An FNA of thyroid showing a common malignancy

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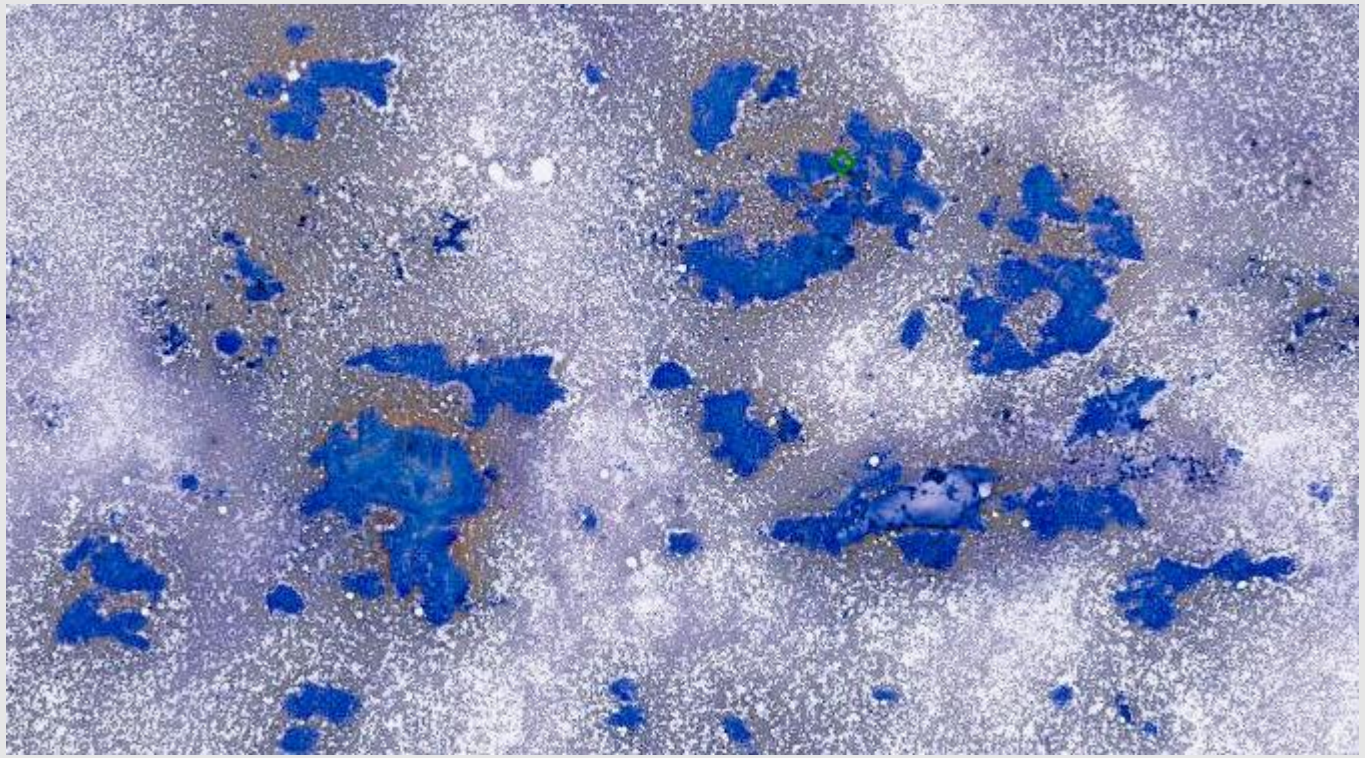
Clinical information

- Female, age 54.
- Referred to ENT by GP for neck lump.
- On Ultrasound the nodule appeared vascular, hypoechoic and solid
- Also appears to breach the thyroid capsule. Suspicious U4/U5
- FNA of right thyroid nodule performed.
- No previous relevant medical history.

Clinical information

- FNA taken without ROSE
- Two air dried slides prepared by the sonographer from the first needle pass.
- Needle washings and second pass placed into cytospin fluid.
- A cytospin slide and plasma/thrombin clot prepared in the laboratory from the cytospin fixed material.

