



Neuro-oncology case history 1



History

- BS - 24 Year old Right handed female presents with 9 month history of difficulty with hearing and slurring of speech.
- Clinical examination suggests Left sensorineural hearing loss
- Left facial numbness
- Slurred speech, occasional gagging on food
- No past medical history of note (Jehova's Witness)

History

- No family history of note
- No past medical history of note

Neuro : Case 1

- What is your differential diagnosis?
- What would be your first stage investigations?

Differential & Plan

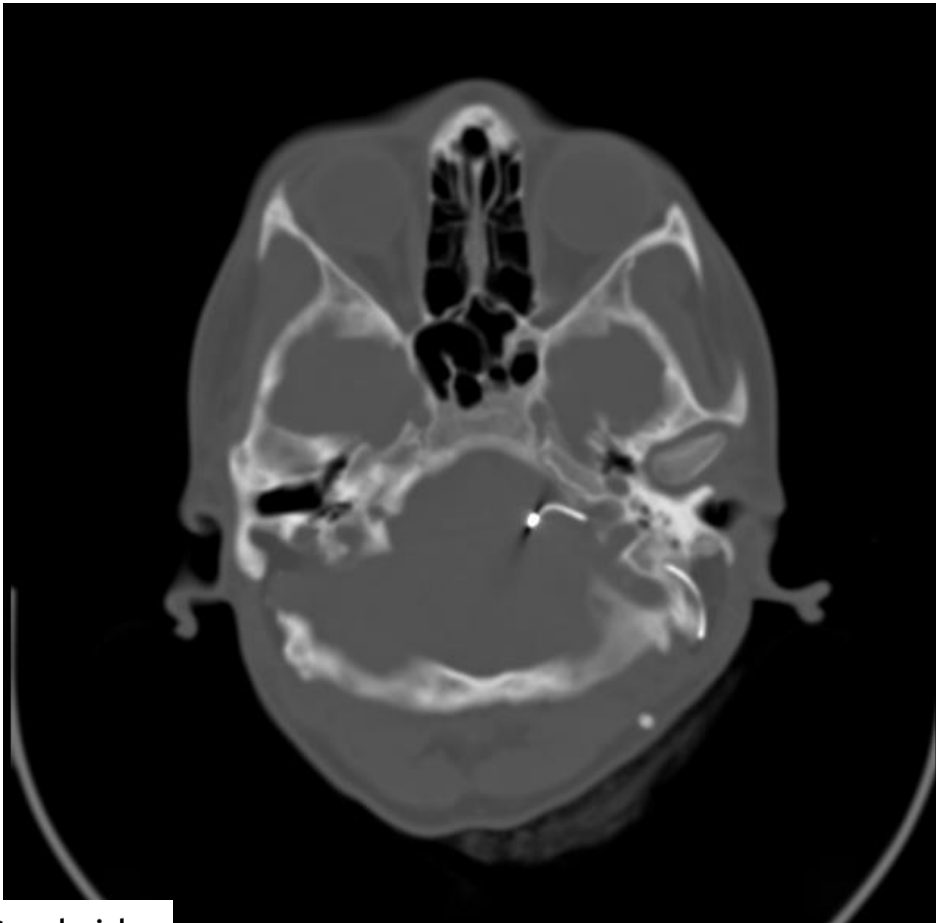
- What is your differential diagnosis?
 - Skull base lesion – infective, neoplastic
 - Primary
 - Metastatic
- What would be your first stage investigations?
 - ENT examination & Audiometry
 - CT of skull base
 - MRI scan

ENT examination

- <https://www.youtube.com/watch?v=3sFUAXzXDo>
- Nasendoscopy unremarkable

CT skull base

- CT is useful for evaluating skull base lesions because it can demonstrate bone erosion and thickening.
- Can you spot anything abnormal on the scan (ignore the metalwork for the moment)



