




An approach to trans-spatial and multi-spatial processes in the head and neck

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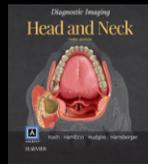



No disclosures

- Special thanks:
- Ashok Srinivasan
- Kristine Mosier
- Edward P. Quigley
- Richard Wiggins

Up front definitions

- Transspatial lesions occupy or involve multiple contiguous spaces
- Multispatial lesions involve multiple spaces, though in a NON-contiguous fashion



Transspatial categories

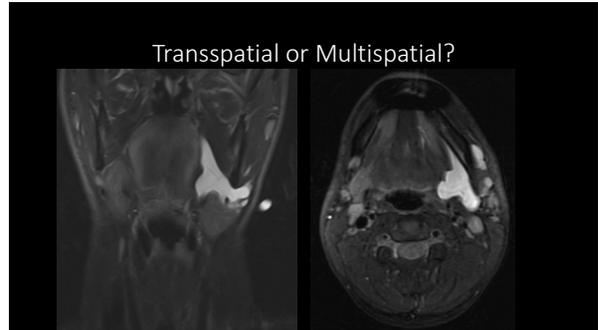
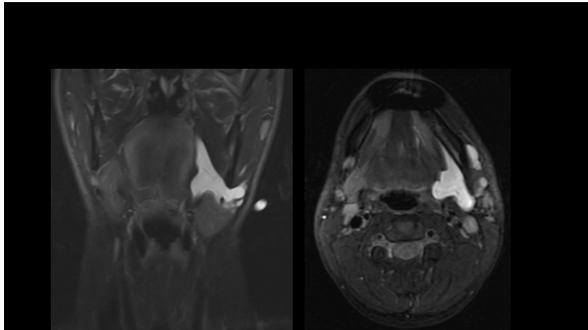
- Congenital
 - Form prior to fascial closure (e.g. veno/lymphatic malformation)
- Inflammatory/Infectious
 - Cellulitis/phlegmon/abscess can affect surgical management
- Benign tumors
 - Nerve origin (schwannoma) or vascular (hemangioma)
- Malignant tumors
 - Pharyngeal mucosal surface squamous cell carcinoma (SCCa) can invade multiple contiguous spaces (beware perineural tumor spread)

Multispatial categories

- Congenital
 - Syndromic presentations (PHACES, NF, etc...)
- Infectious/Inflammatory
 - Suppurative or tuberculous nodes
- Malignant tumors
 - SCCa or lymphoma of the aerodigestive tract, and nodal burden

Case 1

- 24 yoM with facial swelling



Transspatial

- T2 hyperintense from submucosal surface of oropharynx to the sublingual and submandibular space
- Extension to the masseter (masticator space) and elevation of the SMAS
- SMAS = superficial musculature aponeurosis system, facial expression

T2 hyperintense

- Initially believe to be a lymphatic (or venolymphatic) malformation
- U/S guided aspiration was performed in clinic

What biochemical or cytological analysis can be performed upon aspiration of the lesion to prove it is a ranula (i.e. salivary in origin)?

- Lipase
- Amylase
- Protein
- Cell count
- alpha-fetoprotein

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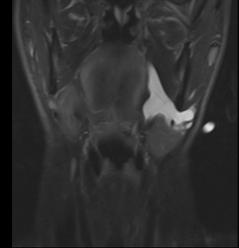
Ranula

- Sublingual space/gland mucous retention cyst
- Simple – unilocular sublingual space cyst
 - Unilateral = oval
 - Bilateral = horseshoe
- Diving – rupture into the submandibular space



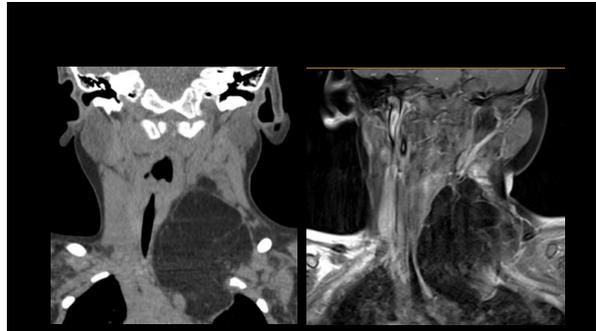
Ranula

- Often matches CSF (T2 FS best sequence)
- Periphery may enhance
- DDx: lymphatic malformation, dermoid (fat), epidermoid (DWI), BCC, nodes, abscess, mucocele (SMG) or sialocele (true/false)
- Treatment is controversial

