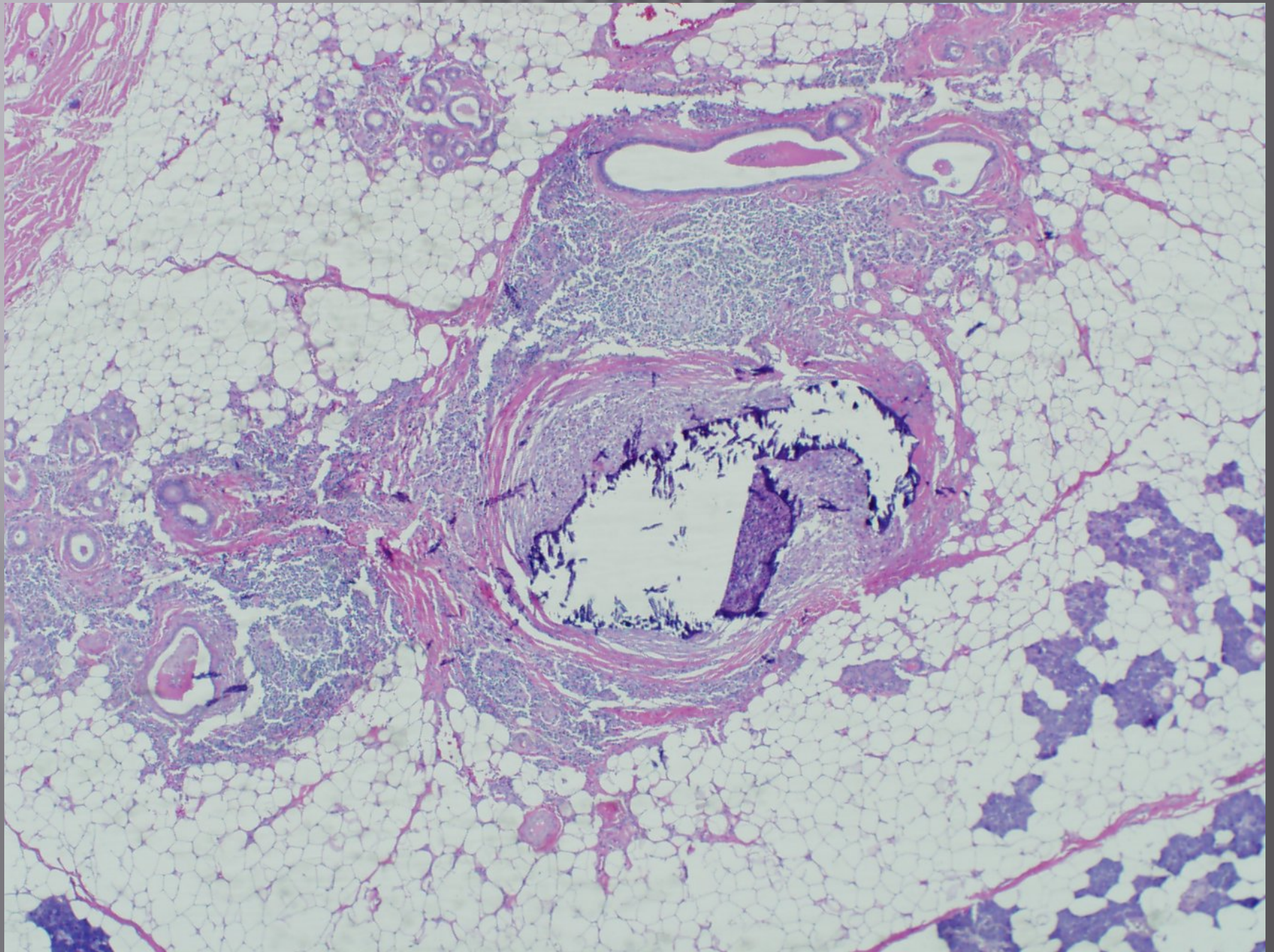


76 year old male with 2 cm salivary gland lesion



**Inflammatory/Non-neoplastic
was FNA diagnosis**

Sialolithiasis



FNA and Salivary Gland Lesions

- ▣ Cytologic diagnoses of malignant tumors were confirmed histologically in 93%
- ▣ Cytologic diagnoses of benign tumors were confirmed on histology in 95%
- ▣ Cytologic diagnoses of inflammatory lesions were confirmed histologically in 73%
- ▣ Cytologic diagnoses of benign salivary gland tissue confirmed histologically in 18%

Salivary Gland: Malignant Neoplasms

- ▣ Acinic cell carcinoma
- ▣ Mucoepidermoid carcinoma
- ▣ Adenoid cystic carcinoma
- ▣ Salivary duct carcinoma
- ▣ Adenocarcinoma NOS
- ▣ Squamous cell carcinoma
- ▣ Malignant lymphomas
- ▣ Metastatic tumors

Collela G et al. J Oral
Maxillofac Surg. 2010.
68: 2146-2153

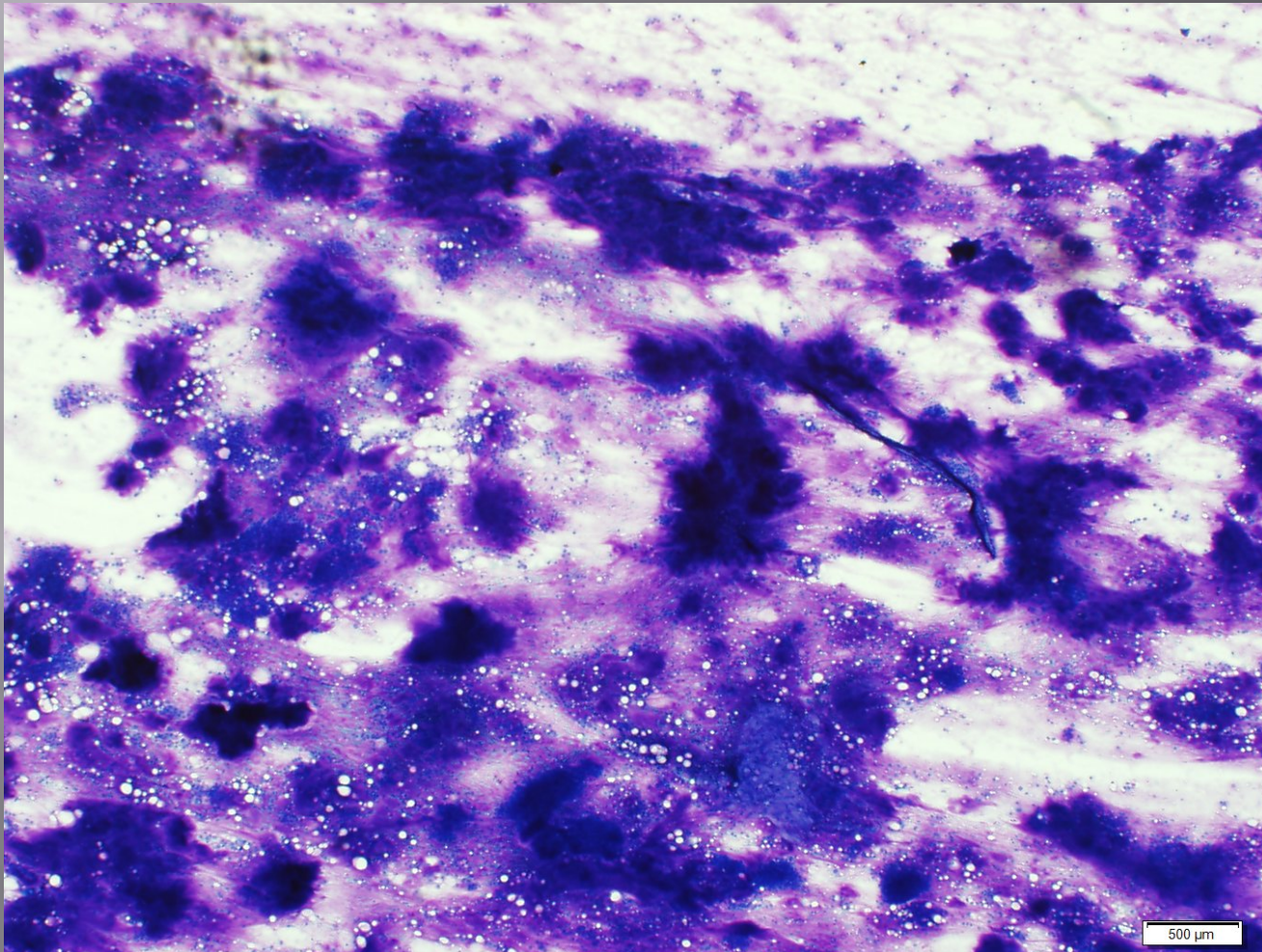
Account for 359/415 malignant tumors (86%)