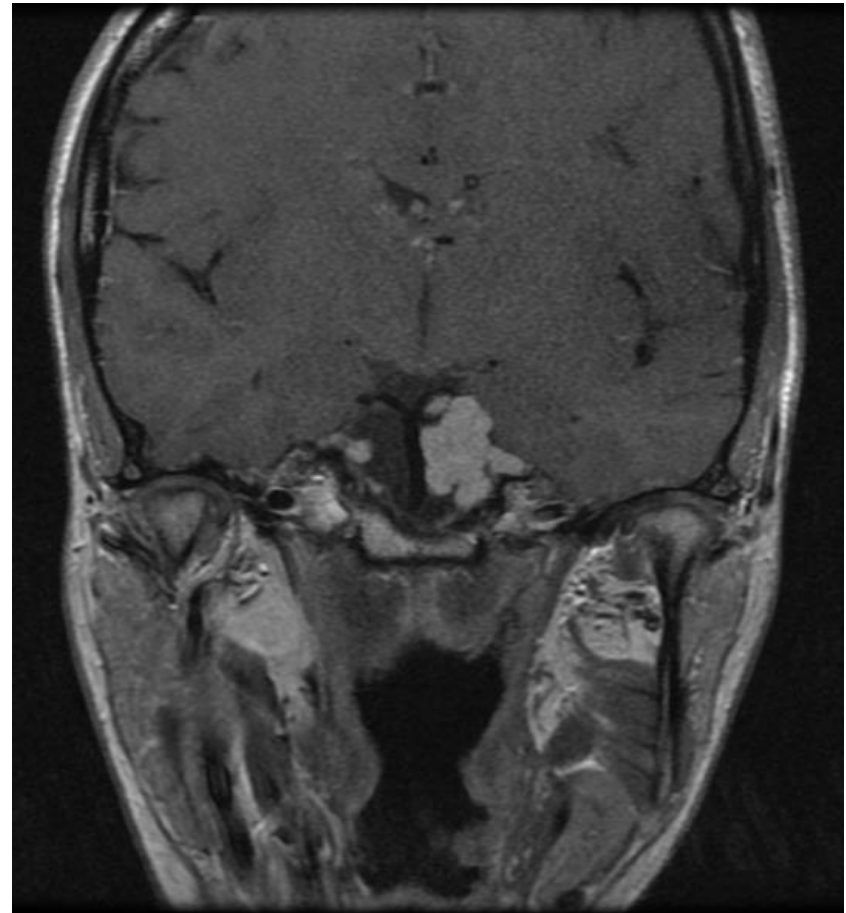
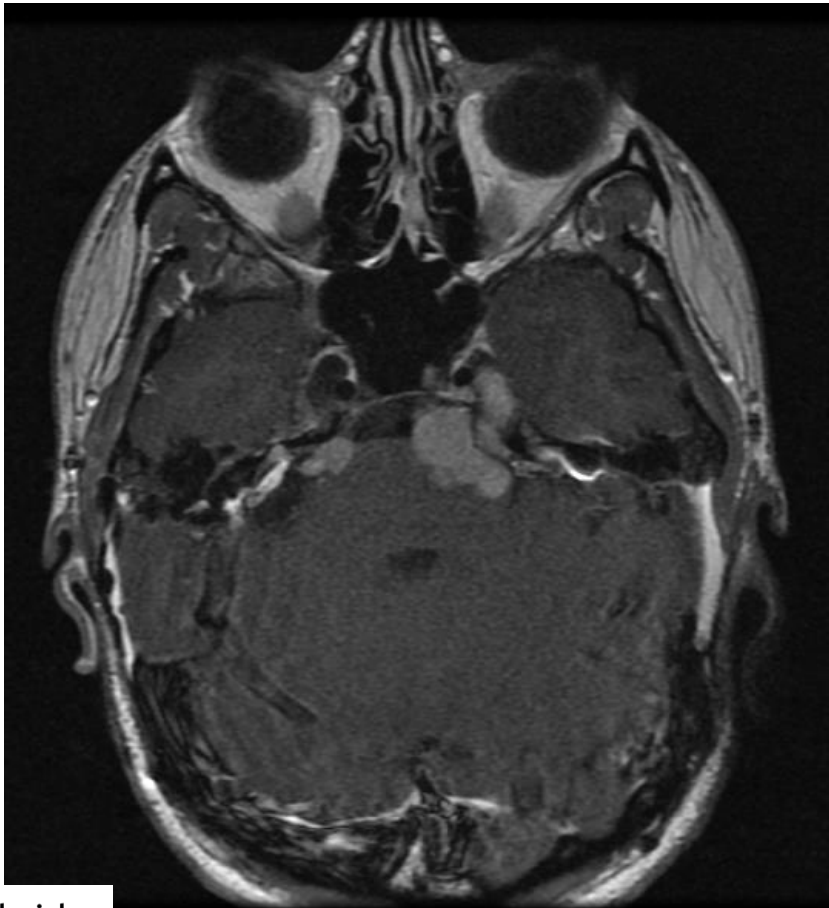
CT skull base

