

Neck of Femur Fractures

Handout & Workbook

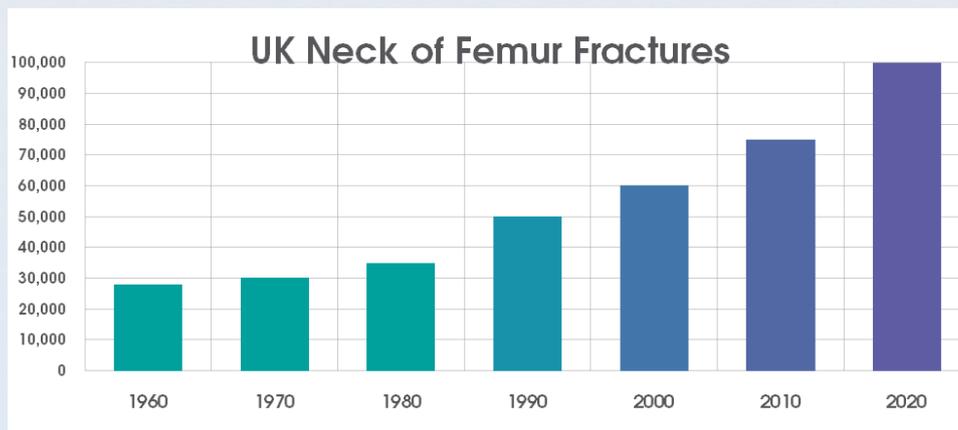


- Page 2 - Background
- Page 3-6 - Anatomy & Classification
- Page 7-8 - Assessment: History, Exam, Investigations
- Page 9 - Pre-operative management
- Page 10-12 - Post-operative management
- Page 13 - Discharge planning
- Page 14-24 - Cases

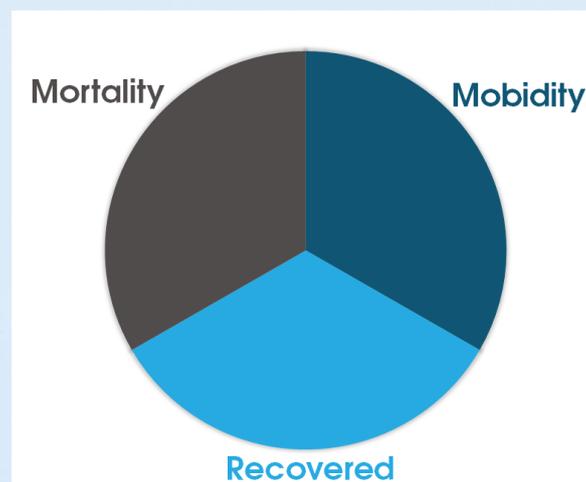


Neck of Femur Fractures

Background



- Neck of Femur fractures are increasing over time.
- Within the UK in 2020 there are 100,000 per year. This number is expected to triple by 2050 to 300,000.

