MSS

Sheet no.

Pathology

Writer: **Malek Absia**

Corrector: **Rana Ma'mun**

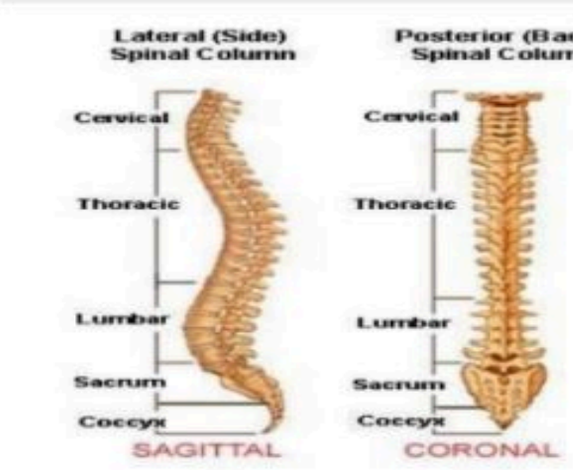
Doctor: **Fadi Hadidi**

❖As you know from the last lectures we have 33 vertebrae and the intervertebral disks (cartilaginous tissue) between them.

❖We call each group of vertebrae according to the site they present.

❖There are 4 group of vertebra: -

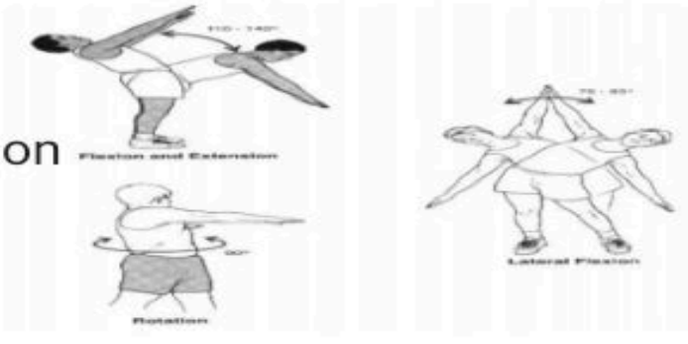
I. cervical (in the neck)
II. thoracic (in the chest)
III. lumber (in the abdomen)
IV. sacrum and coccyx (in the pelvis)



➢ why the vertebral column isn't one piece? why it is multiple parts?

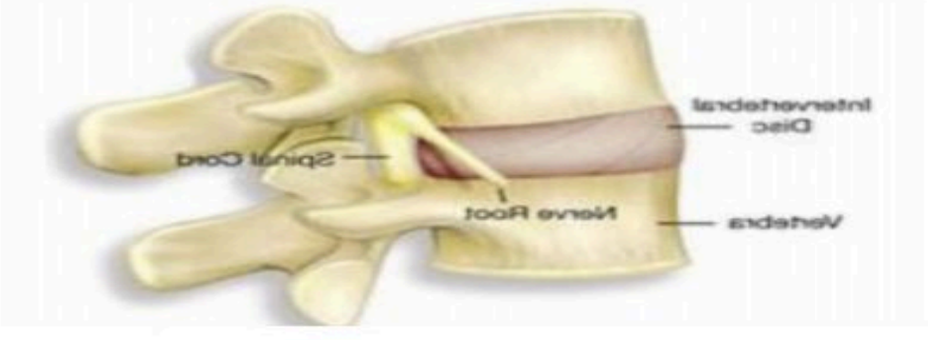
The answer is to have multiple joints and to give the flexibility and to compensate any deformity that could happened to vertebral column .

And to do complex motion like flextion with bending or extension with rotation



Vertebral segment :- it is functional unit made of 2 vertebra and the intervertebral disk between them (it is like a joint).

it is look like a sandwich



- The vertebral column in the coronal view it appears strait but in sagittal view it appears multiple curves ,why?

  The main function of the vertebral column is the maintain the head central over to pelvis in order to align our brain to work in an equilibrium

- We are most affected by gravity ,so the gravity should be equal between right and left part of the body , so if the gravity line is shifted to the right or left our brain will not work properly .

❖What will happen if there is any deviation ??

There are some diseases result from deviations to the right or the left :- 1) torticollis 2) scoliosis .

❶ Torticollis (wry neck)

This image show the child with torticollis due to contracture in sternocleidomastoid muscle because his position in uterus wasn't proper

There are many manifestation in torticollis upon the direction of deviation , for example of there is shift of she gravity line to the left side it will not allow the organ to grow properly and the result is facial asymmetry like A) the left eye is smaller than the right eye B) the left nostril as smaller than the right nostril C)the cheek of the left is smaller than the right cheek D) the mouth in the left side is smaller than the right part

يعني لو صار معاه انحراف للطرف اليمين بصير العكس يعني بتكون عينه اليمين اصغر من اليسار وانفه اليمين اصغر من اليسار الخ الخ

- Treatment:- surgical interfere to correct column

❷Scoliosis

Multi factorial genetic cause disease and most common in female

In this image patient with scoliosis to the right side (it is different if it was to the left like torticollis) .