FNA cytology

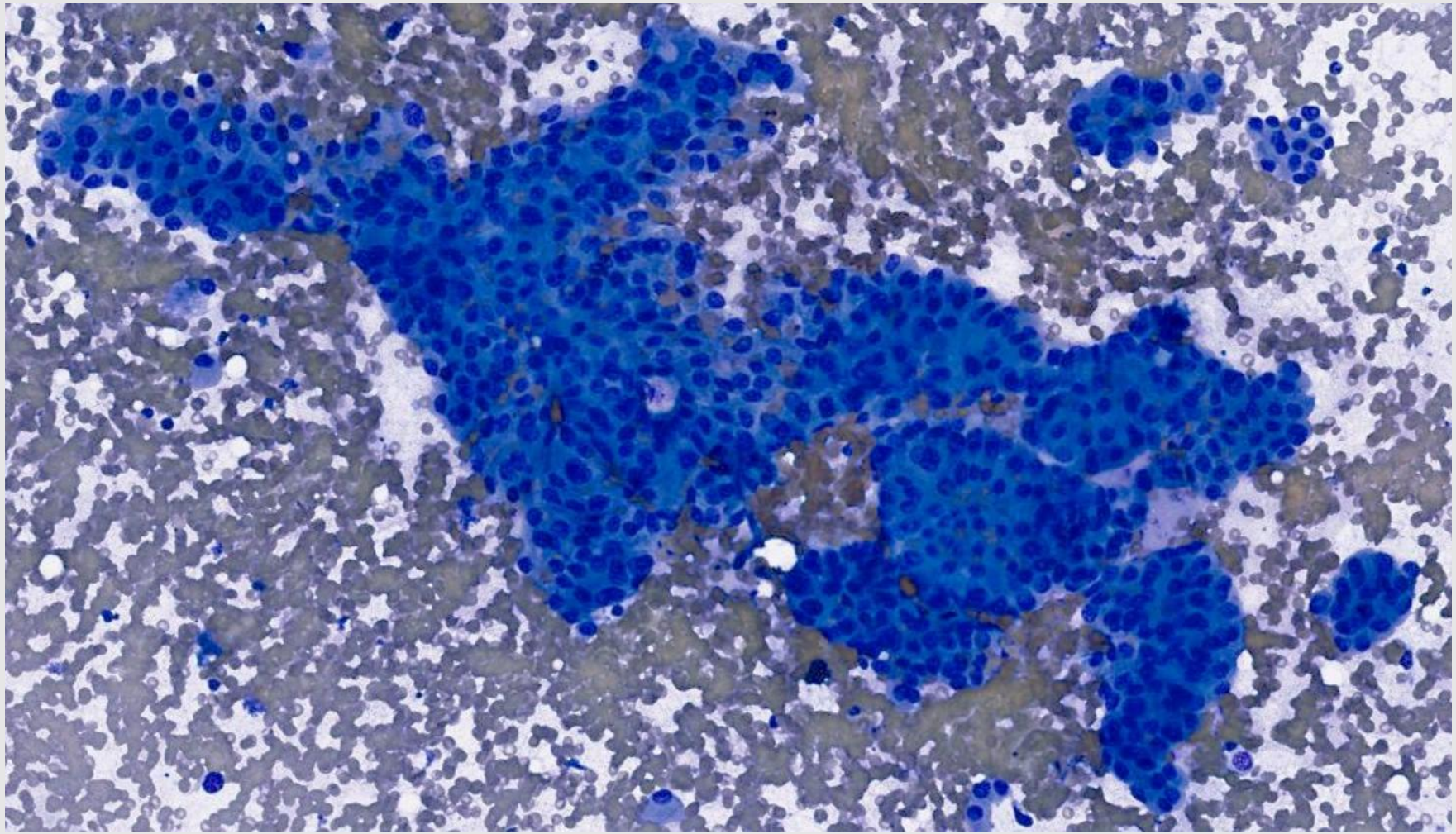


MGG X10 Magnification

Cellular specimen with numerous sheets and papillary groups

FNA cytology

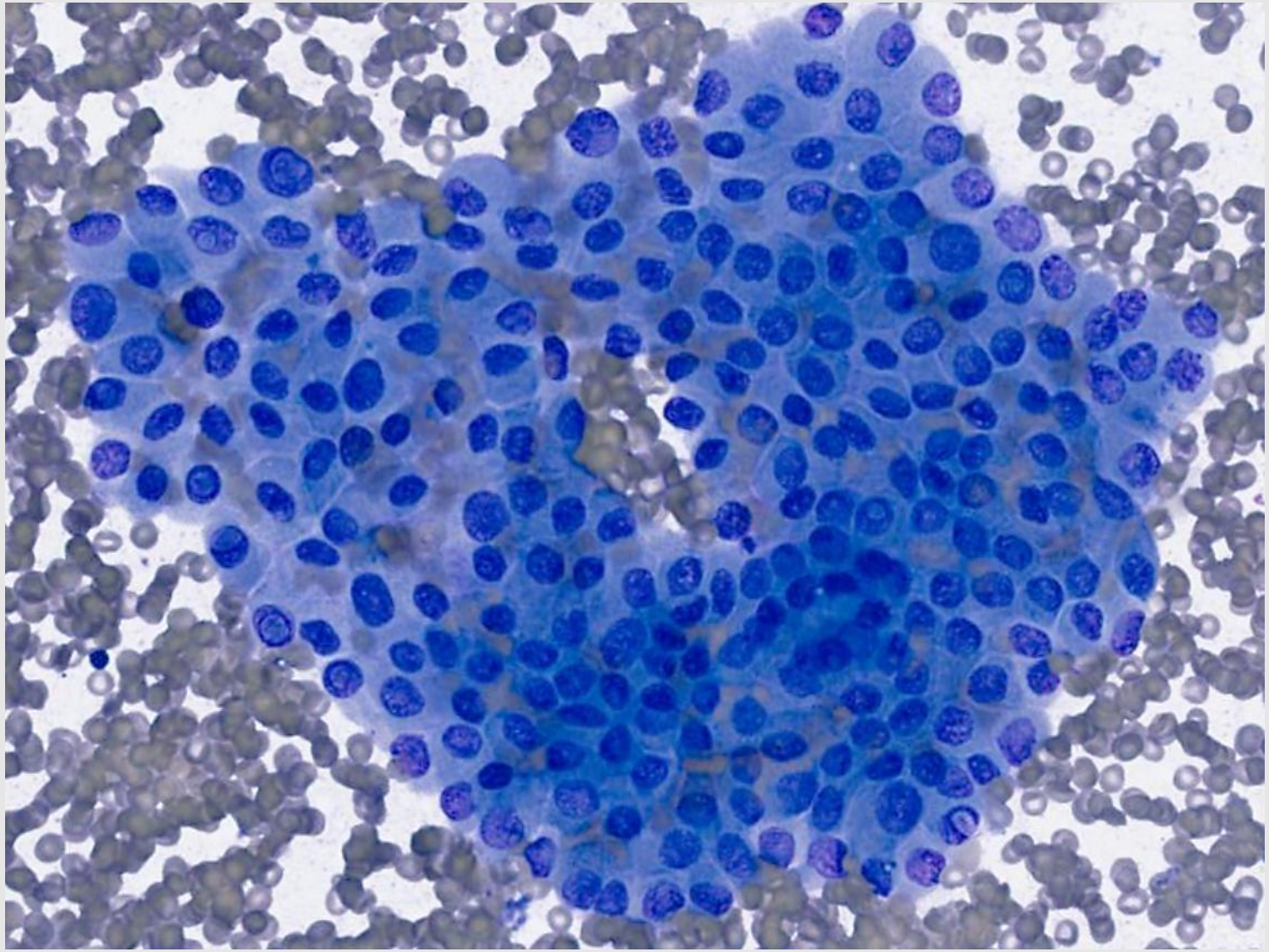
Cohesive sheets of cells



