

a place of mind

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Oncologic Emergency Management Superior Vena Cava Syndrome and Spinal Cord Compression

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Disclosures

- Grant funding from Varian (maker of linear accelerators)
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- Production company used my front porch to film a commercial – turns out it was for PCV13 pneumococcal vaccine (Pfizer)

Further Disclosures

- "If you copy from one book, that's plagiarism; if you copy from many books, that's research." Wallace Notestein
- Thanks to:
 - Paris Ingledew & slides from the Rad Onc lecture series
 - Chad Lund and Andra Krauze
 - (For aiding my "research")

Outline of the Talk

- 1. Describe Spinal Cord Compression, the workup and potential treatments
- 2. Outline SVC, the main causes and potential treatments
- 3. Emphasize that you will probably see these (and then treat them appropriately)

Objectives

- Give you an understanding of the spinal cord compression and SVCO
- Ensure that you will be able to recognize them
- Give you an algorithm or schema of how to go about managing them (in conjunction with the oncology team)

What is a Radiation Oncology Emergency?

- "A medical condition arising from a reversible threat to organ function requiring radiation treatment within a few hours of diagnosis."
 - Cancer Care Ontario, 2004

Very Limited Categories meeting the Definition

Emergencies

- Cord Compression
- Any tumor blocking an essential organ (trachea, main stem bronchi)

Urgencies

- SVCO
- Bleeding tumor
- Tumor blocking organ (e.g. ureteric obstruction)
- Brain Metastases



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Spinal Cord Compression



Clinical Case

- 61 yo woman Hep C, HCC. Prior TACE x 2. Previous Sorafenib. No further chemo options. Disease throughout liver with some bone mets. (Child's Pugh – A6)
- PMHx Peripheral neuropathy from diabetes, +/- ETOH?

Clinical Case – part 1

- 3-4 months ago increasing back pain
- Fall in November to ER, imaged, pain treated and discharged. CT report disease at T11 with invasion into canal.
- Falls x 3 in December. Back to Emerg twice and admitted on 3rd ER visit.



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Spinal Cord Compression Epidemiology

- 40% of cancer patients have spinal metastasis
 - 20% of patients with spinal metastasis develop symptomatic spinal cord compression

Site	5 yr incidence (%)
Myeloma	8
Prostate	7
NPX	6.5
Lung	6
Breast	5.5
Kidney	5
Cervix	2.5
HN	0.9
Colorectum	0.8
Stomach	0.6

Epidemiology



- Location
 - Thoracic 60%
 - Lumbar 30%
 - Cervical 10%



Spinal Cord Compression



Pathophysiology

- 1. Growth and expansion of the vertebral bone metastasis into the spinal canal/epidural space
- 2. Neural foramina extension by para-spinal mass
- Destruction of vertebra causing collapse and displacement of bony fragments, tumor or vertebral discs - into the spinal canal/epidural space

Spinal Cord Compression

"The compression of the dural sac and its contents (spinal cord or cauda equina or both) by an extradural tumor mass.

The minimum radiologic evidence for cord compression is indentation of the thecal sac, at the level of the clinical features."



- Between the bony vertebrae and the dural sheath is a large epidural space filled with a soft padding of fat and a network of veins
- Cerebrospinal fluid fills the subarachnoid space



Pathophysiology

Problems caused by:

- Damage is mainly vascular:
 - Increased arteoriole pressure
 - Venous plexus compression
 - Lack of capillary blood flow
- Leads to...
 - Spinal cord EDEMA
- And then...
 - White matter ischemia and infaction
 - Permanent Cord damage

Pathophysiology – Take Home

- Symptoms often start with pain (tumor disrupting the bone)
- Nerve compromise starts with loss of blood flow due to vessel constriction – it is not often transection of the nerves but ischemia, infarction

Symptoms

- First symptom (in 90% of cases) is BACK PAIN
- Weakness is the most common symptom that leads to medical attention (and is often assoc. with sensory loss too)
- Sphincter dysfunction (Bowel/Bladder) can occur, but rarely in isolation

Spinal Cord Compression Symptoms – Sensory

- Pain is most common
 - Often precedes other neuro deficits by months
- Localized
- Most severe over involved vertebra
 - "Tightness, gripping sensation"
- Radicular
 - Around trunk
 - Down limb



Can have numbness/paresthesia (usually a later finding)

Symptoms - Motor

Sign	UMN Lesion	LMN Lesion
Weakness	Yes	Yes
Atrophy	No	Yes
Fasciculations	No	Yes
Reflexes	Increased	Decreased
Tone	Increased	Decreased

<u>Bladder dysfunction</u> – Urinary retention and need for Foley Catheter <u>Bowel dysfunction</u> – Reduced anal tone

Prognostic Factors

Good Prognostics

- Tumor type responsive to chemo/radiation
- Gradual onset of symptoms
- Good general health / survival
- Vertebral body intact
- Able to walk

Poor Prognostics

- Tumor type resistant to chemo/radiation
- Acute onset with rapid progression
- Poor general health / survival
- Vertebral body collapse
- Unable to walk

Treatment

- Steroids
- Surgery
- Radiotherapy
- (Chemotherapy)

Ambulatory status pretreatment is related to outcomes post-treatment

Therefore, the earlier the treatment the better

Treatment - Steroids

- (Dexamethasone)
 - Best 1st step
 - Aim is to reduce edema and pressure on vasculature / spinal cord
 - Helps maintain motor function
 - No evidence for doses >16 mg/day