A) The trunk is shifted to the right
B) the right sholder is higher than the left

يعني لو كان الانحراف لليسار بكون الجذع رايح لليسار والكتف الايسر اعلى من الايمن

- treatment :- surgical interfere to correct the column .

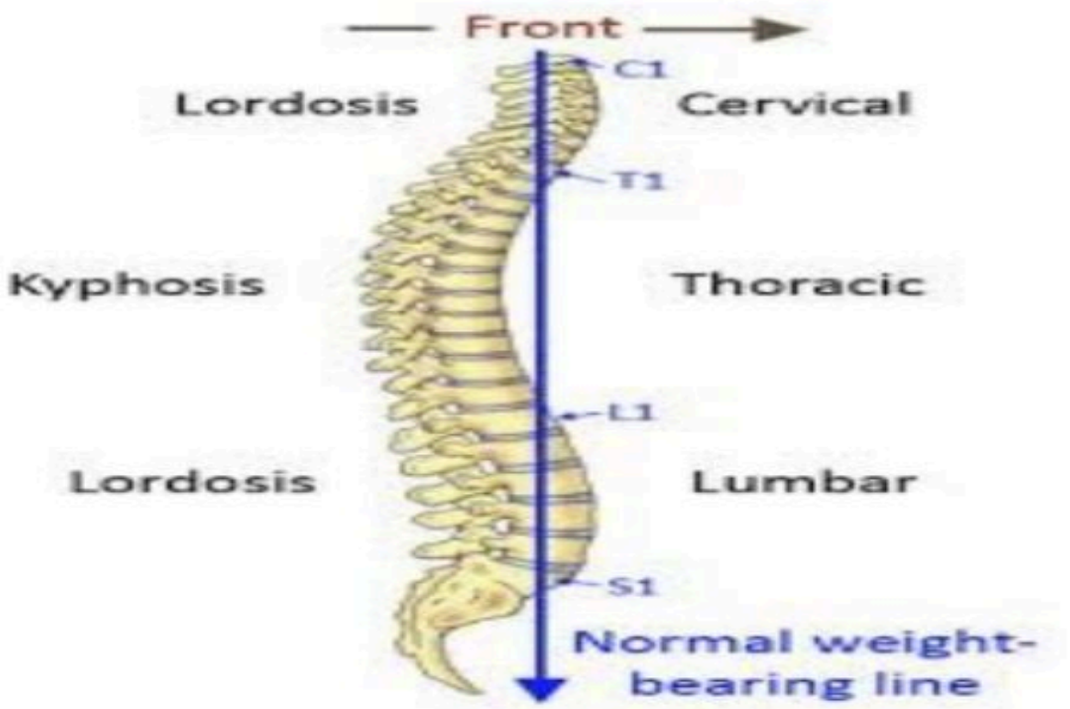
❖ in the normal vertebral column we have 4 normal curves :-

1- cervical lordosis
2- thoracic kyphosis
3- lumber lordosis
4- sacral kyphosis

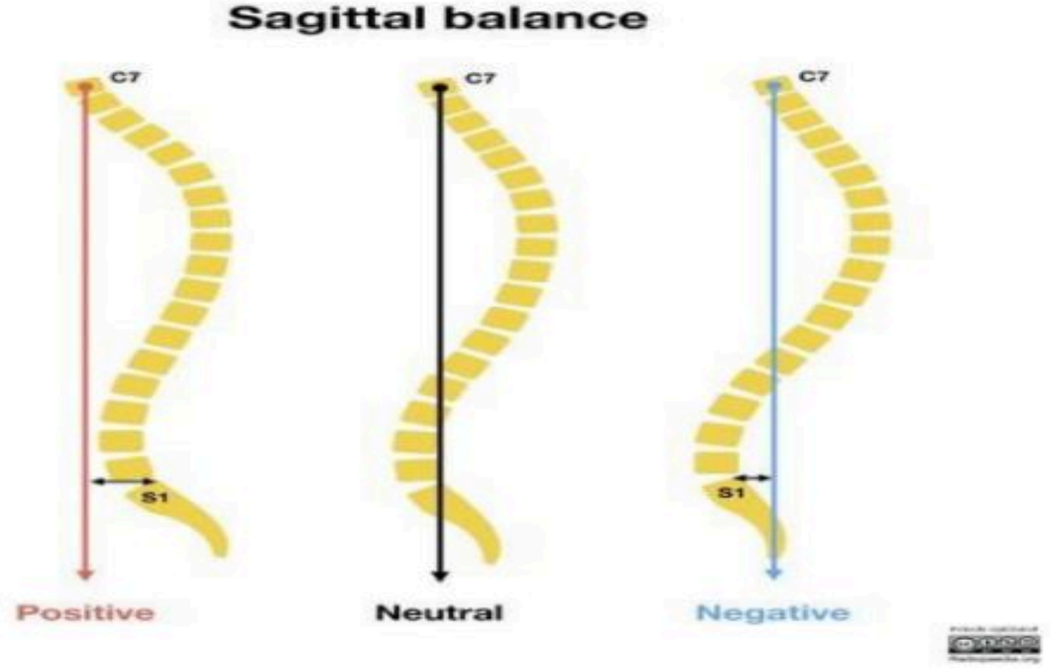
- in the new born the vertebral column present in c shaped (kyphosis) to protect our internal organ, and then they will develop 2 lordosis (cervical and lumbar)

As we said before we under affect of the gravity line, so the gravity line pass through vertebral column and it may destruct the vertebrae, so the presence of these curves will allow the gravity line to be present anterior to the column in the area of kyphosis and posterior in the area of lordosis, so the vertebral column it will not be affect by the gravity line, so 50% of the gravity line is anterior to the column in the area of kyphosis and 50% of the gravity line is posterior to the column in the area of lordosis , so we not affect under the gravity line anymore .