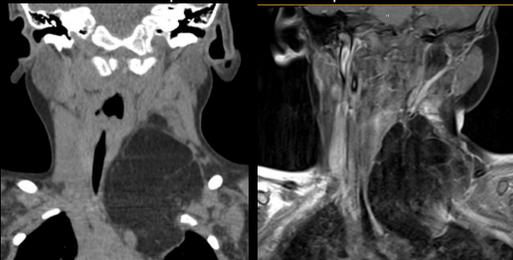


Case 2

- 3 yoM with neck mass



Transspatial or Multispatial?



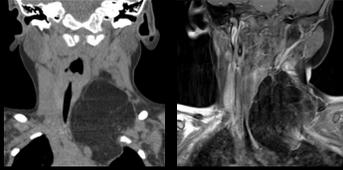
Transspatial

- Fat attenuating/intensity signal from pleural margin into neural foramina, superiorly onto visceral space, parapharyngeal space and posterior cervical space
- Vascular and neuronal encasement
- Minimal septae associated



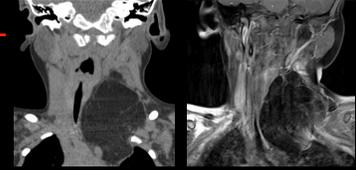
What is the most likely diagnosis for this transspatial fat mass in a 3 year old male?

- Lipoblastoma
- Liposarcoma
- Lymphangioma
- Ganglioneuroma
- Rhabdomyosarcoma



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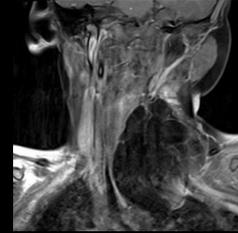
Lipoblastoma/Lipoblastomatosis

- Rare tumor of infancy/childhood
- Postnatal lipoblast proliferation (white fat)
- 80-90% diagnosed by 3 years, rapidly growing neck mass in a male (3:1)
- Lipoblastoma – focal/circumscribed classically superficial
- Lipoblastomatosis – diffuse infiltrative form in deeper tissue (prone to recur)



Lipoblastoma/Lipoblastomatosis

- DDx: liposarcoma (uncommon), lymphangioma (vascular/lymphatic), ganglioneuroma (neuronal tissue), rhabdomyosarcoma (mesoderm)
- Some propose that lipoblastoma may differentiate into mature lipoma (if given the chance)



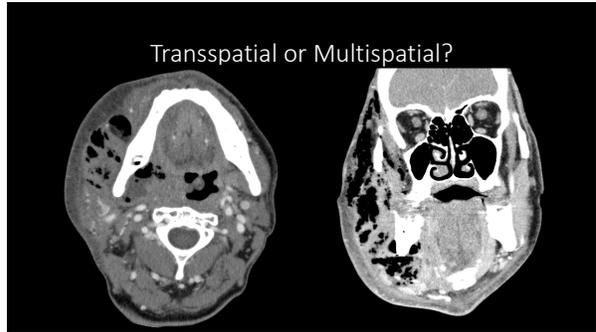
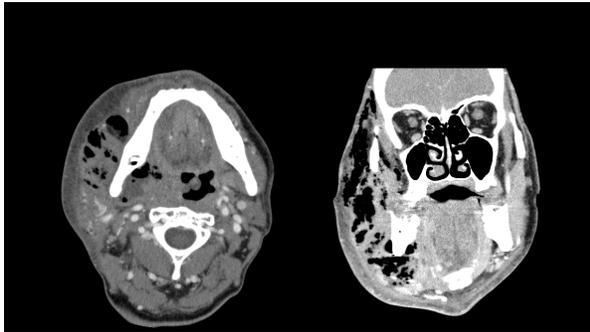
Lipoblastoma/Lipoblastomatosis

- Variable adipocytes, mesenchymal cells, myxoid matrix, well defined septae and fine vascular network
- Key to distinguish from myxoid variant liposarcoma, uncommon in demographic
- Complete excision is ideal
- 12-25% can recur



