Imaging Expert

Chiropractic Measurements

Sep. 8th, 2016
Strategic Planning Team

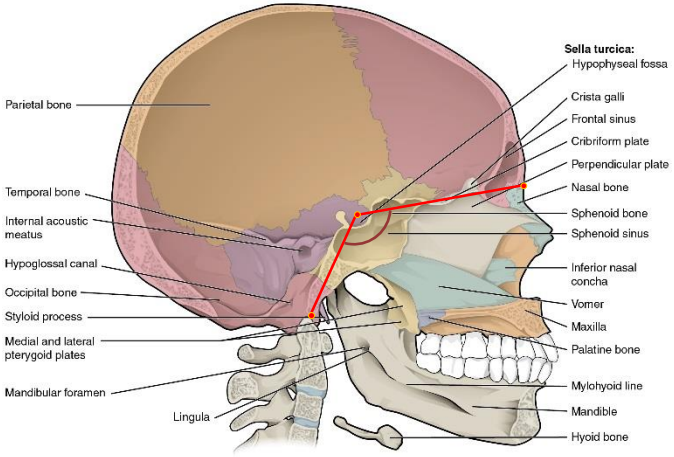
CONTENTS

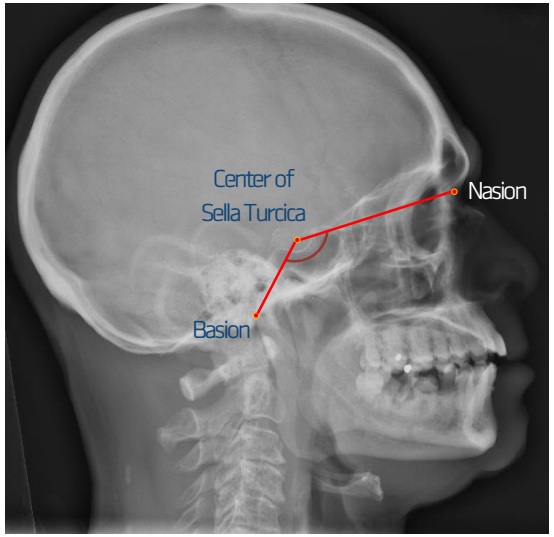
Chiropractic Measurements

1. Skull
2. Spine Common
3. Cervical Spine
4. Thoracic Spine
5. Lumbar Spine
6. Upper Extremity
7. Pelvis
8. Lower Extremity
9. Uncovered Items
10. Reference

Skull

Basilar Angle





QXLink 3.2 function

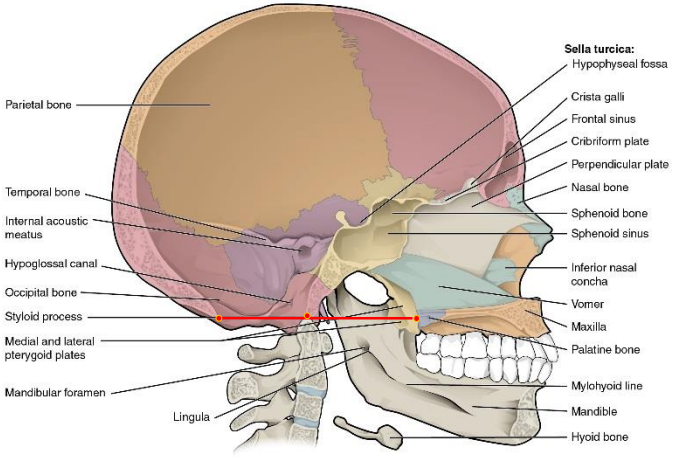
Cross Angle with 2 Lines

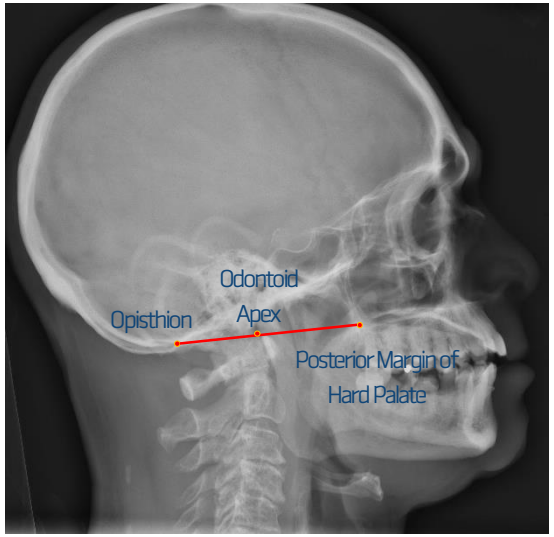
Item	Description
Also Known As	Welcker's basilar angle, Martin's basilar angle, Sphenobasilar angle
Object	Skull
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by the intersection of nasion, basion, and the center of sella turcica
Diagnosis	This Angle is bigger than 152 degree, then platybasia is present. It may be associated with basilar impression
Range	

Item	Average	Minimum	Maximum
All	137	123	152

Skull

Chamberlain's Line



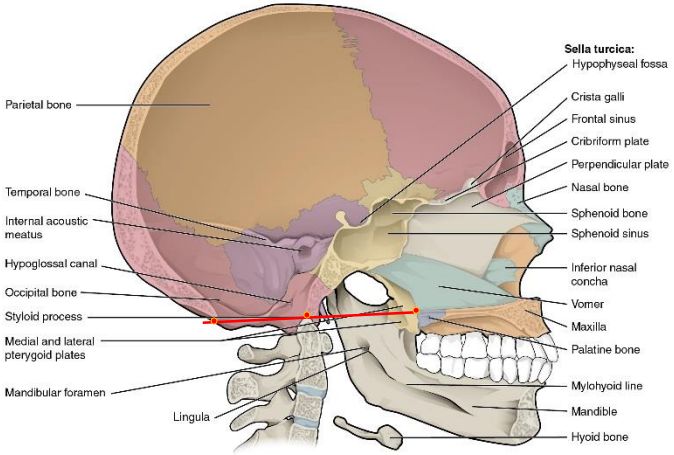


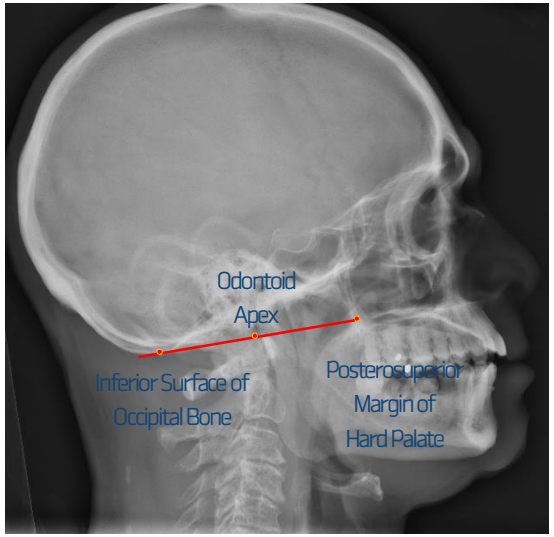
Item	Description
Also Known As	Palato-occipital Line
Object	Skull
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	Line from posterior margin of hard palate to opisthion compared against the location of the odontoid process (dens)
Diagnosis	The tip of odontoid process is over 6mm above this line, basilar impression is present
Range	

Item	Average	Minimum	Maximum
All	3	-	6

Skull

McGregor's Line



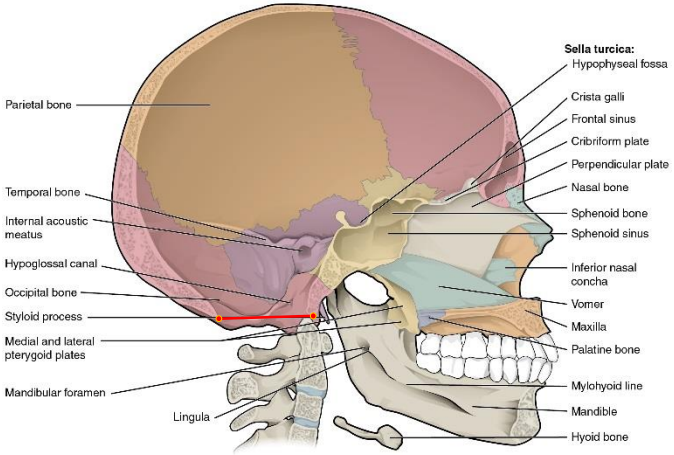


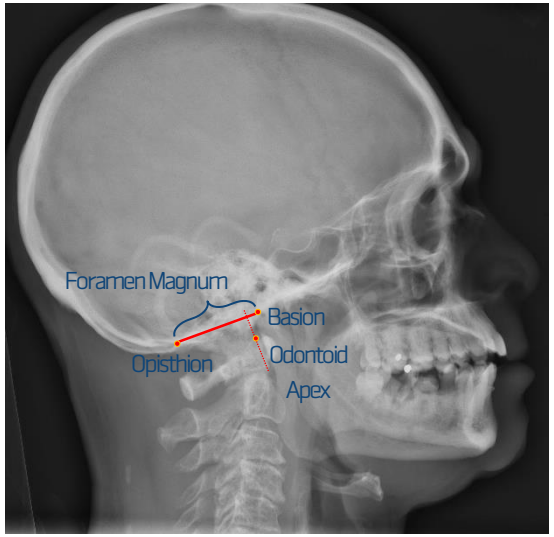
Item	Description
Also Known As	Basal Line
Object	Skull
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	Line from posterosuperior margin of hard palate to the most inferior surface of occipital bone (occiput) compared against the locations of odontoid process (dens)
Diagnosis	Abnormal superior position of the odontoid may indicate that basilar impression is present
Range	

Item	Average	Minimum	Maximum
Male	-	8	-
Female	-	10	-

Skull

Macrae's Line

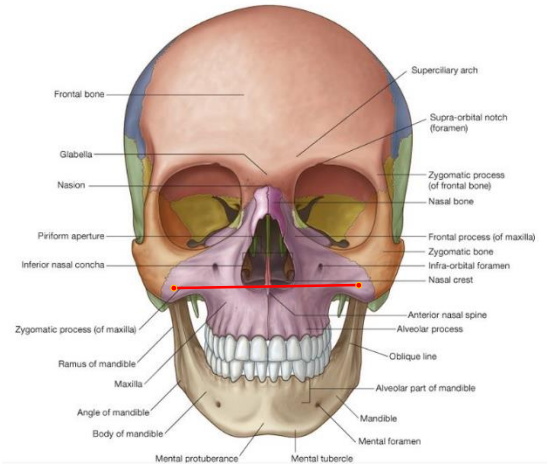


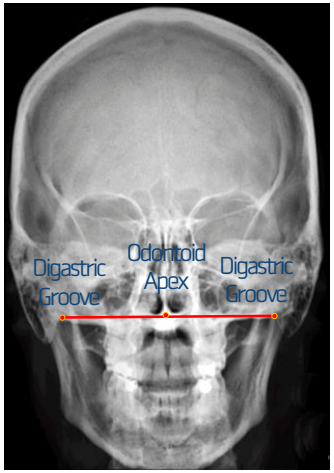


Item	Description
Also Known As	Foramen Magnum Line
Object	Skull
Projection	Lateral (No Flexion Distortion)
Measurement Type	Location Comparison
Definition	Line drawn from basion (anterior margin of foramen magnum) to opisthion (posterior margin of foramen magnum)
Diagnosis	If a perpendicular line drawn through odontoid apex is not intersect this line in its anterior quarter, a dislocation of atlanto–occipital joint or fracture/dysplasia of dens may be present. If inferior margin of occipital bone is convex in a superior direction and/or lies above this line, then basilar impression is present.

Skull

Digastric Line





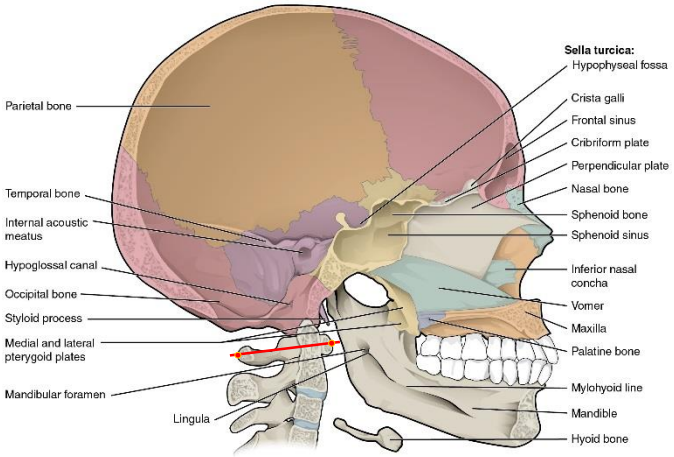
Item	Description
Also Known As	Biventer Line
Object	Skull
Projection	AP (Open Mouth)
Measurement Type	Distance (Millimeter)
Definition	Line drawn between right and left digastric grooves
Diagnosis	Distance from odontoid apex to digastric line and distance from atlanto-occipital joint to digastric line are measured. Both measurement will decrease in basilar impression.
Range	

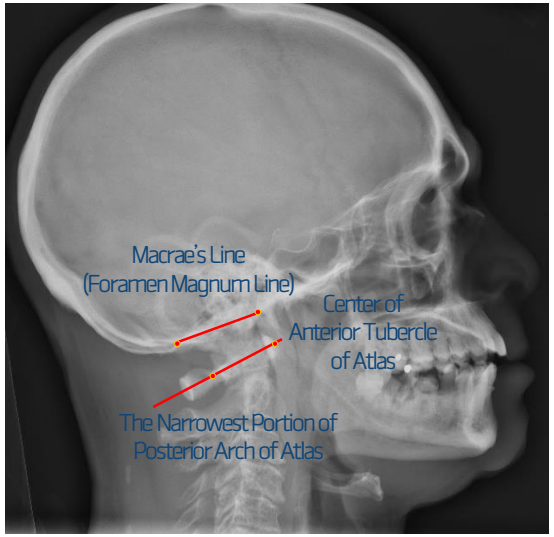
Item	Average	Minimum	Maximum
Digastric line – odontoid apex	11	1	21
Digastric line – atlanto-occipital joint	12	4	20

Skull

Atlas Plane Line

Line



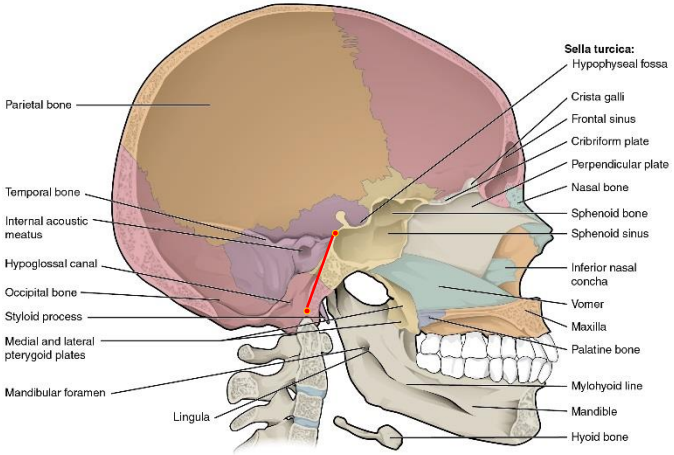


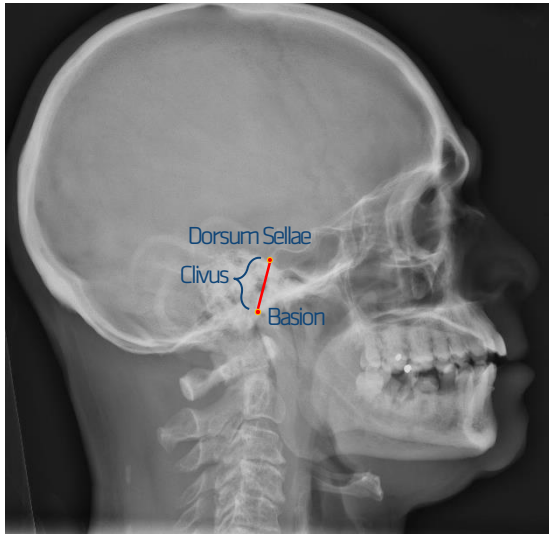
Item	Description
Also Known As	APL
Object	Skull
Projection	Lateral
Measurement Type	Parallelity
Definition	Line drawn through the center of the anterior tubercle and the narrowest portion of the posterior arch of atlas
Diagnosis	Atlas Plane Line and Macrae's Line should be parallel (Occipitoatlantal Alignment). Divergence of them suggests anterior–superior malposition of occiput or posterior–superior malposition of occiput.