لو كان العمود الفقري مستقيم وما فيه انحناءات للامام وللخلف كان تكسر بسبب تاثير الجاذبيه بس هة الانحناءات بتخليه ما يتاثر بالجاذبيه لانو تقريبا نصفه بكون امام خط الجاذبيه ونصفه الاخر خلف خط الجاذبيه



- If the gravity line is shifted anteriorly it is called **positive sagittal balance**
- If the gravity line is shifted posteriorly it is called **negative sagittal balance**



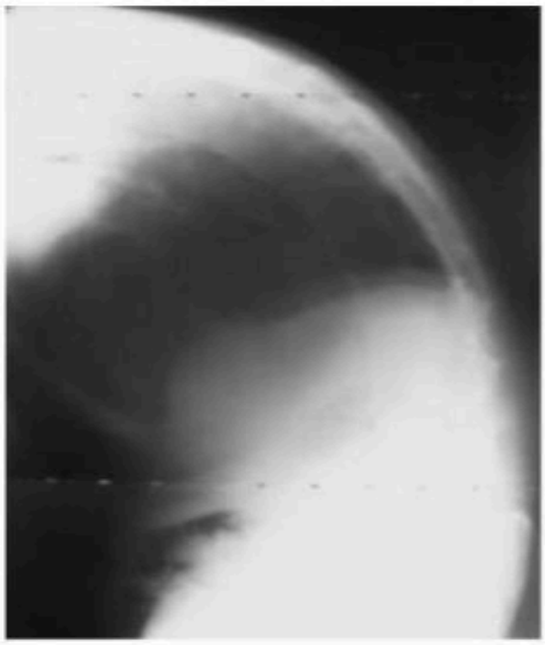
Positive sagittal balance we will have:-
1)headache 2)migraine
3)decrease in cervical motion 4)chronic neck and back tension
5)cardiovascular disease 6)pulmonary disease

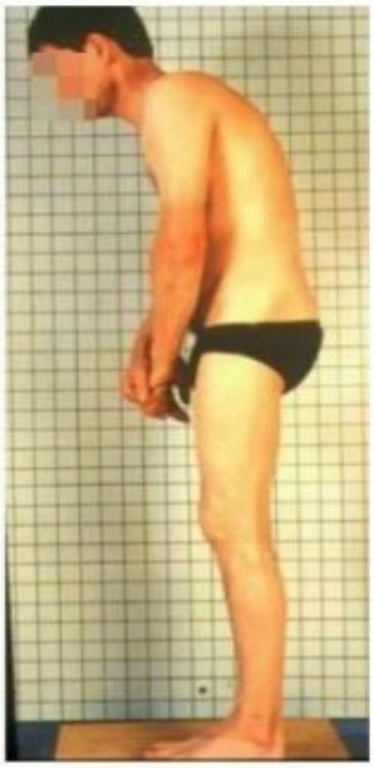
Now lets discuss some clinical cases related to positive sagittal balance (cause kyphosis)

❶ Ankylosing spondylitis

It is inflammatory disease that over time will cause exaggerated kyphosis

- Treatment:- surgical treatment





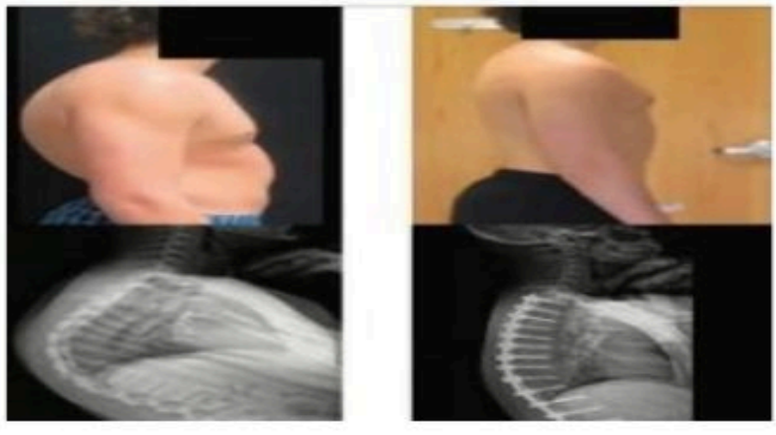
This patient all his joints are ankyloised so he can not do extension,all the time he is under the effect of gravity so he is always in flextion posture ,if we left the patient without tretment it will interfere with his cardiovascular system and his pulmonary system