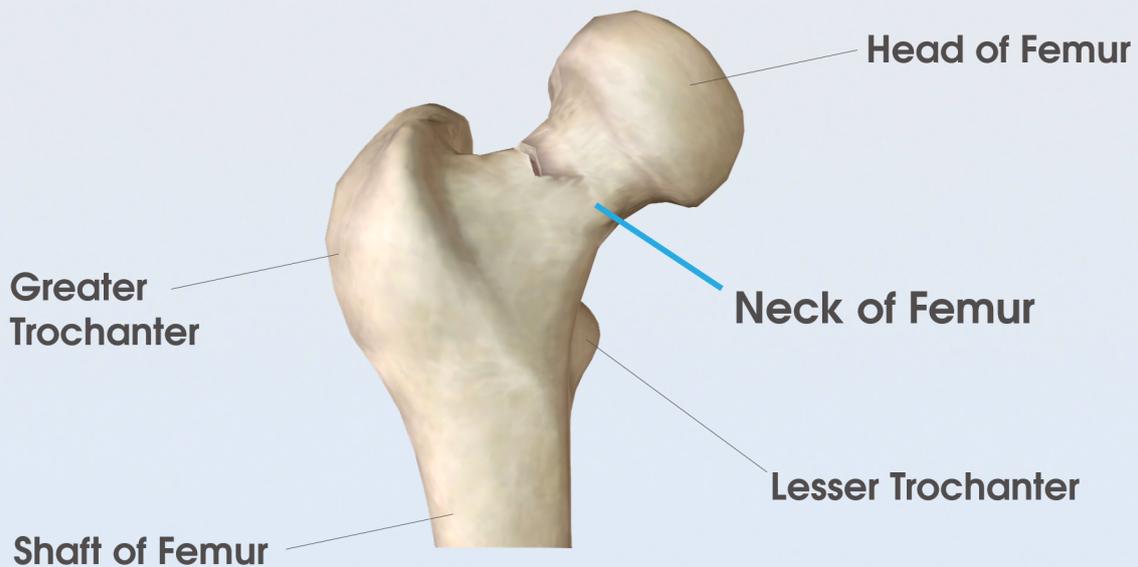


- If you look at ALL neck of femur fractures over a year you can approximately split them into 1/3d's.
- 33% Mortality at 1 year, 33% Morbidity at 1 year, 33% Rehabilitated at 1 year. Remember this is because many elderly and frail people who are terminally ill also suffer a neck of femur fracture which makes these numbers appear worse than they truly are.

Anatomy & Classification

.....

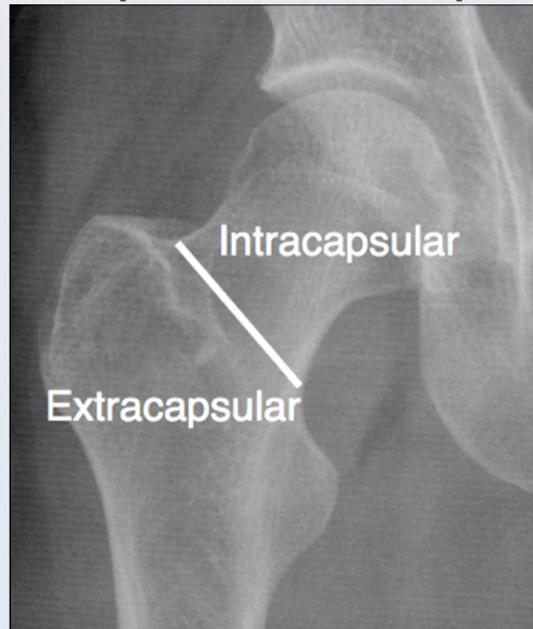
Anatomy Overview



- The Neck of femur is the **weakest aspect of the femur**.
- The femur is the strongest bone in our body so to fracture it normally requires very high trauma in younger population.
- In the elderly they normally have osteopenia or osteoporosis which weakens the bone increasing the risk of fracture.

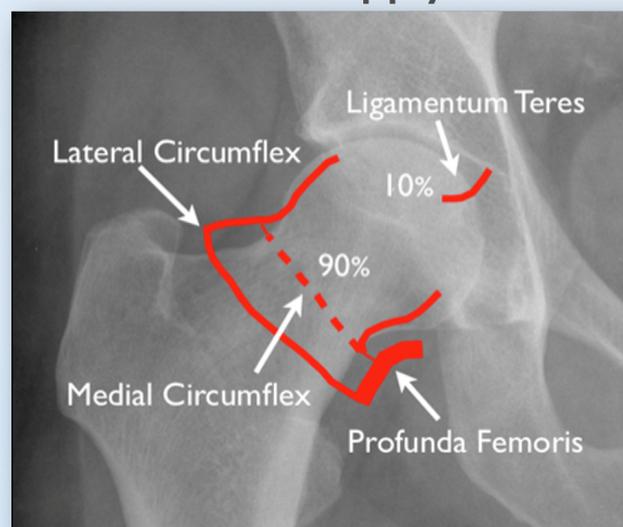
Classification Overview

Intracapsular vs Extracapsular



- Remember that the distinction between Intracapsular and Extracapsular is where the joint capsule joins onto the neck of femur -- see above that line is where the capsule joins.... why is this important? see the blood supply next...