Skull

Wachenheim's Line

Line

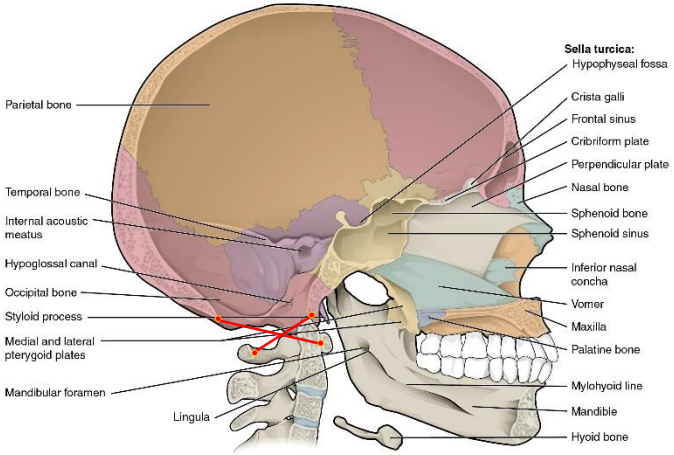


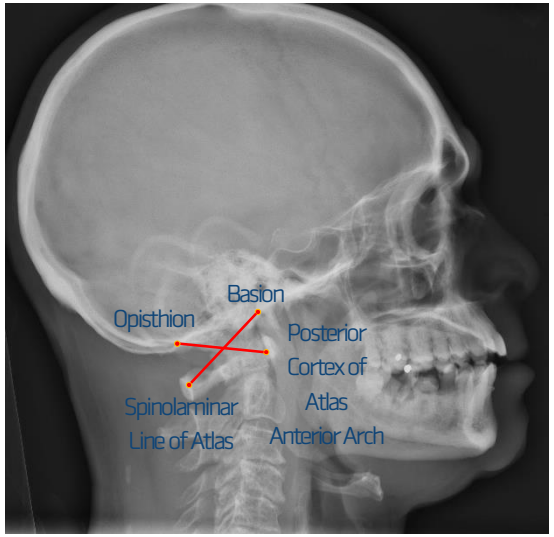


Item	Description
Also Known As	–
Object	Skull
Projection	Lateral
Measurement Type	No Measure
Definition	Line drawn from dorsum sellae along clivus to basion pointing to dens
Diagnosis	–

Skull

Power's Index



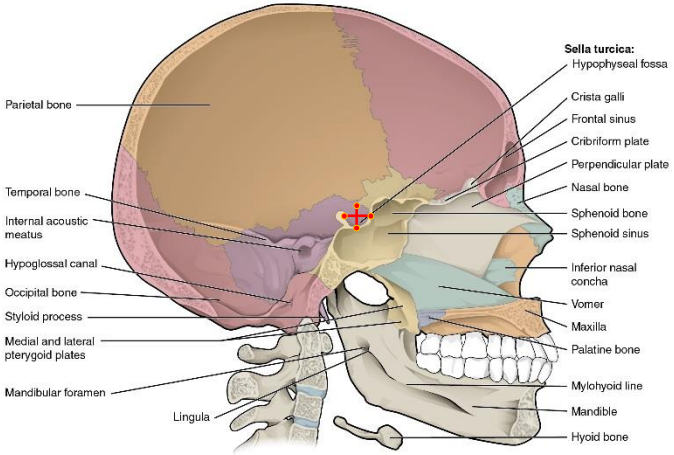


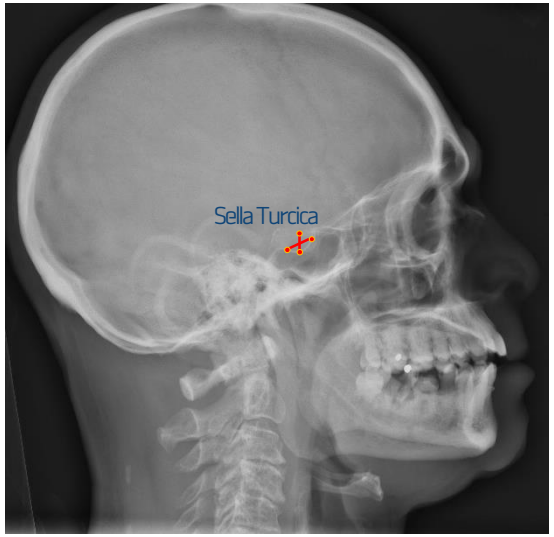
Item	Description
Also Known As	Anterior Atlanto-Occipital Dislocation Measurement
Object	Skull
Projection	Lateral
Measurement Type	Ratio of Length
Definition	The ratio of line drawn from basion to spinolaminar line of atlas (C1) to line drawn from opisthion to posterior cortex of atlas (C1) anterior arch
Diagnosis	If this ratio is greater than 1.0, it implies anterior cranio-cervical dislocation
Range	

Item	Average	Minimum	Maximum
All	0.8	0.6	1

Skull

Sella Turcica Size





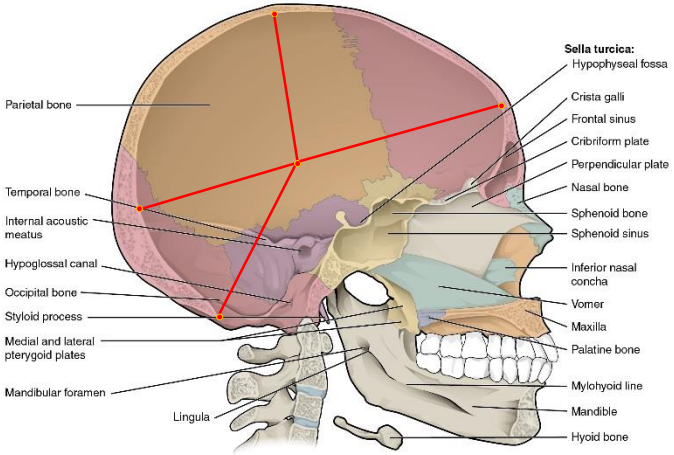
Line

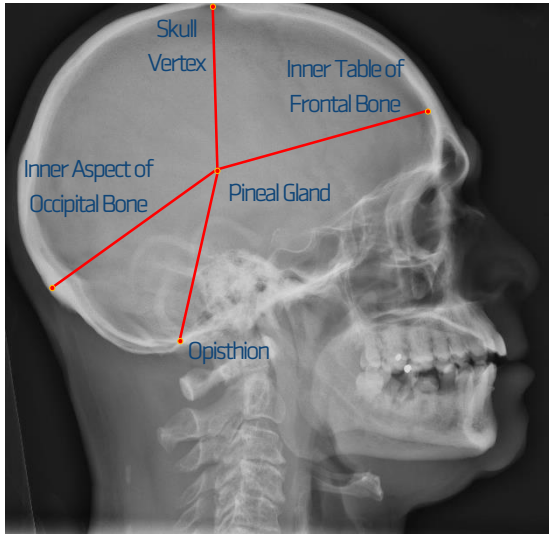
Item	Description
Also Known As	–
Object	Skull
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	Diameter of sella turcica in AP direction and vertical direction
Diagnosis	Small sella may implies hypopituitarism, microcephaly, myotonic dystrophy, Prader–Willi–Lambert syndrome, Cockayne syndrome, Dystrophia myotonica. Enlarged sella may implies pituitary neoplasm, empty sella syndrome, extrapituitary mass (neoplasm, aneurysm)
Range	

Item	Average	Minimum	Maximum
Anteroposterior	11	5	16
Vertical	8	4	12

Skull

Vastine–Kinney Method



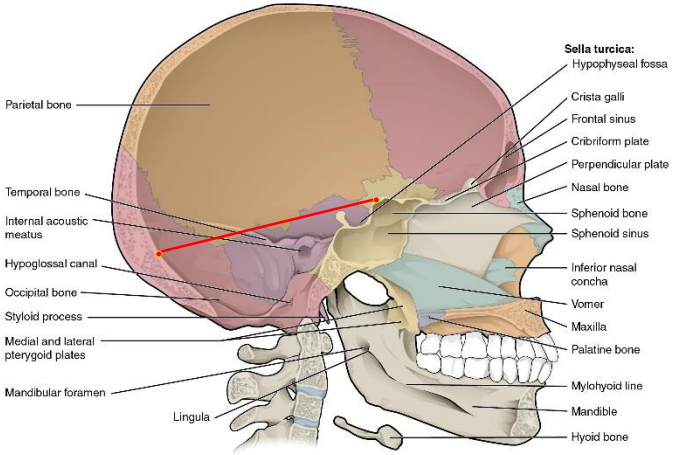


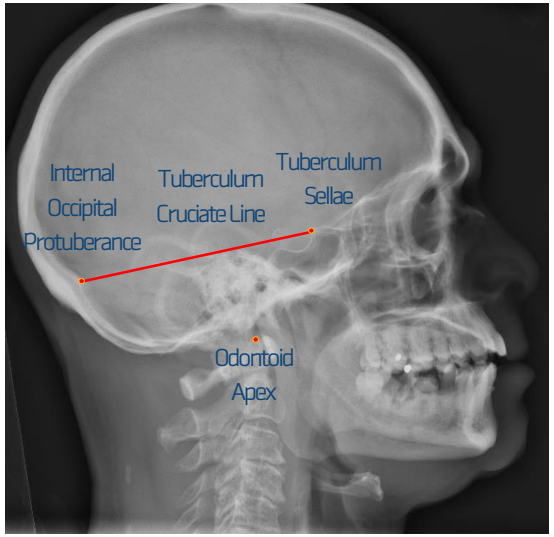
Line

Item	Description
Also Known As	–
Object	Skull
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	Distance from pineal gland to inner table of frontal bone(A), to inner aspect of occipital bone(B), to inner table of skull vertex(C), to opisthion(D)
Diagnosis	Measurements A and B are used to assess anterior or posterior pineal displacement. Whereas measurements C and D are used to assess superior or inferior displacement

Skull

Height Index of Klaus





? Line

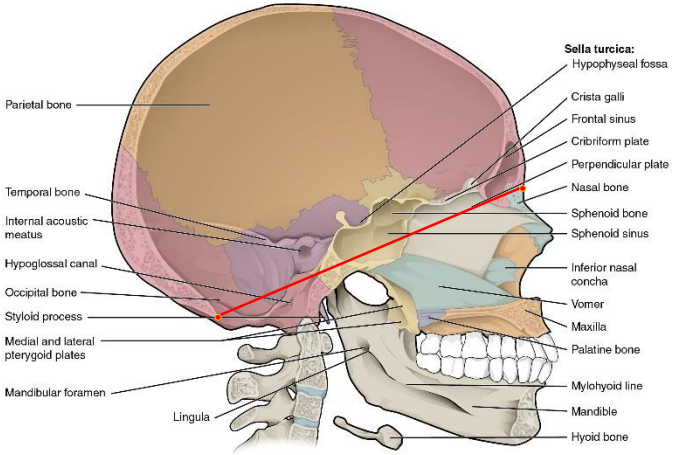
Item	Description
Also Known As	–
Object	Skull
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	**Tuberculum Cruciate Line**: line drawn from tuberculum sellae to internal occipital protuberance Distance from odontoid apex to tuberculum cruciate line
Diagnosis	A measurement < 30mm indicates basilar impression. Values between 30 and 36mm reflect a tendency toward basilar impression.
Range	

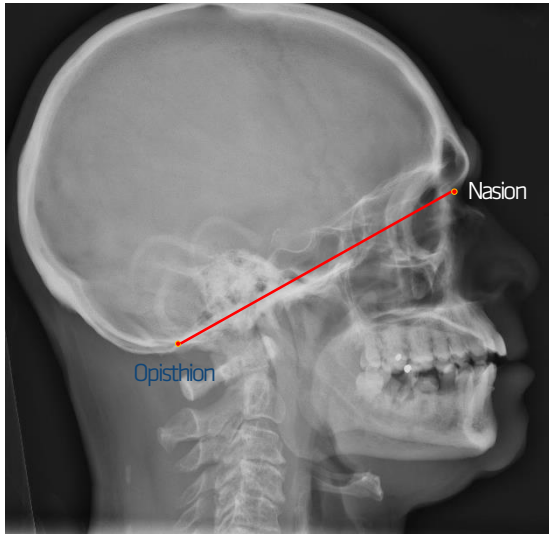
Item	Average	Minimum	Maximum
All	40~41	30	–

Skull

Boogard's Line

Line

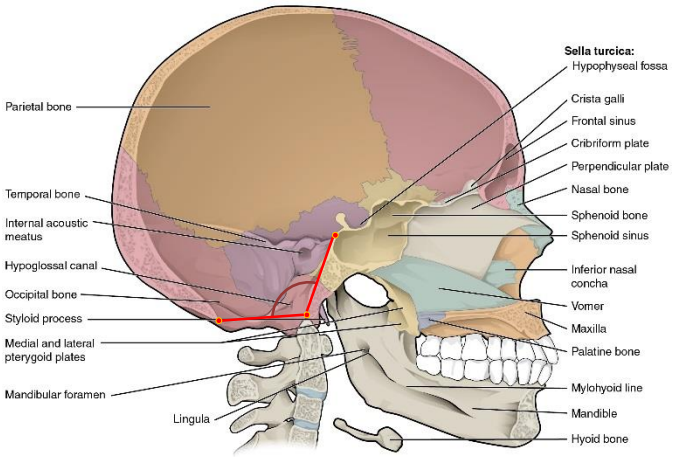


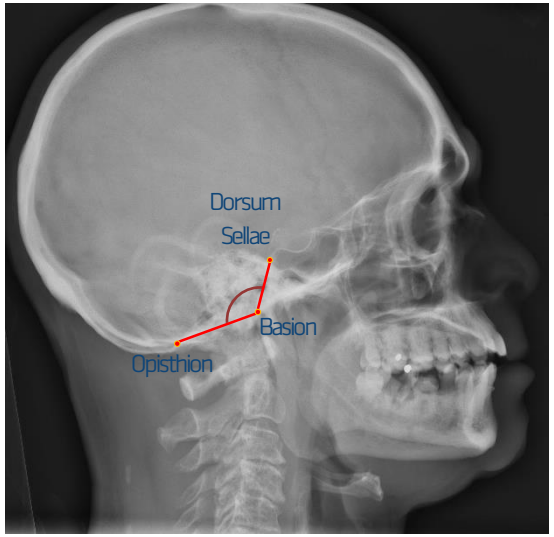


Item	Description
Also Known As	–
Object	Skull
Projection	Lateral
Measurement Type	Location Comparison
Definition	Line drawn from nasion to opisthion
Diagnosis	Basion should lie below this line