❷ Schuermans kyphosis

Developmental type of kyphosis (means that this disease occur during growth) and this disease affect the adolescent age group

- **Symptoms** :- 1)hyper kyphosis due to abnormal developing in the anterior half of the body of the vertebra 2)decrease in the blood supply in the anterior half of the body of vertebra 3) severe back pain
- **Treatment** :- surgical treatment

Certain patient they have decreased in the blood supply from the anterior half of the body of the vertebra so the posterior half of the body of the vertebra will grow more than anterior half and the net result will be wedging of the vertebra so the will develop hyper kyphosis and if we left the patient it will develop pulmonary problems and cardiovascular diseases and neck and back pain



Hyperkyphosis with time will affect the respiration and develop pulmonary problems and cardiovascular diseases

❸ Osteoporosis

This disease make the bone to become weaker , so the ability of the bone to midstand the affect of gravity line will decrease , so the gravity line will shift the patient toward anterior so that develops sagittal imbalance and develop hyper kyphosis

- Treatment :- A) medical treatment to decrease the progression of osteoporosis B) surgical treatment

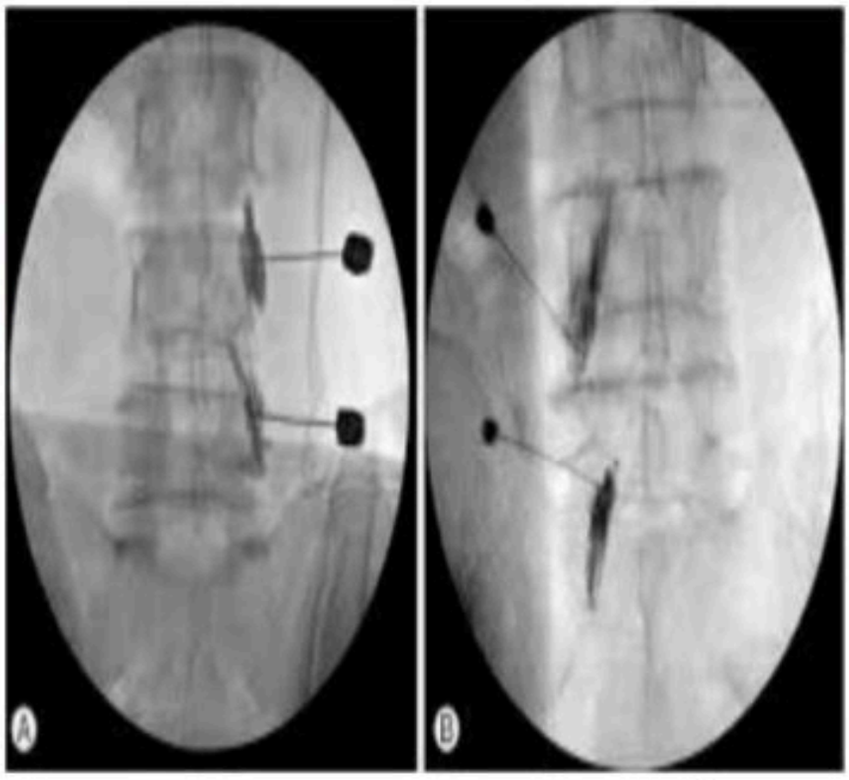
---

Negative sagittal balance will have :-
1)facet joint arthropathy 2)overload sacroiliac joint
3)overload hip and knee joint 4) muscle strain
5)fracture of pars interarticularis 6)spondylolisthesis

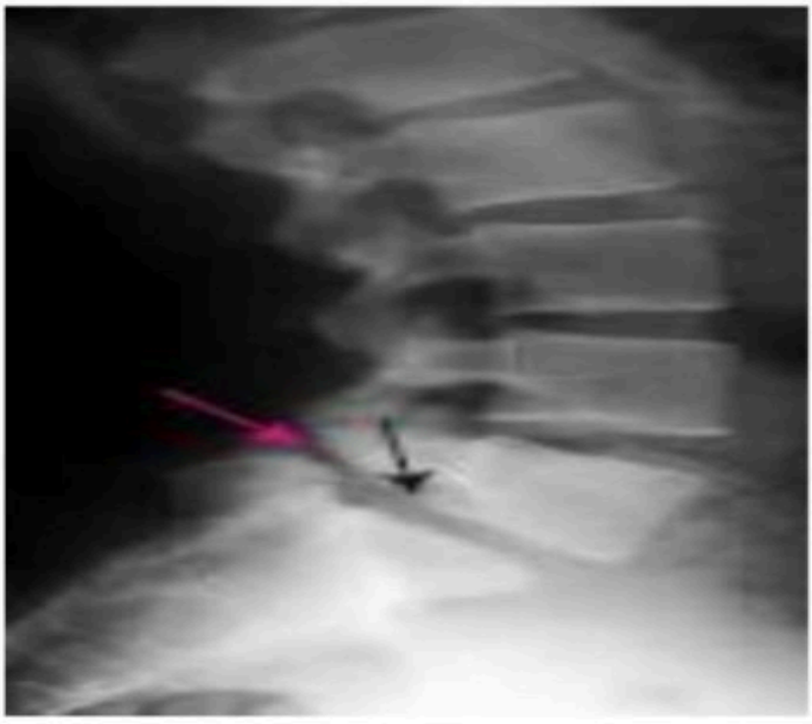
The most common cause of negative sagittal ballance is obesity and it also can occure during pregnancy