MGG X20 Magnification

FNA cytology

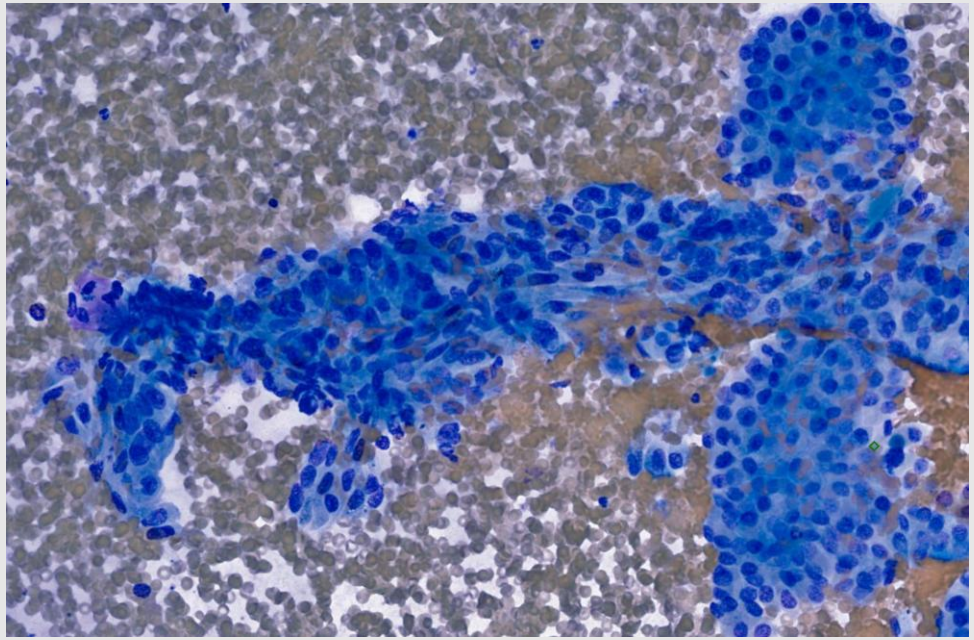
Cells within the sheets have irregular contours and occasional intranuclear inclusions. Cytoplasm is relatively dense and well defined in the group.