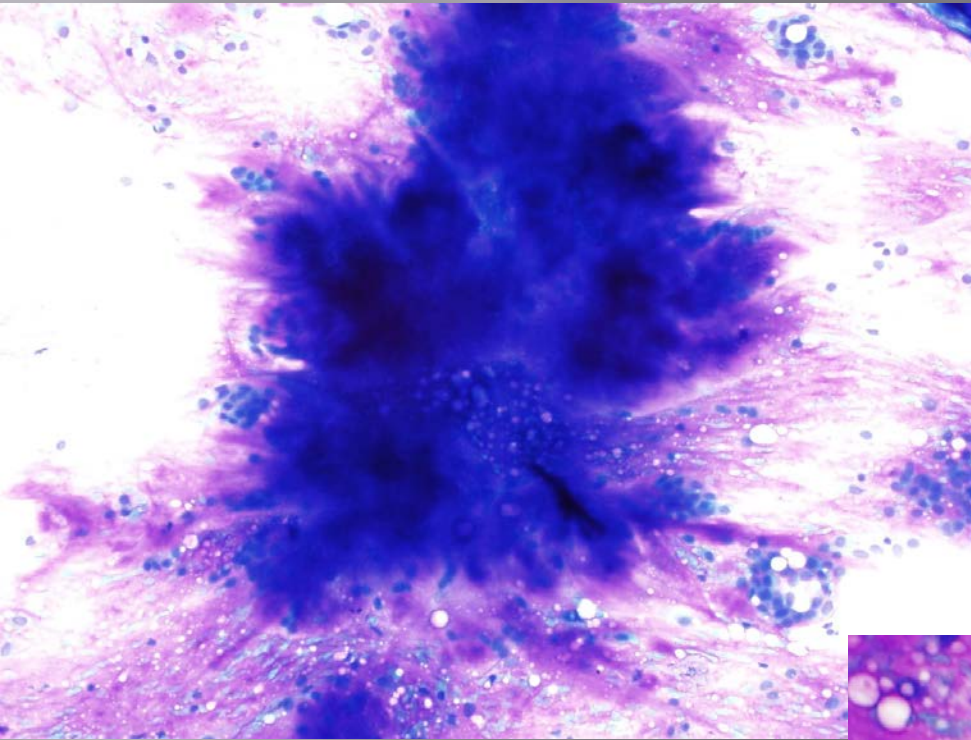
Salivary Gland: Benign Neoplasms

- ▣ Pleomorphic adenoma
- ▣ Warthin tumor

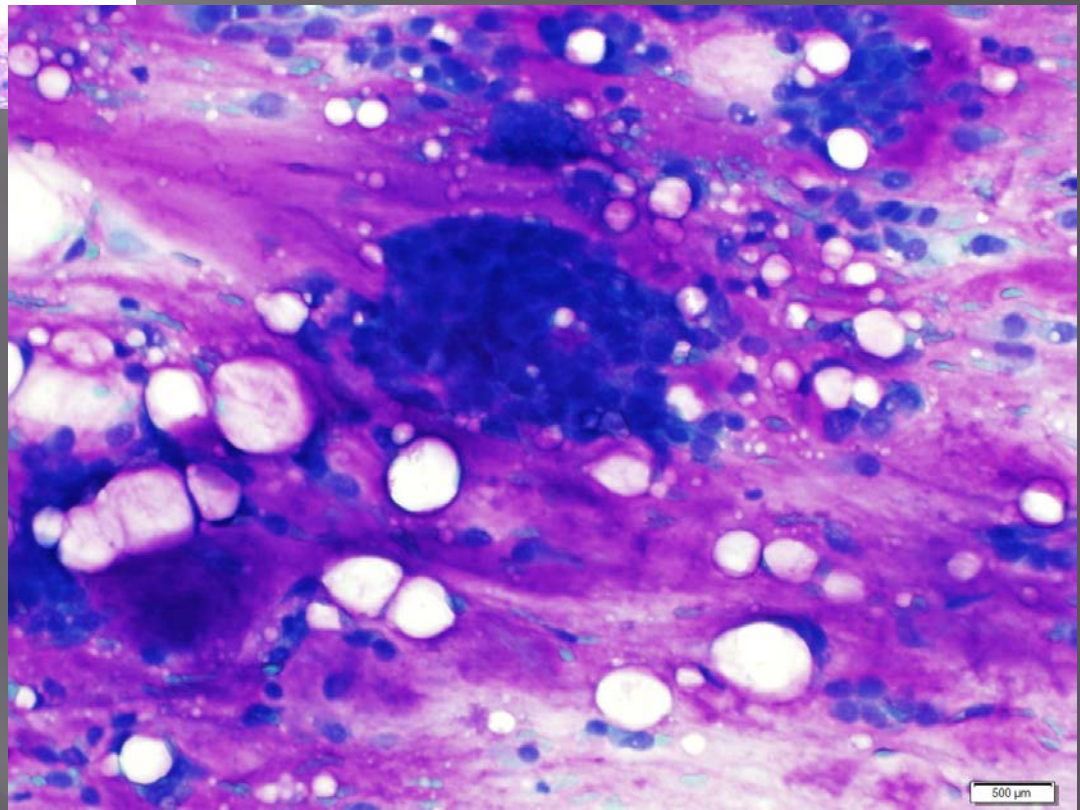
Account for 1,233/1,278 benign tumors
(96%)

45 year old with 4.0 cm slowly enlarging right parotid mass

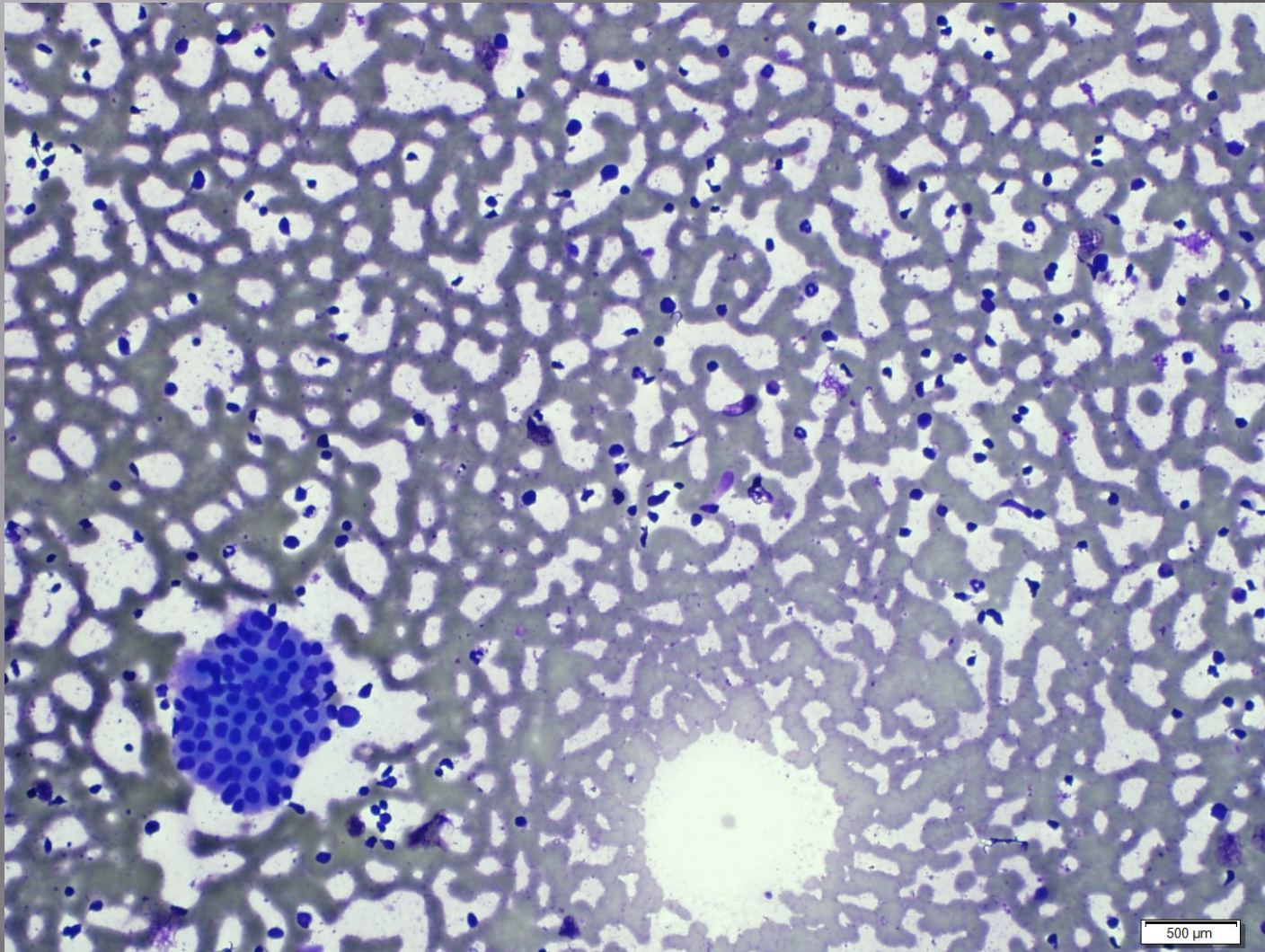


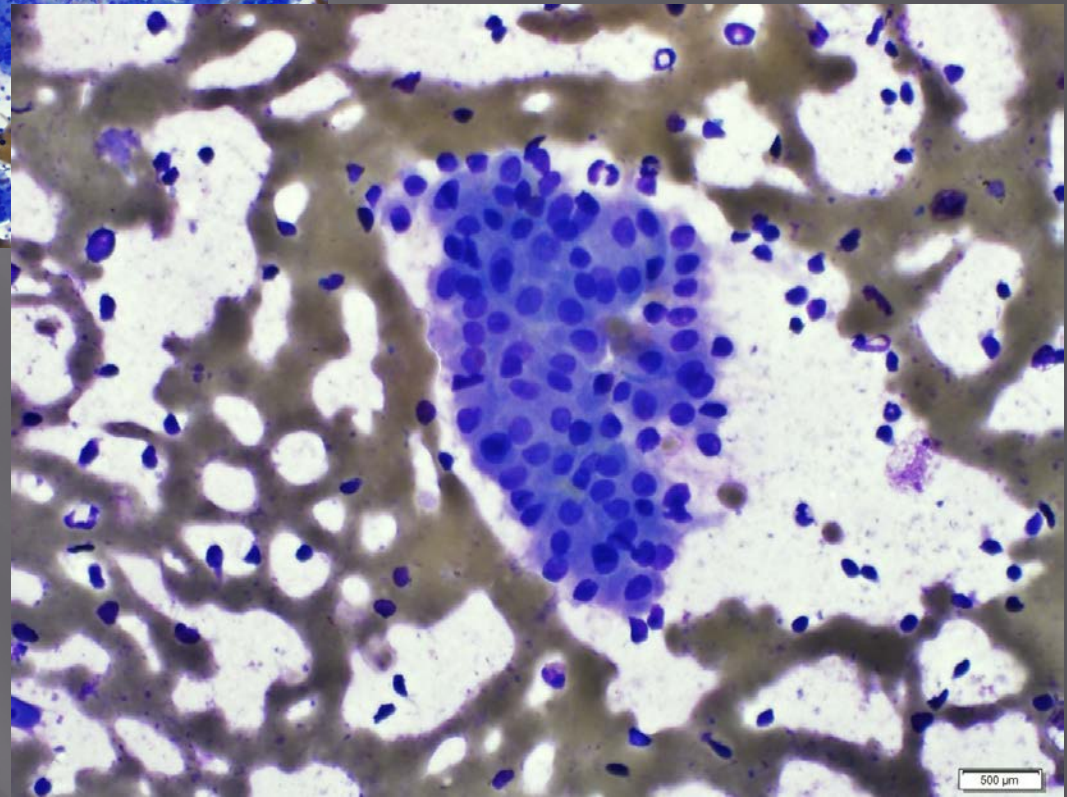
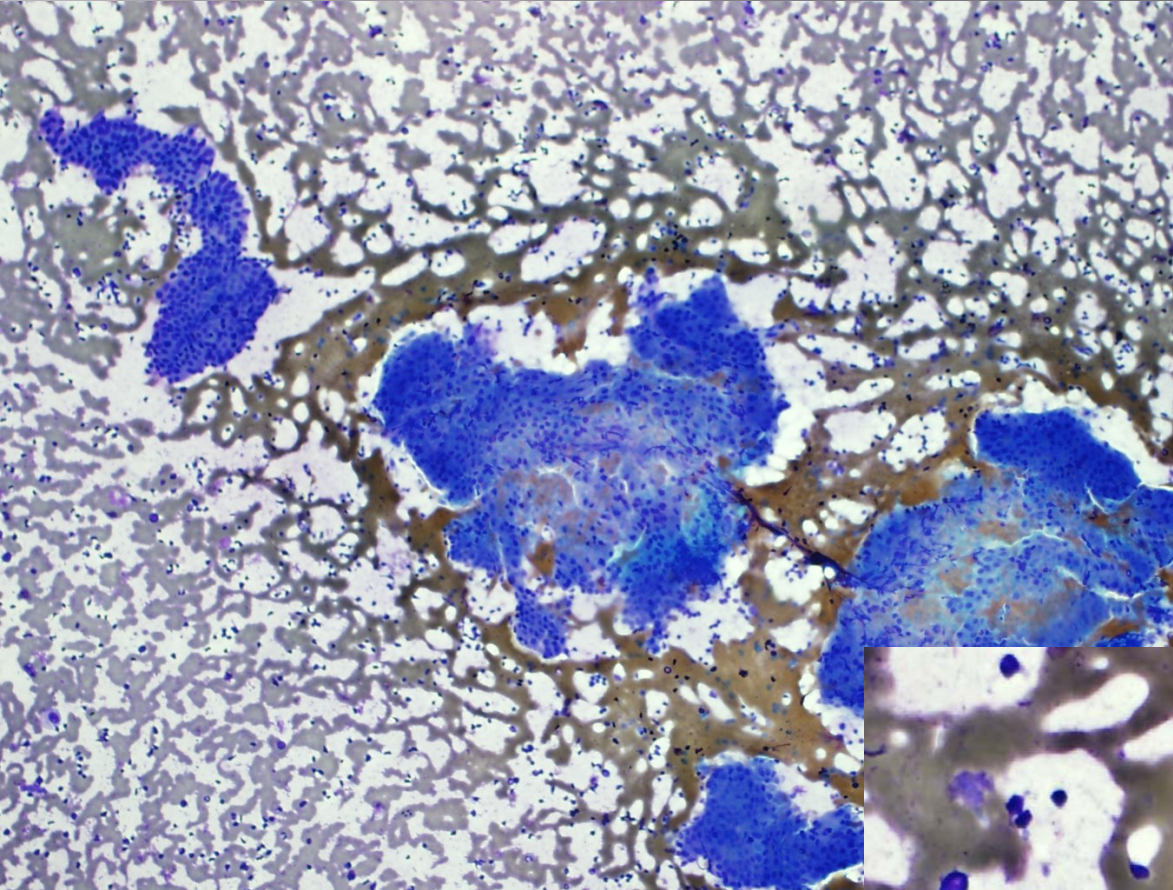