- In this case we see bone erosion along the path of the LEFT trigeminal nerve



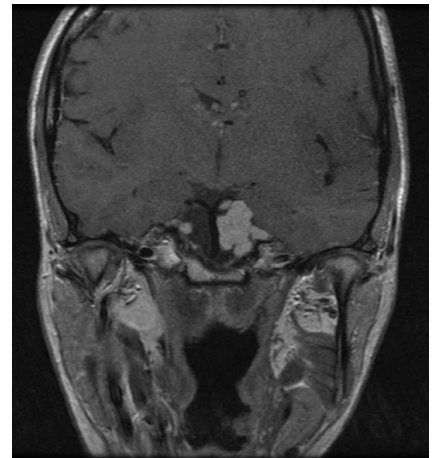
MRI skull base

- This contrast enhanced MRI gives much better soft tissue definition
- Can you describe what you can see?



MRI skull base

- This contrast enhanced MRI gives much better soft tissue definition
- This is a contrast enhanced t1 weighted MRI scan of BS. Three abnormalities are visible
- In the left cerebello-pontine angle there is a large lobulated yet homogeneously enhancing lesion with a well defined border, which is displacing the left side of the pons, but not causing obstructive hydrocephalus.
- Anterior to this mass there is a second mass which is running on the medial wall of the middle cranial fossa, and lateral to the left internal carotid artery
- Finally on the right side there is a small mass in the cerebello-pontine angle
- All 3 tumours have a similar enhancement pattern

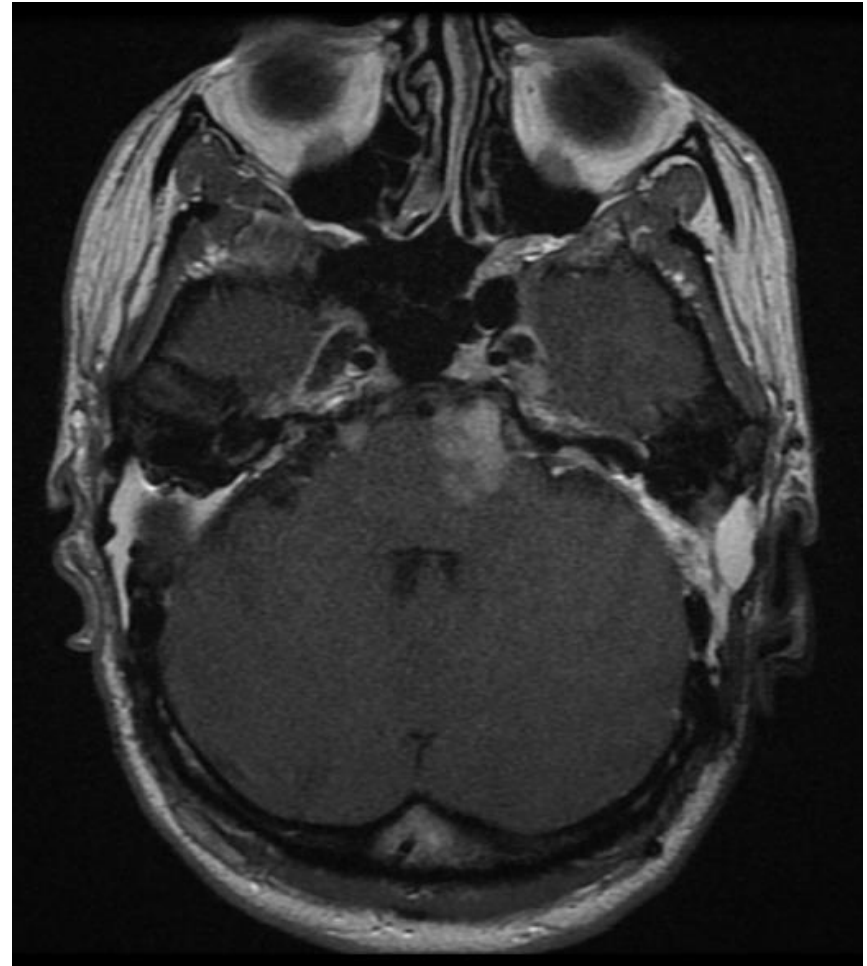


Diagnosis?