Know lets discuss these symptoms

In this image we have facet joint arthropathy , these joints
Are synovial joints, so when there overload they will develop osteoarthritis and severe pain in the back , so we need to interfere in order to decrease the pain by injecting certain medication inside the joints

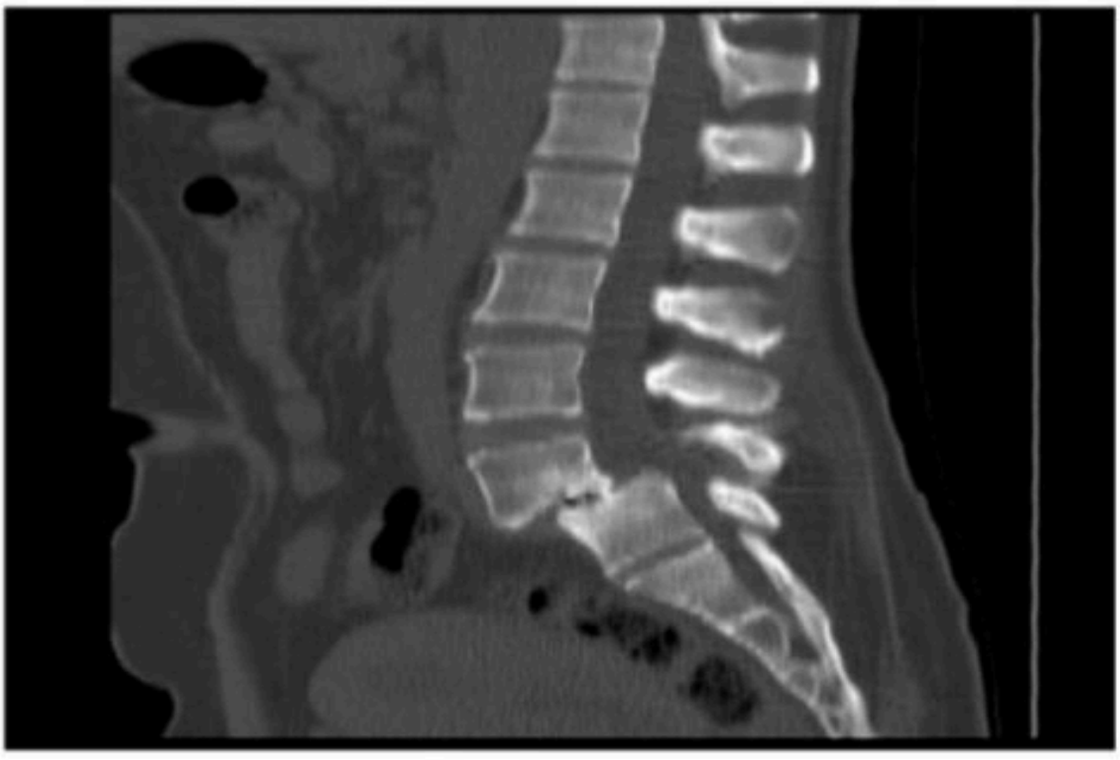


Now this image show the interarticularis area of lumbar vertebra and this is area between lamina and pedicle



In case of negative sagittal balance it will be overloaded by stress from the gravity and over time it will develop fracture in this area and the patient will complain of severe pain and this is what we called spondylolysis .

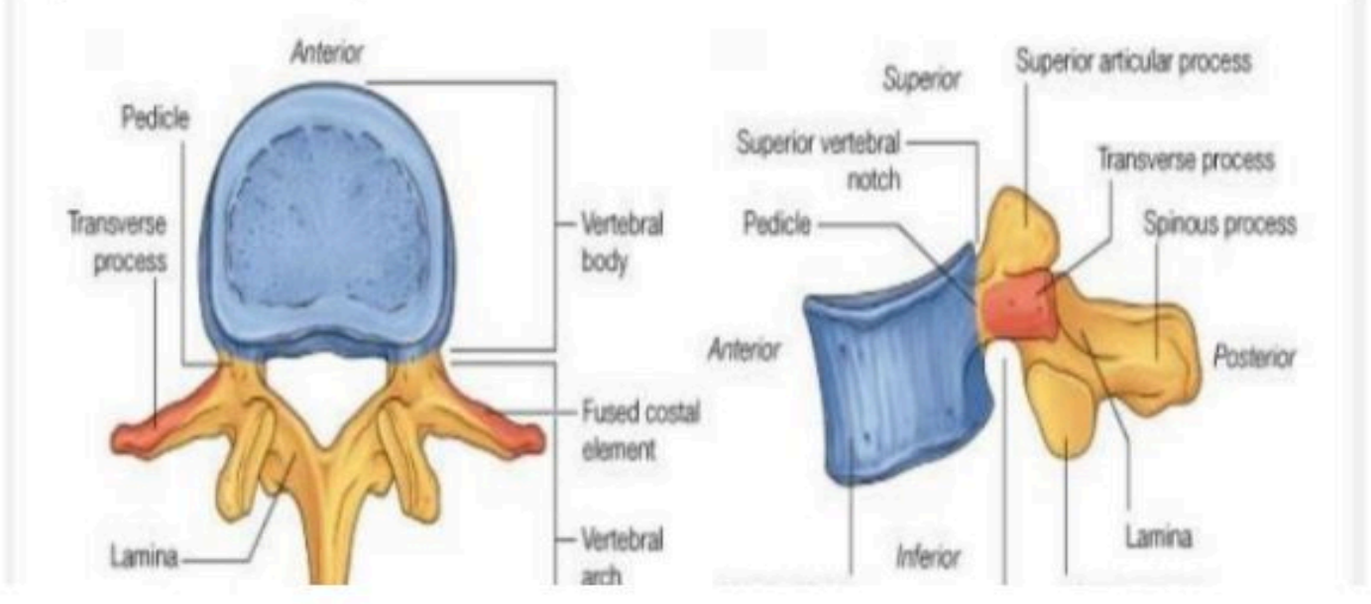
If we left this patient who has spondylolysis without treatment it will develop to spondylolisthesis (listhesis means shifting of the vertebrae)

