SPINAL TUMOURS

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ADVANCED
NEUROSURGERY

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CLASSIFICATION

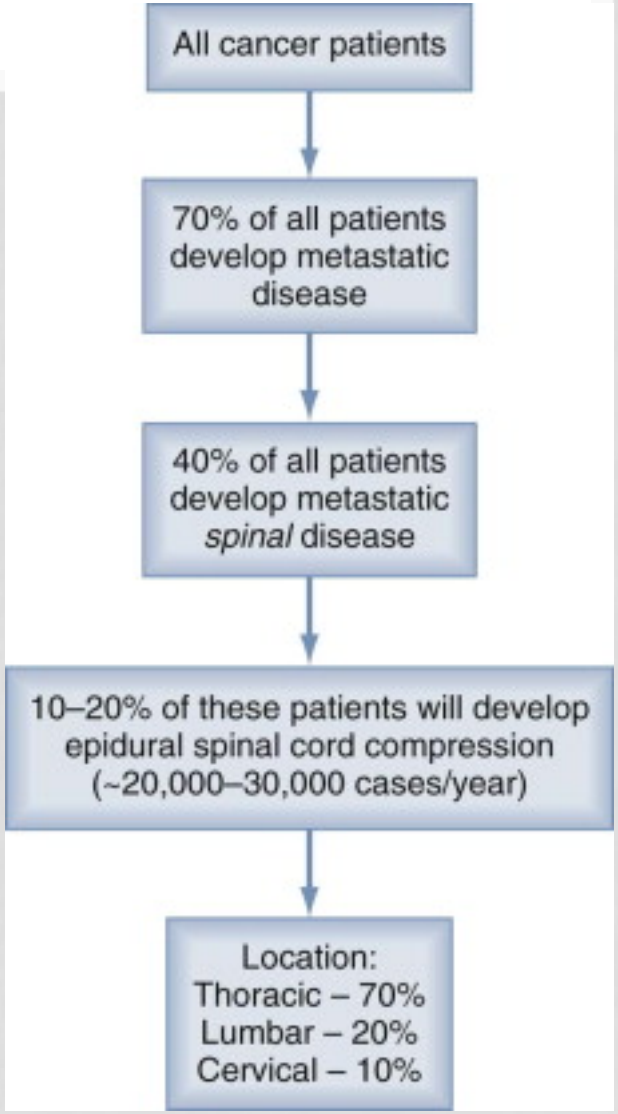
- Extradural (55%): metastasis most common, VH commonest primary
- Intradural extramedullary (40%): nerve sheath tumour/meningioma commonest
- Intradural intramedullary(5%): ependymoma

EXTRADURAL TUMOURS

- Matastasis
- Primary
- Benign
- hemangioma (VH)
- aneurysmal bone cyst (ABC)
- osteoid osteoma/ osteblastoma
- giant cell tumour
- cartilaginous tumours (enchondroma, chondroblastoma, osteochondroma)
- Malignant
- chordoma
- multiple myeloma (MM)/ plasmocytoma
- sarcoma (osteo,chondro, Ewings)
-

METASTASIS

- 50-70% Ca patients have bony mets at time of death, spine commonest
- Breast, lung, prostate, melanoma
- Renal, GI, thyroid, lymphoma, MM
- Posterior VB most commonly affected, intradural rare
- Multiple, non-contiguous lesions in 10-40%



PRESENTATION

- Pain
- mechanical: instabilty/fracture
- tumour-related: expansion of tumour secondary to nocturnal venous engorgement causing mass effect on pain sensitive dura etc
- Cord comprssion
- direct
- fracture
- kyphosis
- invasion through foramen
- Neurologic sypmtoms: radicular vs myelopathic
- ASIA/Frankel scores may be used to quantify deficit

IX

- MRI full spine
- Xray: osteolysis in most (winking owls eye sign)
- Radionucleotide scan: detect osteoblastic mets
- CT myelogram: when previous instrumentation
- Evaluate other systemic disease