- The diagnosis of this patient can be made on the basis of this scan
- Do you know what it is?

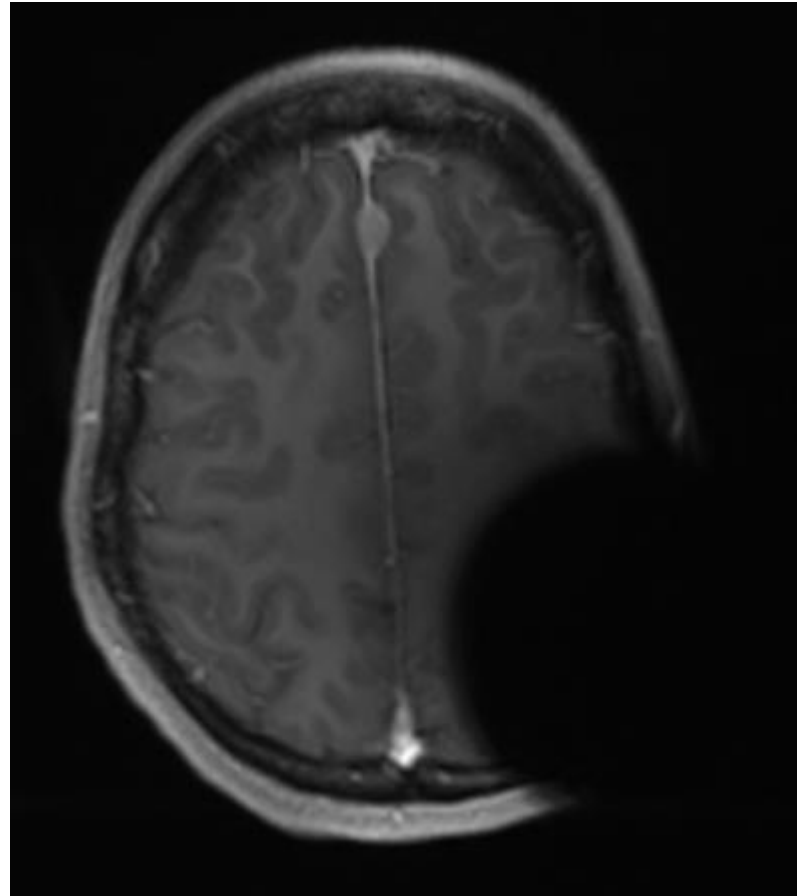
Neurofibromatosis Type 2

- This lady has
- Bilateral vestibular schwannoma
- Trigeminal nerve schwannoma
- Lower cranial nerve schwannoma
- and...



Neurofibromatosis Type 2

- A small parasagittal meningioma (*Examiners like parasagittal meningiomas because a **single** supratentorial lesion can cause **bilateral** leg weakness!*)
- Multiple peripheral nerve lesions too



Genetics

- How is NF2 inherited?

NF2 genetics

- Autosomal dominant
- Mutations in Merlin gene on Chromosome 22
- Merlin is a tumour suppressor gene
- Variable penetrance – younger age at presentation associated with more aggressive disease

NF2 genetics

- Mum, Dad and 2 siblings all tested – no evidence of mutation
- BS has developed *de-novo* mutation
- 50% of patients with NF2 develop *de-novo* mutation

NF2 treatment

- Surgery (often need multiple operations)
- Radiotherapy (radiosurgery) – to smaller lesions
- Medical therapy - Bevacizumab

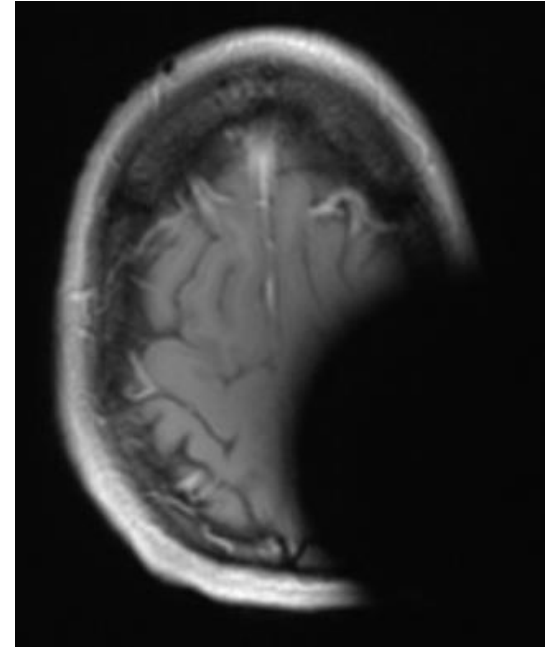
NF2 challenges

- Progressive hearing loss in young people (BS was diagnosed age 9)
- Cranial nerve palsies & tumour load
- Family planning and pre-implantation genetic testing