Pleomorphic Adenoma



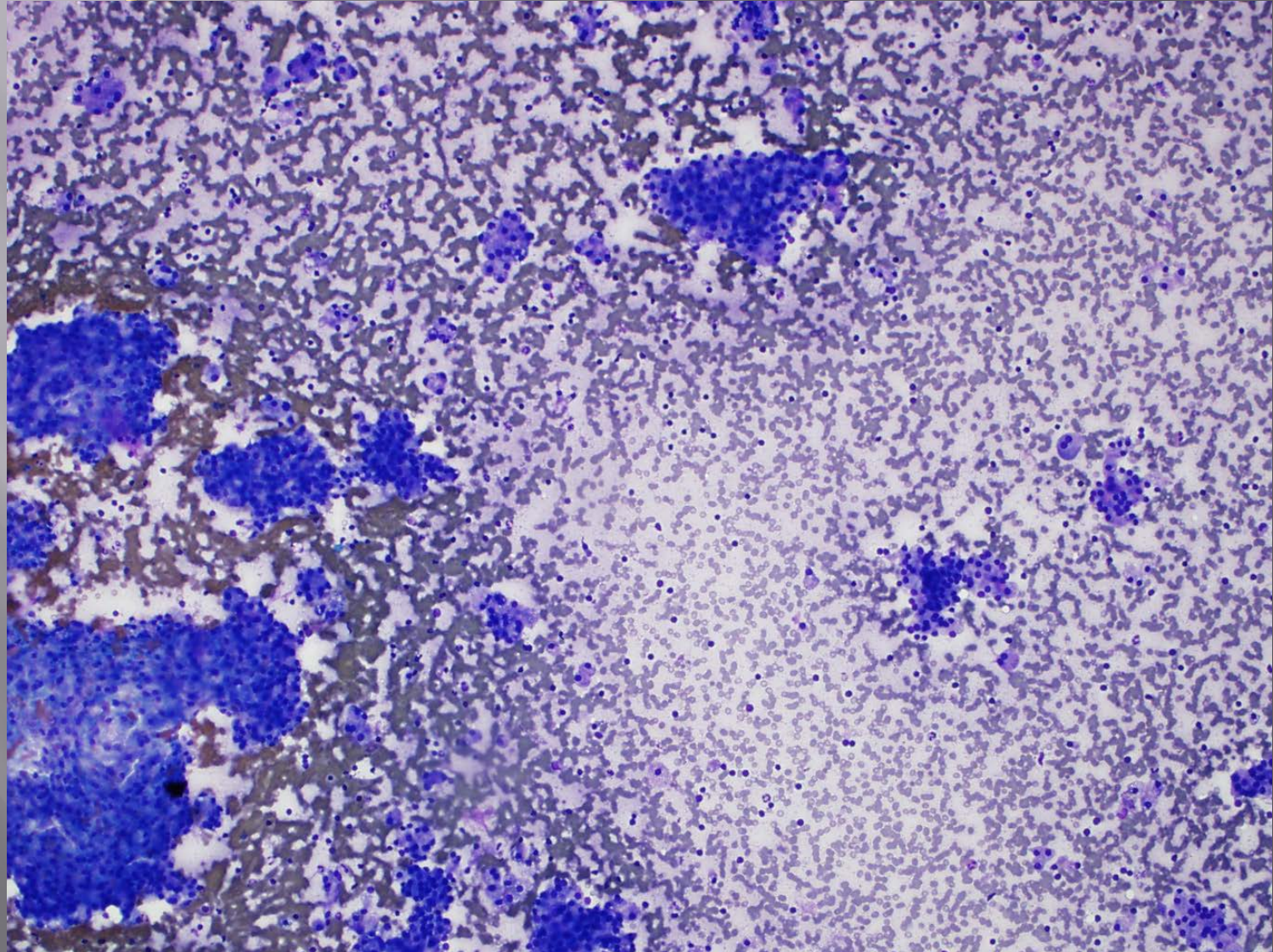
65 year old male with enlarging Left Parotid Mass