MANAGEMENT

- Rx is Palliative in most cases
- Neurological status, ambulatory status pre-Rx and histology determine outcome
- Prognosis >6mo for score >=9
- Other systems: Tomita, North, SINS score
- No concensus on definition for instabilty: multiple systems: Cybulski, Tomita, Kostuik

Medscape® www.medscape.com

Variable	Score
General condition (Karnofsky's performance status)	
Poor (PS 10–40%)	0
Moderate (PS 50%–70%)	1
Good (PS 80%–100%)	2
No. of extraspinal bone metastases foci	
≥3	0
1–2	1
0	2
No. of metastases in the vertebral body	
≥3	0
1–2	1
0	2
Metastases to the major internal organs	
Unremovable	0
Removable	1
No metastases	2
Primary site of the cancer	
Lung, stomach	0
Kidney, liver, uterus	1
Other, unidentified	
Thyroid, prostate, breast, rectum	2
Spinal cord palsy	
Complete	0
Incomplete	1
None	2

Source: Spine © 2006 Lippincott Williams & Wilkins

MEDICATIONS

- Steroid: high dose (Sorensen et al 1994 Eur J Cancer) load 10mg, then 16mg/d dexa for cord compression
- Bisphonates: inhibit osteoclast, tumoricidal- use to decrease morbidity associated with spinal mets except cord compression
- Chemo: prostate mets: Ketoconazole/ Zoladex

SURGERY

- Laminectomy→RTX →direct deompressive surgery + RTX
- Patchell et al Lancet 2005 : direct decompressive surgery + RTX : better rates of ambulation retention, regaining and preservation
- Excludes those with prognosis<3mo and paraplegia>48hrs
- Does not alter survival
- Reflection of improvement in surgical technique/ instrumentation
- Spondylectomy may be considered for single level indolent metastasis eg renal

RTX

- Radiosensitive tumours: MM, SCC lung,seminoma, neuroblastoma, Ewings sarcoma
- Inability to tolerate operation
- Multilevel disease
- Complete deficit > 24-48hrs
- 3000-4000cGy over10-20 days with 5cm margin (2VB above and below): Long course RTX
- Short course RTX for those with survival < 6mo
- Adjuvant therapy esp for radiosensitive tumours
- Rarioresistant: renal cell, colon, sarcoma, NSCC lung
- SRS/IMRT may also be considered
- Provides good pain relief

PRIMARY EXTRADURAL TUMOURS

- Benign
- hemangioma (VH)
- aneurysmal bone cyst (ABC)
- osteoid osteoma (OO)/ osteblastoma (BOB)
- giant cell tumour (GCT)
- cartilaginous tumours (enchondroma, chondroblastoma, osteochondroma)
- Malignant
- chordoma
- multiple myeloma (MM)/ plasmocytoma
- sarcoma (osteo,chondro, Ewings)

PRESENTATION

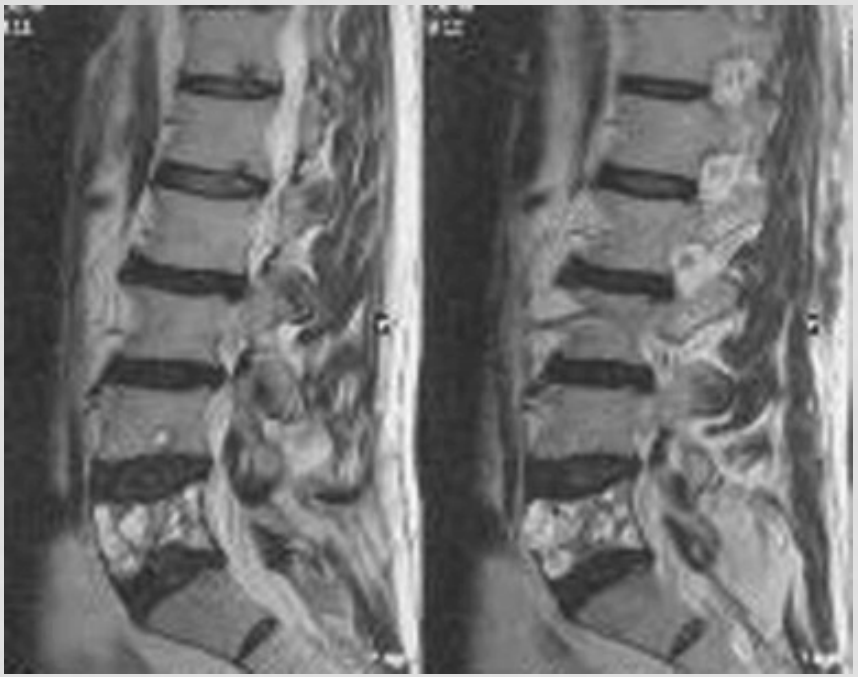
- Younger age group
- Pain: nocturnal and rest
- Radicular and mechanical pain
- Spinal deformity: esp osteoid osteoma
- Aggressive tumours: fracture/cord compression

