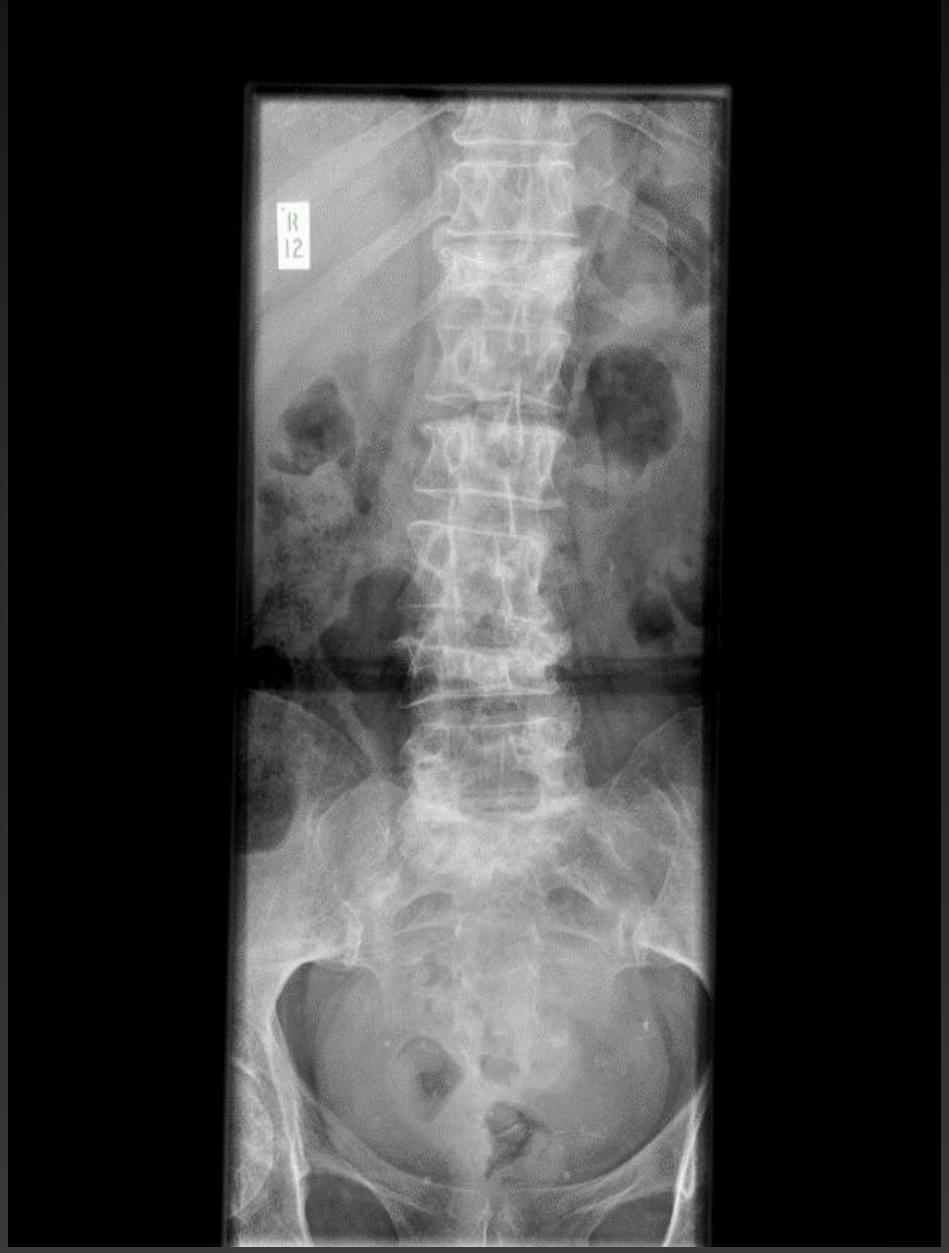
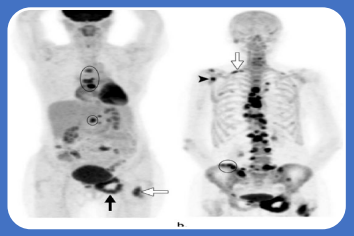
FRIDAY PM 4 O'CLOCK

- 65 year old man referred with a long history of episodic LBP
- Recent 1 month history of pain in the lumbar spine after digging in the garden for 2 hours.
- Seen by GP initially. NSAIDs and paracetamol no help. Cocodamol no help. Tramadol eases pain slightly. Awaiting 6 week follow-up with GP
- Self referred to physio.
- Seen by experienced band 6.


L
12

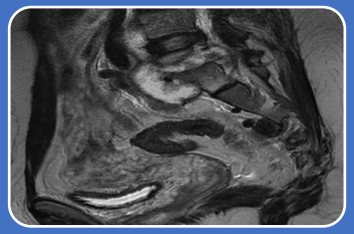

R
12

Fracture



Metastatic Bone Disease

Myeloma



Infection

National Osteoporosis Society

Clinical Guidance for the Effective Identification of Vertebral Fractures

OSTEOPOROSIS

- 30% of white women (age 50-70) are osteoporotic
- By the age of 80, 70% are osteoporotic
- Usually occur between T8 and L2

OSTEOPOROTIC FRACTURES (NOS 2015)

- 12% of women 50-79 have vertebral a fracture
- 1 in 2 women over 50 have had a fracture
- 1 in 5 men over 50 have had a fracture
- 1 in 5 women have had 3 fractures before being diagnosed with osteoporosis

Royal Osteoporosis Society

Better bone health for everybody

Guidance for the management of symptomatic vertebral fragility fractures

COSTS (ROS 2022)

- £3400 per fracture
- 14 additional GP visits in the year post #
- 20 working days lost
- Predicted rise of 26% in vertebral # by 2034

70% of # undiagnosed

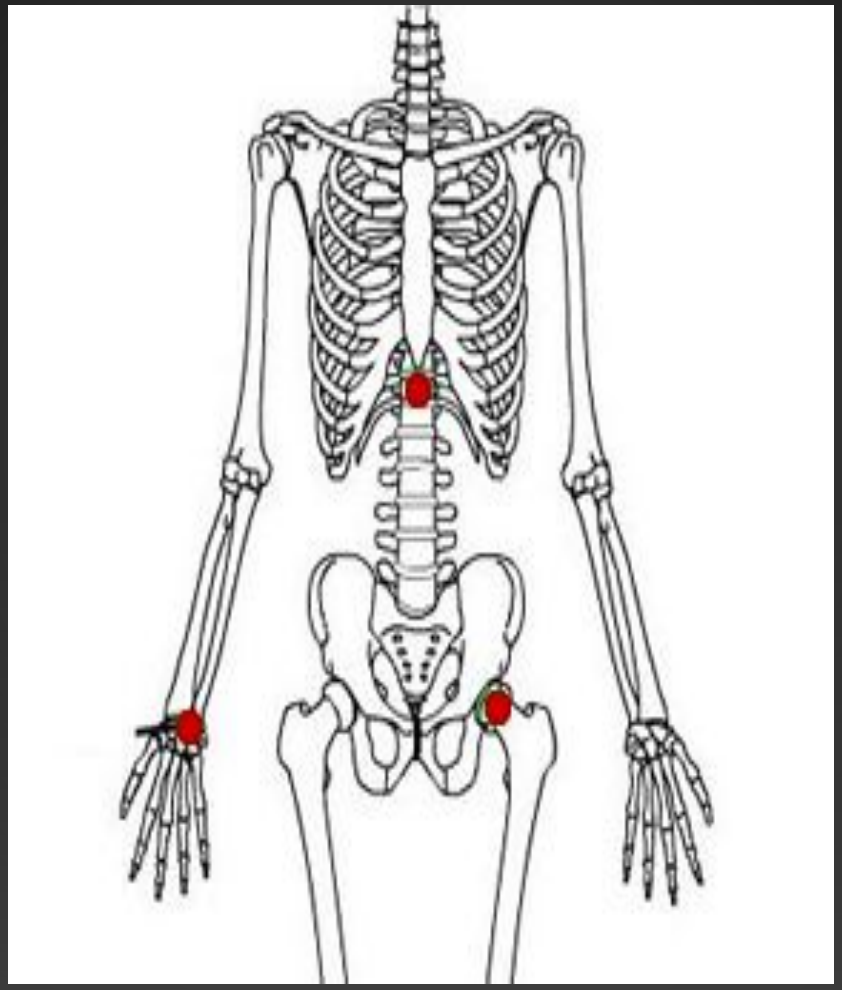
46% of # unreported

Vertebral fracture increases risk of further fracture- hip x2.8- further vertebral fracture x5

36% mortality in the year following hip #

55% of women with hip # have had vertebral #

OSTEOPOROSIS-MAIN SITES



OSTEOPOROSIS-RISK FACTORS

- Sex
- Malabsorption syndromes (e.g., Celiac Disease, IBD)
- Endocrine abnormalities (e.g., hyperparathyroidism)
- Steroid use- 5mg>3 months
- Tumors/malignancy (e.g., Multiple Myeloma)
- Age- over 65
- Alcohol- 3 units per day for women
- Smoking- 20/day