Treatment - Surgery

- Surgery benefits
 - Tissue / Diagnosis
 - Can debulk tumor quickly
 - Can stabilize vertebral body instability
 - Can help with pain
 - Can be given prior to radiation

Treatment - Radiotherapy

- Radiotherapy
 - Generally for those who are not surgical candidates based on health, survival, multiple levels
 - Relieves pain and can reduce compression symptoms
 - Fractionated treatments (usually 5-10)

Treatment: Surgery vs. Radiotherapy

- Uncontrolled series differing results
- Surgery has a couple of advantages
 - Can remove bone from spinal canal
 - Can provide stability
- Disadvantages

- Surgical risks, Inpatient stay and post op course

Spinal Cord Compression



Work Up Algorithm

- Clinical scenario of someone with back pain +/radicular, sensory or motor loss
- 1. Is there a cancer diagnosis? (and what is the treatment history)
- Can you document motor, sensory or sphincter dysfunction? (was the patient "normal" recently?)
Work Up Algorithm

- 3. Imaging ordered (usually start with Xrays or CT scan) minimum is CT.
- 4. Call RO/MO/Neurosurg
 - Can you get an MRI?
 - Are they on Steroids?
 - How bad is the motor loss and how long has it been?

Treatment Decisions



Surgery

- Spinal instability
- Bony compression
- Patients with no/remote cancer diagnosis
- Neurological progression on RT

Radiation

- Medically inoperable
- Ambulatory
- Diffuse disease

Radiation and Surgery are not mutually exclusive

- There are times where surgery is done 1st
 - Provide stability
 - Remove tumor (debulk) immediately against spinal cord
- Radiation next
 - Treat any remaining gross or microscopic disease
 - Aim for long term local tumor control

Review – Cord Compression

- Decisions regarding treatment need to consider: medical status, structural factors, anticipated outcomes and treatment goals
- Aim to maintain and improved quality of life by reducing pain and restoring function
- Early management is BEST

Multiple Interventions



Post Operative MRI



Post Op MRI fusion





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Superior Vena Cava Syndrome



CASE - SVC

- 43 yo woman, non-smoker, dry cough up/down, GP, Antibiotics, GP, worsening cough then pressure in head and swelling in neck, to ER.
- CT scan (SVCO)















Epidemiology

- Much rarer than cord compression
- Most common in lung cancer (small cell > nonsmall)



Pathophysiology

- SVC can become obstructed by:
 - External compression
 - Invasion
 - Internal blockage
- Causes:
 - Benign (thrombus, goitre, aneurysm, sarcoid)
 - Malignant (Lung cancer 75%, lymphoma, germ cell, thyroid or metastatic disease)

Superior Vena Cava (SVC) Obstruction Symptoms

- Dyspnea
- Distension
 - Edema of face (with erythema/plethora)
 - Edema of arms
- Dilated chest wall vessels





SVC - Symptoms

- Often Asymptomatic
- Dyspnea
- Distension
- Dilated vessels
- (occasionally headaches)

Prognostic Factors

- This is entirely dependent on the underlying histology and how it responds to treatment
 - Lymphoma will melt away
 - Germ cell tumors will respond to chemo
 - Small Cell lung cancer will shrink quickly (and often only temporarily)
 - Non-Small lung cancer not good

Treatment

- Steroids
 - You need a <u>diagnosis 1st !</u>
 - Less evidence for this vs. Cord Compression
- Chemo Small cell or lymphoma
- Radiotherapy Nonsmall lung cancer
- Interventional endovascular stent

Superior Vena Cava (SVC) Obstruction Treatment

Radiotherapy

- Unless patient is very unwell, wait for tissue confirmation before treating
- Takes days/weeks to work
- Relief of symptoms in most cases (although this doesn't always correlate with imaging)

Therefore, not really an emergency...more of an urgency

Workup Algorithm

- Commonly this is just going to be seen on a CT report (no clinical symptoms)
- Hx Px: Previous cancer diagnosis, previous treatments and ongoing general health
- Any current symptoms (flushing/HA/veins)
 Particularly note if there is SOB

Workup Algorithm

- If there hasn't been a scan then really need CT chest at minimum
- Send to ER (rule out PE, clots, masses...)
- If there has been a scan and diagnosis, essentially your job is done and can refer on
 - Start steroids, LMWH if thrombosis



Back to our case



What to do now?

- Need diagnosis before treatment.
- Hope it is Lymphoma.
 - Don't give steroids! Don't give XRT yet!
- She underwent a Bronch
- Came back Non-small (Adeno) lung cancer
- Sent onto treatment ASAP with pall XRT (she had bone mets too)

Review SVCO

- Often Emergency treatment isn't needed:
- 1. Ensure there is a diagnosis
- 2. Ensure there is a CT scan
- 3. Ask about sx / signs
- 4. Refer on for urgent treatment

SVCO Radiation plan



Conclusions

- Spinal Cord Compression
 - Common
 - Watch for pain and neurologic symptoms
 - Image and refer early

Conclusions

- Superior Vena Cava Obstruction
 - Symptoms are usually mild
 - Less of an emergency (but urgent tx needed)
 - Image and make diagnosis
 - +/- Anticoagulate, steroids and refer for definitive treatment



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The End

Radiation Dose Distribution

CONVENTIONAL

STEREOTACITC





Investigations

- Plain X-rays
- CT scan
- MRI
 - Test of choice
- Tissue confirmation?

The normal spinal cord




The ABnormal spinal cord



Radiation planning scan



Radiation Planning with Dose