IX

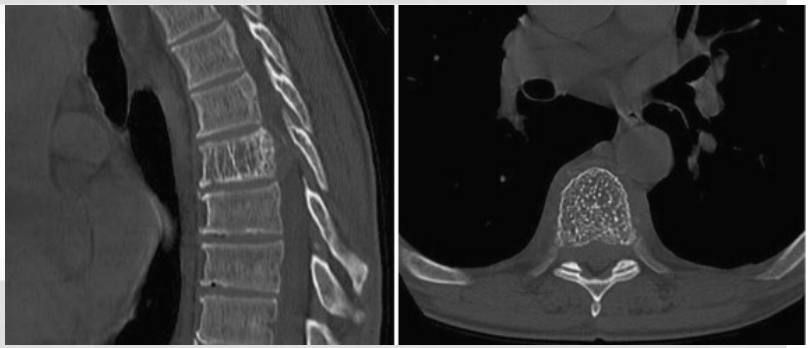
- MRI: eg classic fluid level for ABC
- CT: bony architecture
- Bone scan: hot v cold esp OO
- PET (FDG)
- Angiography: embolization esp ABC, VB, sarcoma, GCT
- CT guided Bx: guides further Mx

ABC

- Cystic osteolytic lesions
- Age < 20 yrs
- Posterior elements
- thoracic spine
- Highly vascular honeycomb of blood filled cavities separated by connected tissue septa, surrounded by thin cortical bone shell
- ?develop from pre-existing tumour or post-#
- MRI: fluid levels within cystic lesion
- Rx: embolizaion +/- surgery
- RTX: radiosensitive but risk secondary sarcoma



VH



- Commonest primary spine tumour
- 10-12% population
- Usually asymptomatic
- Post-pubertal female ? Hormonal influence
- T/L spine
- Mature thin walled blood vessels replace marrow, forming hypertrophic sclerotic trabeculations: cavernous or capillary
- MRI: hyperintense on T1 and T2
- CT: honeycomb/corduroy/polka dot
- Pain: vertebroplasty
- Neurological deficit: embolization + surgery