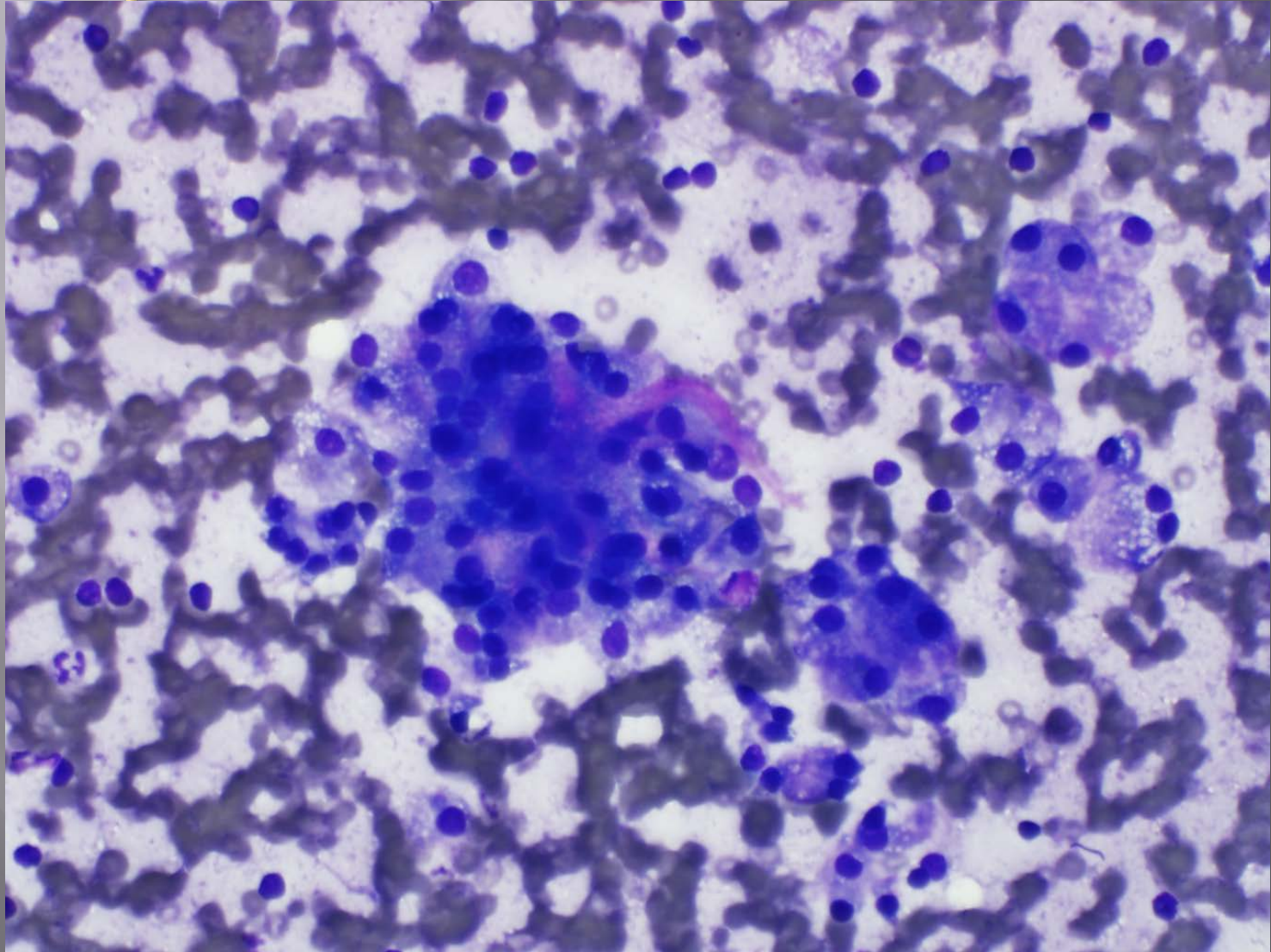


Warthin Tumor

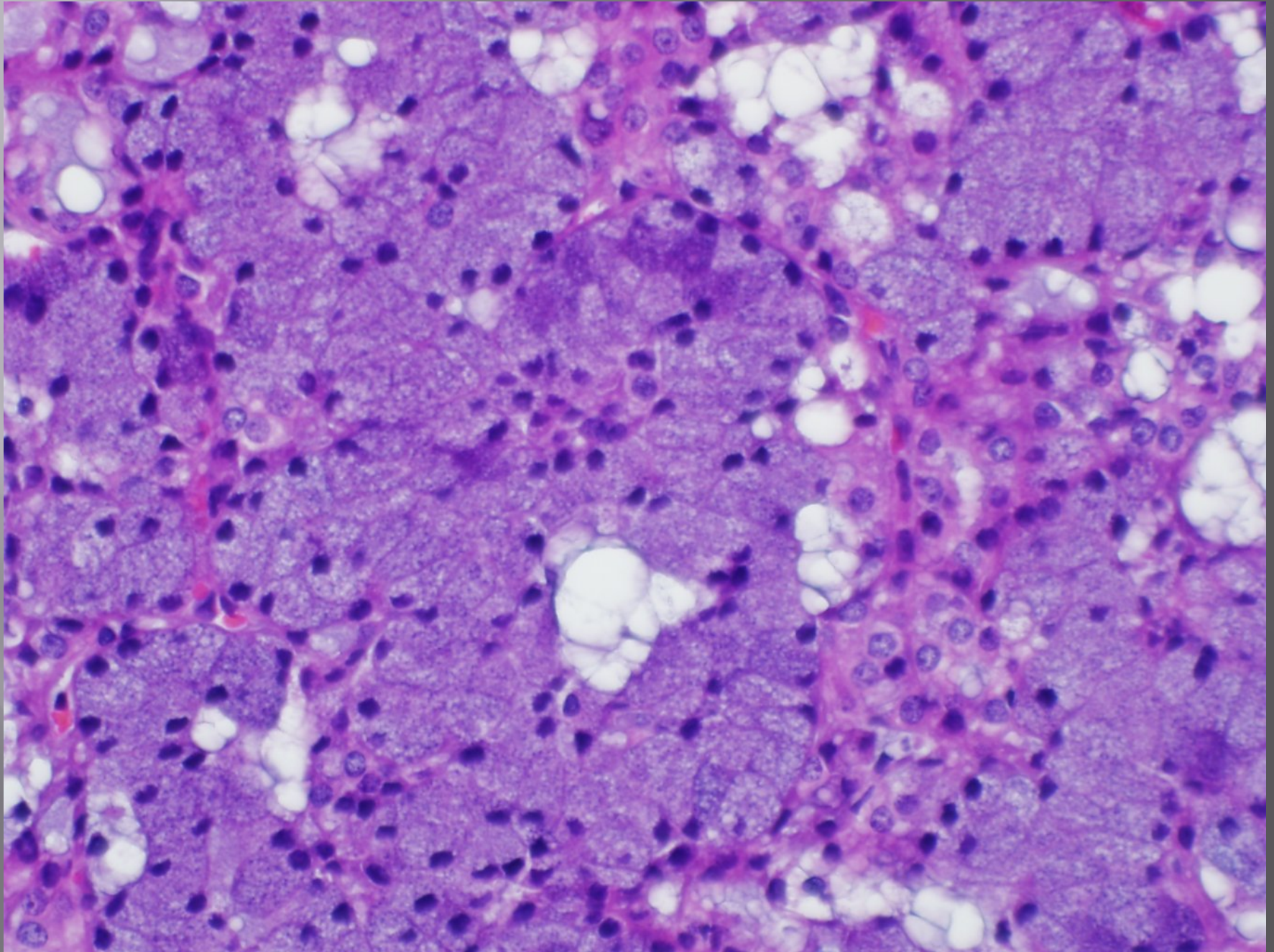
25 year old female with preauricular 2cm nodule



25 year old female with preauricular 2cm nodule



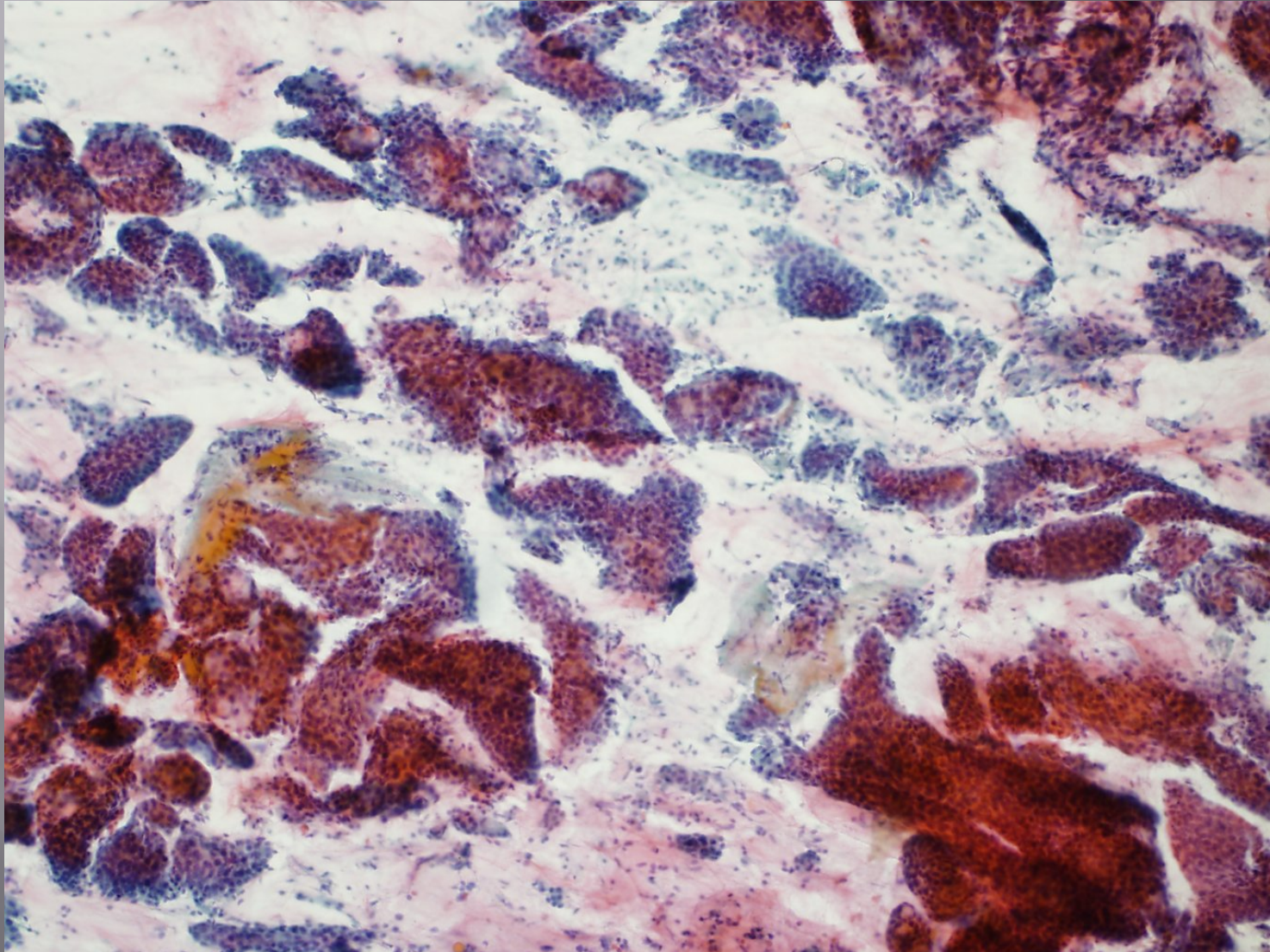
Acinic Cell Carcinoma



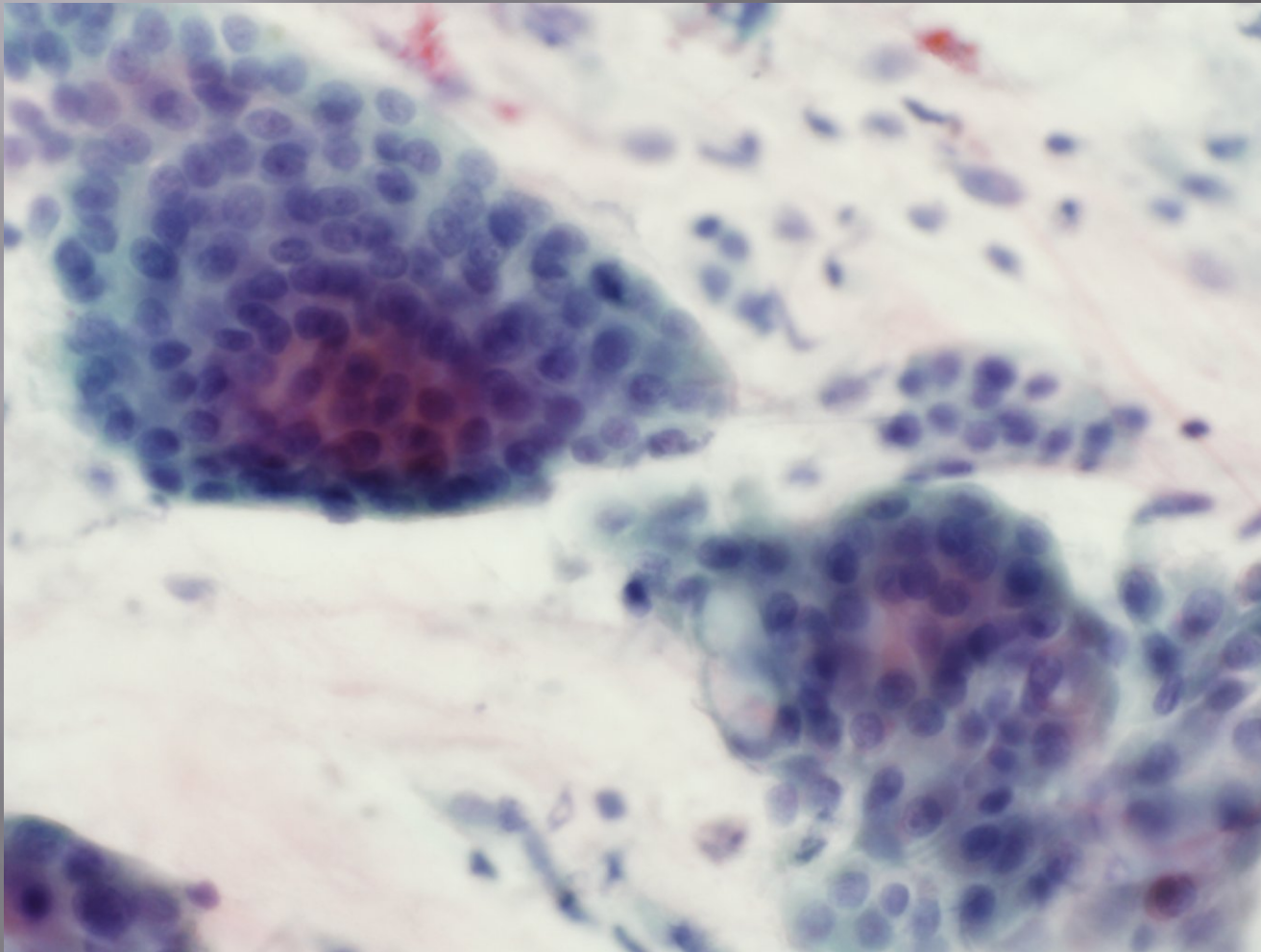
Pitfalls in FNA Sampling of Acinic Cell Carcinoma