Boogard's Angle

Cross Angle with 2 Lines





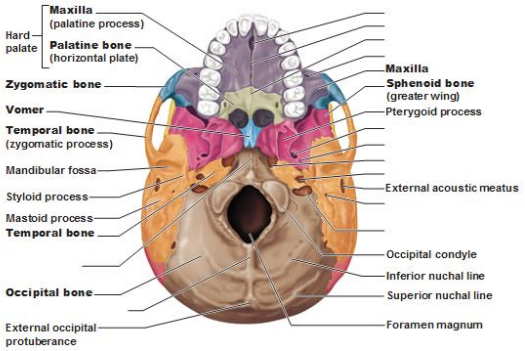
Item	Description
Also Known As	–
Object	Skull
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by Macrae's Line and Wachenheim's Line
Diagnosis	This angle is above 135°, then basilar impression may be present
Range	

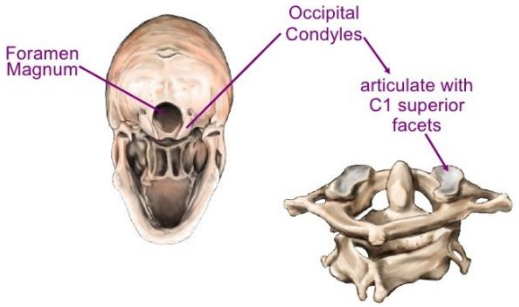
Item	Average	Minimum	Maximum
All	122	119	135

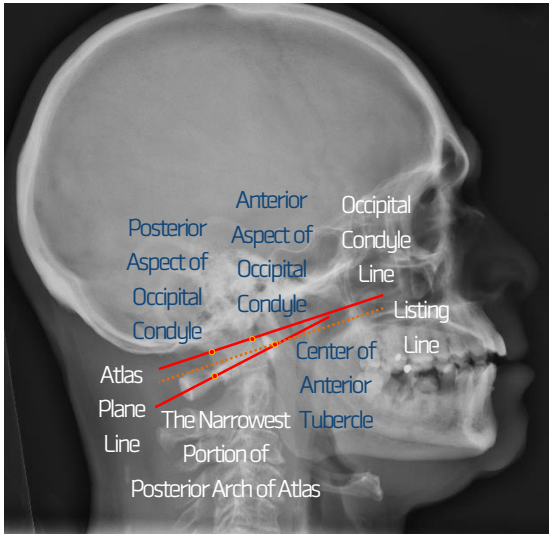
Skull

Cervical Toggle Analysis

Cross Angle with 2 Lines





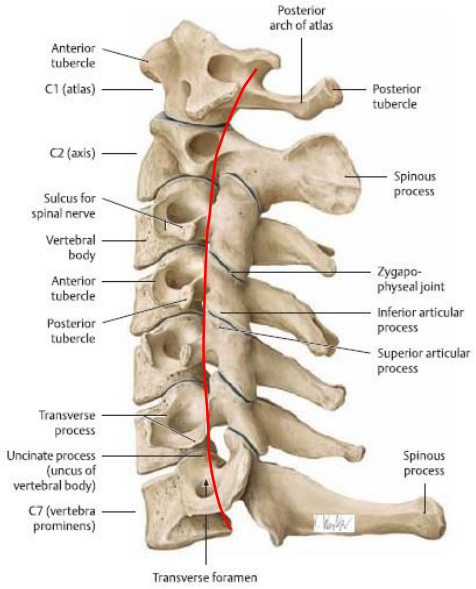


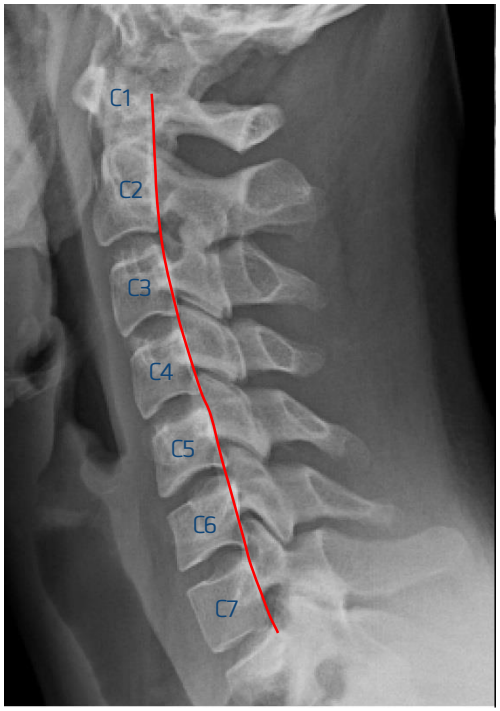
Item	Description
Also Known As	Atlas Tilt
Object	Skull
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	**Occipital Condyle Line**: line drawn through anterior and posterior aspects of occipital condyle **Atlas Plane Line**: line drawn through the center of anterior tubercle and the narrowest portion of posterior arch of atlas (C1) **Listing Line**: line drawn parallel to Occipital Condyle Line and through the narrowest portion of posterior arch of atlas (C1) Angle formed by Atlas Plane Line and Listing Line
Diagnosis	If the angle is over 4 degrees, then superior malposition of atlas may be present. If the angle is under 4 degrees, then inferior malposition of atlas may be present.
Range	Item: All; Average: 4; Minimum: –; Maximum: –

Spine Common

George's Line

Spine Curve George's Line



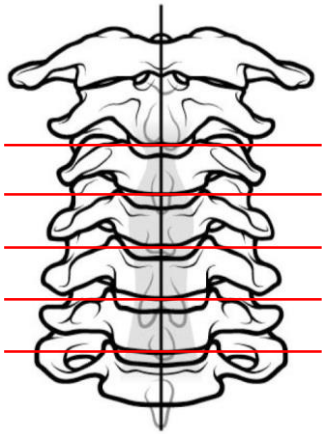


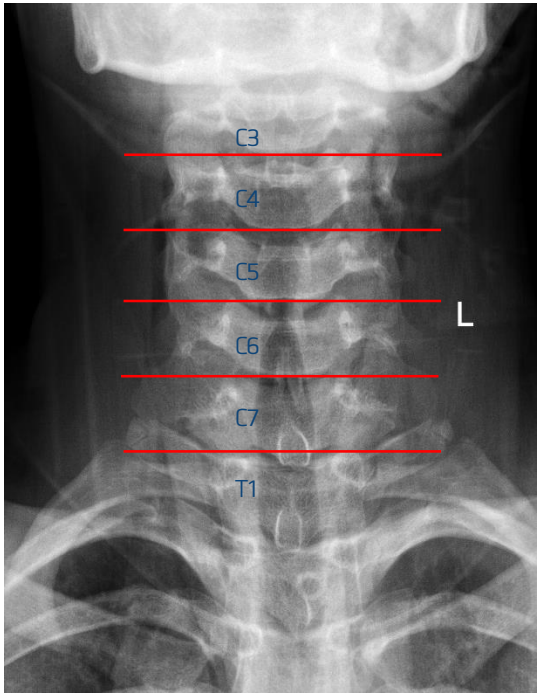
Item	Description
Also Known As	Posterior Body Line
Object	Cervical, Thoracic, Lumbar Spine
Projection	Lateral
Measurement Type	Curve
Definition	Curved line drawn along posterior surfaces of vertebral bodies
Diagnosis	A disruption of this line is indicative of prior trauma or may be a sign of instability, especially in cases of anterolisthesis or retrolisthesis which may be due to fracture, dislocation, ligamentous laxity, or degeneration joint disease. The adjacent posterior body lines should not demonstrate more than 3mm of net translation in a comparison of flexion and extension radiographs.

Spine Common

Endplate Lines (AP)

Line



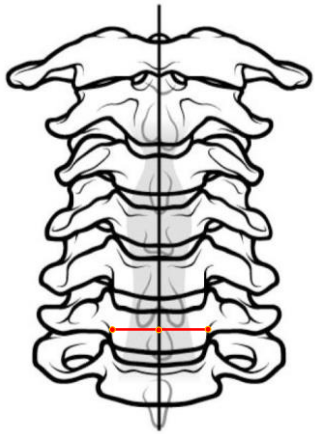


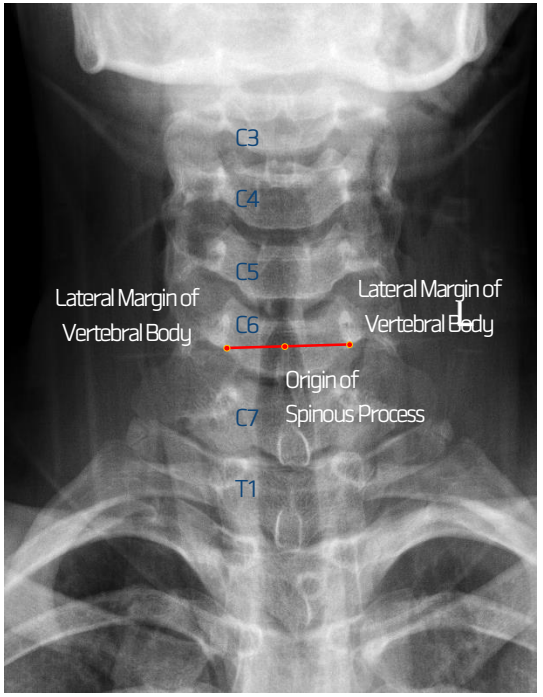
Item	Description
Also Known As	–
Object	Cervical, Thoracic, Lumbar Spine
Projection	AP
Measurement Type	Parallelity
Definition	Lines drawn to approximate inferior vertebral endplates
Diagnosis	Lines at adjacent levels should be parallel

Spine Common

Body Width Method

3 Points Ratio | 4 Points Ratio | Line



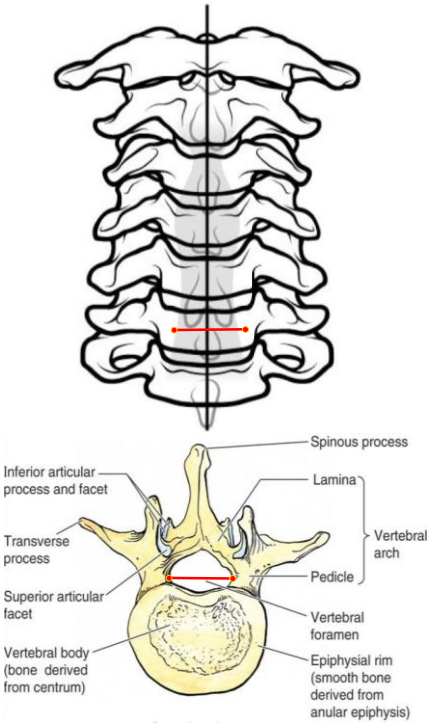


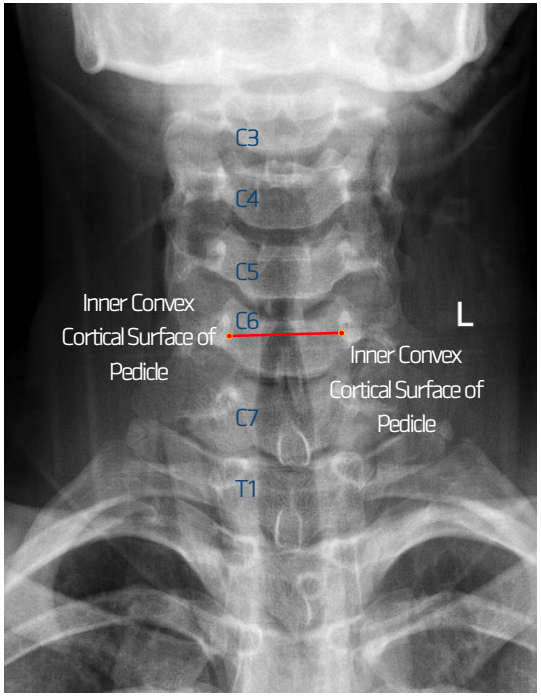
Item	Description
Also Known As	–
Object	Cervical, Thoracic, Lumbar Spine
Projection	AP
Measurement Type	Distance Comparison
Definition	Distance from lateral margins of vertebral bodies to origin of spinous process
Diagnosis	Two distances are not equal, then vertebral rotation is present

Spine Common

Interpedicular Distance

Line





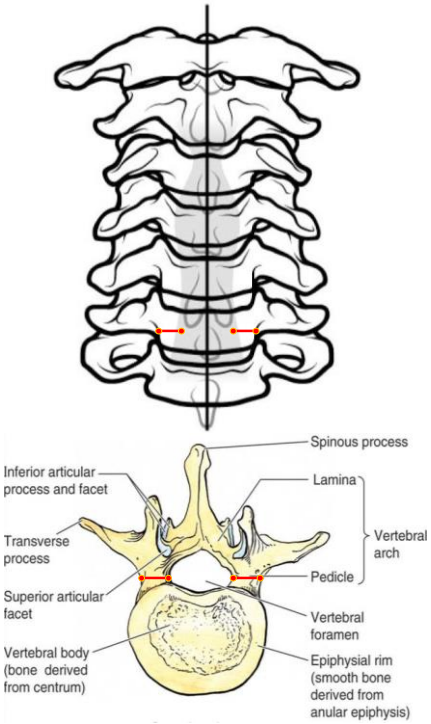
Item	Description
Also Known As	–
Object	Cervical, Thoracic, Lumbar Spine
Projection	AP
Measurement Type	Distance (Millimeter)
Definition	Distance between inner convex cortical surfaces of opposing segmental pedicles
Diagnosis	It evaluates spinal stenosis, congenital malformation, and intraspinal neoplasms. The maximum interpedicular distance may be increased as a result of pedicular erosion from an expanding spinal cord tumor (Elseberg–Dyke sign)
Range	