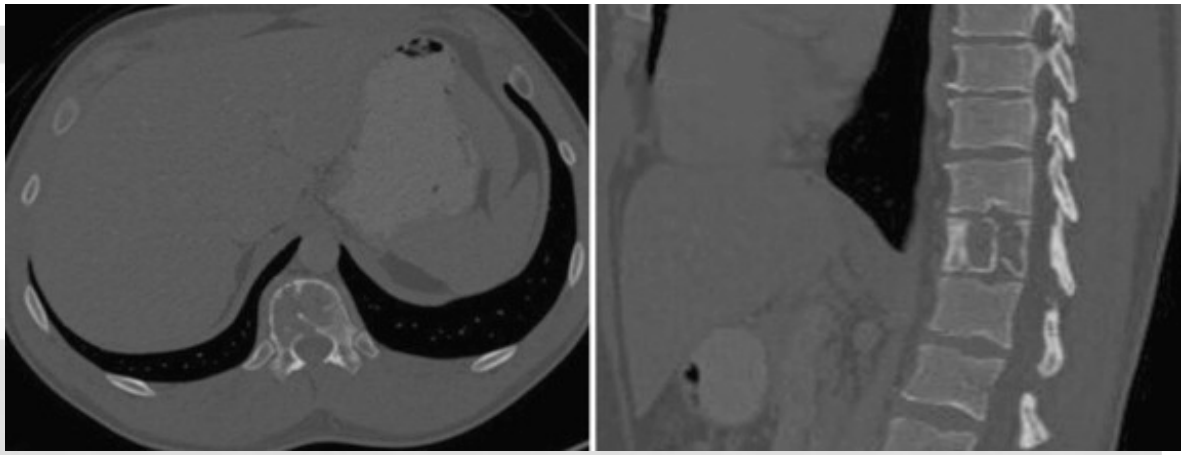
OO/BOB

- Arise from cancellous bone
- OO< 1.5cm
- M>F, teenagers (BOB older)
- P.w. pain esp BOB
- Posterior elements
- Lumbar spine
- Xray: round or oval lesion with a radiolucent center and peripheral sclerosis
- well-organized and interconnected trabeculation in a background of vascularized connective tissue with surrounding reactive cortical bone
- Rx: aspirin for OO, surgery for osteoblastomas (en bloc)
- Rarely malignant tx to osteosarcoma

CARTILAGINOUS TUMOURS

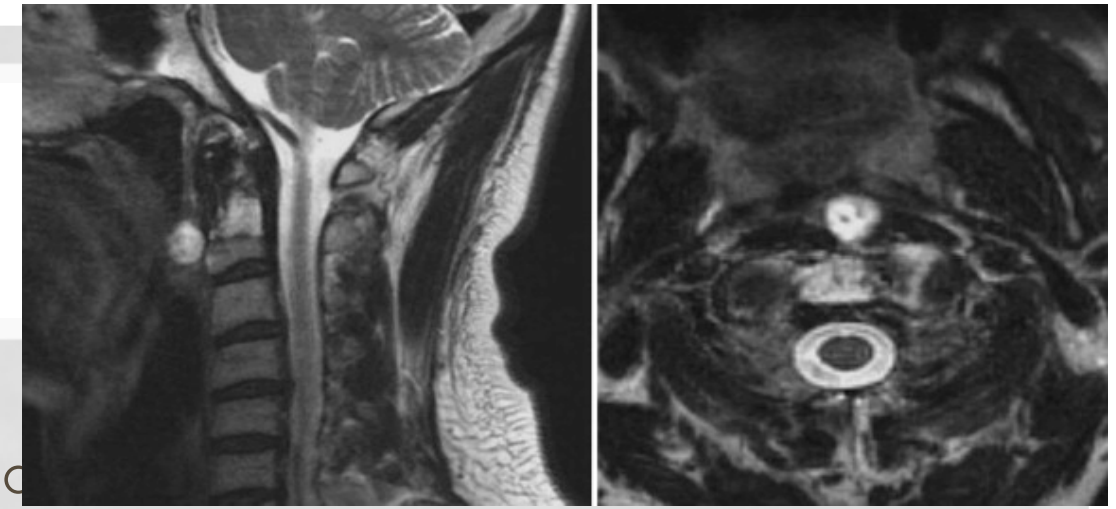
- Enchondroma, chondroblastoma, osteochondroma
- Extremely rare
- Trapping of cartilage outside epiphyseal plate or metaplasia of connective tissues
- CT guided bx for diagnosis
- Surgery for symptomatic lesions
- Malignant degeneration possible

GCT



- Aka osteoclastoma
- 7-10% primary spinal tumours
- 3rd-4th decades
- Sacrum
- F>M
- pain, weakness, sensory deficit, and bladder or bowel dysfunction
- osteoclastic giant cells mixed with spindle cells
- expansile mass with destruction of the vertebral bodies
- Locally aggressive with high recurrence rate
- Rx: Surgery + RTX