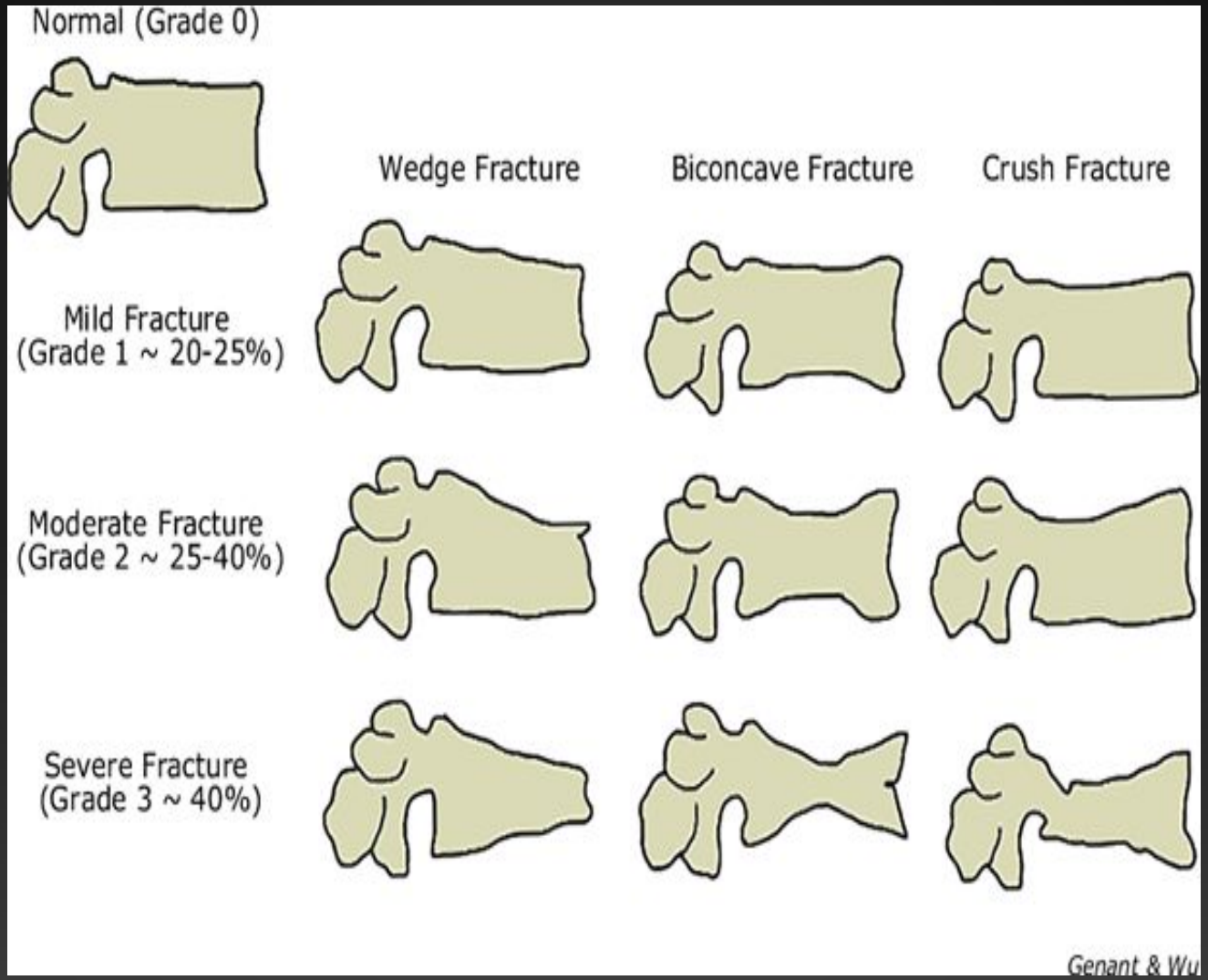
Review > Cochrane Database Syst Rev. 2023 Aug 24;8(8):CD014461.
doi: 10.1002/14651858.CD014461.pub2.

Red flags to screen for vertebral fracture in people presenting with low back pain

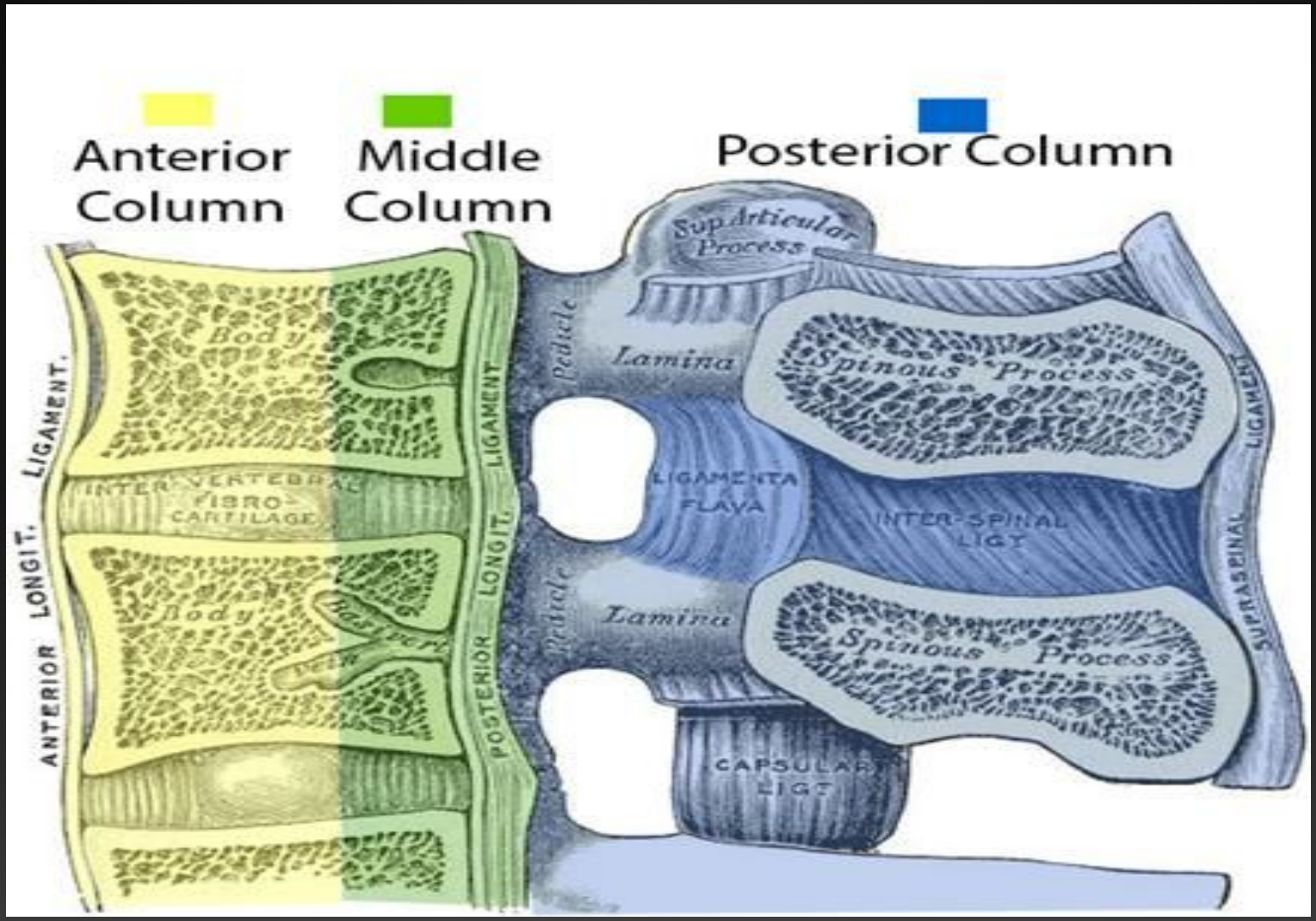
Christopher S Han [1], Mark J Hancock [2], Aron Downie [1 3], Jeffrey G Jarvik [4], Bart W Koes [5 6], Gustavo C Machado [1], Arianne P Verhagen [7], Christopher M Williams [8], Qiuzhe Chen [1], Christopher G Maher [1]

- 14 STUDIES
- Primary care- old age (>75), trauma, steroid use
- Secondary care- old age, trauma
- Tertiary care- Contusion/abrasion

CLASSIFICATION OF FRACTURES

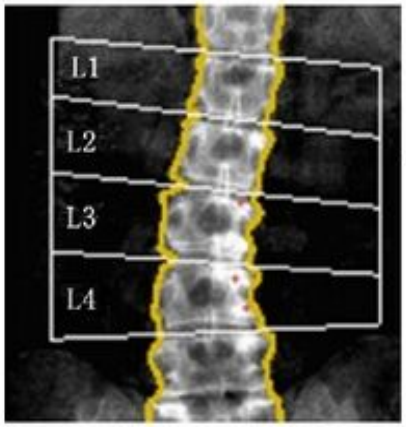


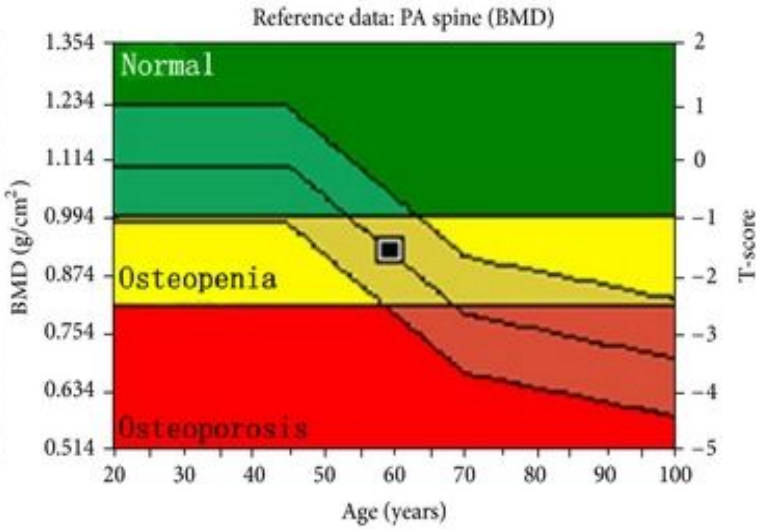
SPINAL 'PILLARS' (DENIS)