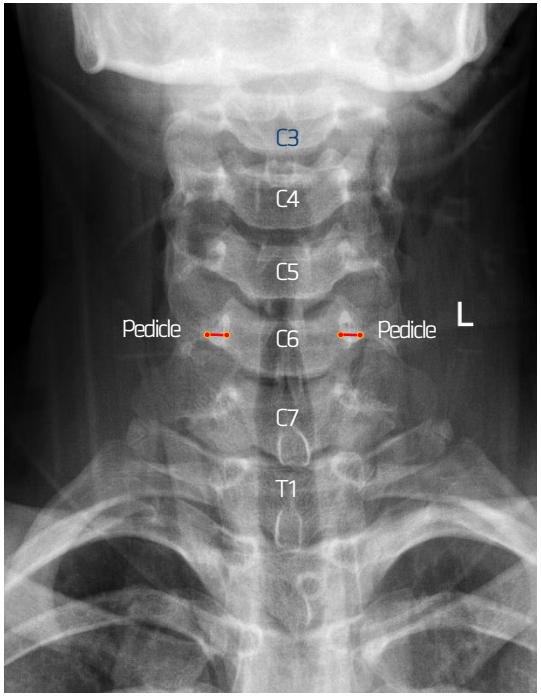
Item	Average	Minimum	Maximum
Cervical Spine	–	–	30
Thoracic Spine	–	–	20
L1 ~ L3	–	–	25
L4, L5	–	–	30

Spine Common

Pedicle Method

4 Points Ratio



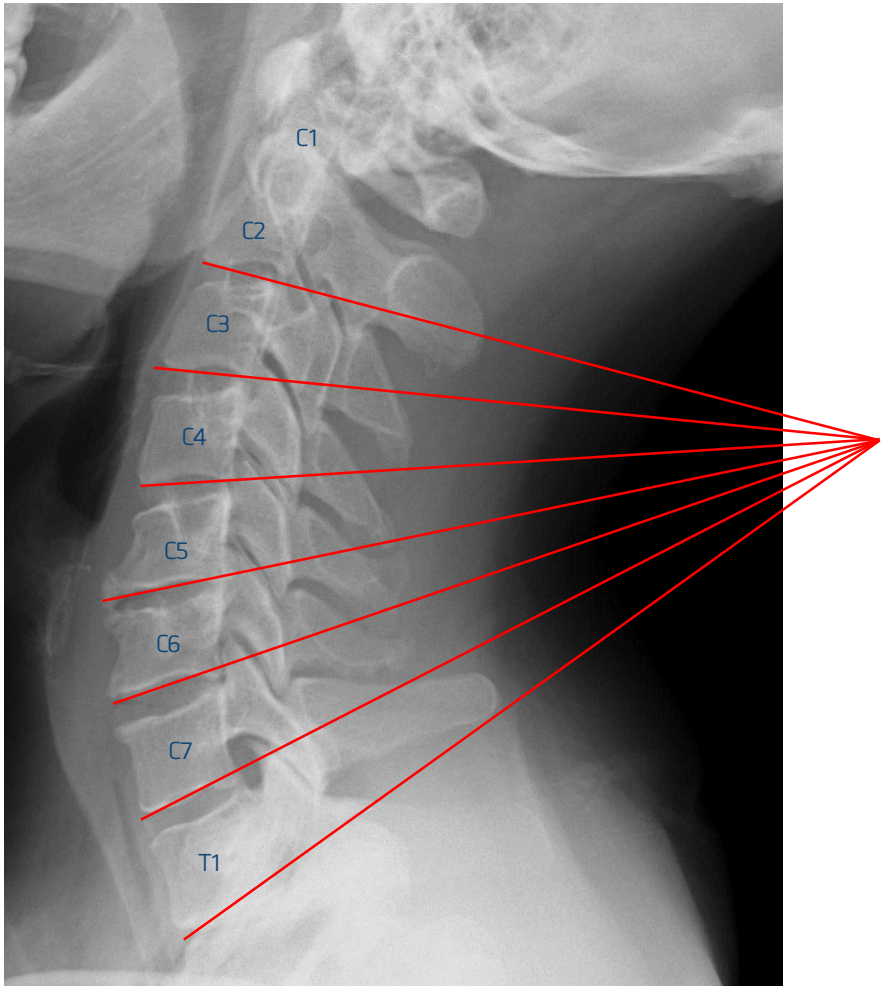


Item	Description
Also Known As	–
Object	Cervical, Thoracic, Lumbar Spine
Projection	AP
Measurement Type	Length Comparison
Definition	Width of two pedicle shadows
Diagnosis	It is expected pedicle shadows demonstrate bilateral symmetry. If the width of a pedicle shadow appears narrower than the contralateral pedicle shadow, it suggests rotation

Cervical Spine

Endplate Lines (Lateral)

Line

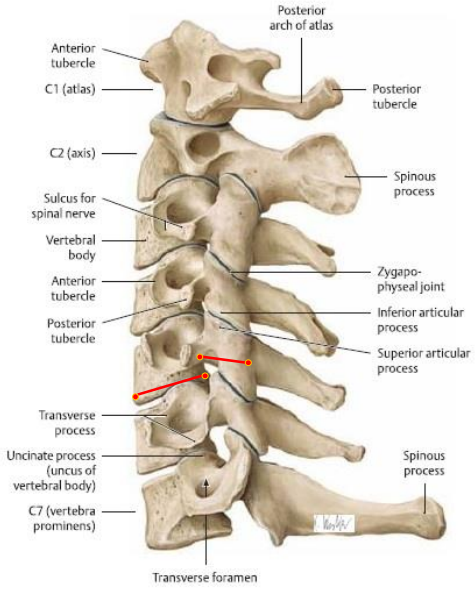


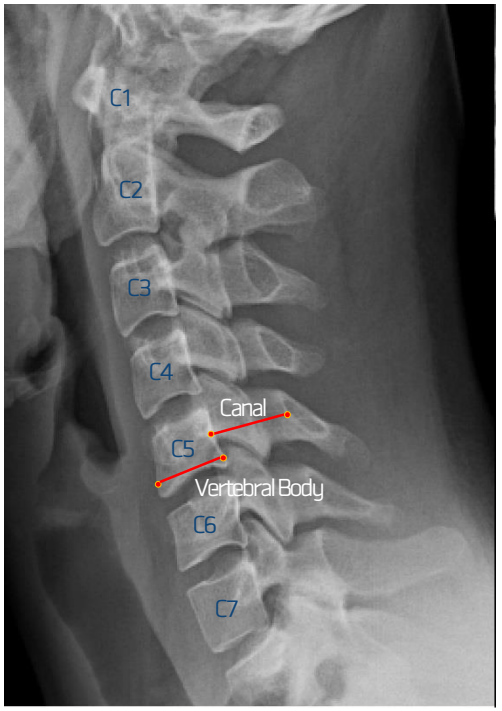
Item	Description
Also Known As	–
Object	Cervical Spine
Projection	Lateral
Measurement Type	Line Convergence
Definition	Lines drawn along inferior endplates of C2~T1 vertebrae and extended posteriorly
Diagnosis	Lines should all intersect at a common point located posterior to spine. Lack of convergence indicates normal lordotic cervical spine curve, or intersegmental malpositions.

Cervical Spine

Pavlov's Ratio

4 Points Ratio



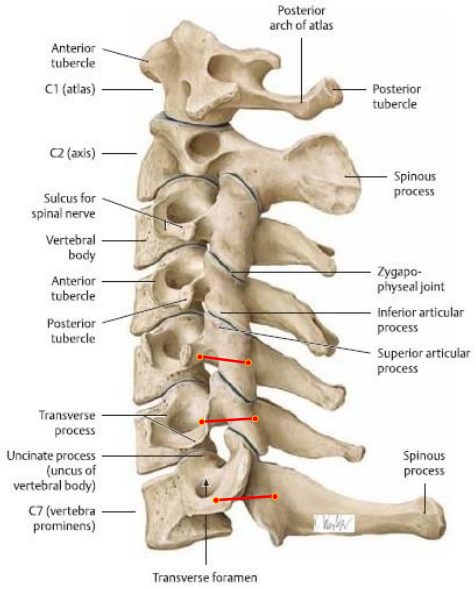


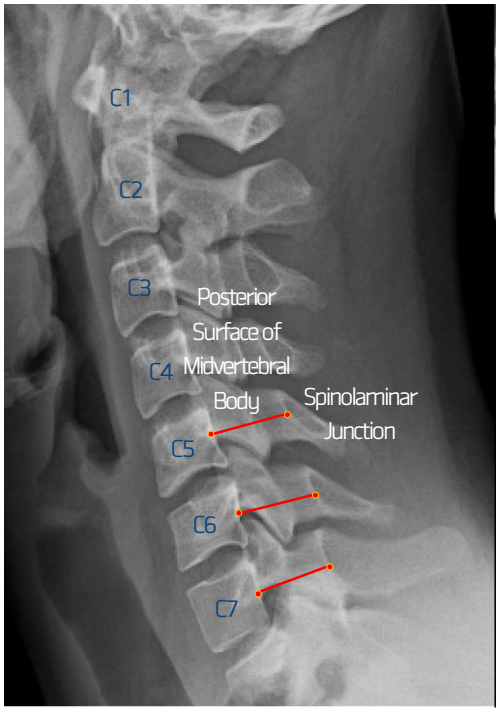
Item	Description
Also Known As	Canal to Body Ratio, Torg Ratio
Object	Cervical Spine
Projection	Lateral
Measurement Type	Ratio of Length
Definition	Ratio of sagittal dimension of canal and vertebral body
Diagnosis	A ratio of less than 0.82 is significant for spinal stenosis.

Cervical Spine

Sagittal Dimension of Cervical Spinal Canal

Line





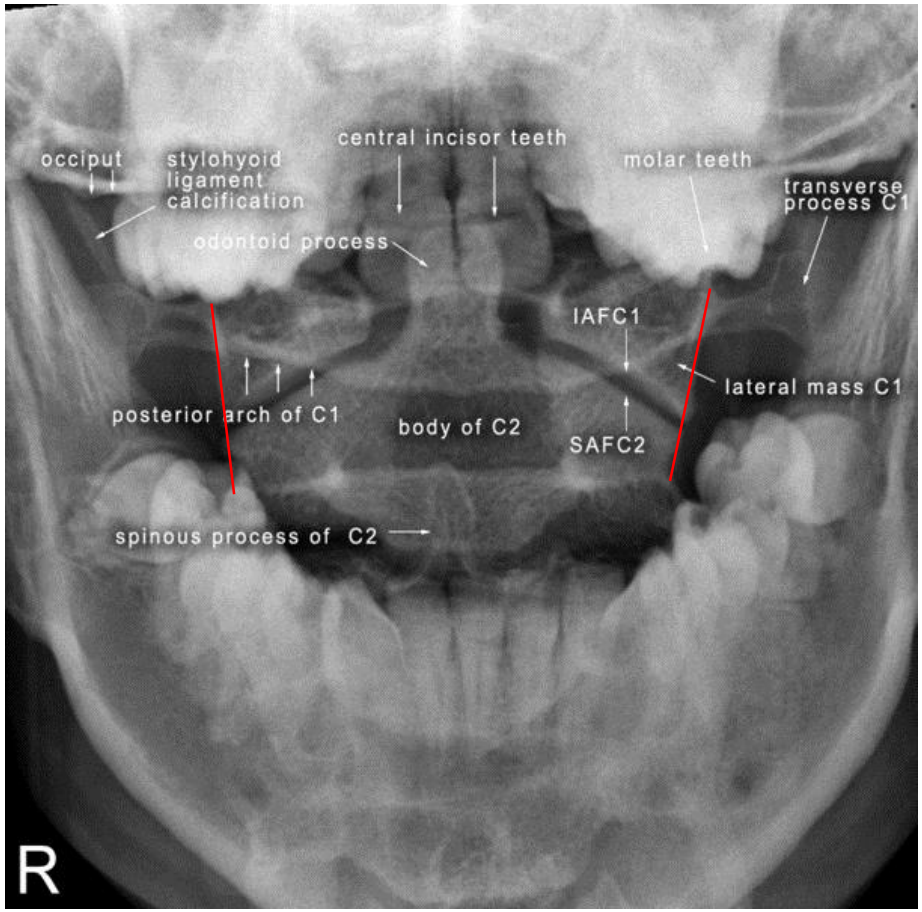
Item	Description
Also Known As	–
Object	Cervical Spine
Projection	Lateral (Neutral, Flexion, Extension)
Measurement Type	Distance (Millimeter)
Definition	Distance from posterior surface of midvertebral body to the nearest surface of the same segmental spinolaminar junction line
Diagnosis	An abnormally widened canal may be associated with a spinal cord neoplasm or syringomyelia
Range	

Item	Average	Minimum	Maximum
C1	22	16	31
C2	20	14	27
C3	18	13	23
C4	17	12	22
C5	17	12	22
C6	17	12	22
C7	17	12	22

Cervical Spine

Atlantoaxial Alignment

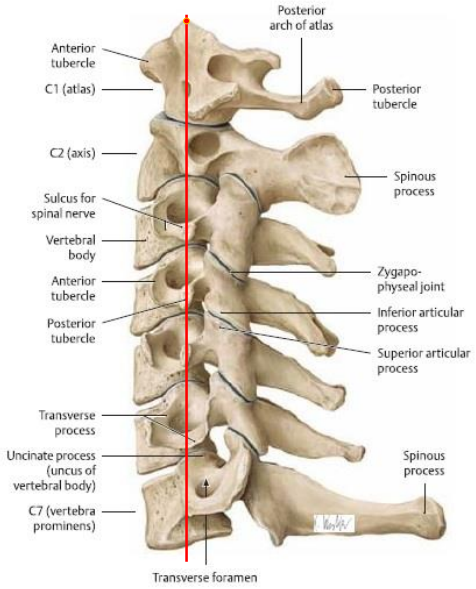
Line

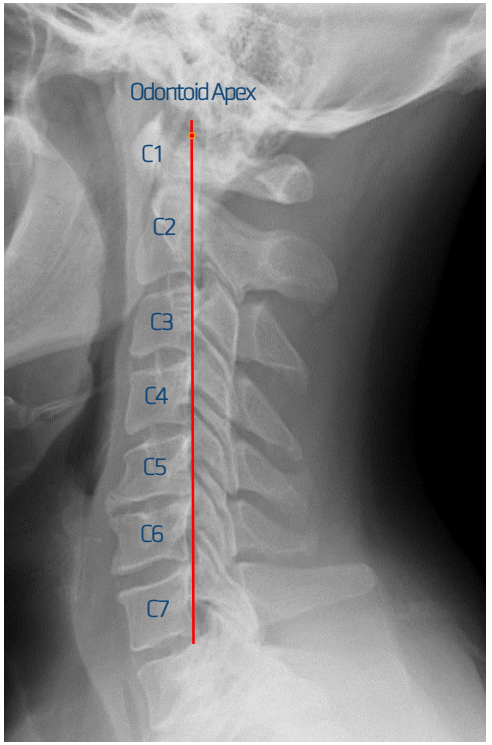


Item	Description
Also Known As	Atlantoaxial "Overhang" Sign
Object	Cervical Spine
Projection	AP (Open Mouth)
Measurement Type	Location Comparison
Definition	Comparison of lateral margins of atlas to lateral corner of axis
Diagnosis	If these two landmarks are not in vertical alignment, a Jefferson's fracture, odontoid fracture, alar ligament instability, or rotatory atlantoaxial subluxation may be present