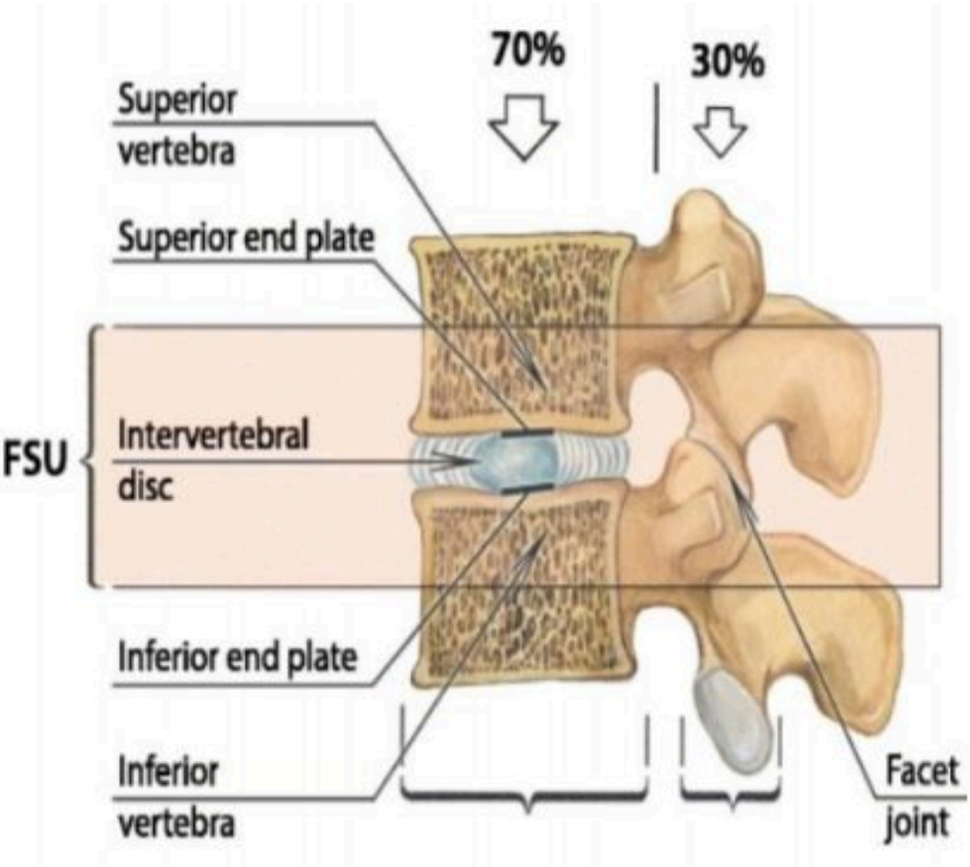


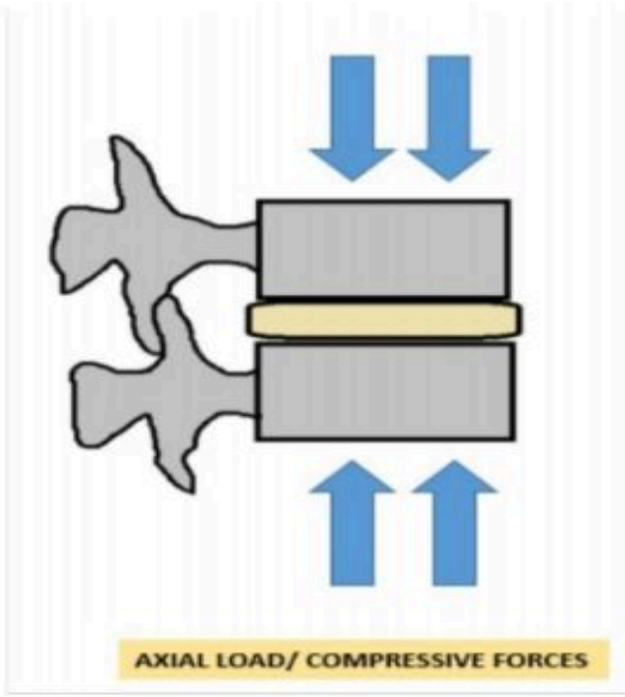
To summarize :- spondylolysis means fracture -------if the fracture doesn't heal or treat and the vertebra shifted anteriorly this is the spondylolisthesis