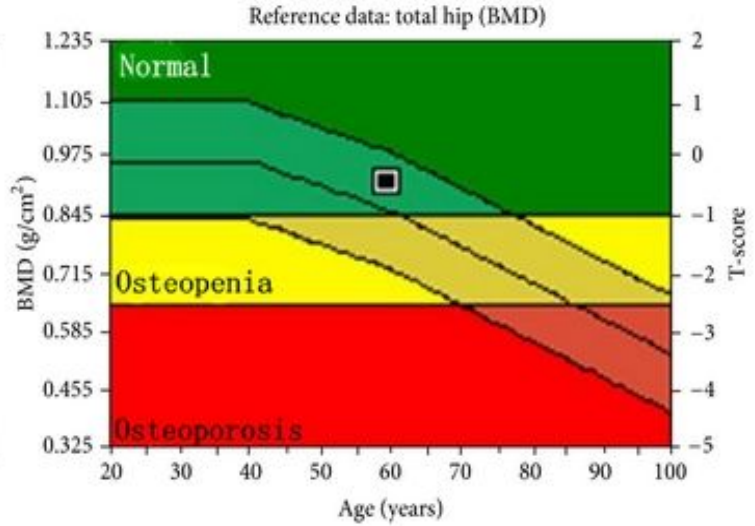


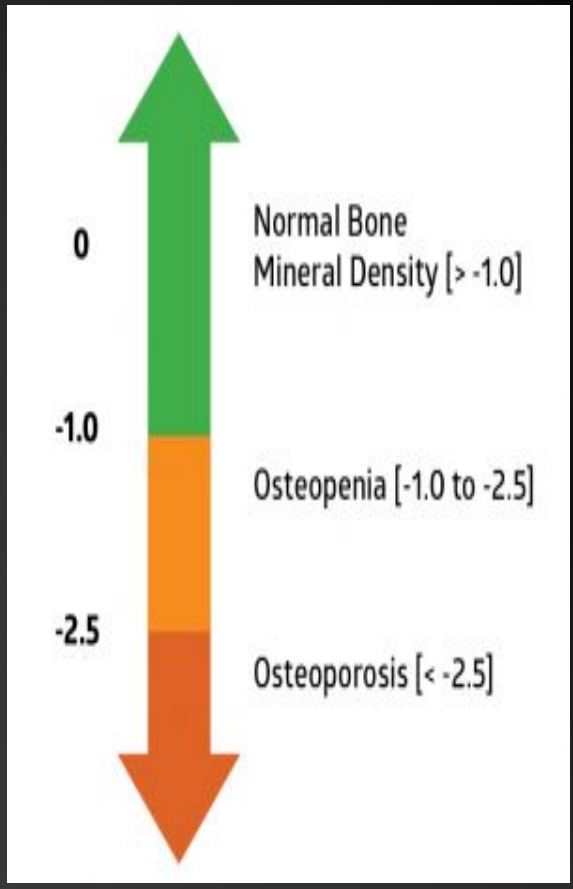
DIAGNOSTICS

- X-ray – when/why would you use
- DEXA- what's normal?
- FRAX score


L1
L2
L3
L4


Reference data: PA spine (BMD)
Normal
Osteopenia
Osteoporosis
BMD (g/cm²)
T-score
Age (years)
1.354
1.234
1.114
0.994
0.874
0.754
0.634
0.514
2
1
0
−1
−2
−3
−4
−5
20
30
40
50
60
70
80
90
100


Reference data: total hip (BMD)
Normal
Osteopenia
Osteoporosis
BMD (g/cm²)
T-score
Age (years)
1.235
1.105
0.975
0.845
0.715
0.585
0.455
0.325
2
1
0
−1
−2
−3
−4
−5
20
30
40
50
60
70
80
90
100


0
-1.0
-2.5
Normal Bone Mineral Density [> -1.0]
Osteopenia [-1.0 to -2.5]
Osteoporosis [< -2.5]

Questionnaire:

1. Age (between 40 and 90 years) or Date of Birth

   Age: _____ Date of Birth: Y: _____ M: _____ D: _____

2. Sex ○ Male ○ Female

3. Weight (kg) _____

4. Height (cm) _____

5. Previous Fracture ◉ No ○ Yes

6. Parent Fractured Hip ◉ No ○ Yes

7. Current Smoking ◉ No ○ Yes

8. Glucocorticoids ◉ No ○ Yes

9. Rheumatoid arthritis ◉ No ○ Yes

10. Secondary osteoporosis ◉ No ○ Yes

11. Alcohol 3 or more units/day ◉ No ○ Yes

12. Femoral neck BMD (g/cm^2)

Select BMD _____

Clear Calculate

Royal Osteoporosis Society

JOIN DONATE

Osteoporosis risk checker

Take our osteoporosis risk checker and get a personalised report on your bone health in just five minutes.

3.5 million people in the UK are currently living with osteoporosis – a condition where bones lose strength and become more likely to break.

Please note the risk checker is not designed for people who have already been diagnosed with osteoporosis or had their bone health assessed by a healthcare professional.

It's never too early to start looking after your bones.

START

Royal Osteoporosis Society

Are you:

- (●) Male
- ( ) Female
- ( ) Other

Osteoporosis and broken bones, including spinal (vertebral) fractures, are more common in women than men.

Women usually have smaller bones than men. Women also lose bone more quickly for a few years around the time of the menopause, caused by a drop in the level of the hormone oestrogen.

Men are still at risk of osteoporosis and fractures though.

If you're transgender, your risk of osteoporosis and broken bones is unlikely to be affected, as long as you're taking prescribed hormone replacement therapy.

Back Next

Royal Osteoporosis Society

Do you take any of these medications?

- [ ] Steroid ('glucocorticoid') tablets (daily treatment or regular short courses)
- [ ] Anti-epileptic drugs
- [ ] Breast cancer treatments that lower your oestrogen levels, such as aromatase inhibitors
- [ ] Prostate cancer treatments that lower your testosterone levels, such as hormone therapy (even if you're on a treatment break)
- [x] None of these

These medications can all increase your risk of osteoporosis and broken bones.

How much your bone health is affected will depend on the type of treatment, the dose you take, and how long you have it for.

Back Next

DRUG TREATMENT

Bisphosphonates

Alendronate (Fosamax ®)

- Risedronate (Actonel ®)
- Ibandronate (Boniva ®)
- Zolendronate (Aclasta ®)

- Stimulators of bone formation

-PTH (Forteo ®)

DRUG TREATMENT

- Calcium/Vitamin D Supplementation
  - Recommended for most men and women >50 years
    - Calcium
      - Age <50 -- 1,000 mg/day
      - Age >50 -- 1,200 mg/day
    - Vitamin D
      - Age < 50 – 400-800 IU/day
      - Age >50 – 800-1000 IU/day
- Combining Vitamin D and calcium supplementation has been shown to increase bone mineral density and reduce the risk of fracture by 50-80 % within the next 6-12 months

VERTEBROPLASTY/KYPHOPLASTY

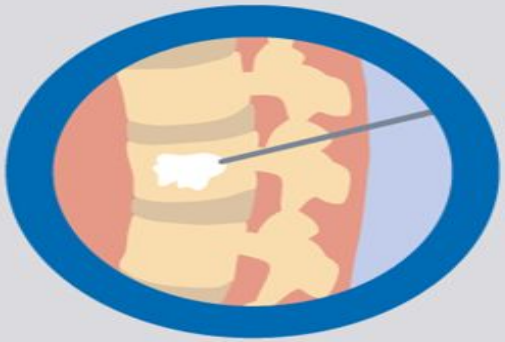
- Cochrane Review 2014
  - Vertebroplasty v placebo
  - No difference in short term for:
    - Pain
    - Disability
    - Quality of life
  - No difference at 1 year
  - No difference if fracture<6weeks or >6 weeks
  - Increased risk of fracture with vertebroplasty (20% v 14%)

thebmj Visual Abstract

Vertebroplasty

For painful acute osteoporotic vertebral compression fractures

VERTOS IV trial



180 People age 50+ with 1–3 vertebral compression fractures

Mean age 76 | 76% female | Median 39 days back pain

Randomisation

Vertebroplasty	Sham intervention
91	89
All patients received local subcutaneous lidocaine and bupivacaine at each pedicle	
Additionally received cementation	Simulated cementation, with verbal and physical cues

Primary outcome

Self reported pain, on a visual analogue scale

0–10, low scores better

Clinical significance 1.5 points

		Vertebroplasty		Sham intervention
Baseline score	Mean	7.7		7.9
After 1 month		3.3	No important difference	3.7
After 12 months		2.7	No important difference	3.2

Vertebroplasty did not result in statistically significant greater pain relief than a sham intervention

thebmj Read the full article online http://bit.ly/BMJvtbp

GIRFT
GETTING IT RIGHT FIRST TIME

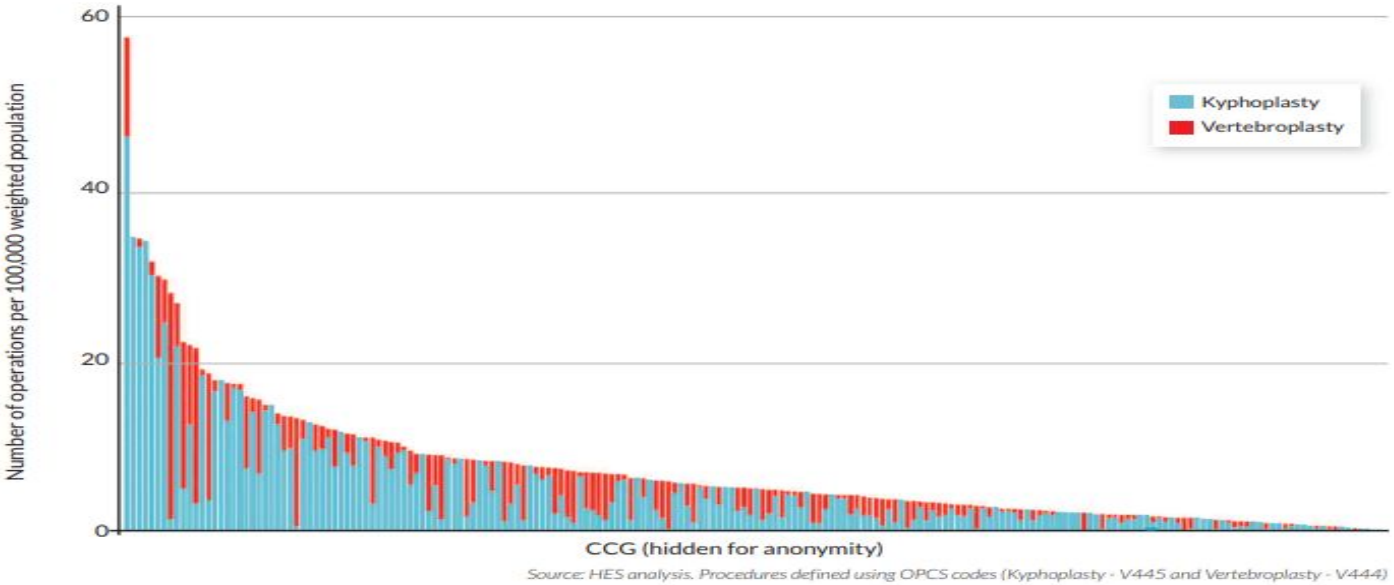
Spinal Services

GIRFT Programme National Specialty Report

by Mike Hutton
GIRFT Clinical Lead for Spinal Services

January 2019

Figure 24: Number of Kyphoplasty and Vertebroplasty operations done by CCG (per 100,000 weighted population, April 2016 to March 2018)