Cervical Spine

Cervical Gravity Line



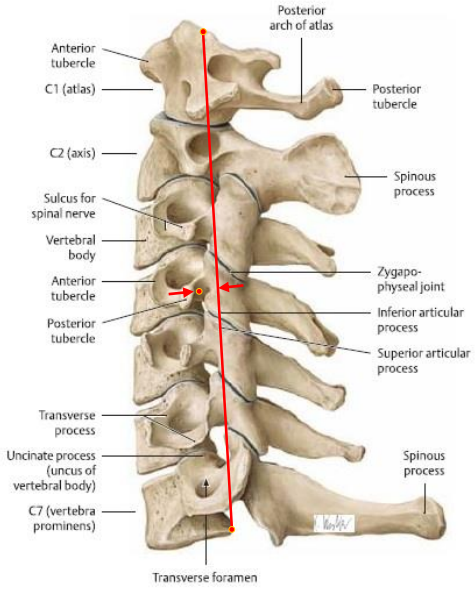


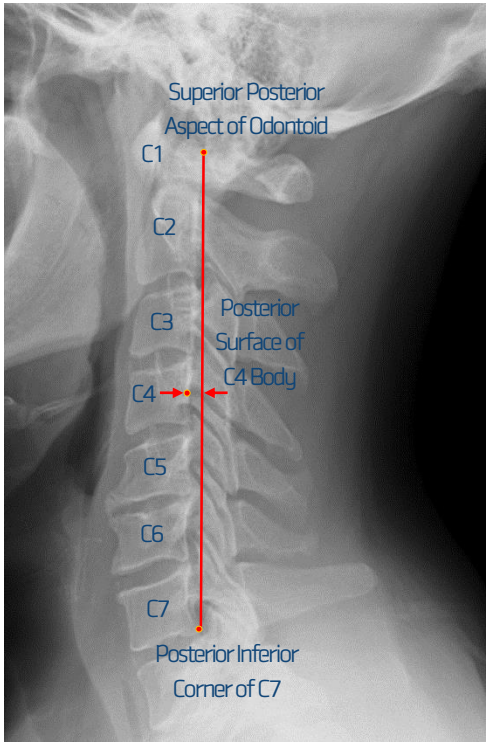
Vertical Line

Item	Description
Also Known As	–
Object	Cervical Spine
Projection	Lateral
Measurement Type	Linearity
Definition	Line drawn through odontoid apex
Diagnosis	If this line does not pass through C7 body, then non ideal gravitational stresses may be present

Cervical Spine

Depth of Cervical Curve



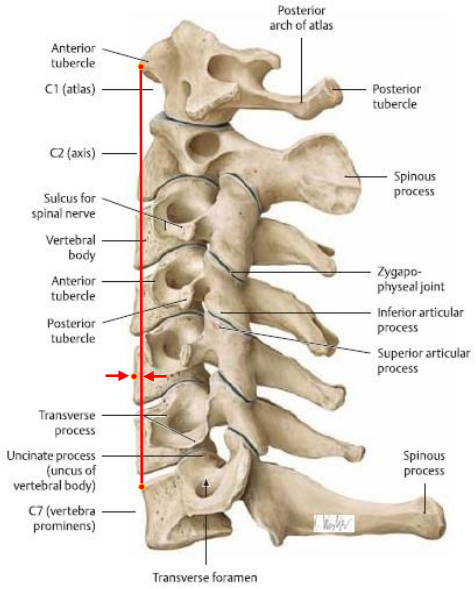


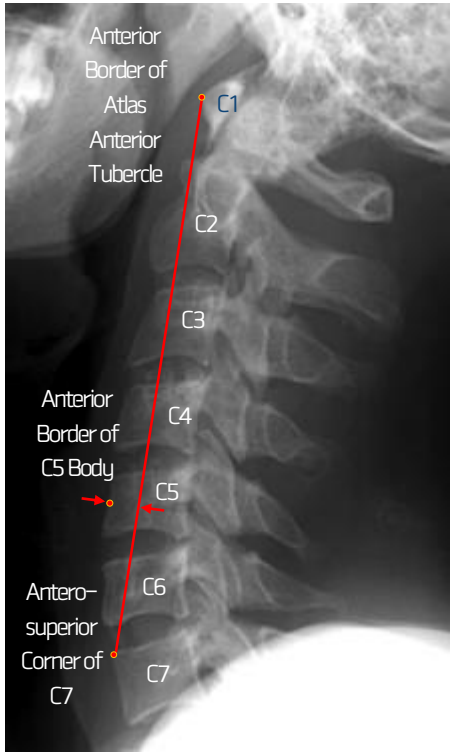
Item	Description
Also Known As	–
Object	Cervical Spine
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	Distance from posterior surface of C4 body to line drawn from superior posterior aspect(tip) of odontoid to posterior inferior corner of C7
Diagnosis	If it has negative value, then kyphosis is present and if it has large value, then hyperlordosis is present
Range	

Item	Average	Minimum	Maximum
All	12	–	–

Cervical Spine

Method of Jochumsen



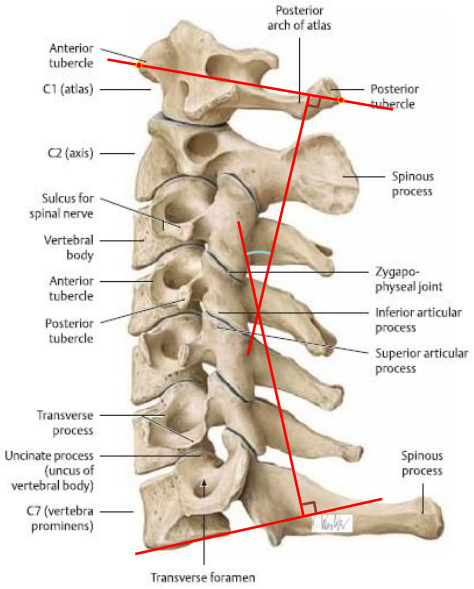


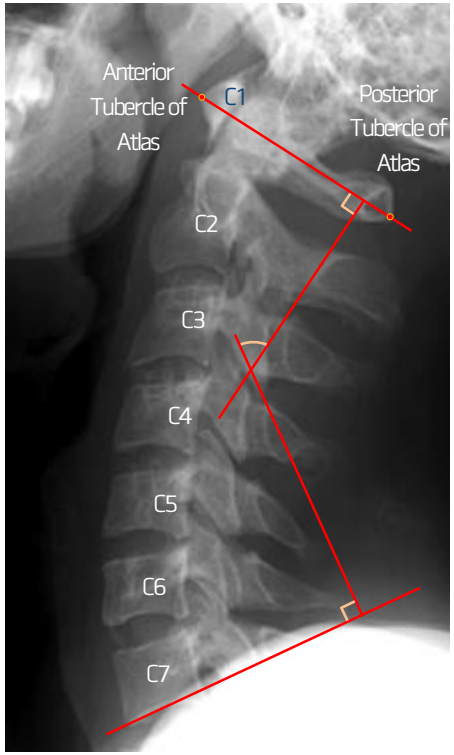
Item	Description
Also Known As	–
Object	Cervical Spine
Projection	Lateral
Measurement Type	Distance
Definition	Distance from anterior border of C5 body to line drawn from anterior border of atlas anterior tubercle to anterosuperior corner of C7
Diagnosis	It indicates relative amount of lordosis within the gross cervical spine. A trauma, muscle spasm, or degenerative spondylosis may induce a reversal (kyphosis) or decrease(hypolordosis, alordosis) in cervical lordosis

Cervical Spine

Angle of Cervical Curve

Cobb Angle





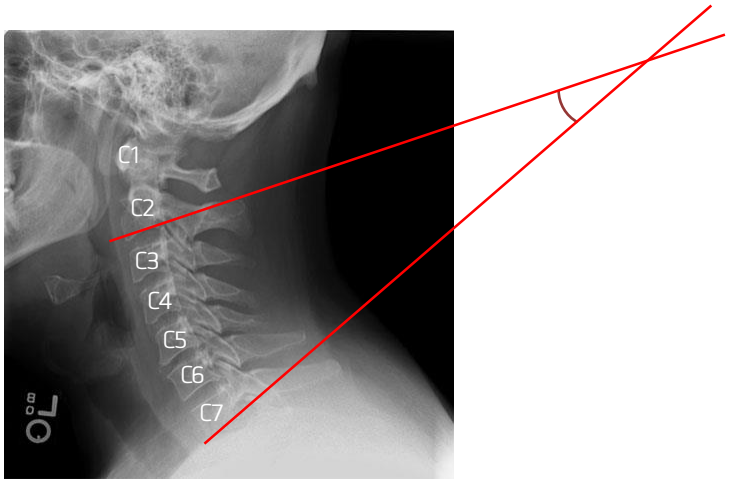
Item	Description
Also Known As	–
Object	Cervical Spine
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle at the intersection of perpendicular lines to line drawn connecting anterior and posterior tubercles of atlas, and to line drawn along inferior endplate of C7
Diagnosis	If it has negative value, then kyphosis is present and if it has large value, then hyperlordosis is present. It is less accurate than Depth of Cervical Curve.
Range	

Item	Average	Minimum	Maximum
All	40	–	–

Cervical Spine

Method of Gore

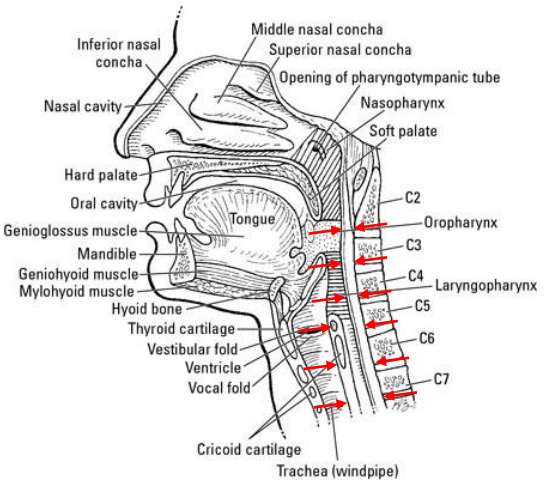
Cross Angle with 2 Lines

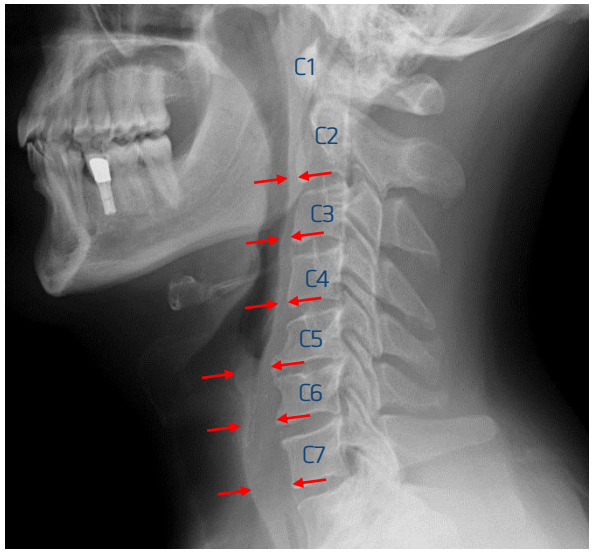


Item	Description
Also Known As	–
Object	Cervical Spine
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by line drawn through posterior surface of C2 body and line drawn through posterior surface of C7 body
Diagnosis	If it has negative value, then kyphosis is present and if it has large value, then hyperlordosis is present

Cervical Spine

Prevertebral Soft Tissues





Line

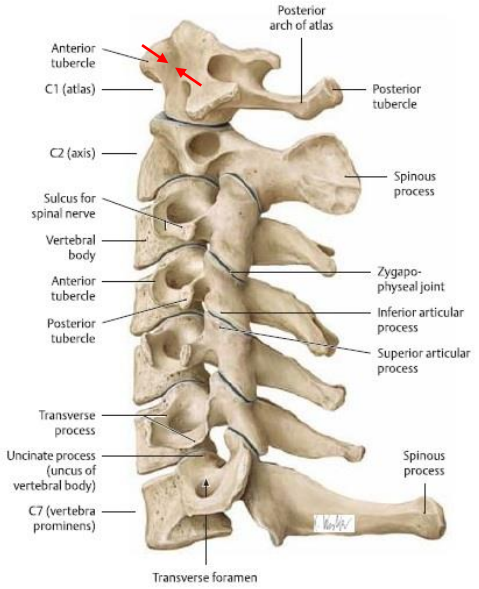
Item	Description
Also Known As	–
Object	Cervical Spine
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	Distance between inferior anterior most aspects of C1~C7 bodies to posterior portion of adjacent tracheal shadow(pharynx, larynx, trachea)
Diagnosis	Widening may indicate post-traumatic hematoma, retropharyngeal abscess, neoplasm from the adjacent bone and soft tissue structures
Range	

Item	Flexion	Neutral	Extension
C1	11	10	8
C2	6	5	6
C3	7	7	6
C4	7	7	8
C5	22	20	20
C6	20	20	19
C7	20	20	21

Cervical Spine

Atlantodental Interspace

Line



Item	Description
Also Known As	ADI, Atlas–Odontoid Space, Predental Interspace, Atlas–Dens Interval
Object	Cervical Spine
Projection	Lateral (Flexion, Extension)
Measurement Type	Distance (Millimeter)
Definition	Distance between posterior margin of anterior tubercle of atlas (C1) and anterior surface of odontoid process
Diagnosis	Decreased space is expected in those with degeneration joint disease of atlantodental joint. Increased space is associated with decreased space in neural canal which may be due to trauma, occipitalization, Down's syndrome, pharyngeal infection (Grisel's disease), inflammatory arthropathies (ankylosing spondylitis, Rheumatoid arthritis, psoriatic arthritis, Reiter's syndrome)
Range	

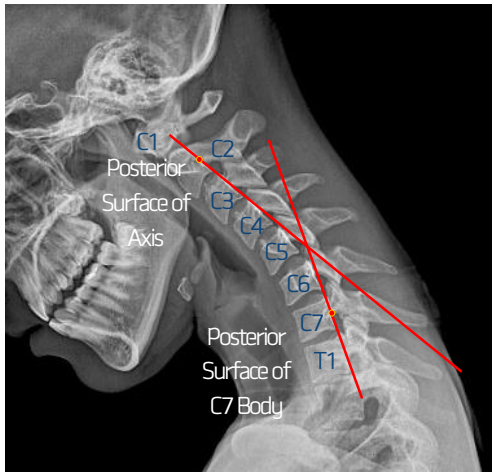
Item	Average	Minimum	Maximum
Adults	–	1	3
Children	–	1	5