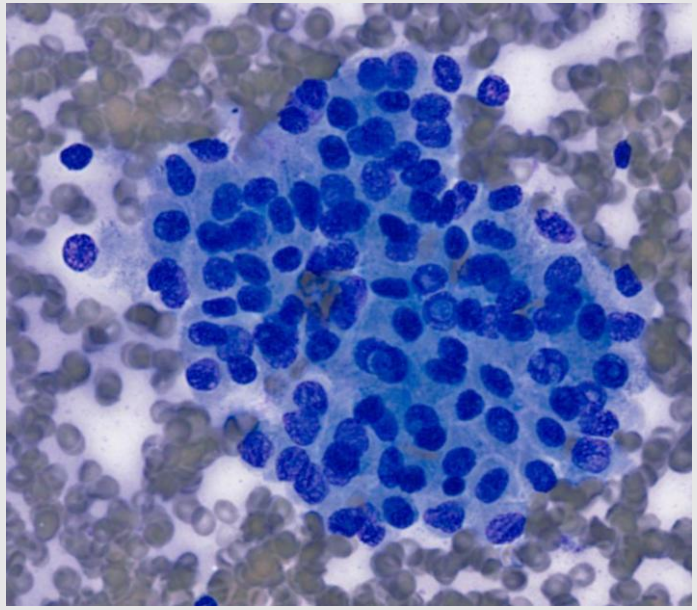
Pap X40 Magnification

FNA cytology

In some areas cells show elongated or oval nuclei.
There is a suggestion of a fibrovascular core.
Groups show disorganisation and loss of cellular arrangement.