Case 3

- 56 yoF with face swelling



Transspatial

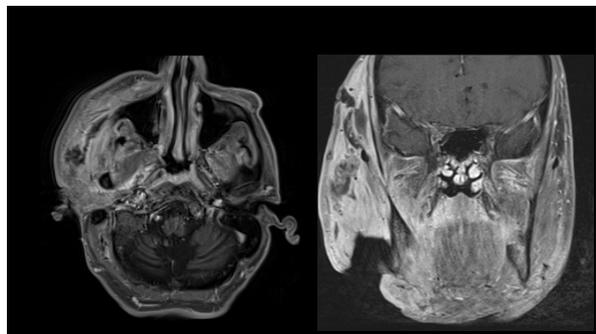
- Mixed gas and fluid attenuation through the SMAS, SMS, SLS, MS, PS, PPS, RPS onto the CS
- Lots of spaces!! But they all touch
- Infection can spread quickly

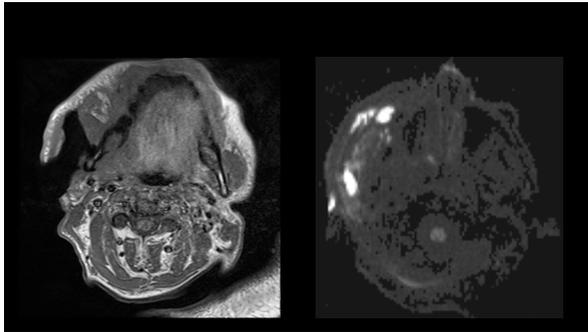
What is the most likely cause of this transspatial infectious process?

- Trauma
- Dental
- Hematogenous
- Iatrogenic
- Neoplastic

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- Trauma
- Dental ←
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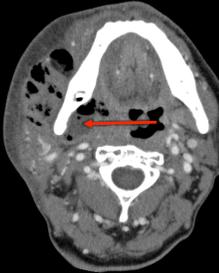
Dental infection

- 1-4% of ER visits (non-traumatic dental)
- Often uninsured, untreated (preventable) chronic infections
- Apical lucency, disrupts adjacent cortex, direct route of spread along muscle and fascial planes



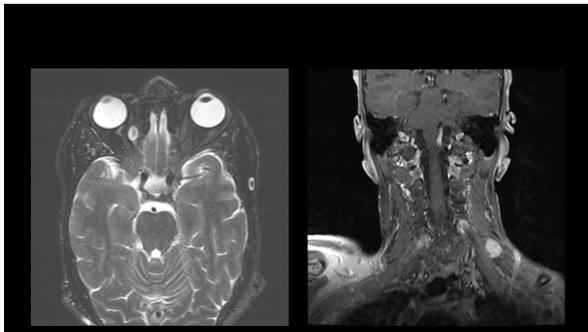
Dental infection

- Over 700 different bacteria make up the oral microbiome
- 100 million organisms/mL saliva
- “the mouth is a dirty place”
- Look for drainable fluid collections
- Treatment is surgical, antimicrobial

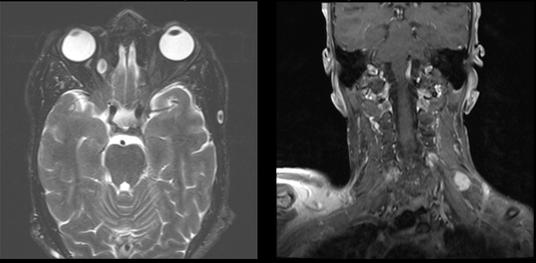


Case 4

- 56 yoF with genetic disorder (unspecified)

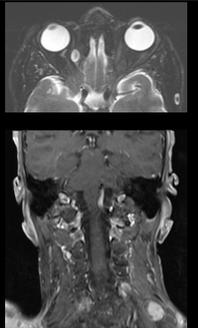
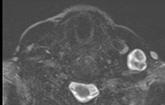


Transspatial or Multispatial?