Blood Supply



- In adulthood pretty much all of us get 90% of the blood to the femoral neck/head from the circumflex arteries (see above). These enter via the base of the femoral neck. So if you have an intracapsular fracture you disrupt this blood supply meaning the femoral head might die (avascular necrosis). For this reason surgery is different for intracapsular vs extracapsular fractures

Intracapsular Fractures

Garden Classification



GARDEN 1



GARDEN 2



GARDEN 3



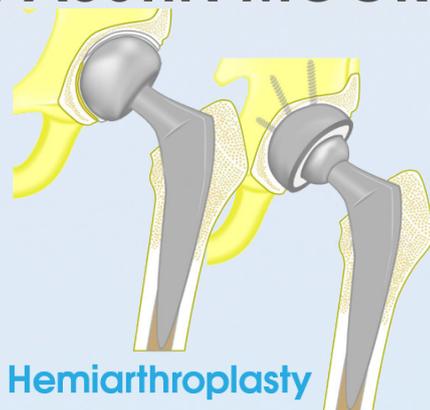
GARDEN 4

1,2 SCREW



**Cannulated
Screws**

3,4 AUSTIN MOORE



Hemiarthroplasty

**Total Hip
Replacement**

- All Intracapsular neck of femur fractures are classified using the Garden classification system above
- Simply Garden 1 and 2 mean NON-DISPLACED = the circumflex arteries might still be intact. In younger patients (40-50) this means they can be treated with cannulated screw fixation.
- Garden 3 and 4 means DISPLACED therefore the circumflex arterial supply will be disrupted and these patients need either a hemiarthroplasty (half-joint replacement-- a famous hemi was the Austin Moore -- now there's lots of different manufacturers) OR a Total Hip Replacement. To have a Total Hip Replacement normally requires you to be fairly fit and well i.e. can walk 1 stick or less for 1 mile, could tolerate anaesthetic, have no cognitive impairment (as they have to follow the hip precautions post-operatively carefully- see later).

Extracapsular Fractures

Intertrochanteric



Intertrochanteric



Dynamic Hip Screw (DHS)

- Intertrochanteric fractures are extracapsular, so the blood supply from the circumflex arteries to neck/head are not damaged. As a result we do not need to replace the neck/head.
- The dynamic hip screw is used as this device allows stable compression to occur when the patient stands between the fractured parts-- helping the healing process whilst also allowing them to weight bear straight away!

Subtrochanteric



Subtrochanteric

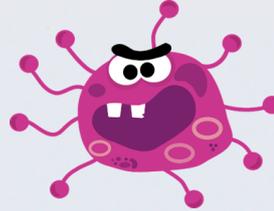


Intramedullary Nailing (IM Nail)

- Subtrochanteric fractures are defined as >5cm below the trochanters. Often these fractures involve the trochanters as well. Remember extracapsular so blood supply intact.
- These are treated with the IM nail that runs the length of the femur and provides stability allowing full weight bearing.

Assessment

History



- The classical history is of an older person who already has co-morbidities increasing their risk of falls (i.e. dementia, frailty, other medical conditions i.e. previous stroke etc.)
- This is often complicated by an intercurrent illness i.e. urine/chest infection which leads to them falling.

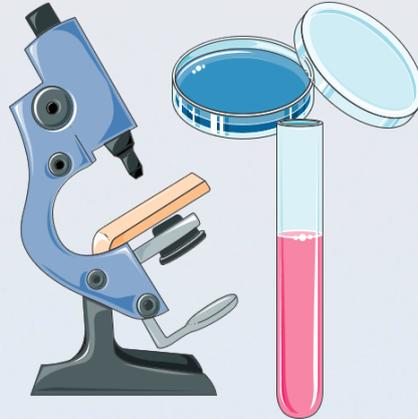
Examination



- Classically on examination you will see: **Shortened, Externally Rotated Leg** held within slight abduction (if you see them acutely in A&E etc.). Pain is elicited on internal/external rotation of the affected limb.
- On the ward always be wary of the older person who is reluctant to weight bear on their leg. If you see this **always ask for a medical review**. It is possible they just have a flare of osteoarthritis or another condition within the leg... but it could be a neck of femur fracture...