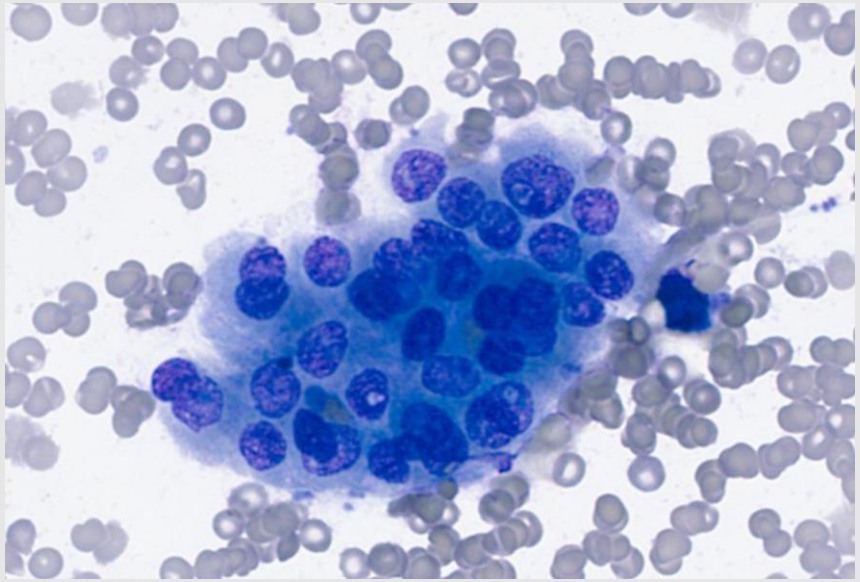
MGG X30 Magnification



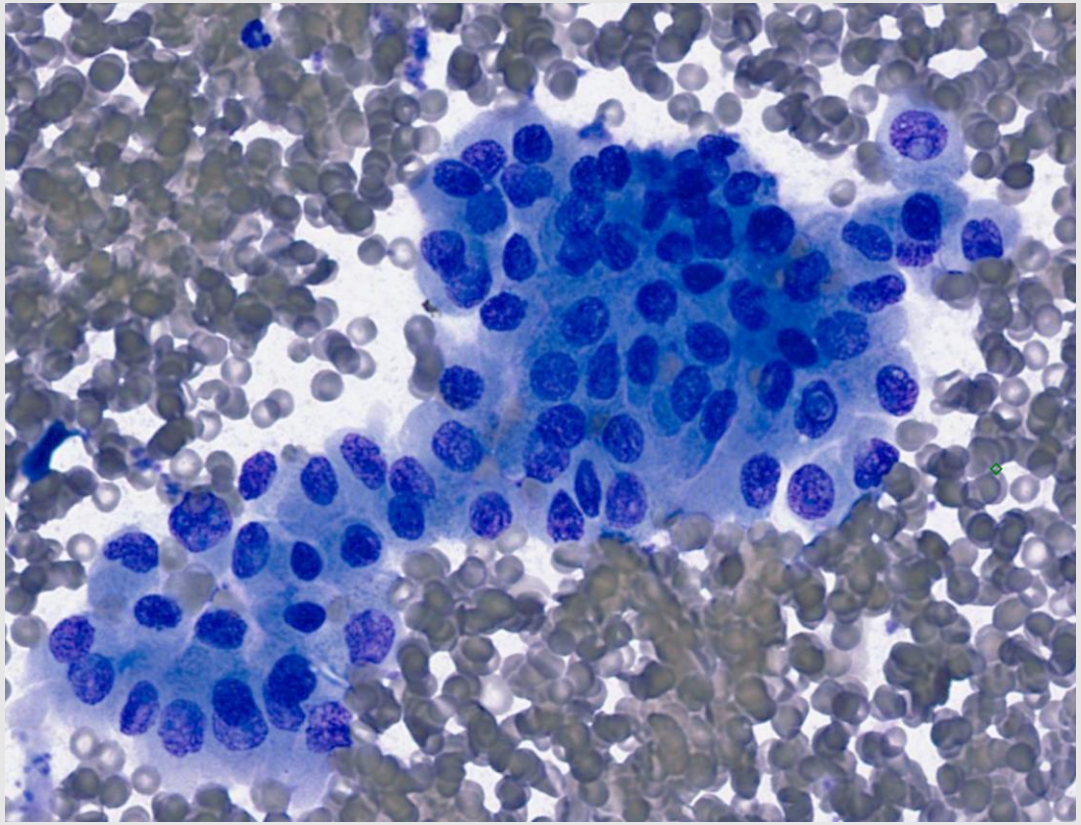
MGG X40 Magnification

FNA cytology

MGG X40 Magnification



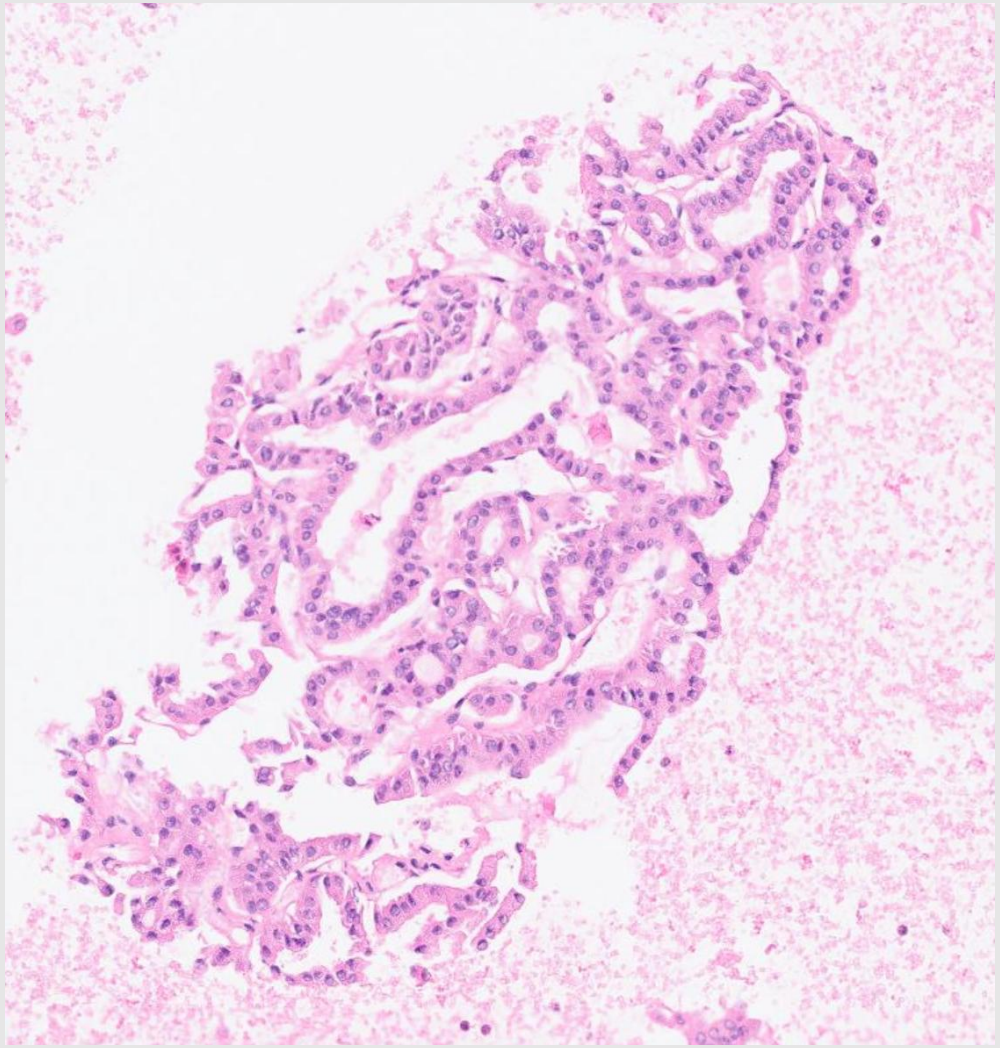
Features of nuclear irregularity, crowding and overlapping.