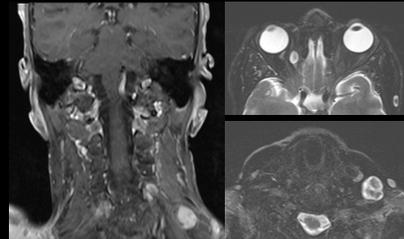
Multispatial

- Right orbital peripherally T2 hyperintense, centrally hypointense target-like lesion
- Additional lesion on the left scalp
- Enhancing left brachial plexus lesion with similar characteristics



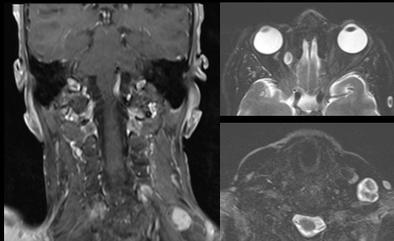
Which chromosome is abnormal in this patient?

- 3
- 9
- 16
- 17
- 22



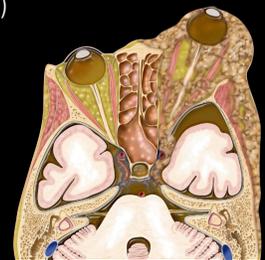
Which chromosome is abnormal in this patient?

- 3
- 9
- 16
- 17 ←
- 22



Neurofibromatosis (type I)

- Autosomal dominant, mutated tumor suppressor protein (neurofibromin), leads to uncontrolled proliferation
- Plexiform neurofibroma (transspatial) is an NF-1 defining lesion
- History is helpful!



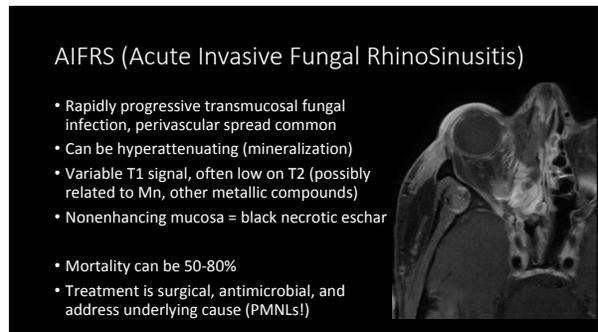
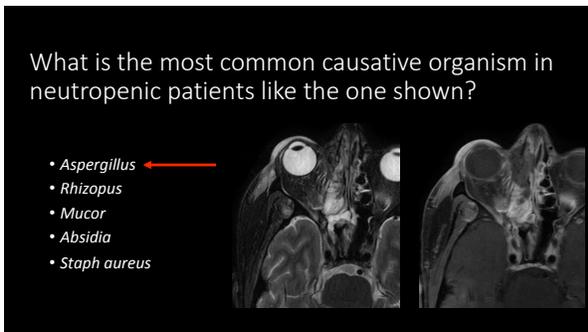
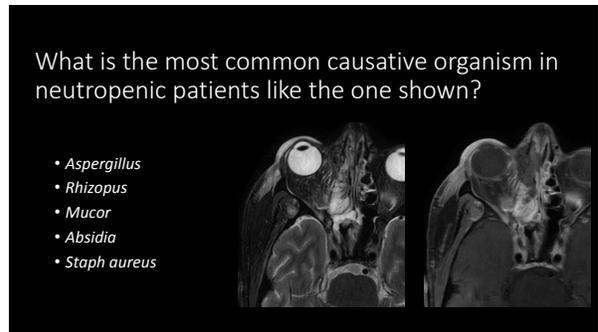
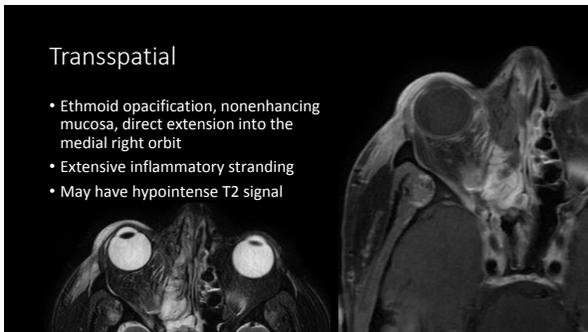
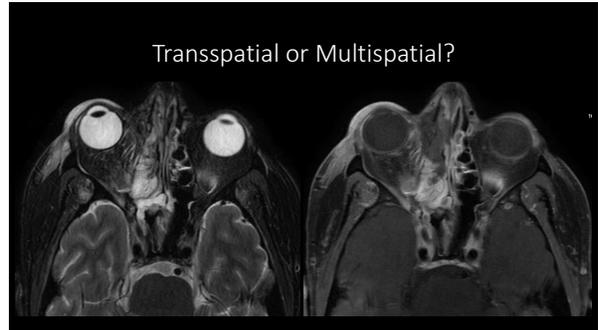
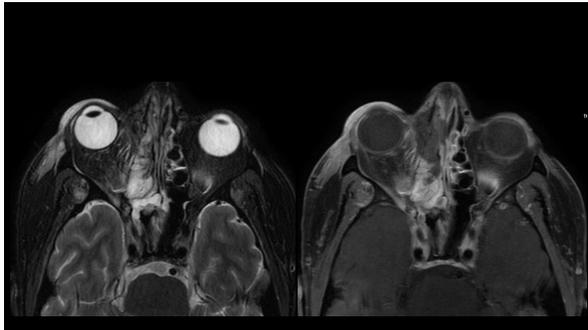
Multiple additional NF-1 associations