Source: HES analysis. Procedures defined using OPCS codes (Kyphoplasty - V445 and Vertebroplasty - V444)

Recommendation	Actions	Timescale
11. BASS to review NICE guidance and recommendations on the appropriate use of vertebroplasty and kyphoplasty and timing of intervention	• BASS asked to review latest evidence on the use of vertebroplasty and kyphoplasty	For immediate action
	• Recommendation from BASS on whether NICE should be asked to update their guidance on when intervention should occur in osteoporotic fractures	For immediate action

ROYAL OSTEOPOROSIS SOCIETY 2022

- Vertebroplasty within 3/52 for older hospitalised patients
- Kyphoplasty for patients with severe pain and disability despite treatment and deformity over 48hours

TREATMENT- PHYSIOTHERAPY!

- WB excs-
- High impact – pre #- 50 impacts per day
- Low impact- post # - 20 mins daily
- Strengthening-

england.mskimprovementprogramme@nhs.net

c.mercer@nhs.net
@mercephysio

Best MSK Health Futures Platform
#BestMSKhealth

Draft guidance for the management of symptomatic vertebral fragility fractures (VFF)

First presentation & point of entry to pathway	Clinical assessment	Investigations	Initiation of treatment and acute pain management	Surgical intervention (if indicated)

1) Pts presenting with recent, sudden onset, back pain often (but not exclusively) following only minimal trauma or even simple daily activities.

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Key features & signs:

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- +/- clinical or lifestyle risk factors for osteoporosis

Likely points of entry to pathway via: General Practice; tier 2 MSK (MCATs) service; ED; other out-patient specialities; diagnostic imaging

NB. For the small minority of VFF pts requiring hospital admission, there should be a clear local policy in terms of which specialty they are admitted under

Pts with non symptomatic VFF (e.g. VFF identified as incidental finding on imaging) pls **refer to the secondary fragility fracture prevention pathway**

<u>RED FLAGS PRESENT?</u>
- pain when lying & affects sleep
- h/o cancer or recent unexplained weight loss
- s/o acute myelopathy or radiculopathy
- acute cauda equina
- fever
- s/o spinal infection in immunocompromised patient or TB

YES

EMERGENCY or *URGENT* referral to spinal team or cancer service as clinically indicated

NO

VFF suspected:

- **Request plain x-ray to confirm VFF**
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- FBC; U&Es; Calcium;
- Phosphate; Alk PO4;
- LFTs;
- TSH;
- Coeliac screen;
- Myeloma screen: serum & urine protein electrophoresis (or serum free light chains if local practice);

+/-vit D (in accordance with guidelines)
+/-testosterone (men <75)
+/-PSA in men

- **Assess absolute 10yr # probability** using FRAX®*or QFracture® within allowed age ranges

Falls risk screening (defer if Ax would be compromised by acute pain)
Refer on for further Ax/mgmt as indicated & in accordance with evidence-based protocols/guidelines

Consider whether a **bone mineral density (BMD) assessment (DXA scan)** is appropriate, noting its limitations in this population**
However, <u>DO NOT WAIT</u> until pt has had a DXA scan to start treatment if VFF confirmed

If indicated, acute pain mgmt to render pt mobile at earliest opportunity:
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- Use functional pain assessment score e.g. FAS (use PAINAD tool in pts with dementia)
- Provide clear & prompt guidance on how to adapt movements involved in day-to-day living & exercises for posture & pain
- **Do not routinely brace** - only under exceptional circumstances

Initiate bone sparing treatment, unless contraindicated, in accordance with evidence-based treatment protocols/guidelines. **Ensure pt is calcium & vit D replete** – use combined calcium & vit D preparation **or** colecalciferol as indicated. Oral bisphosphonate 1st line, however, consider IV bisphosphonate or denosumab if pt is at immediate risk of further fracture or an oral bisphosphonate is unsuitable, +/- eligibility for anabolic treatment

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Arrange urgent MRI (start with sagittal STIR sequence - in case pt unable to tolerate)

If confirmed vertebral body oedema then...

Symptoms improve:
- Pain management & home exercise prog.

Patient struggling with ongoing pain & reduced function > 3/12 post injury:
- Refer to MCATs to be triaged in virtual MDT (should inc pain specialist & spinal surgeon)

Signpost to information resources & support
(e.g. community pharmacist, local pt information session or peer support grp. Additional resources &/or support available at:
The Royal Osteoporosis Society
Versus Arthritis
nhs.uk
patient.info

Make *URGENT* referral to local Spinal Unit for consideration of cement augmentation

Local Spinal Unit:
- Ensure shared decision making
- If relevant, perform cement augmentation (default to vertebroplasty) *WITHIN 72 HRS OF MDT DECISION*
- Send biopsy
- Input procedure in British Spine Registry
- Immediate mobilisation
- Provide home exercise programme

Limited criteria for kyphoplasty, must be decided by the local MDT in agreement with regional spinal network.

Use of femoral neck BMD in FRAX® improves fracture prediction & allows for clinical interpretation against national guidance. However, it does not allow for inclusion of lumbar spine BMD addition, when calculating the probability of fracture, FRAX® will **underestimate the risk if the pt has a history of vertebral fracture, multiple previous fractures, or high-dose glucocorticoids. include falls risk. In assessing 10yr absolute probability of fracture, FRAX® may underestimate the short-term risk of fracture in the older old, due to the competing risk of death from other c*

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RED FLAGS PRESENT?

- pain when lying & affects sleep
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- s/o acute myelopathy or radiculopathy
- acute cauda equina
- fever
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YES

EMERGENCY or *URGENT* referral to spinal team or cancer service as clinically indicated

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1ST CONTACT

- GP
- FCP
- MSK triage service
- ED
- Outpatient appt
- Imaging appt

- Red flags to appropriate pathway (eg ED/2ww)
- Recent/sudden onset of spinal pain with low level trauma (not always)
- Age >50
- Central bony tenderness on percussion
- Increased kyphosis
- Risk factors for osteoporosis

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- If relevant, perform cement augmentation (default to vertebroplasty) *WITHIN 72 HRS OF MDT DECISION*
- Send biopsy
- Input procedure in British Spine Registry
- Immediate mobilisation
- Provide home exercise programme

Limited criteria for kyphoplasty, must be decided by the local MDT in agreement with regional spinal network.

*Use of femoral neck BMD in FRAX® improves fracture prediction & allows for clinical interpretation against national guidance. However, it does not allow for inclusion of lumbar spine BMD addition, when calculating the probability of fracture, FRAX® will **underestimate the risk** if the pt has a history of vertebral fracture, multiple previous fractures, or high-dose glucocorticoids. include falls risk. In assessing 10yr absolute probability of fracture, FRAX® may underestimate the short-term risk of fracture in the older old, due to the competing risk of death from other c*

** DXA is not required if the pt has had a previous scan within the past two years. If the pt has degenerative changes or a vertebral fracture in the lumbar spine region of interest then the BMD results for this site will be spurious!

NO RED FLAGS

Investigations

- Plain X-ray
- FBC, U&E Bone profile, LFT, TSH, Coeliac screen
- Myeloma screen
- +/- Vit D, PSA, Testosterone in males <75
- FRAX score
- DEXA scan

Draft guidance for the management of symptomatic vertebral fragility fractures (VFF)

First presentation & point of entry to pathway	Clinical assessment	Investigations	Initiation of treatment and acute pain management	Surgical intervention (if indicated)

1) Pts presenting with recent, sudden onset, back pain often (but not exclusively) following only minimal trauma or even simple daily activities.