- ▣ The papillary cystic variant can be almost entirely cystic and yield only benign cyst fluid
- ▣ US guidance for any residual mass may solve this issue

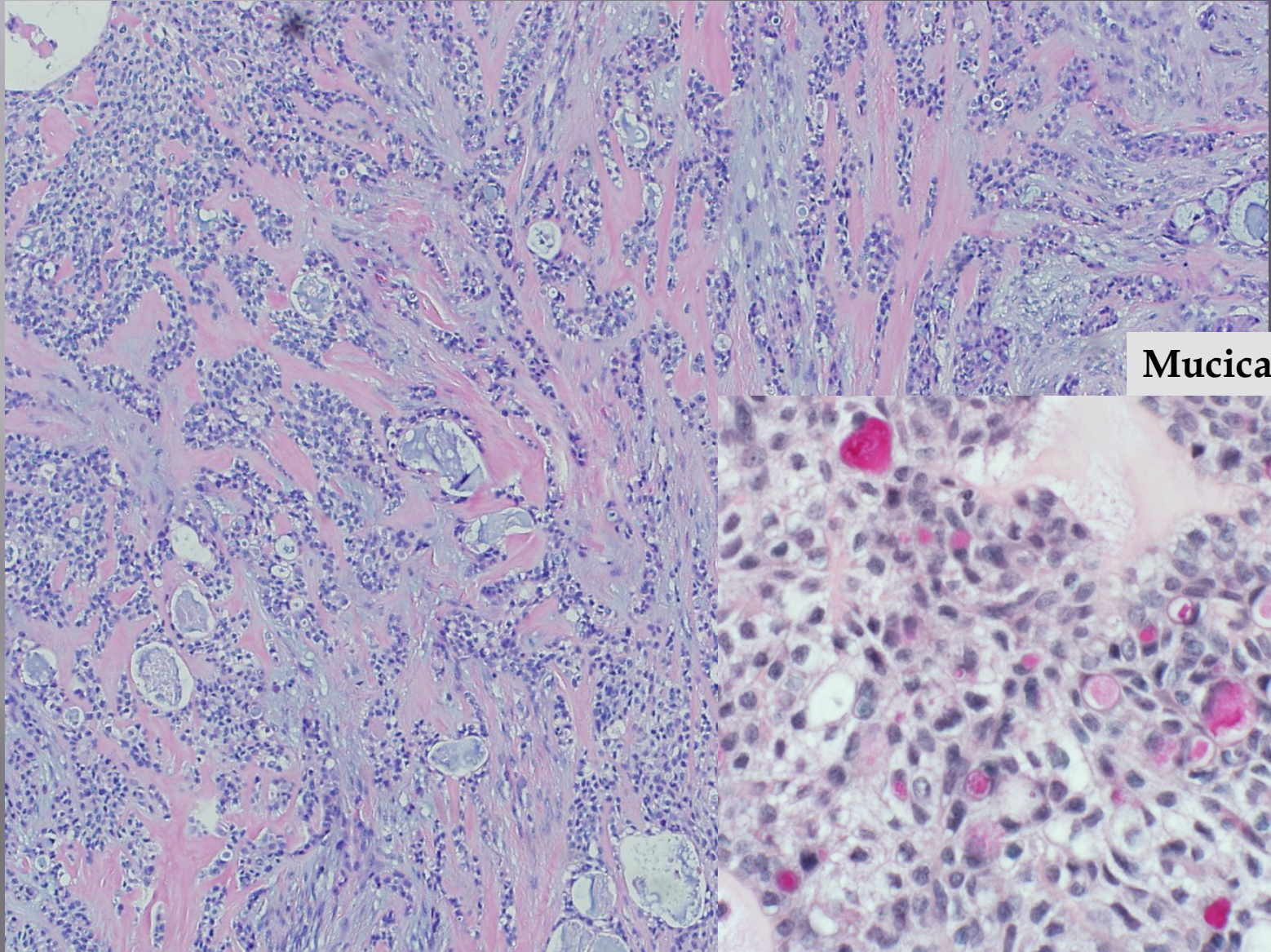
19 year old male with nodule in submandibular gland



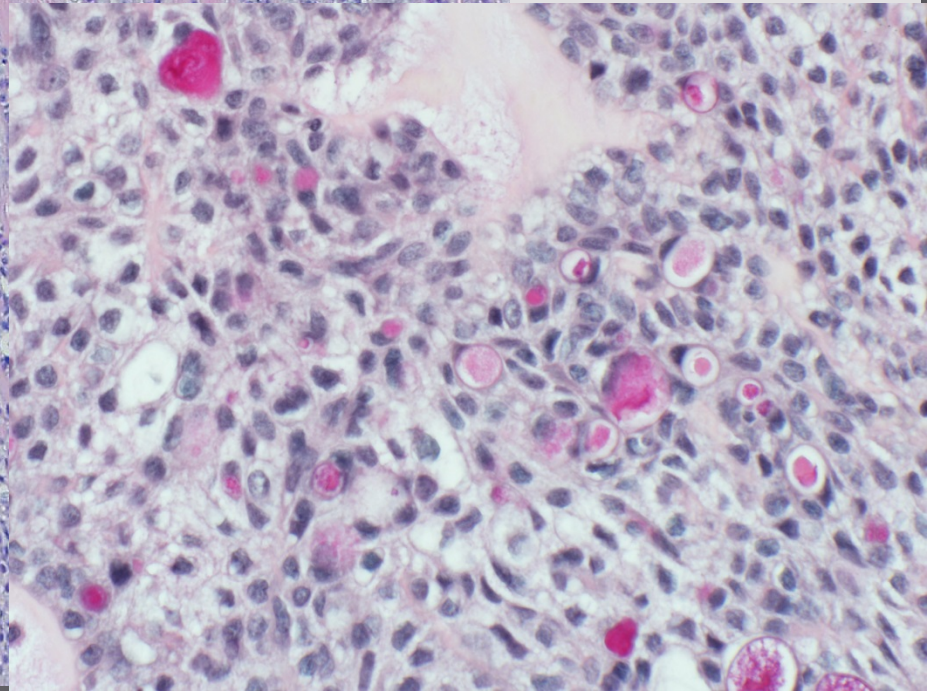
19 year old male with nodule in submandibular gland



Mucoepidermoid Carcinoma

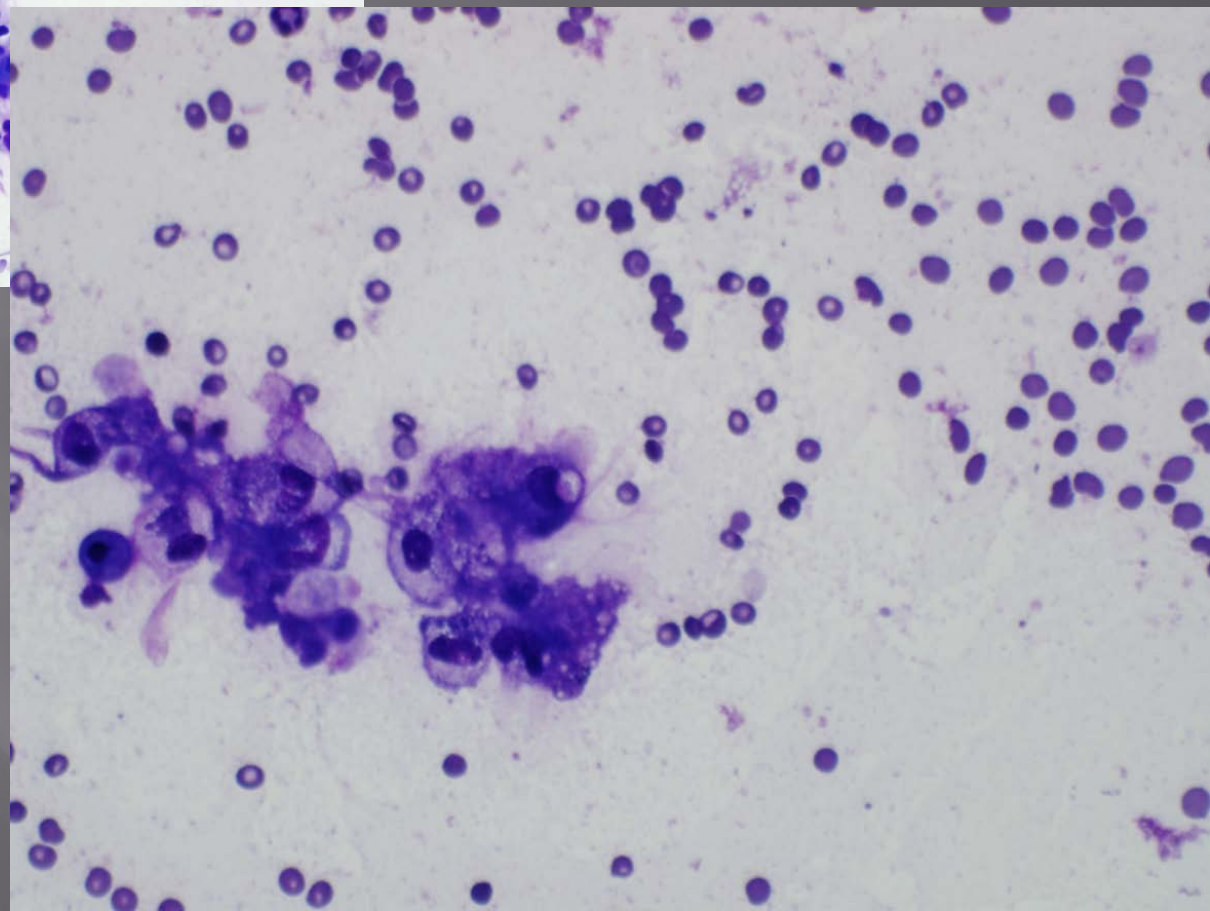
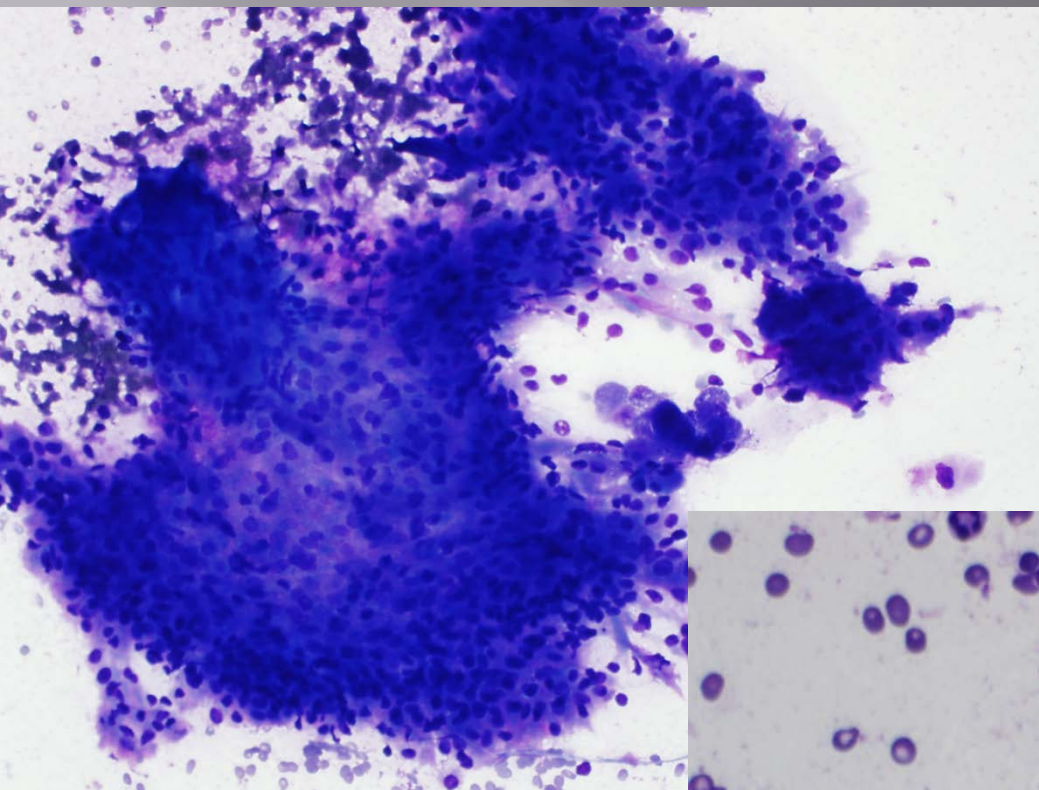