MGG X40 Magnification

FNA cell block

Cellular clot with numerous groups and sheets of cells. No normal thyroid follicular arrangements identified.



Cytology report

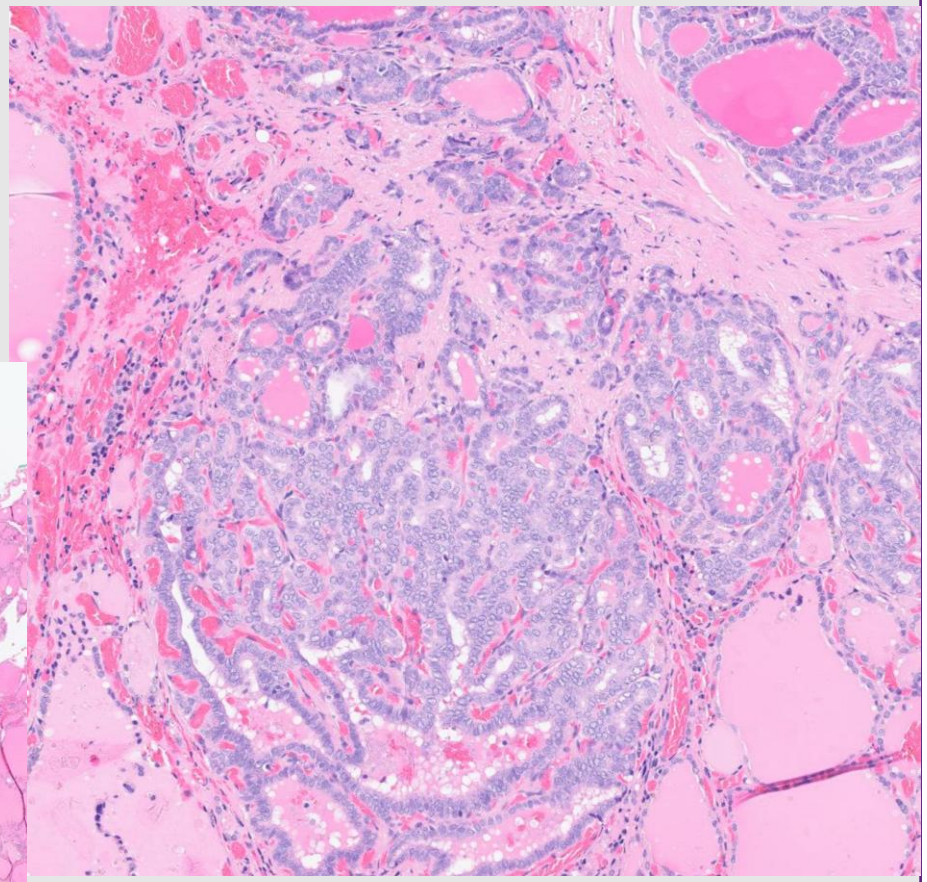
- This is a cellular sample composed of large papillaroid clusters of cells with abundant cytoplasm but also enlarged, overlapping nuclei, nuclear grooves and occasional intranuclear inclusions.

- The features overall, would be in keeping with a papillary thyroid carcinoma the variant of which is difficult to assess because of the abundant, near oncocytic cytoplasm.