2) Pts presenting with ongoing back pain – with features suggestive of VFF

Key features & signs:
- Age ≥50 years
- Midline tenderness to percussion over posterior spinous process(es)
- +/- pre-existing kyphosis suggesting previous VFF
- +/- clinical or lifestyle risk factors for osteoporosis

Likely points of entry to pathway via: General Practice; tier 2 MSK (MCATs) service; ED; other out-patient specialities; diagnostic imaging

NB. For the small minority of VFF pts requiring hospital admission, there should be a clear local policy in terms of which specialty they are admitted under

Pts with non symptomatic VFF (e.g. VFF identified as incidental finding on imaging) pls **refer to the secondary fragility fracture prevention pathway**

RED FLAGS PRESENT?
- pain when lying & affects sleep
- h/o cancer or recent unexplained weight loss
- s/o acute myelopathy or radiculopathy
- acute cauda equina
- fever
- s/o spinal infection in immunocompromised patient or TB

YES

EMERGENCY or *URGENT* referral to spinal team or cancer service as clinically indicated

NO

VFF suspected:
- **Request plain x-ray to confirm VFF**
- **Laboratory investigations**
  - FBC; U&Es; Calcium;
  - Phosphate; Alk PO4;
  - LFTs;
  - TSH;
  - Coeliac screen;
  - Myeloma screen: serum & urine protein electrophoresis (or serum free light chains if local practice);

  +/-vit D (in accordance with guidelines)
  +/-testosterone (men <75)
  +/-PSA in men
- **Assess absolute 10yr # probability** using FRAX®* or QFracture® within allowed age ranges

Falls risk screening (defer if Ax would be compromised by acute pain)
Refer on for further Ax/mgmt as indicated & in accordance with evidence-based protocols/guidelines

Consider whether a **bone mineral density (BMD) assessment (DXA scan)** is appropriate, noting its limitations in this population**
However, DO NOT WAIT until pt has had a DXA scan to start treatment if VFF confirmed

If indicated, acute pain mgmt to render pt mobile at earliest opportunity:
(For inpatients - make early referral to pain team if required)
- Regular paracetamol +/- weak opioids
- PRN strong opioids if needed - beware opioid toxicity (inc delirium) & provide prophylaxis for constipation
- Use (appropriate) pain patches if unable to tolerate oral pain meds
- Avoid NSAIDs & tramadol if possible
- Use functional pain assessment score e.g. FAS (use PAINAD tool in pts with dementia)
- Provide clear & prompt guidance on how to adapt movements involved in day-to-day living & exercises for posture & pain
- **Do not routinely brace** - only under exceptional circumstances

Initiate bone sparing treatment, unless contraindicated, in accordance with evidence-based treatment protocols/guidelines. **Ensure pt is calcium & vit D replete** – use combined calcium & vit D preparation **or** colecalciferol as indicated. Oral bisphosphonate 1st line, however, consider IV bisphosphonate or denosumab if pt is at immediate risk of further fracture or an oral bisphosphonate is unsuitable, +/- eligibility for anabolic treatment

If **unremitting pain after 48 hrs** (in spite of acute pain mgmt) that's still severely compromising ADLs & mobility…

Arrange urgent MRI (start with sagittal STIR sequence - in case pt unable to tolerate)

If confirmed vertebral body oedema then…

Symptoms improve:
- Pain management & home exercise prog.

Patient struggling with ongoing pain & reduced function > 3/12 post injury:
- Refer to MCATs to be triaged in virtual MDT (should inc pain specialist & spinal surgeon)

Signpost to information resources & support
(e.g. community pharmacist, local pt information session or peer support group. Additional resources &/or support available at:
The Royal Osteoporosis Society
Versus Arthritis
nhs.uk
patient.info

Make *URGENT* referral to local Spinal Unit for consideration of cement augmentation

Local Spinal Unit:
- Ensure shared decision making
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ACUTE TREATMENT/MANAGEMENT

- Paracetamol/weak opioids
- Strong opioids
- Pain patches
- Avoids NSAIDs and tramadol if possible
- Advice re ADL/function
- Do not routinely brace
- Start bone sparing treatment
- Consider MRI and vertebroplasty if pain severe and not responding after 48 hours
- Analgesia and HEP for 3/12 and refer on if not improved at the 3/12 stage

TREATMENT- PHYSIOTHERAPY!

- WB excs-
- High impact – pre #- 50 impacts per day
- Low impact- post # - 20 mins daily
- Strengthening-

Quick guide:
visual reference

01761 471771

For full Expert Consensus Statement visit theros.org.uk/HCPexercise

Key recommendations: physical activity and exercise for osteoporosis

Strong

Build bone and muscle strength

Weight-bearing/impact exercise for bones

50 impacts per session

Frequency: Most days

With osteoporosis

Moderate impact

Lower impact

Low impact - weight bearing

Frequency: Most days

Build up gradually

Build muscle

Weights & resistance bands

Frequency: 2-3 days / week

3 sets, 8-12 reps of max weight

Progressive resistance training

Sports and everyday activities

Vertebral or multiple fractures, or less able

Some extra caution

Exercise up to lower impact

Individualised advice

Ensure safe technique

Steady

Improve balance

Activities like tai chi or dance

Frequency: 2-3 days / week

Or a challenging balance class

Positive approach

Reassurance - 'how to' not 'don't do'

Benefits of exercise for osteoporosis

Keep active
– something is better than nothing

- Build bone and muscle strength
- Improve balance
- Improve pain, posture and movements

Aiming for fewer fragility fractures and improved wellbeing

Straight

Improve pain, posture and movements

Manage pain from vertebral fractures

Daily back muscle strengthening exercises

Frequency: Daily

Improve posture and movements

Learn safe moving and lifting

Hip hinge for safe bending

Posture exercises

Frequency: 2-3 days / week

Use alternatives

Extreme or loaded flexion

Avoid

Inactivity and prolonged sitting

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+/-vit D (in accordance with guidelines)
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- **Assess absolute 10yr # probability** using FRAX®*or QFracture® within allowed age ranges

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[POSITION STATEMENT]

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JASON M. BENECIUK, PT, DPT, PhD, MPH[9,10] • RACHEL L. LEECH, MSc, BSc[6] • JAMES SELFE, DSc, PhD, MA, Grad Dip Phys, FCSP[6,11]

International Framework for Red Flags for Potential Serious Spinal Pathologies

TABLE 8 Risk Factors for Spinal Fracture

Risk Factor/Level of Evidence	Context	Further Questions	Low Clinical Suspicion	High Clinical Suspicion
History of osteoporosis High	History of osteoporosis increases the risk of fracture A family history of osteoporosis will also increase the risk of osteoporosis and fracture in women[36] People with known osteoporosis have an increased risk of fracture, and those with a previous osteoporotic fracture have a 5.4-fold increased risk of vertebral fracture and a 2.8-fold increased risk of hip fracture[75] Medication for osteoporosis can reduce the risk of fracture in the following year by 50% to 80%[72]	Do you have osteoporosis? Do you have a family history of osteoporosis? Have you had previous osteoporotic fractures? Are you taking any medication for your osteoporosis? • If so, what are you taking? • If not, have you been prescribed it, or is there a reason you are not taking it?	No family history No other osteoporotic risk factors No previous fractures	Previous osteoporotic fractures Concurrent osteoporotic risk factors
Corticosteroid use High	Steroid use of 7.5 mg for >3 mo increases the risk of osteoporosis.[12,58] The effects of inhaled steroids are inconclusive in terms of bone mineral density, though the clinician should ask about high-dose inhaled steroid use[75]	Have you used steroid tablets or inhaled steroids? • How long have you used them for, and what dose did you use?	No steroid use Steroid use of <5 mg over a 3-mo period in a year	Steroid use of >5 mg over a 3-mo period
Previous history of cancer Low	Metastatic bone disease may decrease bone density, especially in the thoracic region (70% of cases)	Do you have a history of cancer? • Where was the cancer? • What treatment did you have for your cancer? • What stage was the cancer?	No past medical history of cancer	History of cancer of the • breast • prostate • lung • kidney • thyroid

TABLE 9

Symptoms of Spinal Fracture

Symptoms (subjective)/ Level of Evidence	Context	Further Questions	Low Clinical Suspicion	High Clinical Suspicion
Thoracic pain High	Most (70%) nontraumatic spinal fractures occur in the thoracic spine. 70% of metastases occur in the thoracic spine, too, and should be considered in the differential diagnosis Myeloma most commonly affects the thoracic spine, too, and should also be considered in the differential diagnosis Band-like pain should be considered a concern and may indicate MSCC[79]	Detailed questioning of the patient is needed to assess for risk factors for each of these diseases	Thoracic pain with no history of cancer, osteoporosis, or myeloma and no further risk factors	Any patient with known cancer, myeloma, or osteoporosis
Severe pain Low	Some people may have a long history of back pain. It is important to establish whether this is a new or different pain	Is this a familiar pain to you/does this feel familiar? Have you experienced back pain in the past?	If this is a person's first episode of back pain, then conservative management is the first course of action	Describes pain that is unfamiliar and possibly worsening pain
Neurological symptoms Low	People with spinal fracture will not usually develop neurological deficit/signs, but must be carefully examined to exclude neurological deficit	Do you have any change in sensation in your arms or legs? Do you have any difficulties with walking or coordination? Do you have any difficulties with your balance?	No distally referred symptoms or subjective neurological symptoms	People with bilateral/quadrilateral neurological symptoms, including gait disturbance and coordination issues/ bladder and bowel disturbance

Abbreviation: MSCC, metastatic spinal cord compression.