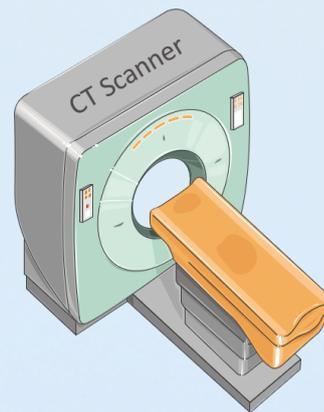
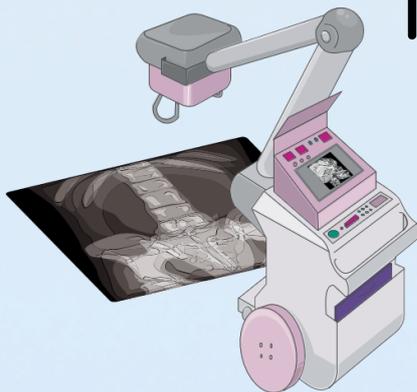
Investigations

Assessing Underlying Cause



- The older person rarely falls as a result of a "trip" -- you will see this in medical notes a lot though as "mechanical fall". The reality in most cases is a multifactorial reason for them falling i.e. co-morbidities and usually a precipitating illness of some form. In A&E the clerking doctor and then the orthopaedic junior doctor will be investigating for the underlying cause with a combination of bloods/ urine sample/ x-rays i.e. chest.

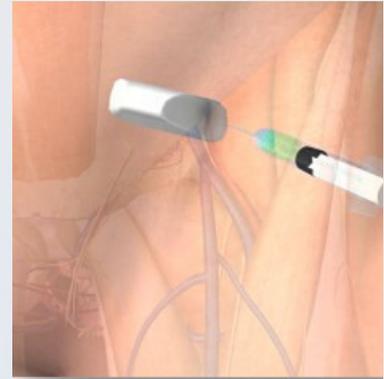
Imaging



- Xray Pelvis (AP and Lateral) on the affected hip normally diagnoses the fracture.
- Sometimes it doesn't yet clinically the patient appears to have a hip fracture. In these cases MRI is the "Gold Standard". In the U.K. due to lack of availability and time needed to complete an MRI we usually use a CT scan if there is uncertainty.

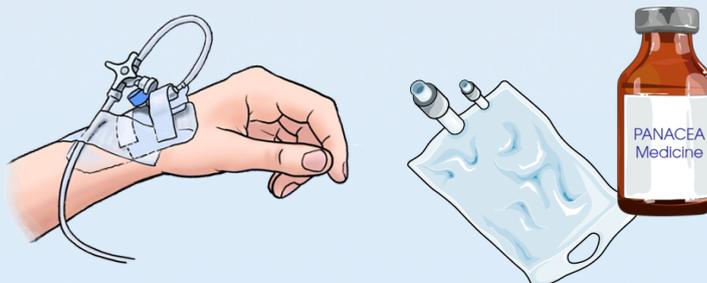
Pre-Operative

Analgesia

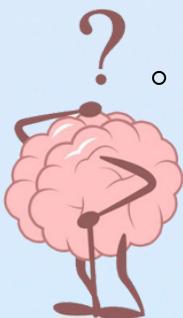


- Normally a combination of paracetamol, NSAIDs and opiates are used.
- There is a movement towards putting in more of the "fascia iliaca blocks". These are a relatively quick and painless procedure of putting local anaesthetic via an injection around the nerves supplying the hip joint which reduces pain without all the other issues that come with the others ---> in particular morphines which cause things like confusion and constipation.

IV Access + Treat Co-Morbidities



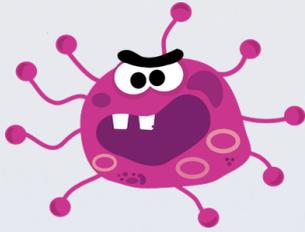
- Doctors will always put a cannula in and ensure blood tests are taken to check the suitability of the patient for an operation, normally to take place the following day. As part of this process they are treating underlying conditions to optimise the patient medically for surgery.



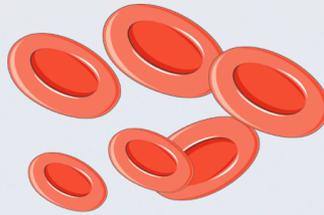
- As part of the initial assessment ALL patients should have their pre-morbid state documented i.e. independantly mobile, mobilised with rollator frame AND their cognitive status i.e. dementia, delirium (acute confusion). This is because it massively impacts the expectations and surgery opted for (see total hip replacement as example)

Post-Operative

Complications



INFECTION



BLEEDING



DVT/PE

- These are 3 key initial aspects we are trying to avoid through working as a multi-disciplinary team. Medical doctors will optimise them from a medical condition perspective.
- Physiotherapy plays a crucial role in getting these patients up and mobilised as soon as possibly safe post operatively.