Mucicarmine



Mucoepidermoid Carcinoma: Difficulties at FNA

- ▣ Frequently underdiagnosed on FNA sampling
- ▣ In one recent series only 52% correctly identified
- ▣ The low grade subtype far outnumbered the high grade type
- ▣ Extracellular mucin mimics the fibrillary stroma seen in PAs. The presence of extracellular or intracellular mucin in FNA specimens may not be reliable in distinguishing from WT
- ▣ Oncocytes found in significant minority of MEC
- ▣ Squamous metaplasia is common in other lesions (Warthin's tumor, pleomorphic adenoma)



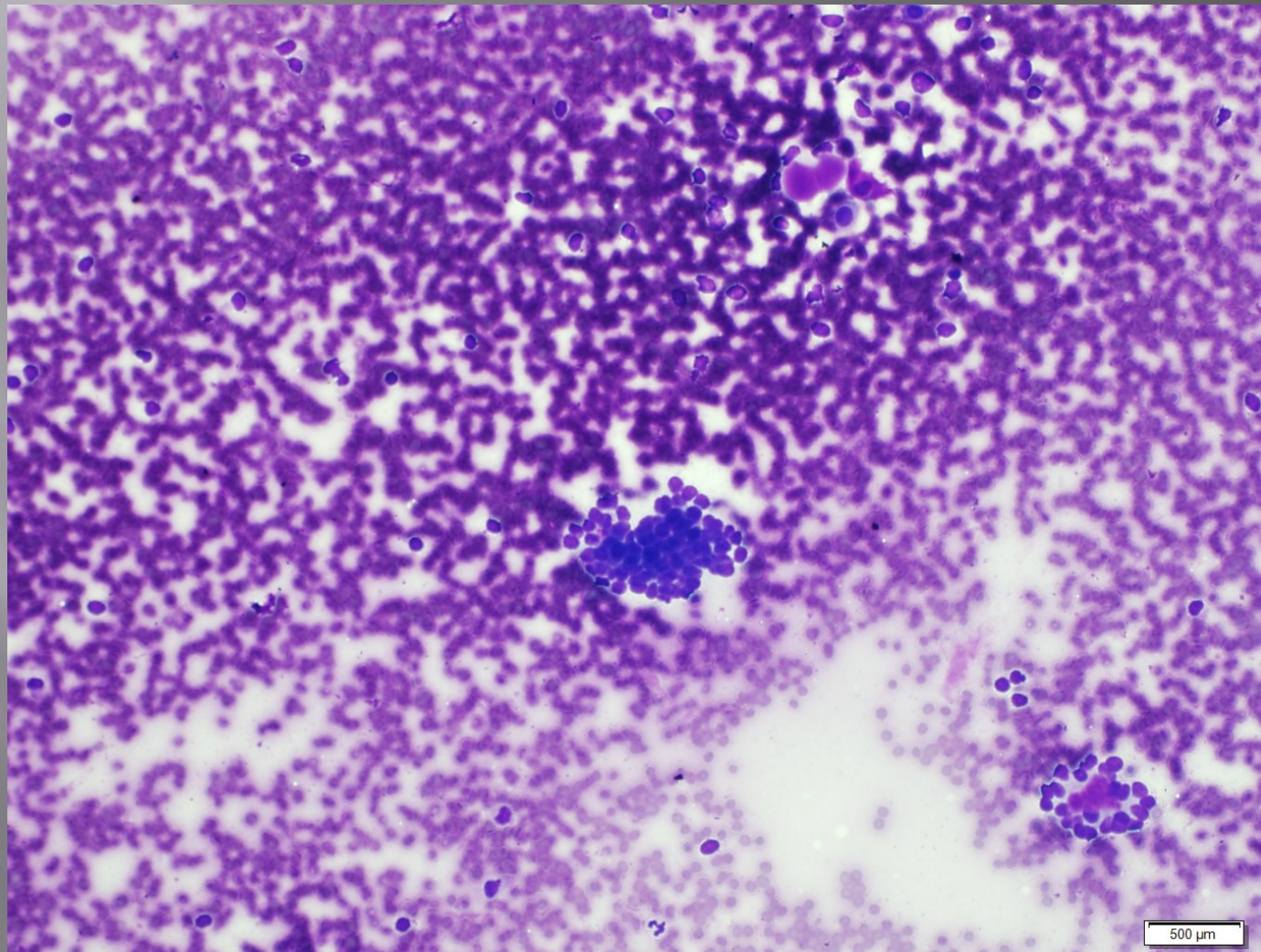
Mucoepidermoid Carcinoma: Cytomorphologic Clues

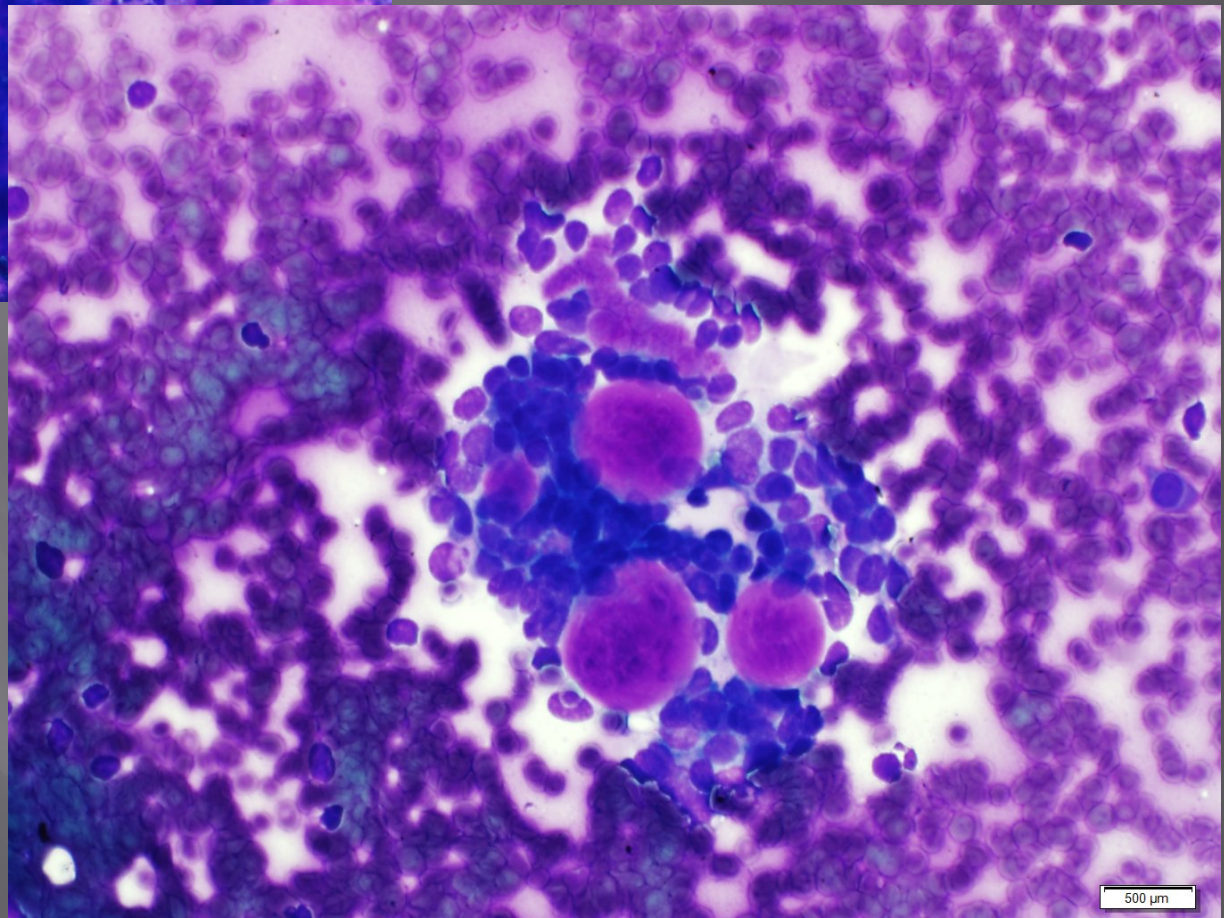
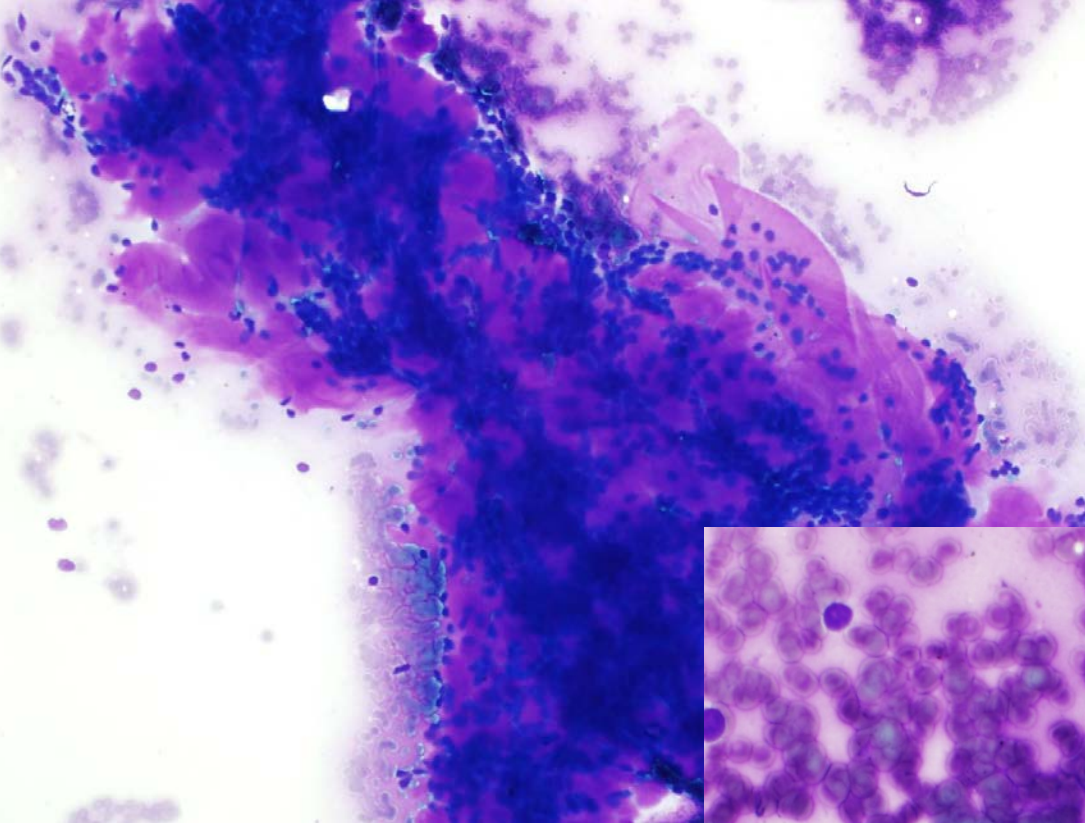
- ▣ Cytologic features selected as most predictive of mucoepidermoid carcinoma (in a series of 23 histologically confirmed tumors):
 - Mucus cells and extracellular mucin (91%)
 - Intermediate cells; overlapping epithelial groups (83%)
 - Clear cells (74%)
- ▣ Squamous/epidermoid cells were less commonly seen (13%)