Preserve hearing

- Cochlear implant – if cochlear nerve intact
- Auditory brainstem implant (ABI) – if nerve damaged / resected

- Provide awareness of environmental sound
- Enhances lip-reading
- Need good hearing in other ear for best results – not easy if you have NF2!

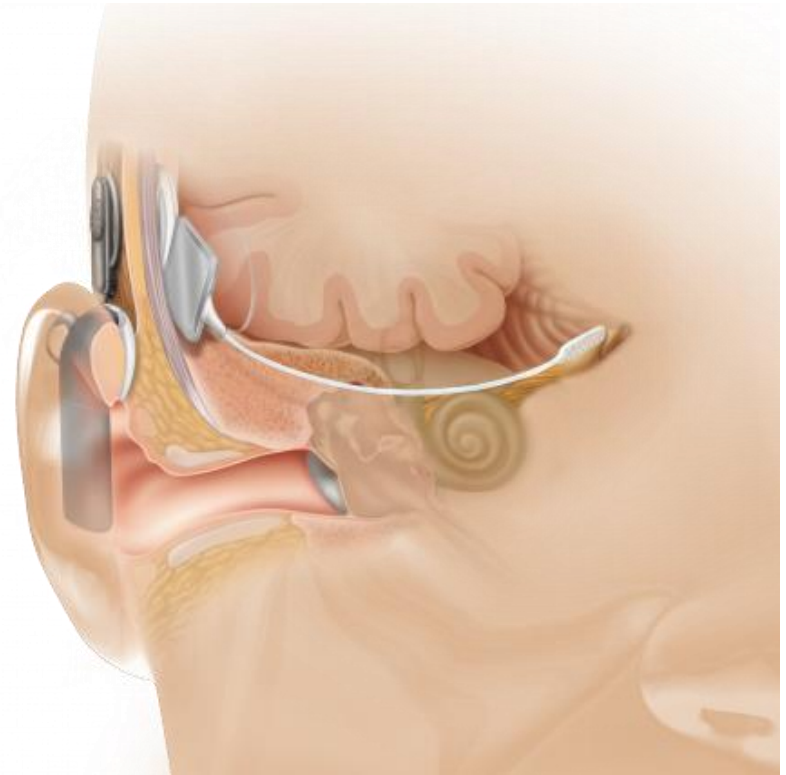


The 'shadow' on BS's MRI is from the ABI device. We know it is obscuring details of one of her tumours.

What do you think happens when the patient goes in the MRI scanner?

Looking after patients with CI/ ABI

- Magnetic field pulls on device which can be very painful
 - Bandage the device externally
 - Inject local anaesthetic
- Heating effects
 - Limit scan time



Tumour load

- Benign tumours, but brain stem compression can be fatal!
- Tumours arise along length of 8th nerve and 'collide' to form bigger masses.
- Sporadic vestibular schwannomas arise from one focus point

Bevacizumab (Avastin)

- Anti-angiogenic therapy.
Humanised antibody to VEGF
- Prevents binding to VEGF receptor
- Used initially in patients with advanced bowel and breast cancer
- Found to be active in vestibular schwannomas associated with NF2 (NFAVS)



Scott Plotkin, a neurologist from Harvard, first postulated that a benign but very vascular tumour such as NFAVS might benefit from antiangiogenic therapy.

BVZ in NFAVS

- Tested in patients with rapidly growing tumours and progressive hearing loss
- Found Avastin stabilised tumours and preserved hearing
- First UK patient treated in Addenbrooke's 1 year later
- Provided as a highly specialist therapy directly by Department of Health

Clinical Outcomes

- Transformed management of NFAVS
- Surgery rate has dropped by 60% across whole of UK
- Hearing preservation achieved in most patients
- Concerns about hypertension, renal injury and long term effects in children.