Medical Treatment

- Will normally involve an orthogeriatrician (medical consultant) who will assess and optimise the patients current medical illnesses both acute and chronic.
- They will also assess them for **BONE PROTECTION**: Vitamin D/ calcium supplements and possibly the bisphosphonates- these drugs specifically work on bone turnover to increase density.
- The orthopaedic surgeon will normally review the patient after surgery fairly quickly (morning ward round) to assess the post-operative imaging (check the prosthesis appears in the correct alignment), to review the wound and then state if they are happy for the patient to be mobilised--> so always check the medical notes for the "post-operative plan"

Post-Operative Physiotherapy Management

Cannulated Screw= **PWB**

Hemi/DHS/THR/IM Nail= **FWB**

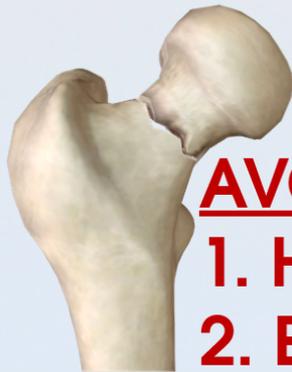


- First check the medical/ surgical notes specifically for what the post operative plan reads. The above is ONLY a general guide.
- Normally the patient will be weight bearing straight after the surgery (Day 1).
- If they have cannulated screws though, this normally means partial weight bearing for 6-8 weeks until the surgeon is happy there is sufficient bone healing to progress to full weight bearing.
- You start day 1 by sitting the patient over the end of the bed. They would then normally be encouraged to trial sit to stand with assistance. If they are still feeling well and their observations are remaining normal then a short distance of mobilisation with a frame is usual.
- Day2-3 the patient may be ready to progress to more exercise between parrallel bars in the gym and progress their mobility onwards aiming rollator frame --> crutches--> single stick etc.
- Exercise programmes vary dependant upon where you work but as a general rule things begin in a fairly static position: static quads, gluteal squeezes, ROM exercises knee/ankle.
- The key is AIM for FUNCTION, this should be personalised to the patient.
- Higher level strengthening can normally begin 6-8 weeks after operation. Higher impact activity at 3 months post op.

Post-Operative

Hip Rules

Intracapsular – Hemi/Total Hip Precautions



AVOID FOR 3 MONTHS:

1. Hip Flexion $>90^{\circ}$
2. External Rotation
3. Adduct $>$ Midline
4. Truncal Flexion $>90^{\circ}$.

Extracapsular – DHS/IM Nail Increase MVT as Able



- The above provides a general set of rules dependant upon what operation the patient has regarding what you can and cannot do after the operation.
- Always check specific post op instructions for each patient to be absolutely sure.

Discharge Planning

Multidisciplinary Team

- Patients who have suffered a neck of femur fracture have an average stay in hospital of 10-14 days.
- They should ALL be reviewed weekly in the MDT meeting so that everyone can input on their current care, rehabilitation progress and the aims for discharge.
- It is of course completely personalised for each patient.
- The MDT will normally be led by the orthogeriatrician and will also include the charge nurse/ nurse involved in the patients care, orthopaedic junior doctor, occupational therapist, physiotherapist and the discharge coordinator +/- others involved in the patients care.
- In this meeting everyone will input their views on the respective aspects of the patients care so that a plan can be made on where the patient will be discharged and their expected date of discharge.
- Some patients will be able to go home: Occasionally early e.g. at 7 days (but this is rare). Some will need more rehabilitation in an outpatient community setting OR inpatient ward (if they still need medical input as these inpatient rehab wards tend to have doctors for this vs community where they rarely have onsite doctors).
- Some people will have limited rehabilitation potential and as a result will be considered for either short term respite care, with a view that they might be able to return home after recovering from their illness/ fracture. Another proportion will be more frail and not able to return home and so will be transferred to a residential/ nursing home dependant on long term care requirements.