CHORDOMA



- 1/100000/yr
- Commonest spine malign
- Arise from notochord remnants in skull base (clivus) and sacrum
- Peak age 50-60
- Sensory, bowel or bladder disturbance
- MRI:T1-hypo, T2 hyper, enhance
- CT: oseolytic near centre of VB with surrounding bony expansion and calcification within timour
- elongated cords of clear cells known as physaliphorous cells
- Slow growing, yet invasive and metastasize
- Chondroid subgroup(speno-occiput): better prognosis (15.8 yrs)
- 5yr survival rate with wide local excision + Proton beam RTX = 67%, 10 yr 40% (McMaster)

MM/PLASMACYTOMA

- Most common malignant primary in spine
- 5-7/100000/yr
- Neoplasm of single clone of plasma cells
- Proliferation of plasma cells in marrow and produce abnormal immunoglobulins (M-protein)
- Plasmacytoma if solitary (50% 10 yr survival)
- M>F
- 6^{th}-7^{th} decade
- Pain,Pathological #, pancytopenia,hypercalcemia
- CT bx + BMA, serum electrophoresis (IgG), 24hr urine Bence-Jones protein
- RTX mainstay + dex
- Chemo+ BMT for advanced disease
- Survival: 29-62 months (stage 3-1)

SARCOMA

Chondrosarcoma	Osteosarcoma	Ewing's sarcoma
50-60yrs	Middle age	Childhood 10-20yrs chromosomal translocation t(11;22)(q24;q12), small round blue cells on histo
M>F	Pain,palpable mass	Pin, swelling, mass, neurology
Petroclival, sacrum	VB	sacrococygeal
CT: osteolytic	Osteoblastic, dense demineralized matrix	Mottled onion skin on XR, MR: large soft unmineralized portions
Slow growth	Early metastasis, prognosis dismal	Early mets, 5yr survival 10-15% with mets
surgery	Surgery, chemo, RTX	En bloc/debulking