Mucoepidermoid Carcinoma: Tips for Equivocal Cases

- ▣ In equivocal cases only a tentative differential diagnosis (epithelial salivary gland neoplasm) can be offered
- ▣ Smears from non-neoplastic cysts (retention cysts and lymphoepithelial cysts) can mimic low grade MEC with mucus, debris, metaplastic squamous cells
- ▣ High grade squamous cell carcinoma may not be distinguishable from high grade MEC
 - Obvious mucinous component (MEC)
 - Keratinization is present (SCCA)

35 year old female with Right Neck Nodule



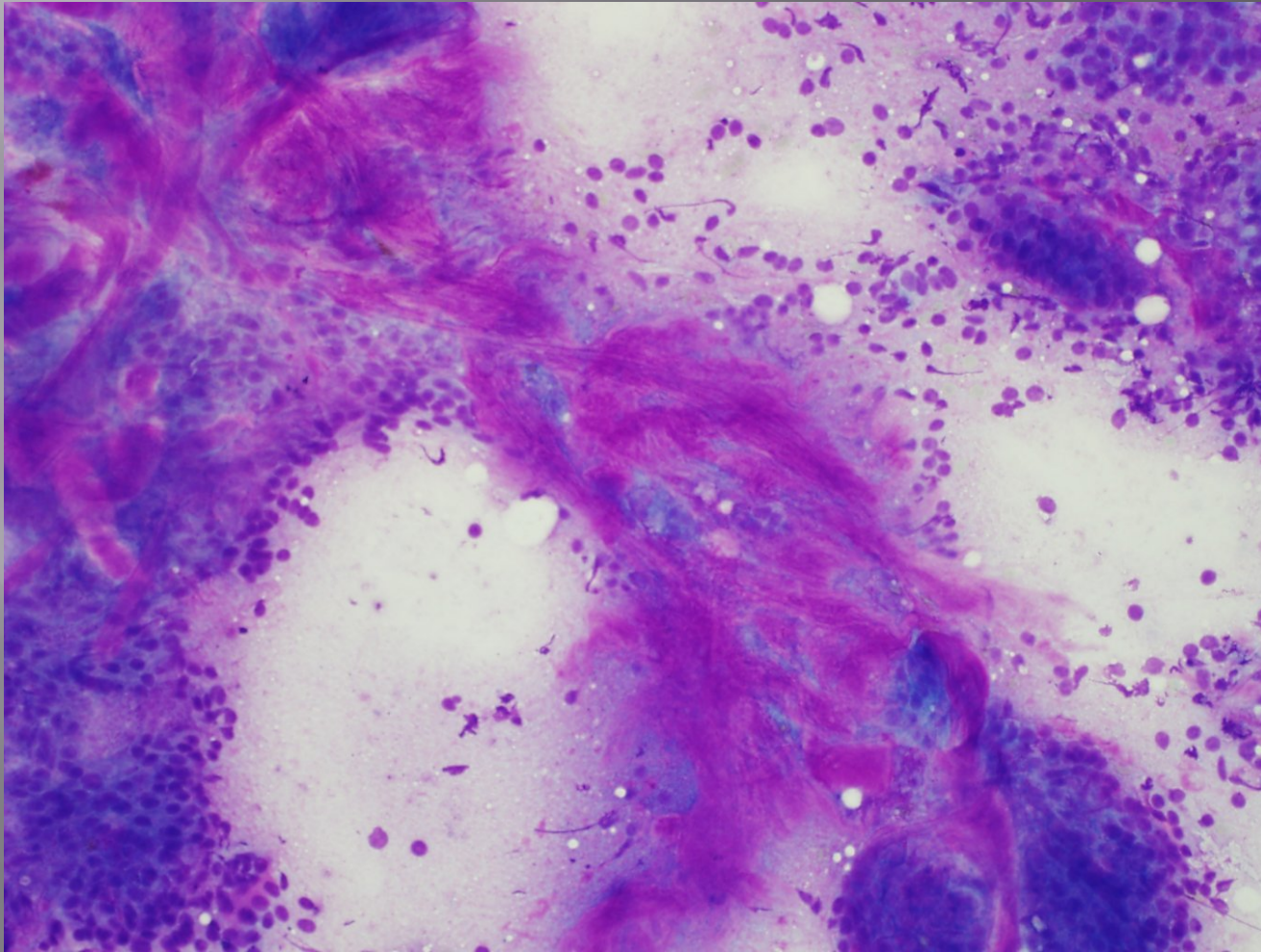


500 μ m

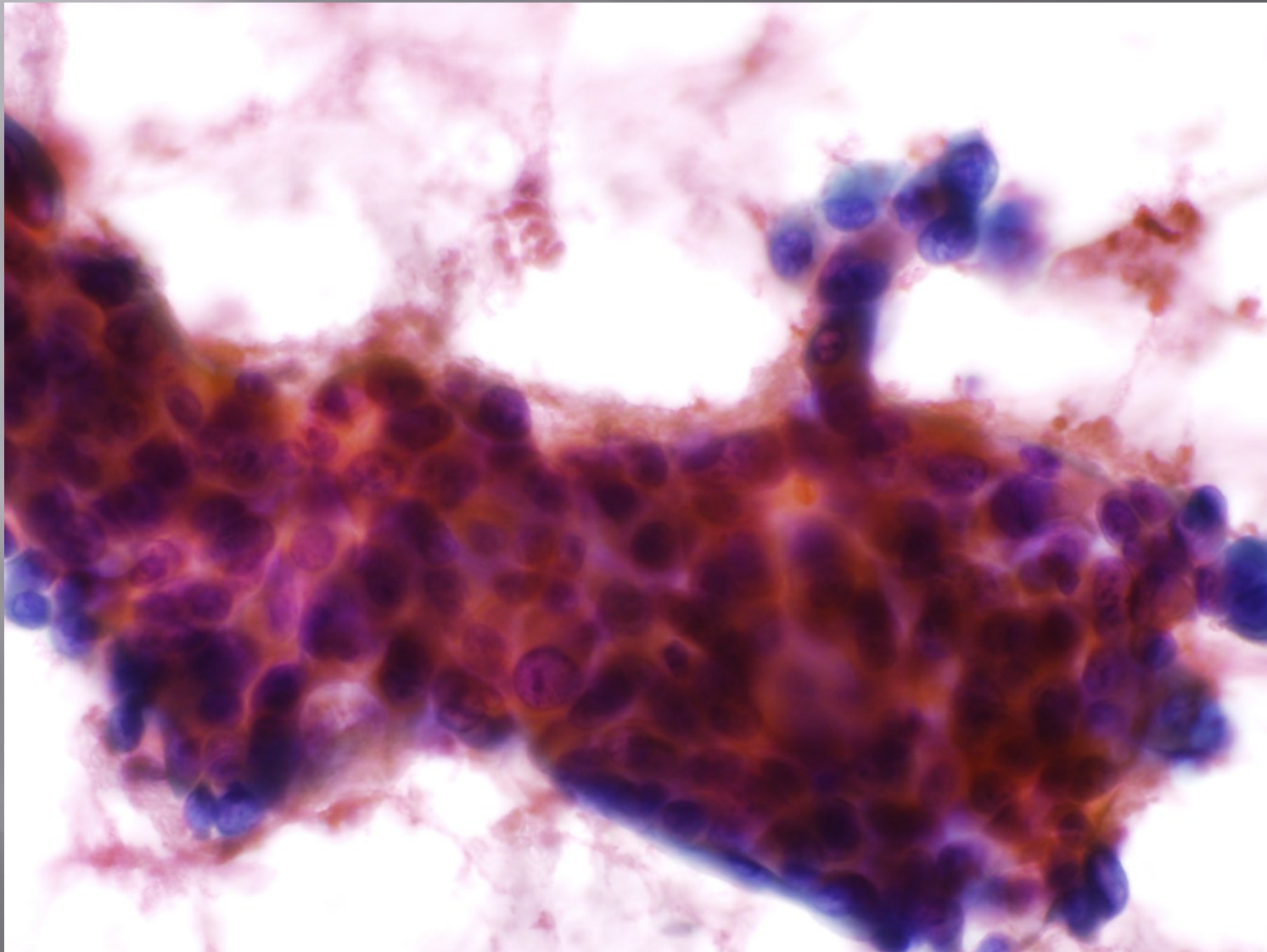
Adenoid Cystic Carcinoma

- ▣ Aggregates of small, uniform ovoid cells ('boomerang cells') with associated spheres of magenta matrix
- ▣ Some cases have cytomorphic overlap with pleomorphic adenoma, basal cell adenoma and basal cell adenocarcinoma
- ▣ Thus some FNAs should be designated basaloid neoplasm

