Towards AJCC 9th Edition: A Radiologist's Visual Guide to Nasopharyngeal Carcinoma Staging

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INTRODUCTION

AJCC 9th edition introduces critical, evidence-based modifications to the TNM staging of NPC with imaging playing a pivotal role in accurate staging and prognosis.

Curated pictorial analysis of NPC cases from our institute, specifically selected to demonstrate AJCC 9th edition updates and address common diagnostic challenges encounter in clinical practice.

T Category Staging: Key Refinements

T3 – Clarification of Bone Invasion

Unequivocal tumour infiltration into skull base (including pterygoid structures), paranasal sinuses or cervical vertebrae includes: (1) cortical bone destruction; (2) tumour infiltration into marrow; or (3) soft tissue mass within the bone. **Bone sclerosis** is **not** a standalone T3 criterion.

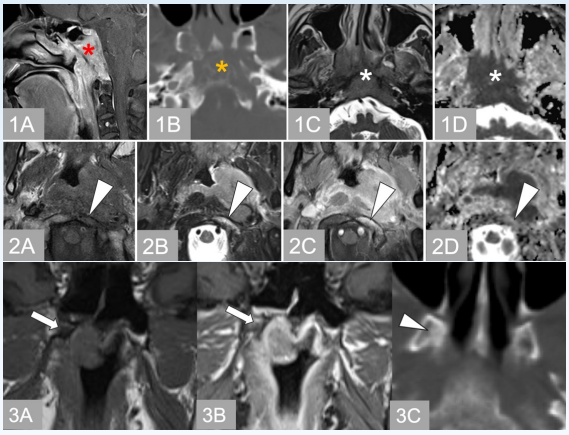

Fig 1. Tumour infiltration of clivus with **intermediate T2 signal** and **moderate enhancement** demonstrates marrow infiltration (A, asterisk), cortical destruction (B, asterisk) and tumor mass within the bone (C & D, white asterisks).

Fig 2. Peritumoural inflammation of C1 vertebra demonstrates marrow oedema with low T1 signal (A, arrow), **markedly high T2 signal** (B, arrowhead), **marked enhancement** (C, arrowhead) and facilitated diffusion (D, arrowhead).

Fig 3. Peritumoural infiltration of right pterygoid with loss of marrow signal (A, arrow) but intact cortex (B, arrow) and bone sclerosis on CT (C, arrowhead).

T4 – Expanded Criteria

Tumour with any of the involvement/ extension: (1) orbit including **inferior orbital fissure**; (2) **unequivocal** radiological and/ or clinical involvement of **cranial nerves**.

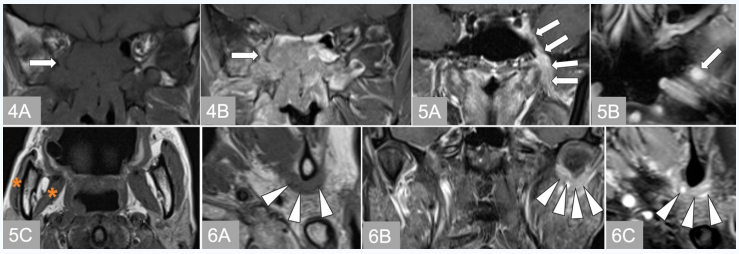

Fig 4. Tumour infiltrating **inferior orbit fissure** on coronal views (A & B, arrows).

Fig 5. Perineural spread with enhanced thickening of left mandibular (V3) nerve (A, arrows), expansion of left foramen ovale (B, arrow), and atrophy of left masticator muscles due to chronic denervation change (C, asterisks).

Fig 6. Perineural spread of auriculotemporal nerve with thickening on T1W image (A, arrowheads) and enhancement on coronal (B, arrowheads) & axial views (C, arrowheads).

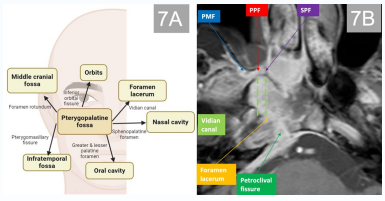

Fig 7. Critical Pathways for Perineural Tumour Spread in the Skull Base
The pterygopalatine fossa (PPF) is a critical neural crossroad. Tumour can spread **posteriorly** via Vidian canal to foramen lacerum, **posteriorly** via foramen rotundum (V2 nerve) to the middle cranial fossa (B), **anteriorly** via sphenopalatine fossa (SPF) to nasal cavity, **laterally** via pterygomaxillary fissure (PMF) to the infratemporal fossa (B), **superiorly** via inferior orbital fissure into the orbit and **inferiorly** via greater and lesser palatine foramen into oral cavity (A). Knowing these connections is critical for accurate tumour mapping.

N & M Categories Staging: Stratifying Risks

N3 – Addition of Advanced Imaging Extranodal Extension (iENE)

Cervical lymph node(s) with **advanced iENE** into adjacent **muscles, skin, and/ or neurovascular bundle**.

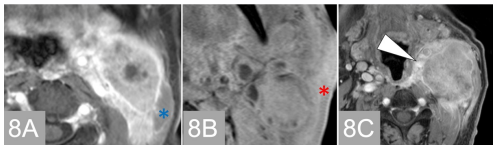

Fig 8. Advanced iENE (grade 3) including invasion of the sternocleidomastoid muscle (A, asterisk), infiltration of skin (B, asterisk), and encasement of neurovascular bundle (C, arrowhead).

M1 – Quantifying Metastatic Burden

Subdivision of M1 into **M1a (≤3 lesions)** and **M1b (>3 lesions)** in ≥1 organs/ site.

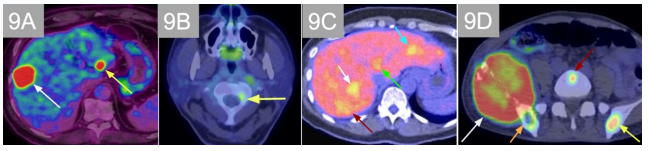

Fig 9. M1a (≤ 3 lesions) shown by hepatic metastasis (A, arrows), or a solitary C1 vertebral metastasis (B, arrow). M1b (> 3 lesions) shown by widespread hepatic metastasis (C, arrows), or bone metastasis (D, arrows).

CONCLUSION

This visual guide bridges the new AJCC 9th edition staging system into daily radiological practice, promoting more accurate reporting and effective multidisciplinary communication.

REFERENCE

1. Pan, J. J., Mai, H. Q., Ng, W. T., Hu, C. S., Li, J. G., Chen, X. Z., ... & Lee, A. W. (2024). Ninth version of the AJCC and UICC nasopharyngeal cancer TNM staging classification. JAMA oncology.
2. Rai, P., Lakhani, D. A., Agarwal, A., & Bhatt, A. A. (2025). The 9th Version of the AJCC Staging System for Nasopharyngeal Carcinoma: A Guide for Radiologists. American Journal of Roentgenology.