Cervical Spine

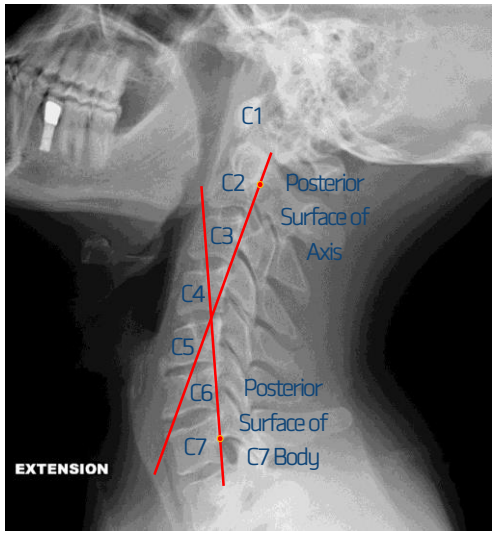
Stress Lines of Cervical Spine

Line

✓ Flexion



✓ Extension

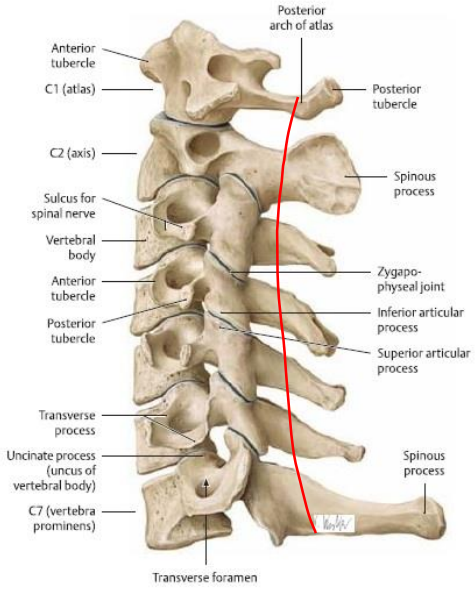


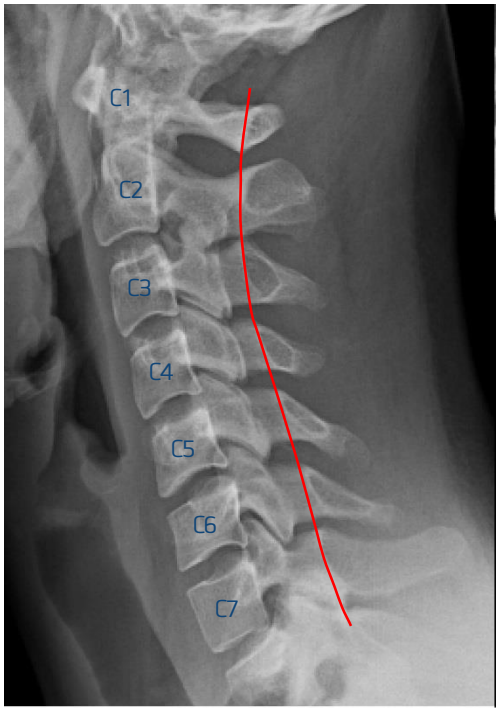
Item	Description
Also Known As	Ruth Jackson's Lines
Object	Cervical Spine
Projection	Lateral (Flexion, Extension)
Measurement Type	Location of Intersection
Definition	Line drawn along posterior surface of axis and line drawn along posterior surface of C7 body
Diagnosis	In flexion, two lines should intersect at the level of C5–C6 disc or facet joints. In extension, two lines should intersect at the level of C4–C5 disc or facet joints. Muscle spasm, joint fixation, and disc degeneration may alter the stress point.

Cervical Spine

Posterior Cervical Line

Spine Curve

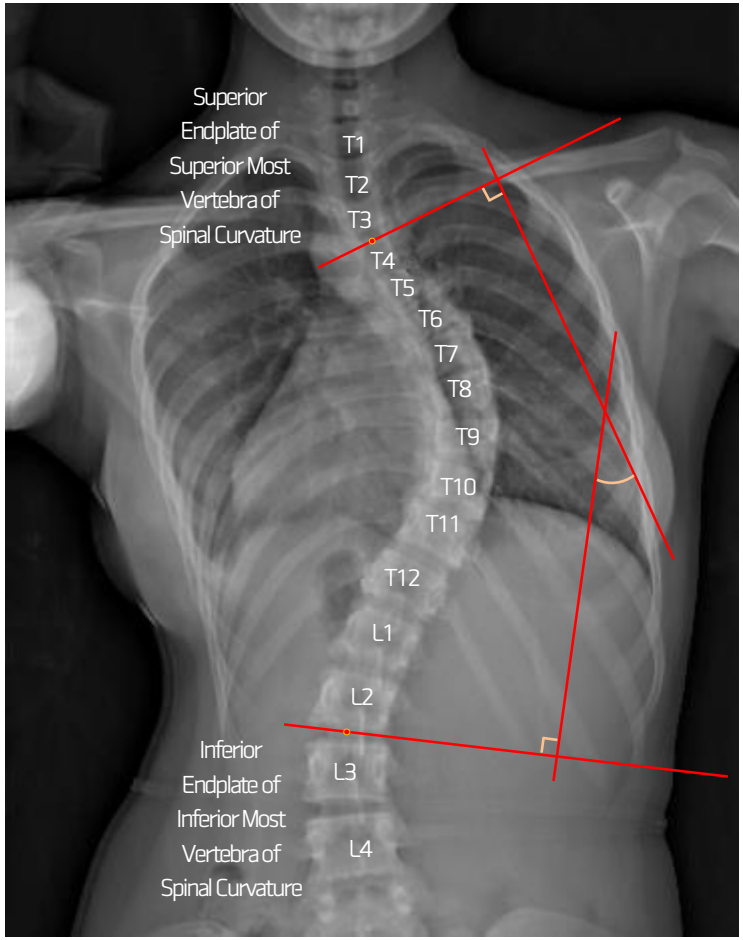




Item	Description
Also Known As	Spinolaminar Line, Spinolaminar Junction Line, Arch–body Line
Object	Cervical Spine
Projection	Lateral (Neutral, Flexion, Extension)
Measurement Type	No Measure
Definition	Non continuous cortical white line (curve) of spinolaminar junction identified at each level C1 to C7
Diagnosis	A discontinuity in the lines will indicate an anterior or posterior displacement of vertebra. This line is especially useful for detecting subtle odontoid fractures and atlantoaxial subluxation (anterior). A disruption in the middle to lower cervical spine may also be a sign of anterolisthesis, retrolisthesis, or frank dislocation.

Thoracic Spine

Cobb's Method of Scoliosis Evaluation



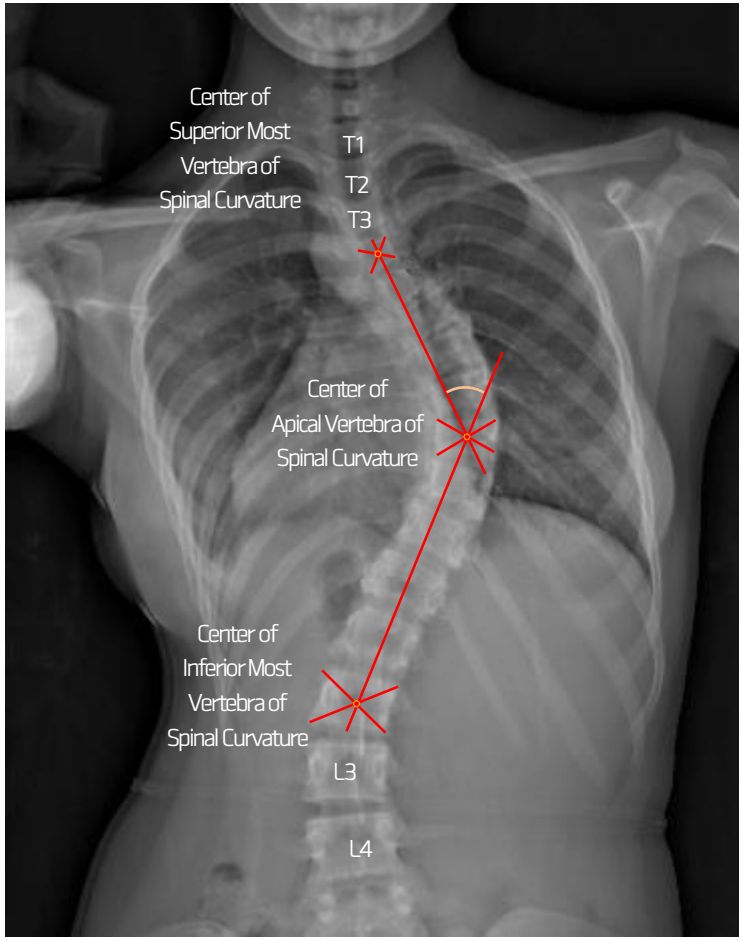
Cobb Angle

Item	Description
Also Known As	Cobb–Lippman method
Object	Thoracic Spine
Projection	AP
Measurement Type	Angle (Degree)
Definition	Angle formed by perpendicular lines to line drawn along superior endplate of superior most vertebra of spinal curvature and line drawn along inferior endplate of inferior most vertebra of spinal curvature
Diagnosis	Curvature < 20 degree requires only continued observation, curvature between 20~40 degree should be braced, curvature > 40 degree require surgical intervention. 5 degree progression of a scoliosis between two successive radiographs is considered significant.

Thoracic Spine

Risser–Ferguson Method of Scoliosis Evaluation

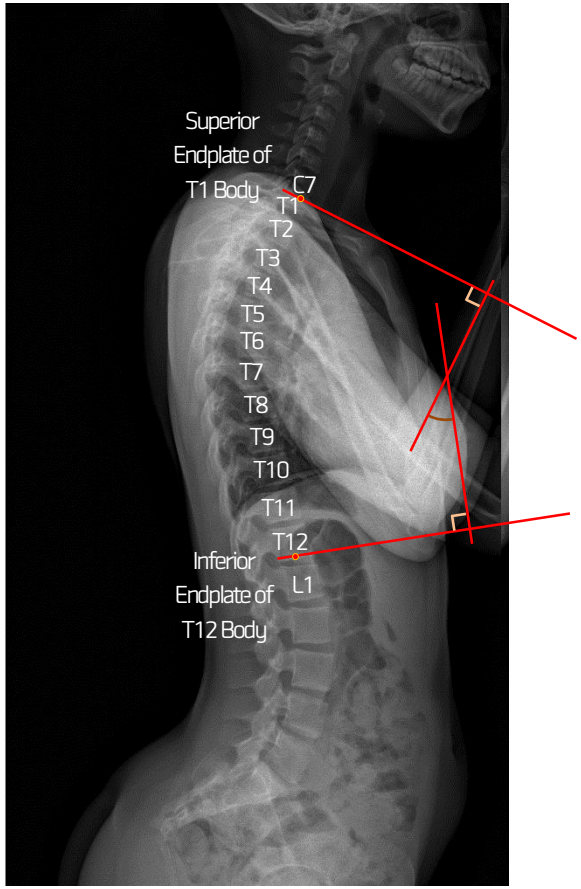
Vertebral Line Cross Angle with 2 Lines



Item	Description
Also Known As	–
Object	Thoracic Spine
Projection	AP
Measurement Type	Angle (Degree)
Definition	Angle formed by the intersection of lines which passes both through the center of apical vertebra (most laterally placed segment in the curve) and through the center of both end vertebra of spinal curvature
Diagnosis	This method gives values approximately 25% lower than those of Cobb's method (10°)

Thoracic Spine

Thoracic Kyphosis



Sagittal Spine Alignment

Cobb Angle

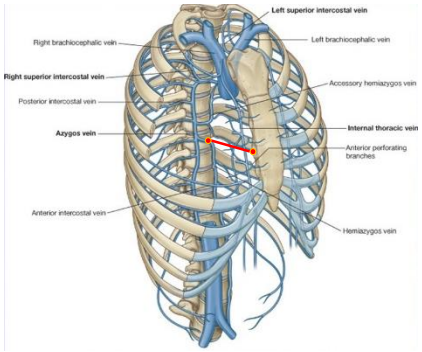
Item	Description
Also Known As	–
Object	Thoracic Spine
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by perpendicular lines to line drawn through superior endplate of T1 body and line drawn through inferior endplate of T12 body
Diagnosis	An increased kyphosis may be seen with old age, osteoporosis, Scheuermann's disease, congenital anomalies, muscular paralysis, or cystic fibrosis
Range	

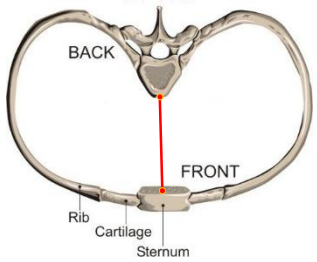
Category	Age	Average	Minimum	Maximum
Female	2~9	24	8	36
	10~19	26	11	41
	20~29	27	7	40
	30~39	28	10	42
	40~49	33	21	50
	50~59	41	22	53
	60~69	45	34	54
	70~79	42	30	56
Male	2~9	21	5	40
	10~19	25	8	39
	20~29	26	13	48
	30~39	29	13	49
	40~49	30	17	44
	50~59	33	25	45
	60~69	35	25	62
	70~79	41	32	66

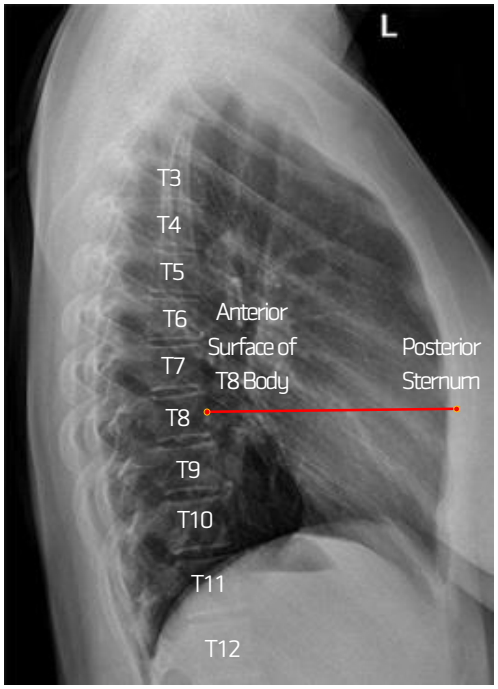
Thoracic Spine

Thoracic Cage Dimension

Line







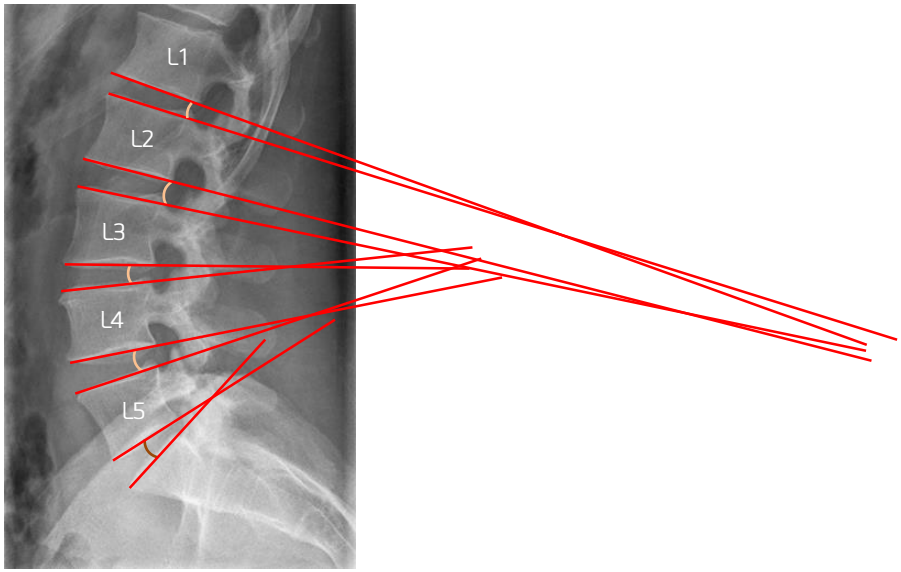
Item	Description
Also Known As	Straight Back Syndrome Evaluation
Object	Thoracic Spine
Projection	Lateral
Measurement Type	Distance (Centimeter)
Definition	Distance between posterior sternum and anterior surface of T8 body
Diagnosis	Lower than normal values indicates straight back syndrome (which should then prompt evaluation for auscultation for a cardiac murmur)
Range	