Neck of Femur Fracture Cases

Here are 5 cases that will test your knowledge and ask you to think laterally about a problem. Application of knowledge is key to understanding a topic. Have a think about each question, write your answer and think about why you have put this, then go to the following page to see the answers!

Case 1

Mrs Smith is 84 years old. She is frail and has been losing weight recently with a chronic cough and new haemoptysis. She had a fall whilst in her care home and now is having difficult weight bearing on her right leg. On review the leg appears shortened, externally rotated and on any attempt at passive movement of the hip joint it causes severe pain.

Question 1 - What Does the X-Ray Below Demonstrate?

Question 2 - What is the most suitable treatment for her?

Question 3 - What is the relevance of the weight loss and haemoptysis?



Case 1 - Answers

Question 1 - What Does the X-Ray Below Demonstrate?

Right Intertrochanteric NOF# with Subtrochanteric Extension

This x-ray shows an intertrochanteric fracture, you can say this because if you look at the fracture the lesser and greater trochanter are involved. However, it shows subtrochanteric extension, remember this means the fracture line goes further than 5cm below the trochanters.

Question 2 - What is the most suitable treatment for her?

Intramedullary Nailing

The most suitable treatment in this case would be intramedullary nailing. You cannot use a dynamic hip screw for subtrochanteric fractures because it will not provide the stability you are wanting. An I.M nail will allow stability and for the patient to mobilise the following day.

Question 3 - What is the relevance of the weight loss and haemoptysis?

Lung Cancer with Bony Metastasis

This is quite a medical question for the doctor, however, it is interesting to understand. She has weight loss and haemoptysis. In this case we are suggesting she may have a lung cancer. Breast, Lung, Kidney, Thyroid and Prostate primary cancers typically metastasise to bone and when you see a fracture like this you should always think..... is this a pathological fracture due to a bone tumour?
(either primary or secondary to another cancer)

Case 2

Mrs Jones is 75 and was admitted to the hospital with pneumonia. You see her on the respiratory ward and as part of her rehabilitation she is now mobilising with a rollator frame. You notice she is reluctant to put her weight fully onto the left leg. You check with Mrs Jones and the medical team, she has no history of trauma. You discuss this issue with the junior doctor on the ward who requests a left hip x-ray.

Question 1 - What Does the X-Ray show?

Question 2 - What is the most suitable treatment for her?



Case 2 - Answers

Question 1 - What Does the X-Ray show?

Osteoarthritis of the left hip joint

This x-ray shows quite severe osteoarthritis of the left hip joint. An easy way to remember the xray features of osteoarthritis is the mnemonic **LOSS**: loss of joint space, osteophyte formation, subchondral cysts, subchondral sclerosis. ALL of these features can be seen on this X-ray.

Question 2 - What is the most suitable treatment for her?

Analgesia and Graded Rehabilitation

The most suitable treatment is actually first to ensure the medical team provide Mrs Jones with appropriate analgesia so that she can then begin to mobilise more. She should also be given range of movement and gentle hip restrengthening exercises to do whilst not with her physiotherapy team. In the longer term once she has recovered from her pneumonia, over the next few months, would be to see her GP to consider referral to the orthopaedic team for consideration of a total hip replacement.

Case 3

Mr. Patrick is a 60 year old male. He is known to have osteoporosis which was found after a colles fracture he suffered a year ago after a slip in the garden. He has been taking some vitamin d supplements over the counter to "build up his bones". This weekend he has been outside and slipped on his wet patio and presented to A&E with inability to weight bear on his right leg with severe pain within his groin.

Question 1 - What Does the X-Ray Below Demonstrate?

Question 2 - What is the most suitable treatment for him?

Question 3 - What medication should the medical team consider?



Case 3 - Answers

Question 1 - What Does the X-Ray show?

Right Inter-trochanteric NOF#

This x-ray shows an intertrochanteric fracture which is quite clear on this image. You can see quite a clear fracture line running between the trochanters. Remember as the rule of thumb if the lesser trochanter appears involved the fracture is likely to be an intertrochanteric one (rather than intracapsular)

Question 2 - What is the most suitable treatment for him?