TABLE 10 Signs of Spinal Fracture

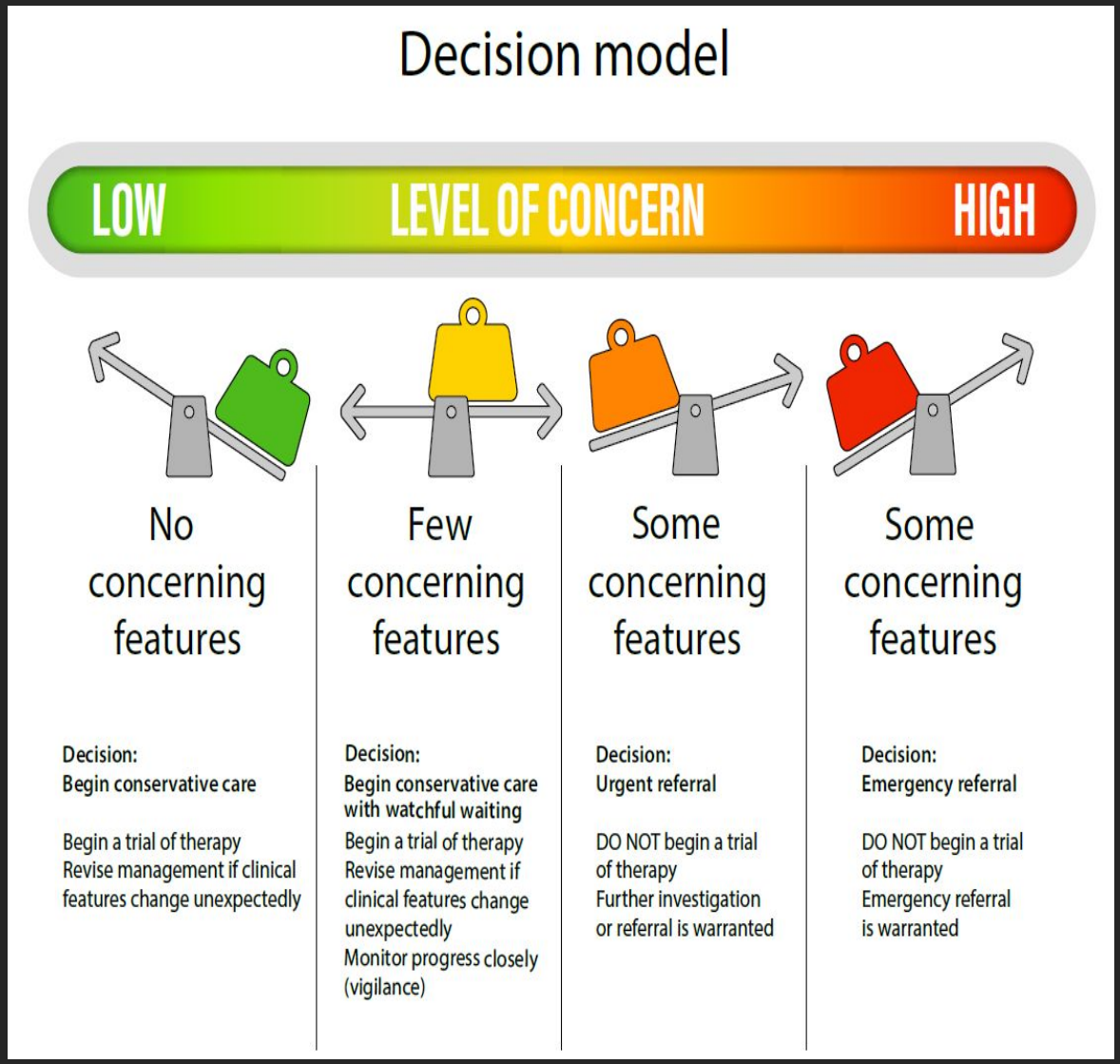
Signs (objective)/ Level of Evidence	Context	Physical Assessment	Low Clinical Suspicion	High Clinical Suspicion
Spine tenderness Low	Patients with midline bony tenderness should be considered to be at risk of spinal fracture[50]	Palpate the spinous processes and consider percussion/vibration with a 128-Hz tuning fork to examine spinal tenderness or reproduction of symptoms further Bony percussion/use of a tuning fork may indicate the presence of bony injury, though this should be interpreted with caution	No spinal tenderness	Tenderness or reproduction of symptoms on palpation, percussion, and/or vibration
Neurological signs Low	People with a subjective complaint of neurological symptoms must have a full neurological examination	Upper- and lower-limb neurology and upper and lower motor neuron testing should be performed. Neurological examination may need to include the upper and/or lower limbs, including upper and lower motor neuron clinical tests	Localized spinal pain with no distal referral or limb symptoms	People with spinal fracture and symptoms in the limbs, or with coordination/gait disturbance, or changes to bladder/bowel activity
Spinal deformity Low	Onset of deformity post trauma Sudden change in posture associated with a sudden increase in pain in the person with known osteoporosis	Bony percussion may indicate bony injury, as may use of a tuning fork, though these tests should be treated with some caution Imaging may be appropriate	No change in spinal posture	Sudden change in spinal shape related to trauma or in a known osteoporotic patient
Contusion or abrasion Low	May indicate the site of trauma and should be considered if associated with a painful site	...	Abrasion with no bony tenderness	Abrasion following trauma associated with central spinal bony tenderness

TABLE 11 Initial Investigations for Spinal Fracture

Modality	Context
X-ray	X-rays are the first-line choice to determine whether there is a fracture present, with lateral views likely to yield the most information.[50] X-rays are readily available and relatively low cost. It may be difficult to determine the age of the fracture using X-rays alone
MRI	MRI is the investigation of choice for differentiating osteoporotic fractures from metastatic disease and myeloma. Use MRI if there are multiple fractures identified on X-ray.[50] MRI will also help to determine the age of the fracture, as it can identify bone marrow edema from recent/healing fractures[61]
CT scan	A CT scan is commonly performed for other conditions. Assess the sagittal view for undiagnosed vertebral fractures.[72] CT scans may be helpful in evaluating complex fractures or those with retropulsed fragments, as they give excellent bony definition.[61] CT scans may also be used where MRI is contraindicated

Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging.

Step 2: Decide clinical action. The choice of clinical action should be based on the level of concern determined in step 1.

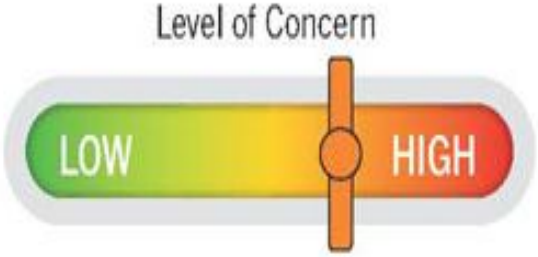


A 35-year-old man presents with sudden onset of thoracic pain after lifting a heavy bag of concrete. The man has no previous history of fracture and is generally in good health. He smokes 5 cigarettes a day and has done so for 10 years. He has limited thoracic spine movement into rotation to both sides. He is locally tender to palpation at T8 and T9 unilaterally on both sides.

- Man under 65 years of age
- No family history
- No steroid use
- No previous fractures
- No excessive alcohol use
- Minimal to no smoking
- Clinical action: treat and monitor symptoms. His age and sex put him at low risk of osteoporotic fracture and his smoking habit is below 20 cigarettes per day, which is low risk. No further investigation is required at this stage

A 78-year-old woman presents with upper lumbar pain. No precipitating injury was reported, but the pain has worsened over the last 3 months. The pain is worse when lying supine. She has a history of left radius fractures. She had her menopause at age 38, having started her periods at 15 years of age. She is otherwise well and has no family history of osteoporosis.

- Age and sex are risk factors
- Worsening pain
- Early menopause and a late menarche
- Worse when lying supine
- History of fractures
- Clinical action: urgent thoracic spine X-ray. The patient has several risk factors for osteoporosis, including age, sex, early menopause and late menarche, and history of radius fractures. An X-ray of her thoracolumbar region in the first instance would be appropriate



MYELOMA

- Most common spinal primary
- 2% of all cancers- 15% blood cancers
- 5700 cases in the UK each year
- High survival rates if detected early
- Affects plasma cells/marrow
- Spine, pelvis, rib cage and skull
- >55 (1% under 35) Mostly 70 ys+
- M:F equal (or slightly more prevalent in men)
- Higher prevalence in Afro-Caribbean

- Abnormal plasma cells release a large amount of single antibody or paraprotein

MYELOMA

- Pain
- Fracture
- Osteoporosis
- Abdominal pain
- Constipation
- Loss of appetite
- Weakness
- Feeling drowsy/confused

- Anaemia
- Leukopenia- (low leukocytes)
- Thrombocytopaenia (low platelets)
- Hypercalcaemia

DIAGNOSIS

- Protein electrophoresis
- Monoclonal gammopathy
- Paraprotein bands divided into type of immunoglobulin
- Most commonly IgG (60%) and IgA (20%)
- Serum light chain proteins ie Kappa and Lambda
- Kappa and Lambda ratios important <2 NAD 2-100 MGUS >100 likely myeloma
- Doubling in 6 months likely malignant
- ESR CRP U and E LFT FBC


MULTIPLE MYELOMA
Calcium
Renal impairment
Anemia
Boney lesions

COMMON TREATMENTS FOR MULTIPLE MYELOMA

CHEMOTHERAPY

Although some meds are in pill form, chemo is usually delivered through an IV infusion or via an injection, killing cancer cells over

TARGETED THERAPY

This type of treatment zeroes in on certain proteins and receptors in cancer cells, slowing the growth or boosting fight.

STEROIDS

These drug include prednisone and dexamethasone, which help to reduce inflammation, swelling, and pain. They can also ease some chemotherapy side effects

BISPHOSPHONATES

Because myeloma can weaken bones, it's helpful to take a bone-strengthening medication to slow the damage and reduce

INITIAL DRUG TREATMENT 4-6/12

- Daratumumab (Darzalex®), bortezomib (Velcade®), thalidomide and dexamethasone (known as DVTD)
- Bortezomib (Velcade®), thalidomide and dexamethasone (known as VTD)
- Bortezomib (Velcade®), cyclophosphamide and dexamethasone (known as VCD)
- Lenalidomide (Revlimid®) and dexamethasone
- Melphalan, prednisolone and thalidomide (known as MPT)
- Cyclophosphamide, thalidomide and dexamethasone (known as CTD) · A different combination, find out more about clinical trials and novel drugs

RESEARCH ARTICLE

Myeloma: Patient accounts of their pathways to diagnosis

Debra A. Howell[1]*, Ruth I. Hart[1¤], Alexandra G. Smith[1], Una Macleod[2], Russell Patmore[3], Gordon Cook[4], Eve Roman[1]

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DIAGNOSTICS-SKELETAL SURVEY

SKELETAL SURVEY

OSTEOPOROSIS

- Decreased bone density (30-40%)
- Sclerotic end plates
- End plate bowing
- Cod fish appearance
- End plate collapse
- Anterior collapse and wedging