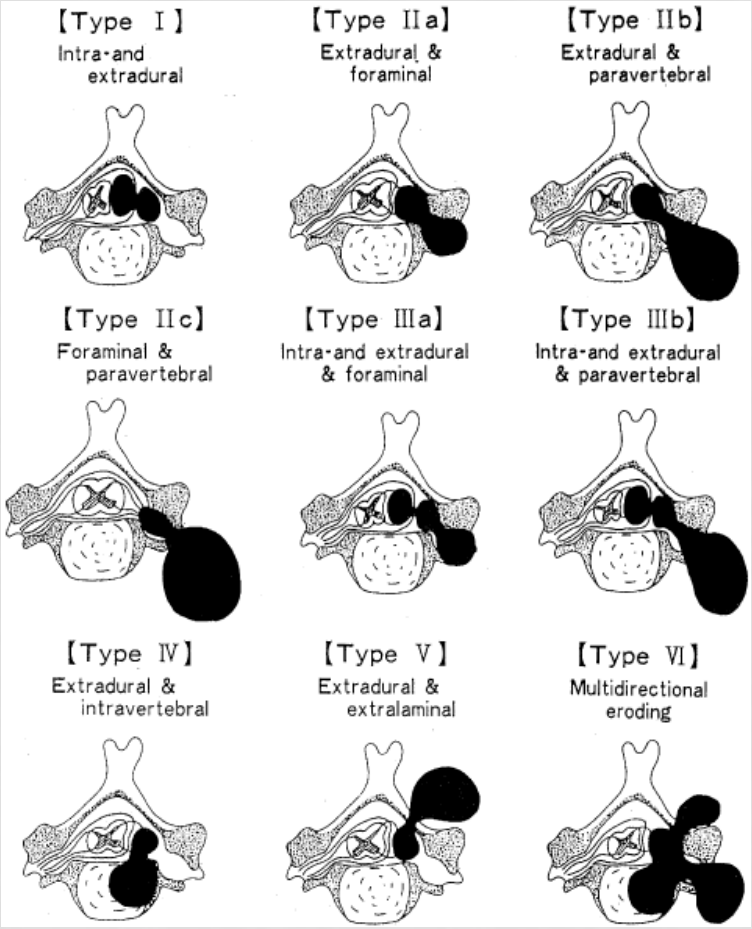
SPINAL CORD TUMOURS

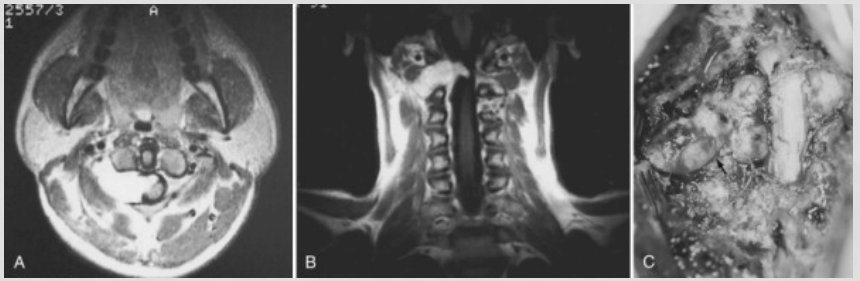
- Include intra (1/3)and extramedullary (2/3)
- conus and filum tumours included
- 15% CNS neoplasms
- IDEM: nerve sheath tumour (40%),
- meningioma (40%)
- filum ependymoma (15%)
- others (paraganglioma, mets) 5%
- Intramedullary: ependymoma (45%)
- astrocytoma (40%)
- HGB (5%)
- other (vascular, mets, inflammation, lipoma) 10%

NERVE SHEATH TUMOURS

Neurofibroma	Schwannoma
Include prineural cell/fibroblast	Pure schwann cell
Fusiform/plexifrom enlargement of involved nerve	Smooth globoid masses suspended eccentrically from nerve
NF1	NF2
	Elonagted bipolar cells, Antoni A and Antoni B
0.3-0.4/10000	
4^{th}-6^{th} decades, M=F	
ventral root	Dorsal root
2.5% malignant (1/2 in NF)	
30% extend through dural sleeve (dumbell) or may extend subpial esp neurofibroma	

ASAZUMA CLASSIFICATION OF DUMBELL TUMOURS





MENINGIOMA

- Arachnoid cap cells, pial or dural fibroblasts
- F>>M
- 5^{th}-7^{th} decades
- Upper C-spine, FM, T-spine
- Ventral/ventrolateral position
- Smooth/fibrous to variegated/fleshy/friable+/- microcalcification
- En plaque
- Dural attachment broad
- Do not penetrate pia

FILUM EPENDYMOMA

- 40% of spinal ependtmomas
- Commonest: Myxopapillary ependymoma
- 3rd-5th decades
- M>F
- papillary arrangement of cuboidal or columnar tumor cells surrounding a vascularized core of hyalinized and poorly cellular connective tissue