Category	Item	Average	Minimum	Maximum
Normal	Male	14	11	19
	Female	12	9	15
Straight Back Syndrome	Male	11	9	13
	Female	10	8	11

Lumbar Spine

Intervertebral Disc Angles

Cross Angle with 2 Lines

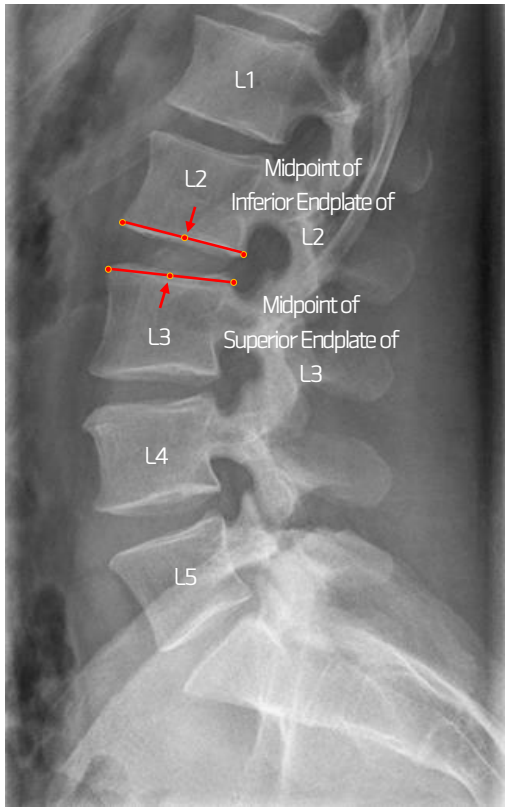


Item	Description
Also Known As	–
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by two lines extended posteriorly from two endplates of lumbar body
Diagnosis	These values will be altered in antalgia, muscular imbalance, and improper posture. Increased angle may indicate facet syndrome, decreased angle may indicate acute discal injuries.
Range	

Item	Average	Minimum	Maximum
L1	8	–	–
L2	10	–	–
L3	12	–	–
L4	14	–	–
L5	14	–	–

Lumbar Spine

Hurxthal's Method



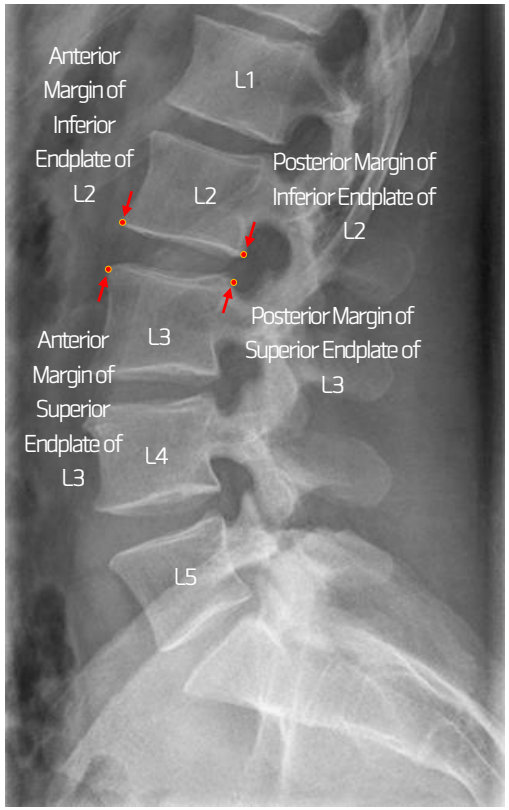
Center Point Line

Item	Description
Also Known As	–
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Distance
Definition	Distance between the opposing endplates at the midpoint between anterior and posterior vertebral body margins
Diagnosis	The most common causes of decreased disc height is disc degeneration, post surgery, postchemonucleolysis, infection, or congenital hypoplasia. When segmental rotation is >40˚ or lateral flexion is >20 , this method become unreliable.

Lumbar Spine

Farfan's Method

4 Points Ratio

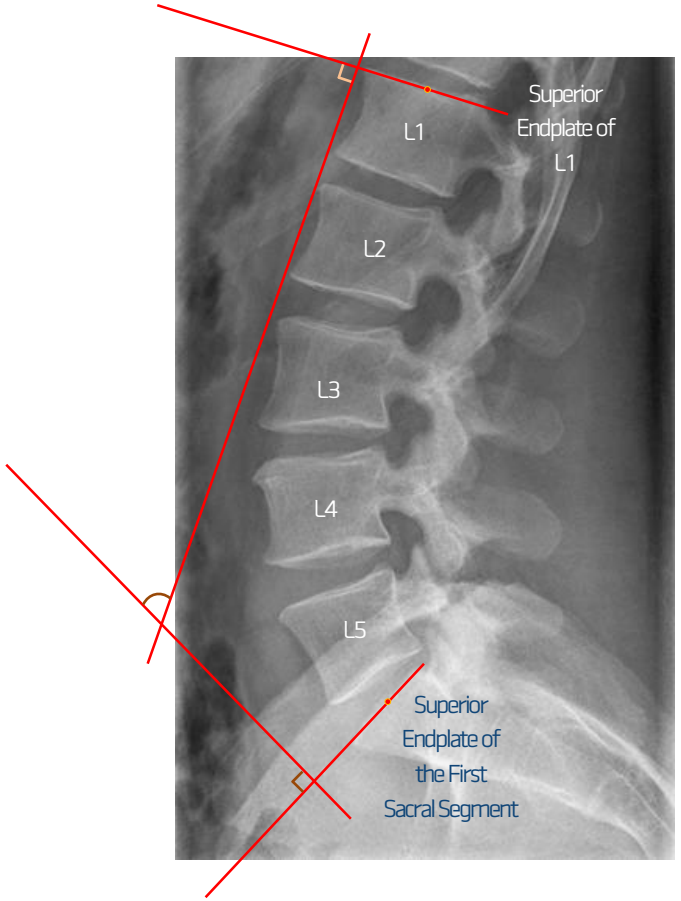


Item	Description
Also Known As	–
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Ratio of Length
Definition	Ratio of anterior disc height (distance between opposing endplate at anterior margin) over posterior disc height (distance between opposing endplate at posterior margin)
Diagnosis	The most common causes of decreased disc height is disc degeneration, post surgery, postchemonucleolysis, infection, or congenital hypoplasia. When segmental rotation is >40˚ or lateral flexion is >20 , this method become unreliable
Range	

Item	Average	Minimum	Maximum
L1	0.17	–	–
L2	0.18	–	–
L3	0.20	–	–
L4	0.25	–	–
L5	0.28	–	–

Lumbar Spine

Lumber Lordosis



Cobb Angle

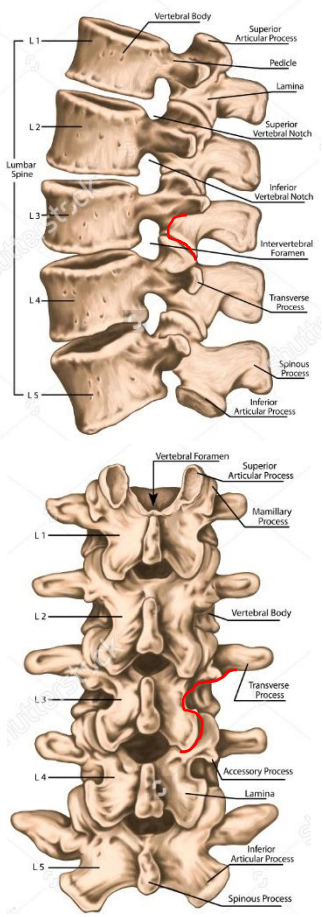
Item	Description
Also Known As	Lumbar Spinal Angle, Lumbar Angle
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by the intersection of two lines perpendicular to line drawn anteriorly through and parallel to superior endplate of L1 and line drawn anteriorly through and parallel to superior endplate of the first sacral segment
Diagnosis	While a wide consensus of the importance of lumbar lordosis is debated an increase tends to move the nucleus pulposus anteriorly is evident
Range	

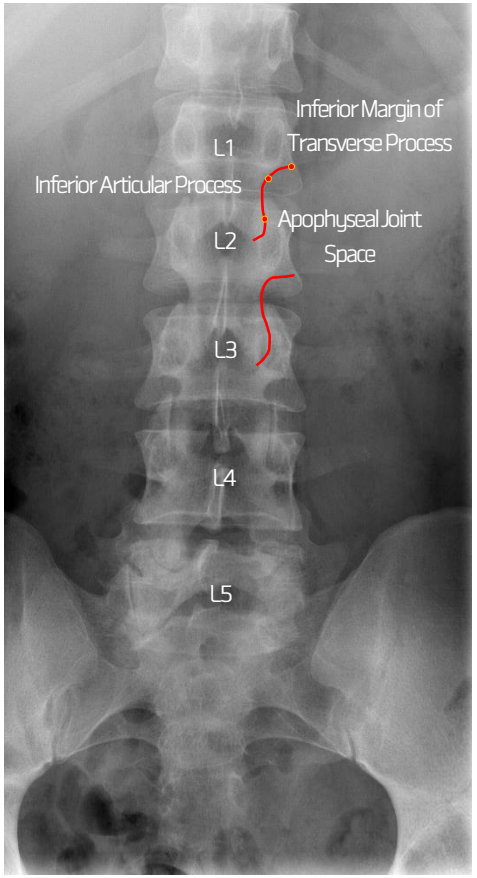
Item	Average	Minimum	Maximum
All	50~60	-	-

Lumbar Spine

Hadley's S Curve

Free Line Curve Line

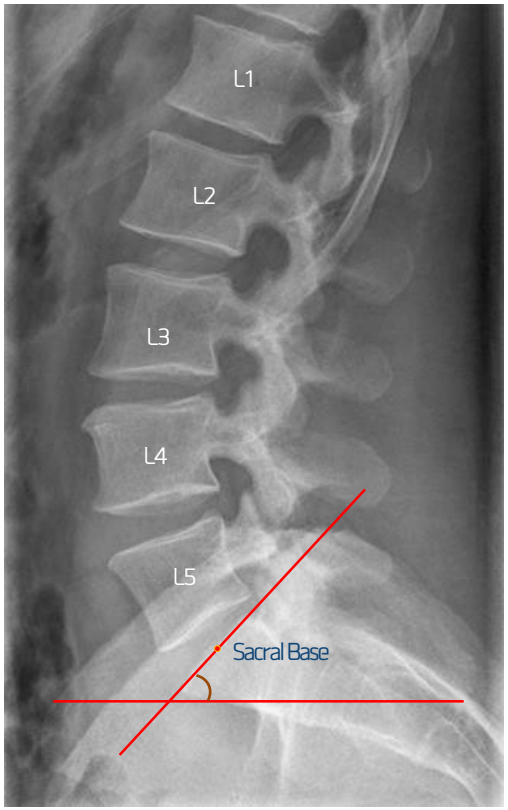




Item	Description
Also Known As	–
Object	Lumbar Spine
Projection	AP, Oblique
Measurement Type	S Curve
Definition	Curved line along inferior margin of transverse process and down along inferior articular process to apophyseal joint space, continued along the articulation onto superior articular process of inferior vertebra
Diagnosis	Abrupt interruption in the smooth contour of this line may indicate facet imbrication (subluxation)

Lumbar Spine

Lumbosacral Angle



Horizontal Orthogonal Angle

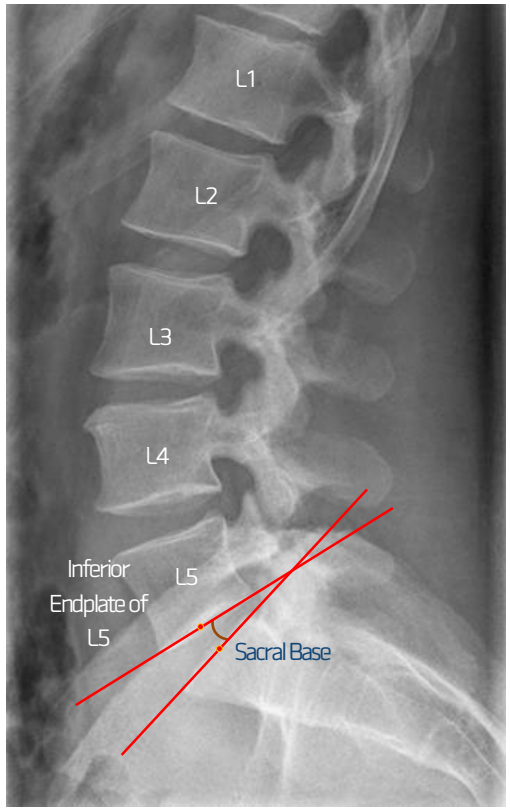
Item	Description
Also Known As	Sacral Slope
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by oblique line drawn through and parallel to sacral base and horizontal line
Diagnosis	Standard deviation is ±7˚
Range	

Item	Average	Minimum	Maximum
All	41	26	57

Lumbar Spine

Lumbosacral Disc Angle

Cross Angle with 2 Lines



Item	Description
Also Known As	–
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by the intersection of line along sacral base and line along inferior endplate of L5
Diagnosis	An increased angle of 15˚ in associated with low back pain due to facet impaction

Lumbar Spine

Lumbar Gravity Line

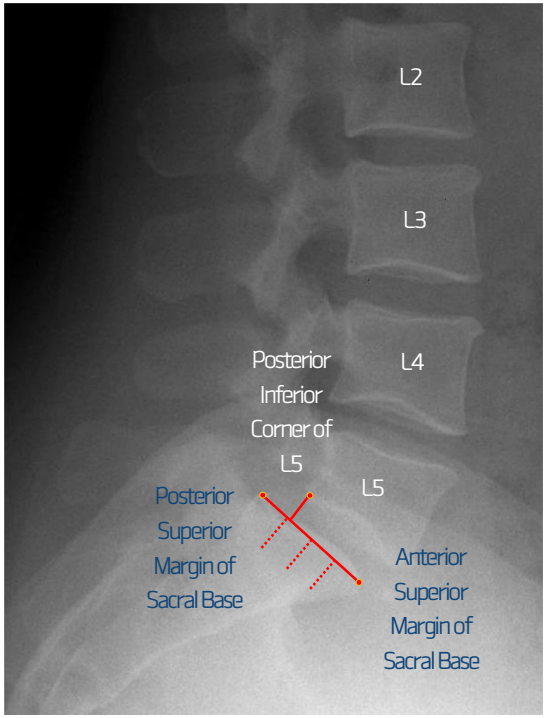
Vertebral Line Vertical Line

Item	Description
Also Known As	–
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Vertical Line
Definition	Vertical Line intersecting the center of L3 vertebral body
Diagnosis	If this line pass anterior to sacrum, a shearing stress may exist between lumbosacral apophyseal joints. If this line pass posterior to the sacrum, more stress may be placed upon pars interarticularis.