Now lets discuss some clinical cases related to negative sagittal balance (cause lordosis)

- We found that 70% of the load is over the body of vertebra , while the 30% of the load is on the posterior part pf the vertebra and for this reason the body of the vertebra is very important part because it carry most of the load and it is sharing the load with intervertebral disk , because the intervertebral disk act as a cushion and help the vertebral body to stand with 70% load .



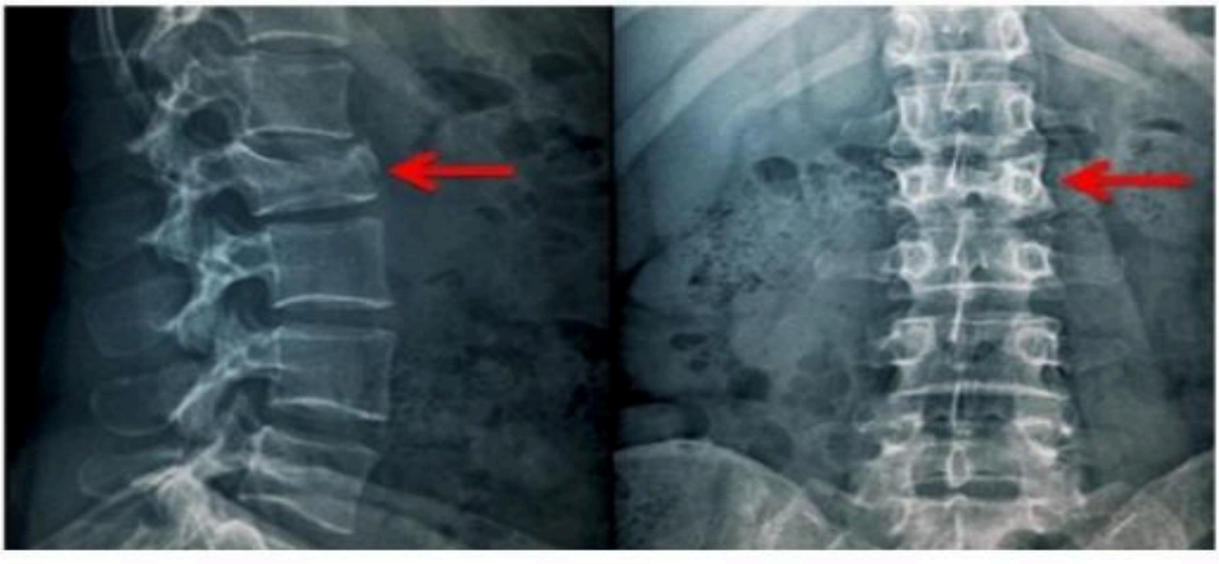


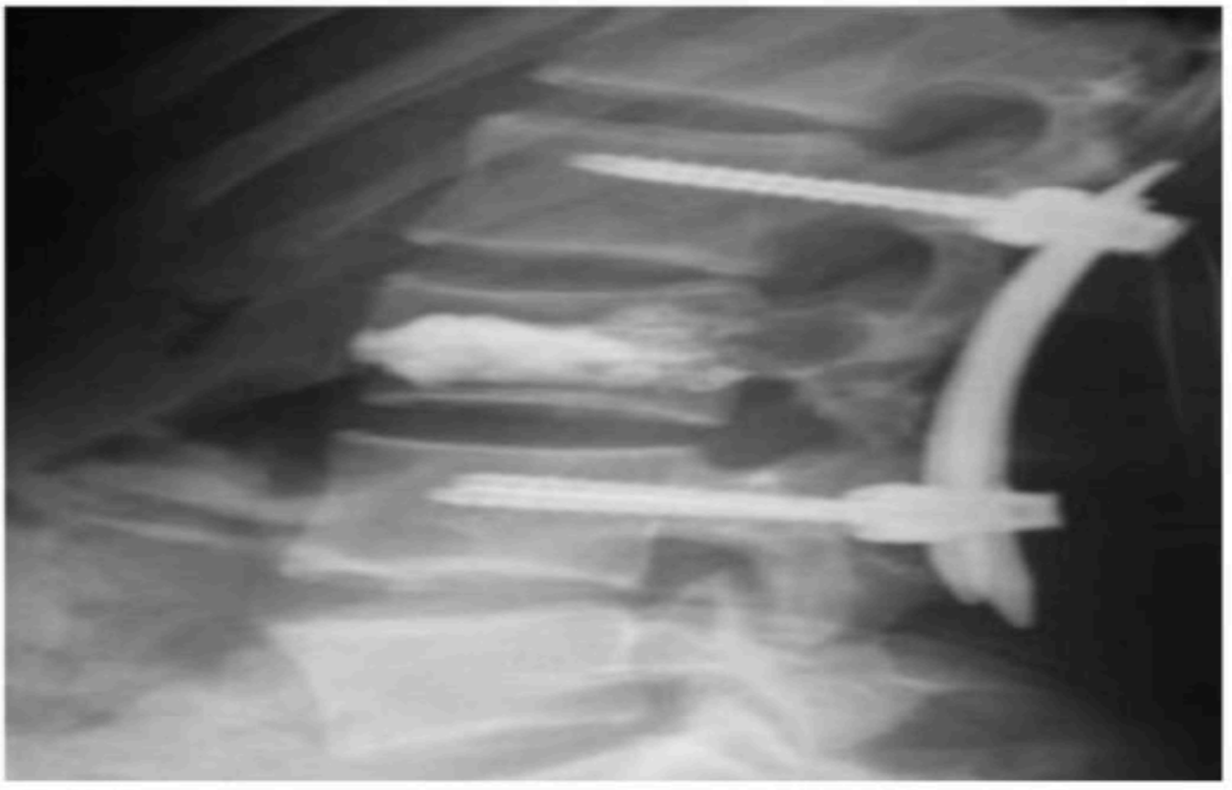


- **Sometimes the vertebra cant withstand this load and it will make fracture of the vertebra and this case is dangerous because the patient will develop paralysis and injury to spinal cord ,**

  - **Treatment:-**

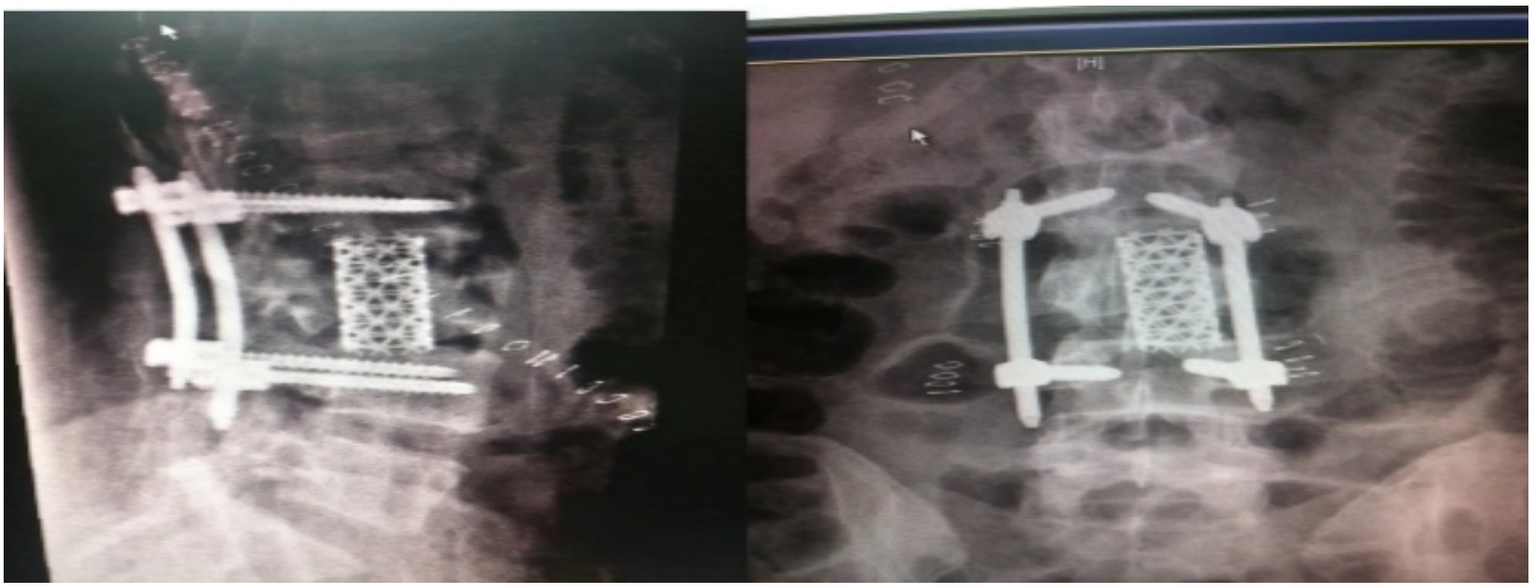
so we have to interfere in order to stabilize and restore the function of the body of the vertebra by insertion of bone graft or bone cement .





- **Sometimes the load will be very huge such as falling down from high buildings that cause destroy the whole body of the vertebra and the posterior arch and it is called burst fracture >>> see the red image**

- **Treatment :-**
  In this case (burst fracture) we have to interfere in order to restore as much as possible the integrity of the body of the vertebra and the posterior structure by replacing the vertebra with metallic vertebra and support this metallic vertebra by screws from posterior in order to restore integrity .



Take home message

***Normal alignment of spine is critical for optimal function**

***Sagittal balance is major predictor of disability related to chronic back pain especially in elderly patient like osteoporosis**