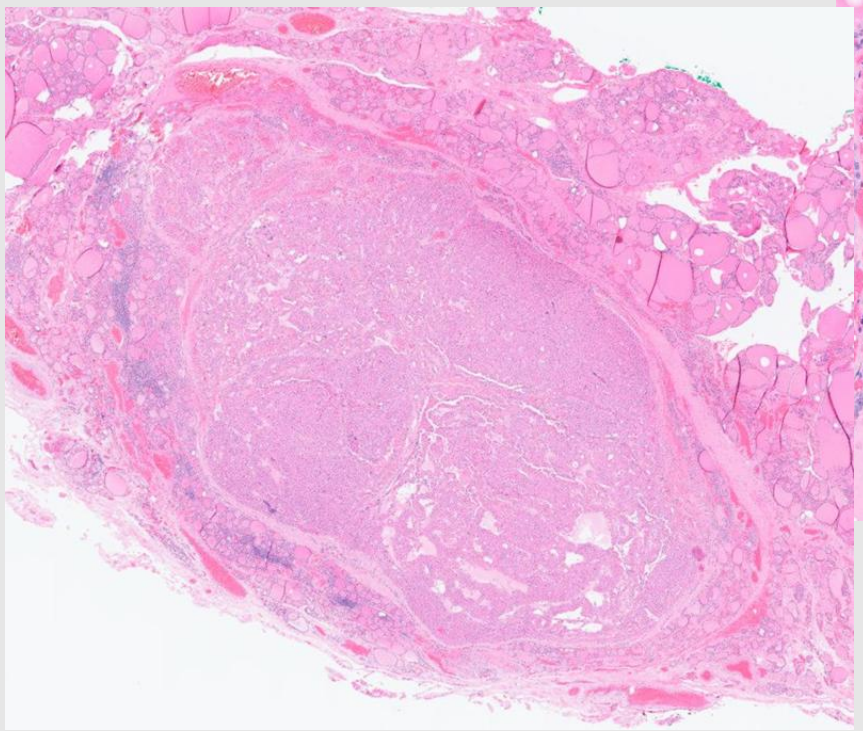
- Thy5, papillary thyroid carcinoma

Histology & Clinical Correlation

- Patient underwent a total thyroidectomy for right U4/ 5 Thy5 + level 6 and 7 neck dissection
- Histology – A widely infiltrative lesion (32mm) in the right lobe with various architectural patterns including papillary, microfollicular and oncocytic but all show nuclear features of papillary thyroid carcinoma.



Within the left lobe a second papillary thyroid carcinoma (12mm). Both show a significant tall cell component of over 70%. Also a third tiny nodule (1.5mm) of a more classical type papillary thyroid microcarcinoma.



Outcome

- Surgery performed with curative intent.
- Histology showed a multifocal invasive papillary thyroid carcinoma, pT2(m), with angioinvasion, incompletely excised.
- Patient referred to oncology for radioactive iodine ablation treatment.

Discussion

- Papillary thyroid carcinoma (PTC) is the most common type of malignancy affecting the thyroid gland, accounting for 80% of cases. The rate of diagnosis has been increasing in recent years, partly due to improved recognition of nodules on imaging, increased reporting of microcarcinomas, but other factors such as obesity may play a part.
- Risk factors include significant exposure to ionising radiation, high dietary iodine intake and pre-existing benign thyroid disease. Some reports of a potential role of sex hormones and their receptors in PTC incidence
- More common in females – 3:1 female to male ratio. Median age at diagnosis is 50 years old.

Discussion

Key morphological features of papillary thyroid carcinoma

- Cellular specimens, sheets and papillary or finger-like groups. Some peripheral palisading can be seen and often an anatomical edge to the group. Fibrovascular cores may be seen.
- Nuclear features can be distinctive.

- Intranuclear inclusions are sharply demarcated areas of nuclear clearing, thought to represent an invagination of cytoplasm. Artefactual inclusions can be a pitfall but are less clearly defined and are often empty.
- Nuclear grooves are a longitudinal crease along the full length of the nucleus. However, they may be seen in non-papillary neoplasms and also benign lesions.
- Enlarged nuclei with elongation, crowding and overlap

Discussion

Key morphological features of papillary thyroid carcinoma

- Variation in cell size with cytoplasm which can be dense, almost resembling metaplastic or oncocytic change. Well defined cell borders.
- Non cellular features include ‘chewing gum’ colloid and psammoma bodies

Discussion

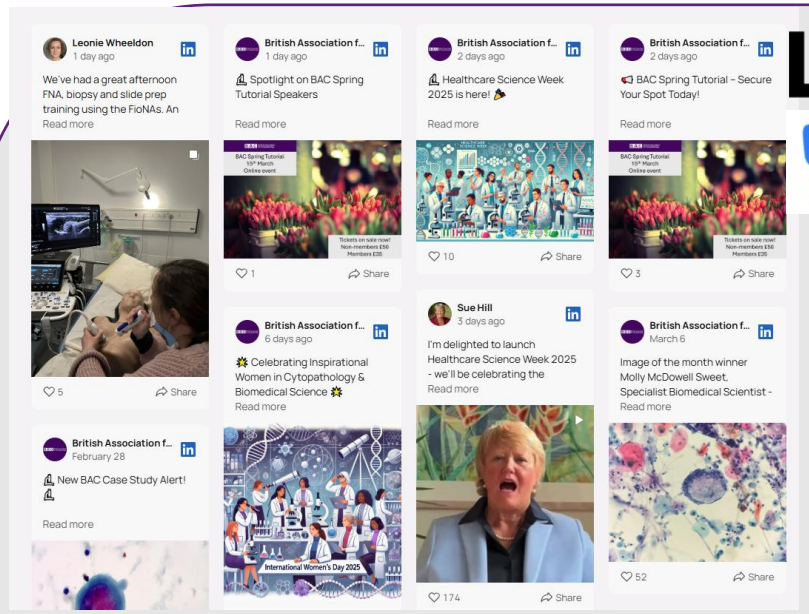
- The value of immunohistochemistry is limited in the diagnosis of papillary thyroid carcinoma. Cytokeratins are typically positive as is PAX8, TTF1 and thyroglobulin. These markers may be useful for identifying metastases. Calcitonin is negative. The usefulness of CK19 in equivocal cases, differentiating benign mimics from PTC (CK19 positive) is debated.
- Difficulties in diagnosis include presence of cystic change, large lymphocytic infiltrate and mixed patterns of growth.
- There are 15 different histological variants, and subtyping is based on assessment of architecture and cytological features. The most common histological variants include classical, follicular variant and microcarcinoma. Some variants have a more aggressive disease course.