OTHER INTRADURAL LESIONS

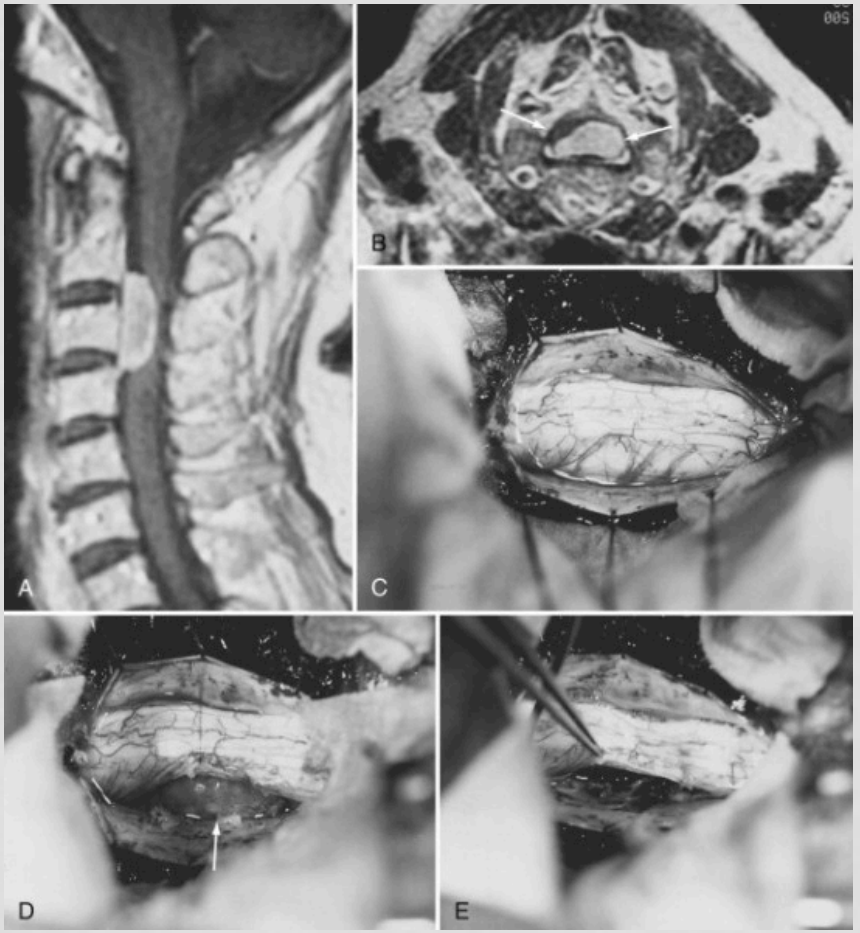
- Inclusion tumours (eg lipoma with tethered cord)
- Epidermoid
- Dermoid
- Neuroenteric cyst
- Teratoma
- Paraganglioma: neural crest cells- cauda equina/filum
- Arachnoid cyst: dorsal thoracic spine
- Inflammatory: sarcoidosis, TB
- Vascular: aneurysm of ant. Spinal artery

PRESENTATION

- Radicular/dull axial pain
- Segmental motor weakness, long tract signs
- Suboccipital pain and hand weakness with upper C-spine/FM tumours ?venous insufficiency
- Brown Sequard
- Hydrocephalus (CSF protein)
- SAH rarely with schwannoma

IX

- MRI: Signal abnormalities, CSF capping, and spinal cord or cauda equina displacement
- intradural or extradural distribution of a paraspinal or dumbbell tumor is better resolved with myelography-CT.
- Image entire neuraxis for ependymoma