- FASI – dentate nuclei, GP, brainstem, thalamus, HF
- Lambdoid suture defect and sphenoid dysplasia
- ICA stenosis, Moyamoya
- Pheo, PT adenomas
- Thoracic meningoceles
- Pseudoarthroses (long bones)



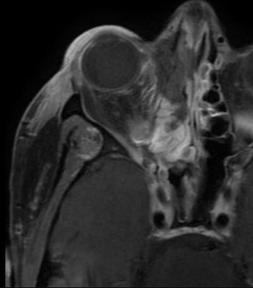
Case 5

- 28 yoM with ALL, febrile neutropenia



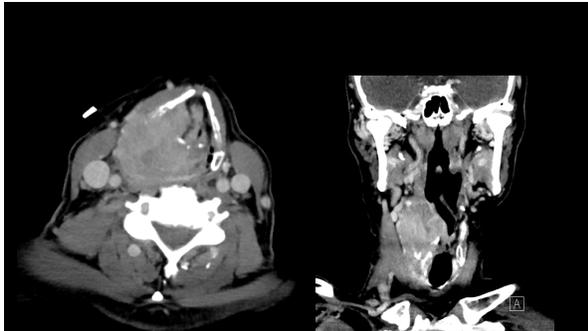
AIFRS

- Neutropenic = Aspergillus
- DM patients = Zygomycetes
- Poor predictors include orbital or intracranial spread, inability to address the underlying cause
- Checklist: cavernous sinus, vasculature, cranial nerves, brain parenchyma

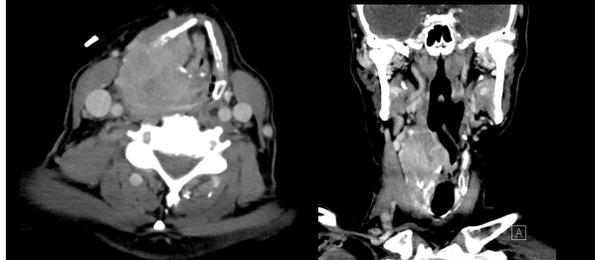


Case 6

- 75 yoM with hoarseness



Transspatial or Multispatial?



Transspatial

- Relatively hyperattenuating mass centered in the supraglottic larynx
- Aryepiglottic fold thickening, invasion of the post cricoid space and piriform
- Paraglottic infiltration and extension through the thyroid cartilage into the overlying strap musculature



What is the most common laryngeal site for squamous cell cancer to present?

- Supraglottis
- Glottis
- Subglottis
- All are equal



What is the most common laryngeal site for squamous cell cancer to present?

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- Glottis ←
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Which laryngeal site rarely has positive (metastatic) nodes at presentation?

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Squamous cell carcinoma (larynx)

- Glottic is most common (this case is a supraglottic primary however)
- Glottic is least likely to have nodal involvement (limited lymphatics)
- Supraglottic/subglottic commonly have nodal spread of disease
- Smoking and EtOH are major risk factors, lead to "field cancerization"



Squamous cell carcinoma (larynx)

- Accurate staging requires knowledge of vocal cord function (cord paresis heralds at LEAST a T3 category)
- Invasion beyond the thyroid cartilage indicates a T4a category
- T4b reserved for mediastinal, prevertebral or carotid involvement
- Features of ENE: infiltrative fat planes, irregular nodal border, tethering of the adjacent tissues



Thank you for your time

- Please email remylobo@med.umich.edu with any questions, comments or feedback



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