Discussion

- Treatment for PTC commonly involves a hemi or total thyroidectomy - most PTC is multifocal disease.
- Post operative radioactive iodine treatment used to ablate any remaining thyroid cells following total thyroidectomy.
- Molecular biomarkers – PTC driver mutations result in constitutively active MAPK or PI3K/AKT pathways. Relevant drivers include point mutations of BRAF and RAS genes. The most common BRAF point mutation whereby valine (V) is substituted for glutamic acid (E) at position 600 (V600E) results in uncontrolled BRAF kinase activity and aberrant cell proliferation. BRAF-mutated tumours often exhibit a more aggressive disease course and frequent lymph node involvement. Tumours harbouring BRAF-V600E mutations are more likely to show poor iodine uptake which can complicate the effectiveness of radioiodine treatment.

References

1. Carnazza M et al. The Current Understanding of the Molecular Pathogenesis of Papillary Thyroid Cancer. Int. J. Mol. Sci 2025, 26:4646
2. Vaio F et al. State of the Art on Thyroid Cancer Biology and Oncology. Biomedicines 2026, 14:168
3. Essentials of Head and Neck Cytology Gia-Khanh Nguyen 2009 https://pathology.ubc.ca/files/2012/06/HEADANDNECKFINALVERSIONR.pdf Accessed 23/02/26
4. Papillary Thyroid Carcinoma Continuing Education Activity Limaiem F, Rehman A and Mazzoni T. https://www.ncbi.nlm.nih.gov/books/NBK536943/?report=printable Accessed 23/02/26
5. Manual and Atlas of Fine Needle Aspiration Cytology 2nd edition. Orell SR, Sterrett GF, Walters MN-I and Whitaker D. Churchill Livingstone Press 1993



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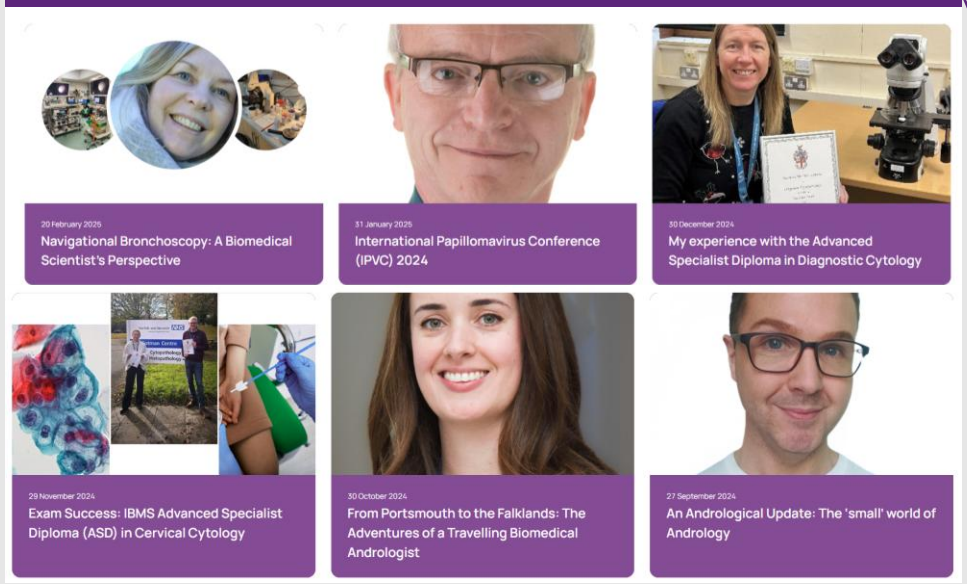

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