Dynamic Hip Screw

The dynamic hip screw will provide good stability and the added benefit of compression at the fracture site when weight bearing. This will allow Mr Patrick to start weight bearing day 1 after surgery which will be important to prevent many common unwanted post-operative side effects: blood clots, infections, constipation, low mood, longer hospital stays.

Question 3 - What medication should the medical team consider?

Bisphosphonates

These are medications which slow bone resorption (bone breakdown) and thereby aid with building bone density. Commonly used drugs you will come across are: alendronic acid, zoledronic acid-- to name a couple. These medications are used in patients with osteoporosis (as defined by a DEXA scan..... but we dont scan if you are over 75 with a fragility fracture, we just assume you will have osteoporosis and start treatment!)

Case 4

Mr. Hunter is an 82 year old male with dementia and parkinsons disease. He lives within a care home and despite having a walking stick rarely uses it according to the carers with him and has "quite a few falls". He got out of bed to go to the toilet this morning and his carers heard a thud. On arrival they found him on the floor. He was unable to get back to his feet. You can move his left leg but it is quite difficult owing to his parkinsons disease her has quite a lot of hypertonicity and it is difficult to tell if he is in pain as he appears quite confused.

Question 1 - What Does the X-Ray Below Demonstrate?

Question 2 - What is the most suitable treatment for him?

Question 3 - What walking aid would you aim towards post-operatively?



Case 4 - Answers

Question 1 - What Does the X-Ray show?

**Left Undisplaced Intracapsular NOF#
(Garden 1 with valgus impaction)**

This x-ray shows an undisplaced intracapsular neck of femur fracture. Remember forgetting the garden classification for a second, which is somewhat academic, the important thing to remember is spotting an intracapsular fracture. For most people that will mean they require a hemiarthroplasty/total hip replacement (see rules for these earlier on). If the patient is young i.e. <50 then you might be more tempted to manage them non-operatively if the fracture is non-displaced as they are likely to wear-out any surgical prosthesis you use and therefore require challenging revision surgery (best avoided wherever possible).

Question 2 - What is the most suitable treatment for him?

Left Hip Hemiarthroplasty

A Hemiarthroplasty is the correct choice as its a reasonably quick operation (lets say 30-45 minutes for the highly efficient surgeon), it relieves pain, do not need to follow hip precautions, can get him back on his feet (hopefully) day 1 post operatively... or at least try.

Question 3 - What walking aid would you aim towards post operatively?

Rollator Frame

Ideally we would be aiming to get him on to a rollator frame if possible. He is struggling to use a single stick already, two sticks in a patient with dementia and parkinsons is going to be very difficult to get him to use competently. A frame will offer good support and confidence.

Case 5

Mrs. Jenkins is 60 years old. She had a bad fall about a year ago on the ice and landed badly on the right hip. She remembers "months of pain" and difficulty weight bearing. In fact since then she just feels it has never gotten fully better and has had persistent pain in the left groin to such an extent she now walks with a stick. Otherwise she is fit and well. She is really wanting to get back to her hobby of walking.

Question 1 - What Does the X-Ray Below Demonstrate?

Question 2 - What is the most suitable treatment for her?



Case 5 - Answers

Question 1 - What Does the X-Ray show?

Left Femoral Head Avascular Necrosis.

The fall a year ago based on this history and xray findings was actually when she most likely sustained an intracapsular neck of femur fracture. She managed this herself and unfortunately, as is the concern with intracapsular neck of femur fractures, the blood supply to the femoral head was disrupted during this fracture. this has led to poor healing and subsequent lack of blood supply to her femoral head and avascular necrosis (you can see the fairly opaque, irregular appearance of the head which is characteristic of this).

Question 2 - What is the most suitable treatment for her?

Left Total Hip Replacement

Mrs Jenkins is otherwise fit and well and normally enjoys alot of walking. She would be suitable for a total hip replacement as she meets the criteria for this, it would likely resolve the pain and provide her with the functionality and length of use she would require out of a hip replacement. She will also be able to follow post operative hip precaution protocols..... whilst on this point remember that in future years as prostheses continue to improve and can be made as almost exact replicas of our innate hip joints these hip precautions will slowly dwindle away. Currently there is still a higher risk of dislocation of the hip joint after surgery so it is generally a good idea to follow the aforementioned hip precautions for around 3 months. post operatively.