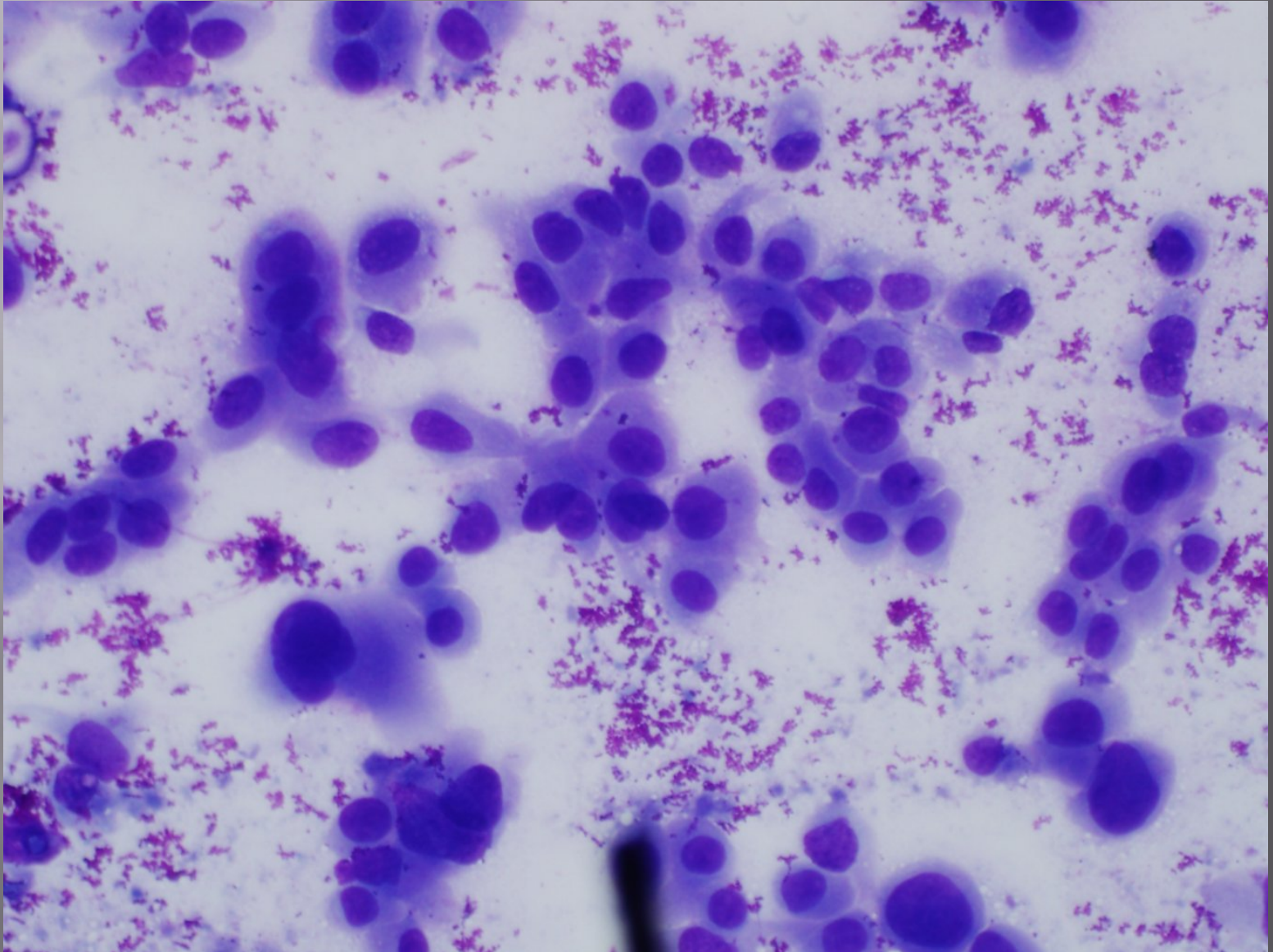
Adenoid Cystic Carcinoma with PA-like Features on FNA



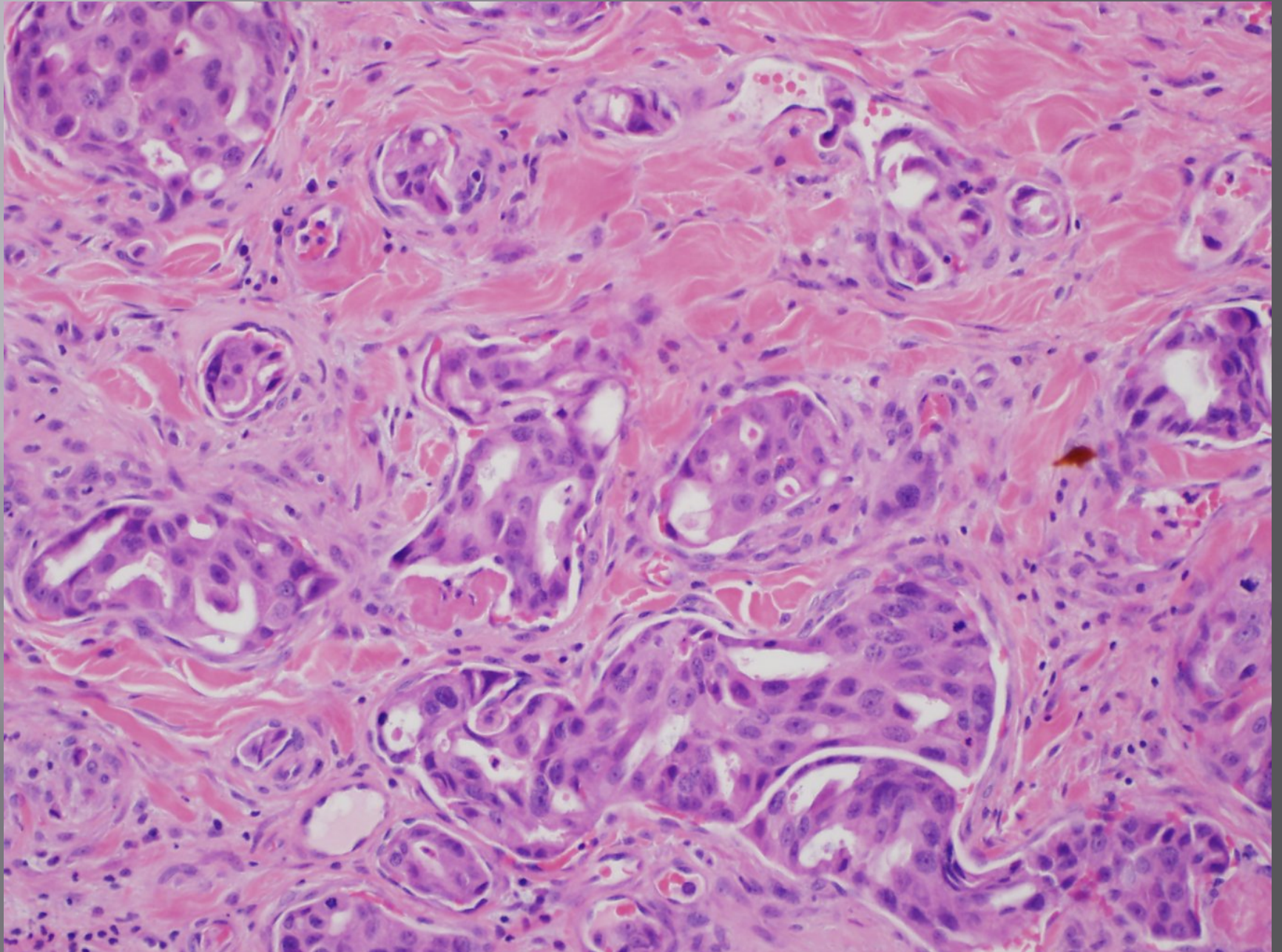
72 year old male with parotid mass



Carcinoma was
FNA diagnosis



Salivary Duct Carcinoma



Salivary Duct Carcinoma

- ▣ Overtly malignant cytology
- ▣ Large cells with abundant granular cytoplasm (malignant oncocytoid)
- ▣ Overlapping sheets/clusters of cells
- ▣ Frequent necrosis

Salivary Gland FNA: My Advice

- ▣ Render a definitive (or most consistent with) diagnosis when you can:
 - PA
 - Warthin Tumor
 - Adenoid cystic carcinoma
 - Acinic cell carcinoma
 - Mucoepidermoid carcinoma (selected subset)
- ▣ Use umbrella categories when you must:
 - Oncocytic neoplasm (benign Ddx)
 - Basaloid neoplasm (adenoma to adenoid cystic Ddx)
 - Carcinoma (salivary duct among others)

Table 5
Consolidation of New Cytology Categories Into Classes

Categorization/Subcategorization	Risk of Malignancy, No./Total No. (%)	Classification	No./Total No. (%)	
			Overall Risk of Malignancy	Overall Risk of HG Malignancy
Nonneoplastic	0/25 (0)	Benign	2/103 (2.0)	1/103 (1.0)
Pleomorphic adenoma	2/49 (4.1)			
Warthin tumor	0/29 (0)			
Monomorphic cellular basaloid neoplasm with fibrillary stroma	2/13 (15.4)	NUMP	9/50 (18.0)	2/50 (4.0)
Monomorphic cellular basaloid neoplasm with hyaline stroma	3/7 (42.9)			
Monomorphic oncocytoid neoplasm with cyst contents background	0/11 (0)			
Monomorphic oncocytoid neoplasm with other background	4/19 (21.1)	Suspicious for malignancy	25/33 (75.8)	9/33 (27.3)
Monomorphic cellular basaloid neoplasm with mixed/other	6/10 (60.0)			
Monomorphic oncocytoid neoplasm with mucinous background	8/10 (80.0)			
Cellular basaloid neoplasm with coarsely granular/vacuolated cytoplasm	11/13 (84.6)	Positive for malignancy	25/25 (100.0)	22/25 (88.0)
Pleomorphic basaloid neoplasm	4/4 (100.0)			
Pleomorphic oncocytoid neoplasm	21/21 (100.0)			

Adapted from Griffith et al. Salivary Gland Tumor Fine-Needle Aspiration Cytology. *Am J Clin Pathol* 2015;143:839-53.

Questions?