OSTEOPOROSIS

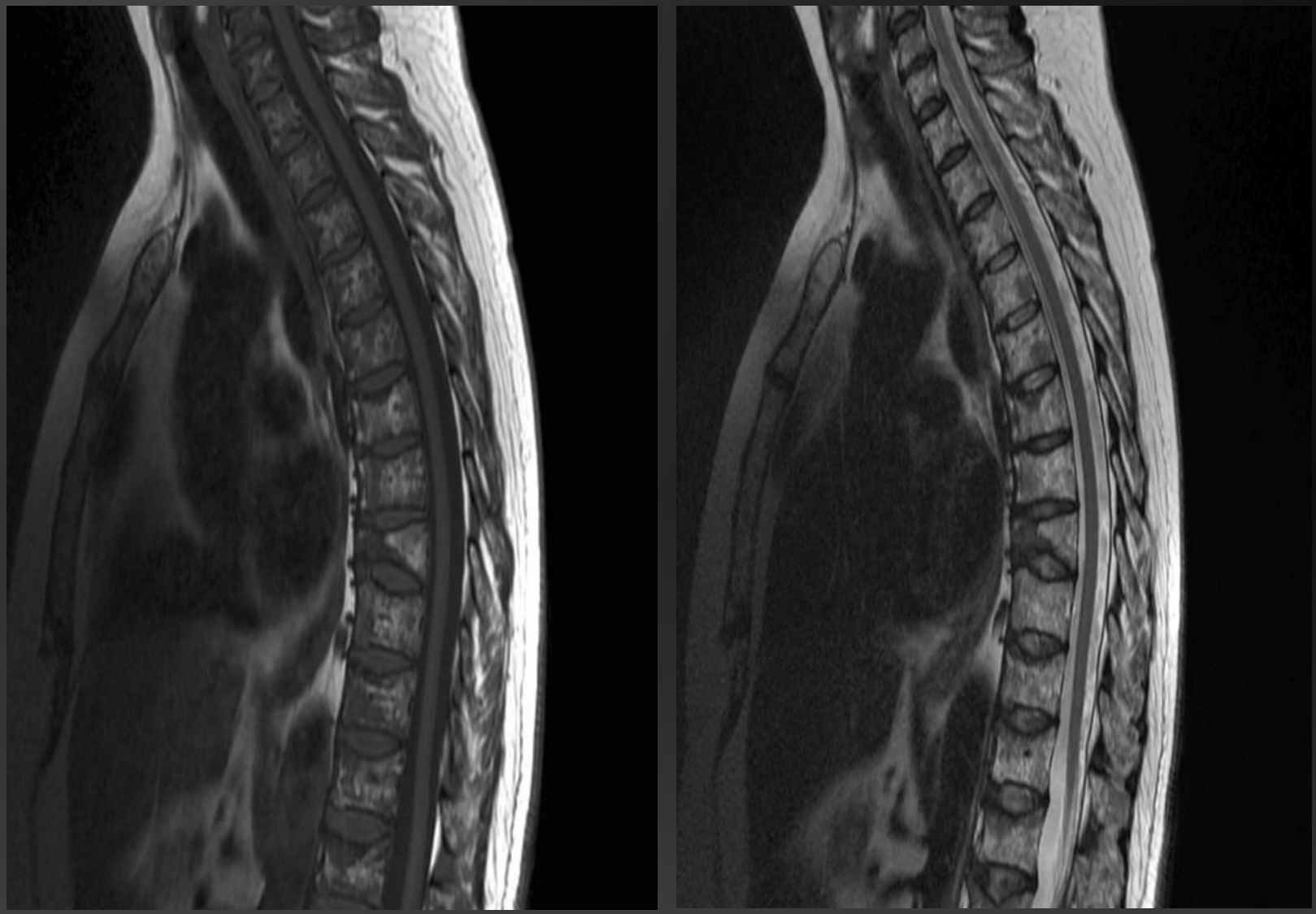
OSTEOPOROSIS

OSTEOPOROSIS MRI

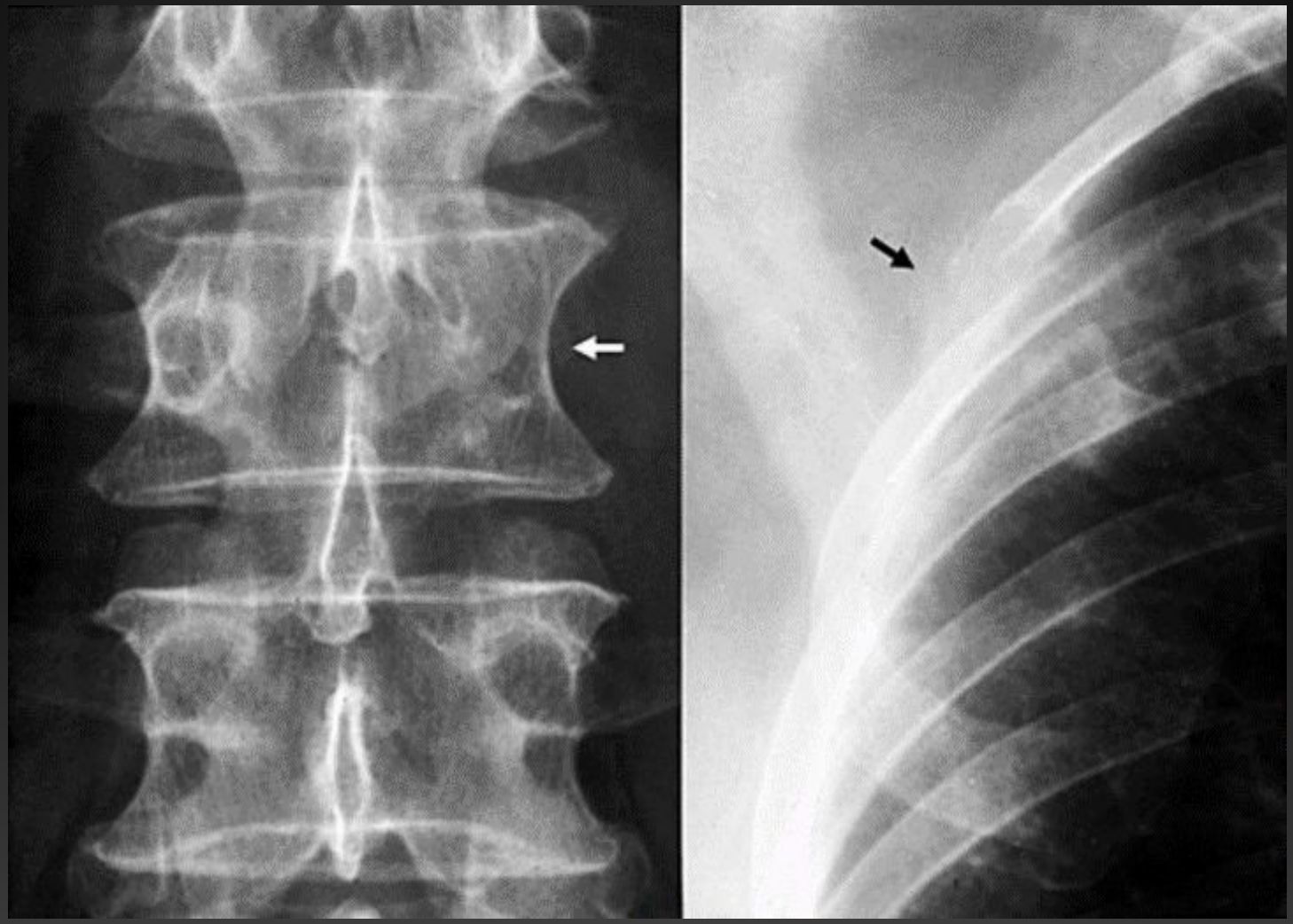
- Similar appearances to X-ray
- Old fractures have normal marrow signal
- New fractures decreased marrow signal on T1
- Osteoporotic fractures are usually angular rather than convex posteriorly