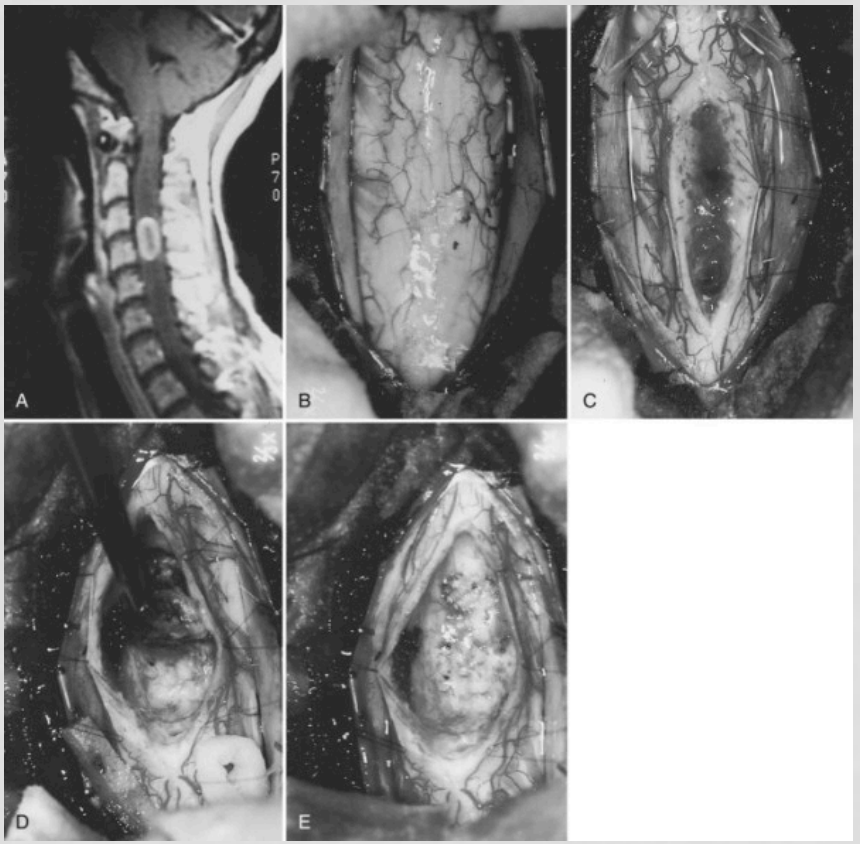


TREATMENT

- Complete surgical excision
- Usually via laminectomy +/- facetectomy
- Anterior approach for purely ventral tumours
- No evidence to resect vs coagulate dural origin of meningioma
- Recurrence rare for GTR NST resection and 10-15% for GTR meningioma resection at 10yrs, ependymoma ~20%
- Monitor with post-op serial MRI
- Re-resection or SRS for recurrence

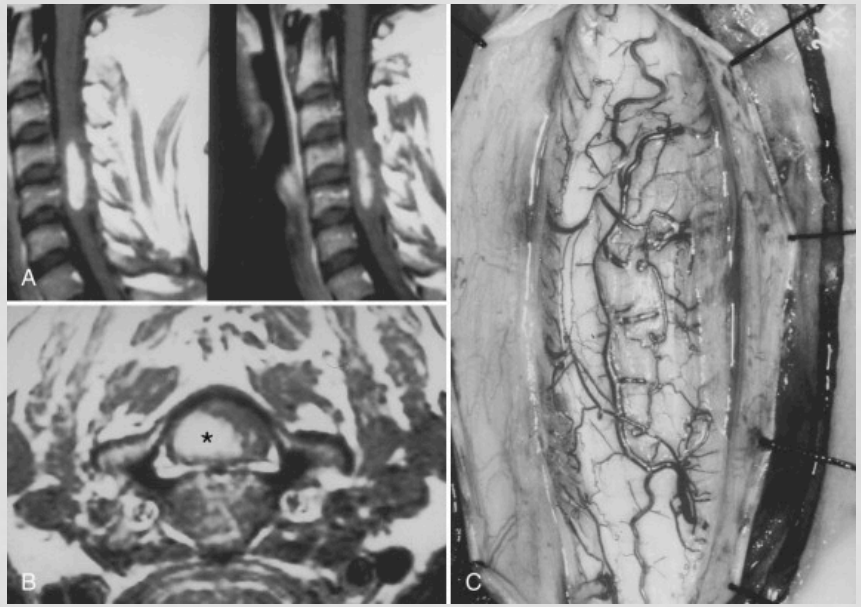
EPENDYMOMA

- Commonest intramedullary
- Middle adult yrs, M=F
- 65% associated cysts
- Association with NF2
- Subtypes: cellular, tanycytic, epithelial, subependymomal, myxopapillary, mixed
- Unencapsulated but usually well circumscribed and do not invade SC
- Prognosis excellent esp myxopapilllary subtype:



ASTROCYTOMA

- 3% CNS astro
- 1st three decades
- Commonest in paeds
- Assoc with NF1
- Most grade 1/2 fibrillary astro
- High grade rare
- Commonest Cx Cx/Tx jn
- Assoc with syrinx
- 50% recurrence in 4-5 yrs



CLINICAL

- Non-specific axial pain
- Slow progressive neurological decline
- Intratumoral haemorrhage: abrpt deterioration esp ependymoma
- Sphincteric disturbance with conus lesions
- Spasticity and numbness

TREATMENT

- Surgery is mainstay
- Extent of resection depends on plane b/w tumour and normal cord once myelotomy done
- Biopsy when infiltrative lesion esp astrocytoma
- Neurological preservation more important
- Frozen section useful
- Adjuvant RTX reserved for malignant tumours or dissemination
- Literature conflicting on EOR and tumour control in astrocytoma
- ?aim for GTR with pilocytic
- No concrete evidence that adjuvant RTX improves survival in low grade astro
- High grade astro: biopsy + RTX- prognosis generally poor (6-12mo)