OSTEOPOROSIS

MYELOMA



METASTASES-LYTIC LESIONS FROM CA BREAST



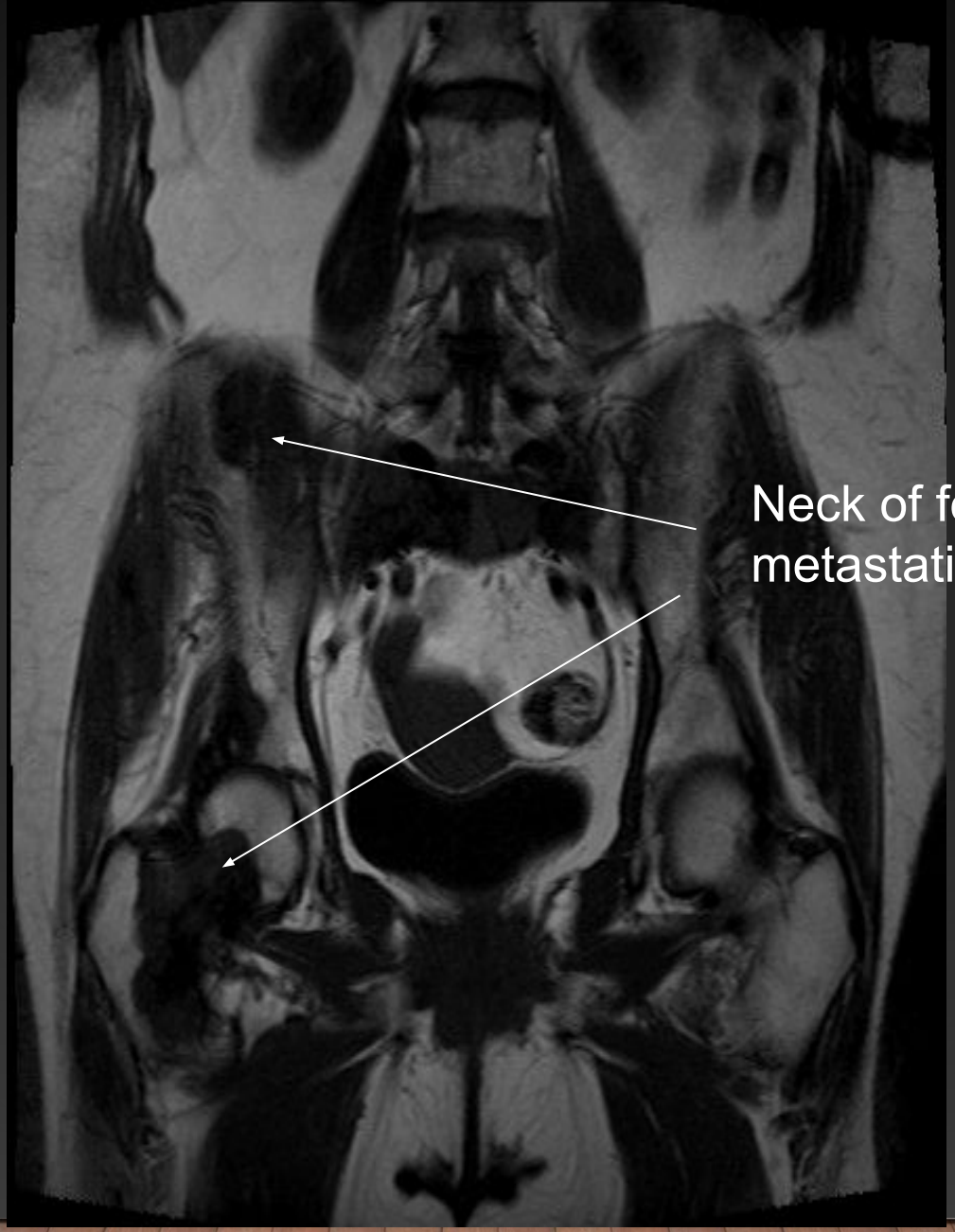

METASTASES

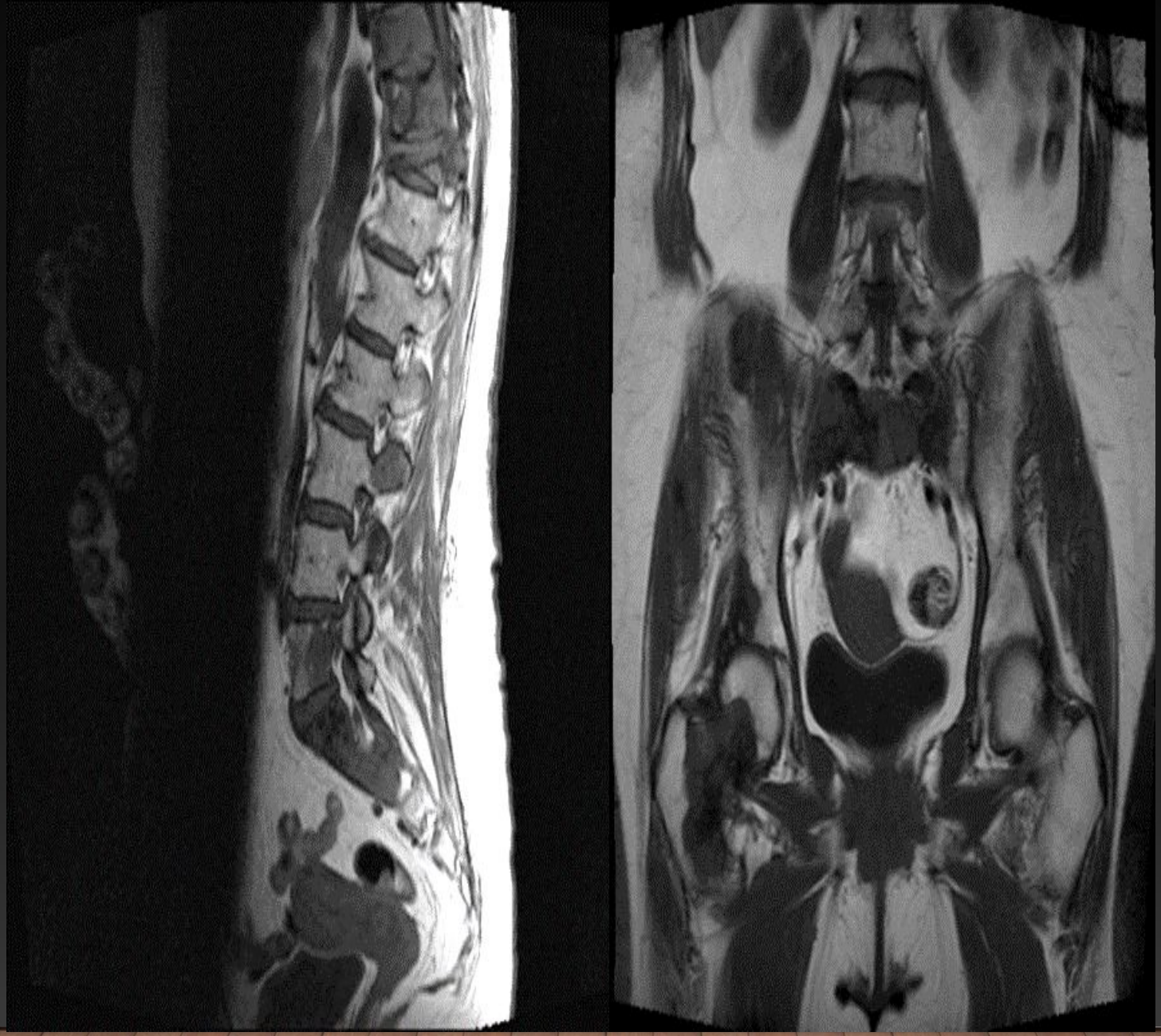
- Pathological fractures show decreased signal homogeneity whereas osteoporotic fractures show no signal change
- Anterior vertebral body and pedicles mostly affected rather than infection which predominantly involves the end plates
- Convex posterior vertebral body rather than angular that happens with osteoporosis

METASTASES

METASTASES

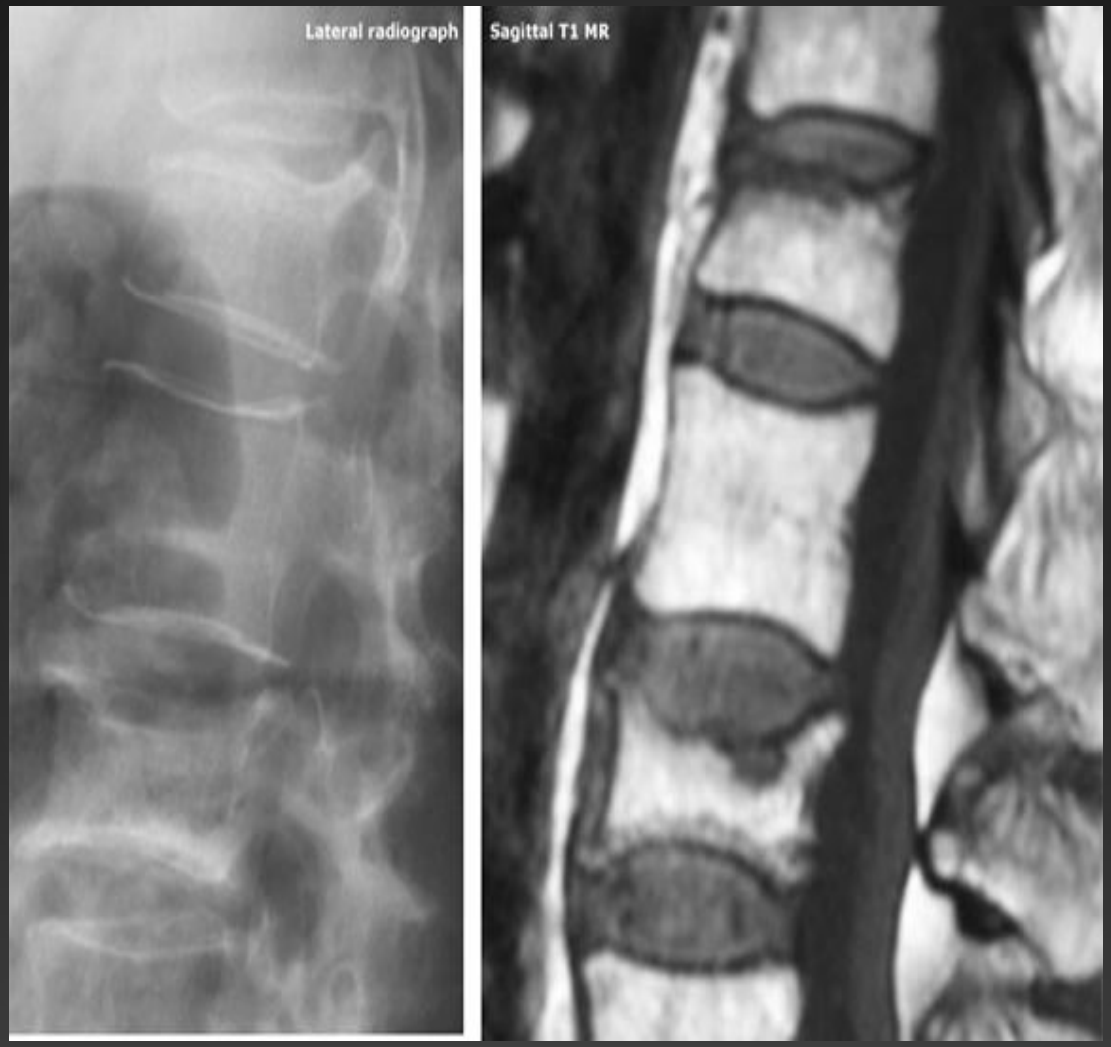
METASTASES





- Jung et al (2003)
  - 27 patients with metastatic fractures
  - 55 patients with osteoporotic fractures
  - Findings for metastatic disease:
    - Convex posterior body
    - Change in signal in the pedicles
    - Epidural mass
    - Paraspinal mass
- Findings for osteoporosis
  - Low signal band on T1 and T2
  - Normal bone marrow signal in vertebral body
  - Retropulsion of posterior bone fragment
  - Multiple level fractures

OSTEOPOROSIS V MYELOMA/METASTASES



ANGULAR POSTERIOR BODY-BENIG N

CONVEX POSTERIOR BORDER -MALIGNANT

BONE SCAN

- Measure of osteoblast activity
- 20% myeloma missed with bone scan
- Good for metastatic distribution
- Non-specific for pathology


L