Lumbar Spine

Meyerding's Rating System

Spondylolisthesis

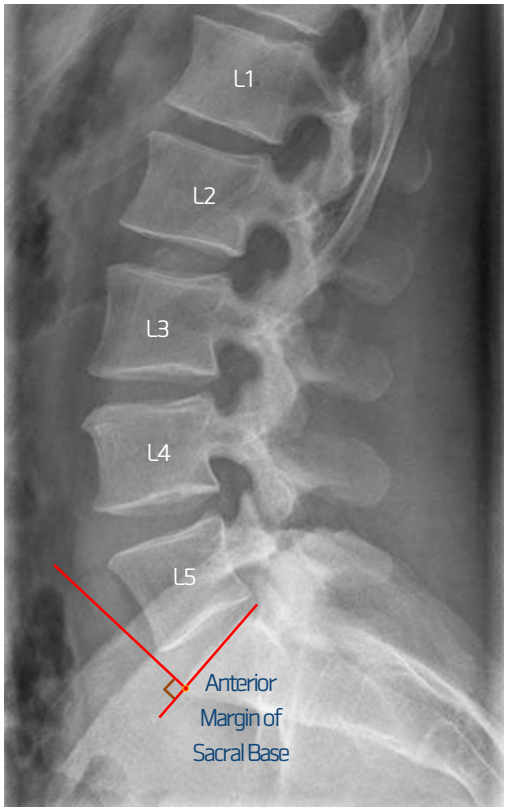


Item	Description
Also Known As	Meyerding's Grading Method in Spondylolisthesis
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Location Comparison
Definition	Relative position of posterior inferior corner of L5 body to 4 divisions devided by equal length on a line drawn from anterior superior margin to posterior superior margin along superior surface of the first sacral segment
Diagnosis	The degree of anterolisthesis of the affected vertebral body can be categorized according to the division in which the posterior-inferior corner of the body lies. If vertebral body has completely slipped beyond sacral promontory, the condition is called spondyloptosis.
Range	Posteriro-inferior corner is aligned within:

Item	Description
Grade 1	1st division
Grade 2	2nd division
Grade 3	3rd division
Grade 4	4th division

Lumbar Spine

Ullmann's Line

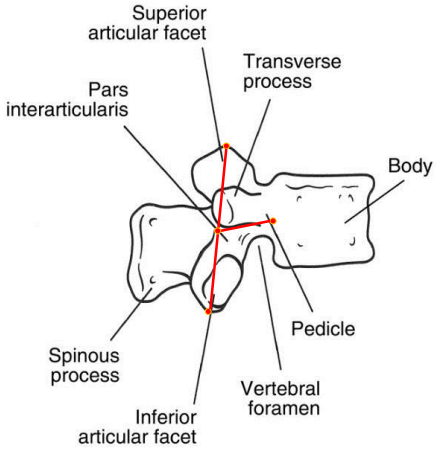


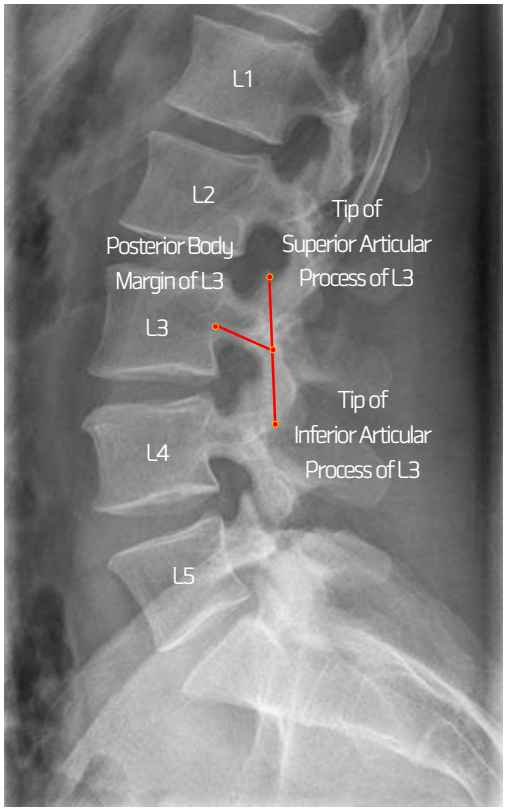
Item	Description
Also Known As	Garland–Thomas Line, Right–angle Test Line
Object	Lumbar Spine
Projection	Lateral
Measurement Type	No Measure
Definition	Perpendicular line to a line drawn through superior surface of 1st sacral segment, at anterior margin of sacral base compared to L5 vertebral body
Diagnosis	Anterior margin of L5 body crosses the perpendicular line, anterolisthesis may be present. This is a useful line for detecting the presence of spondylolisthesis when there is poor visualization of the pars region.

Lumbar Spine

Eisenstein's Method

Center Point Line



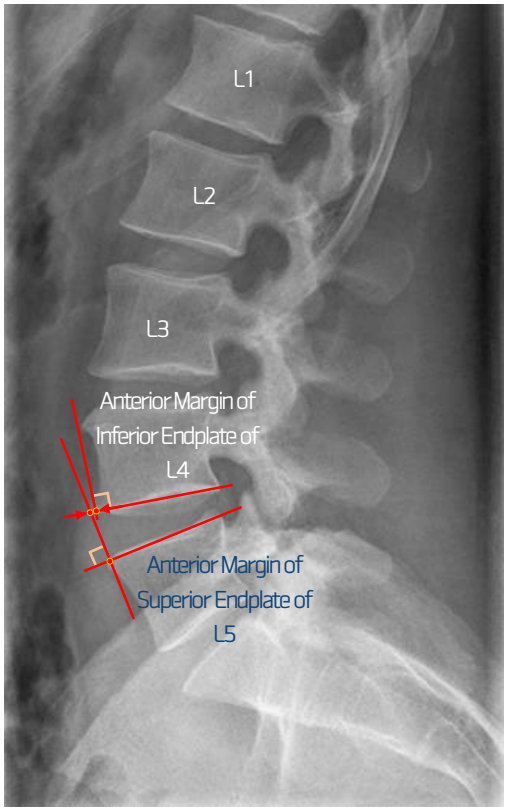


Item	Description
Also Known As	Lumbar Spinal Canal
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	Distance from posterior body margin to middle portion of facet line (line drawn connecting the tips of superior and inferior articular processes of the same segment)
Diagnosis	The canal dimension below 15mm may indicate spinal stenosis
Range	

Item	Average	Minimum	Maximum
All	-	15(14, 12)	-

Lumbar Spine

Barge's "e" Space



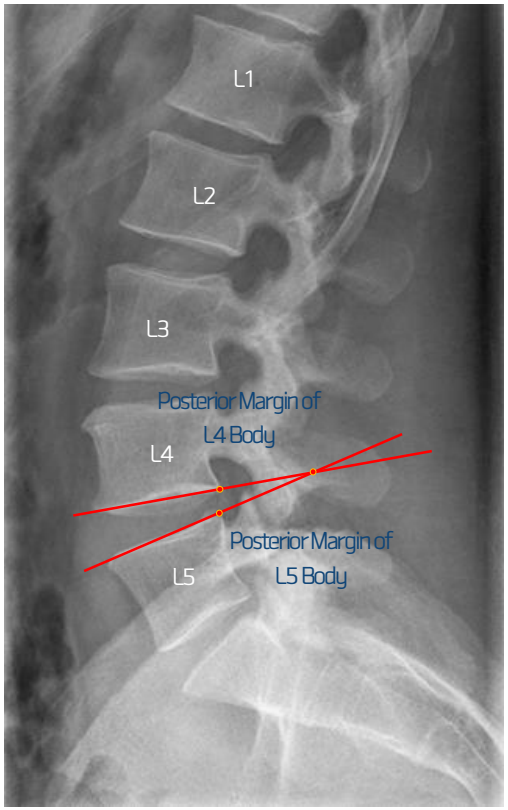
Item	Description
Also Known As	–
Object	Lumbar Spine
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	Distance between two lines at inferior endplate, which are perpendicular to lines drawn along superior and inferior vertebral endplates of each segment and drawn across intervertebral disc space
Diagnosis	Negative value indicates anterolisthesis
Range	

Item	Average	Minimum	Maximum
All	–	–	3

Lumbar Spine

Van Akkerveeken's Measurement of Lumbar Instability

Line



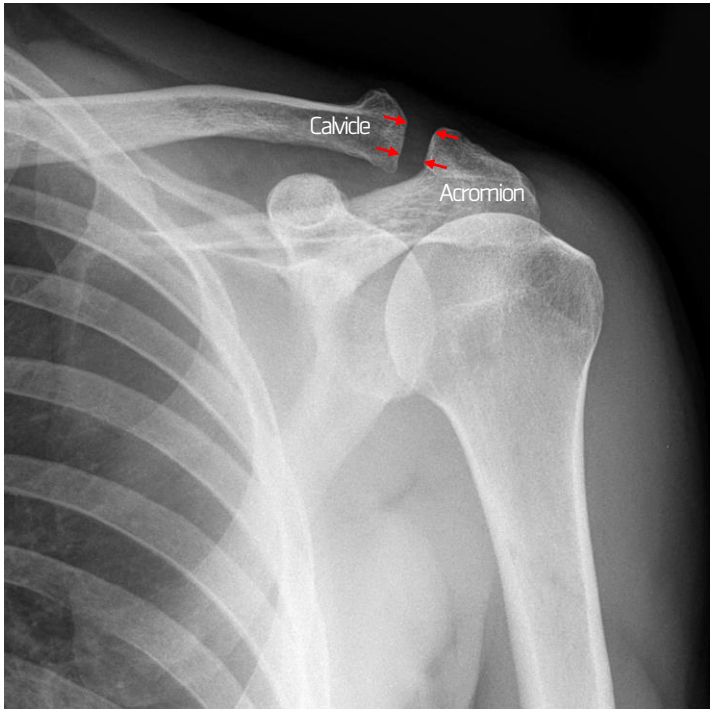
Item	Description
Also Known As	–
Object	Lumbar Spine
Projection	Lateral (Neutral, Flexion, Extension)
Measurement Type	Distance Comparison (Millimeter)
Definition	Distance from posterior body margins to the point of intersection formed by two lines drawn through and parallel to opposing segmental endplates posteriorly
Diagnosis	If there is >1.5mm (3mm) difference in measurement, then it is likely that nuclear, annular, and posterior ligament damage at the displaced segment is present
Range	

Item	Average	Minimum	Maximum
All	–	–	1.5

Upper Extremity

Acromioclavicular Joint Space

Line

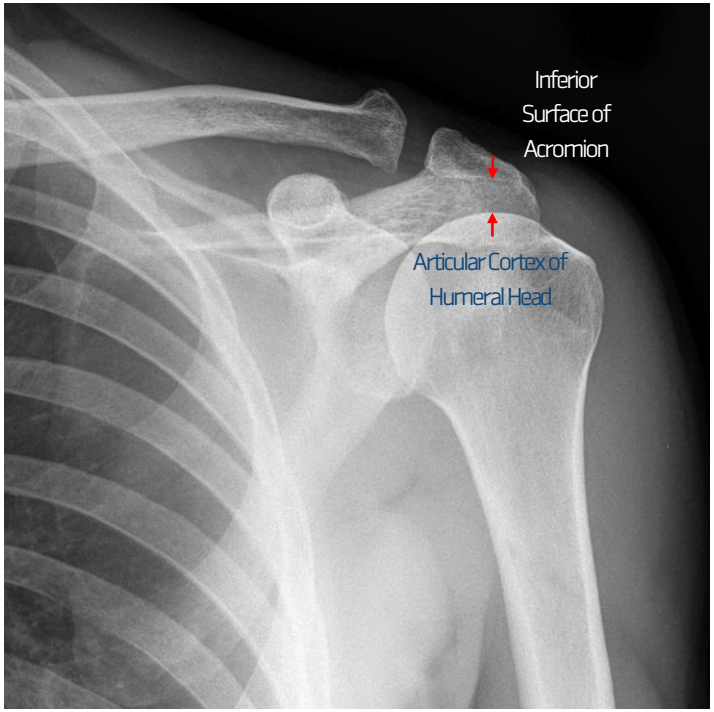


Item	Description
Also Known As	–
Object	Shoulder
Projection	AP, PA
Measurement Type	Distance (Millimeter)
Definition	Average distance of superior and inferior joint space between clavicle and acromion process
Diagnosis	Decreased joint space may indicate degenerative joint disease. Increased joint space may indicate traumatic separation, hyperparathyroidism, rheumatoid arthritis.
Range	

Item	Average	Minimum	Maximum
Male	3.3	2.5	4.1
Female	2.9	2.1	3.7

Acromiohumeral Joint Space

Line

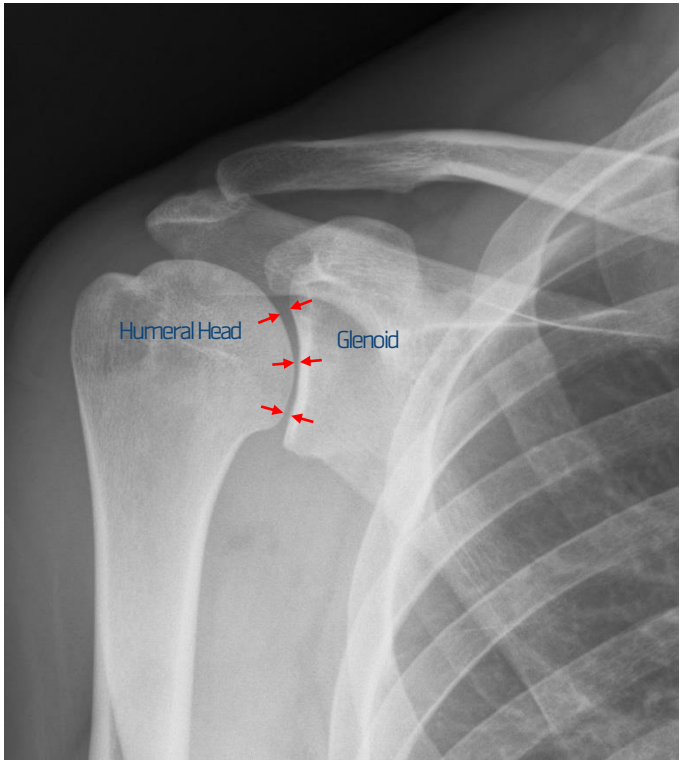


Item	Description
Also Known As	–
Object	Shoulder
Projection	AP
Measurement Type	Distance (Millimeter)
Definition	Distance between inferior surface of acromion and articular cortex of humeral head
Diagnosis	Narrowed space may indicate superior shoulder displacement, which is often secondary to shoulder impingement syndrome with rotator cuff tendonopathy. Enlarged space may indicate dislocation, joint effusion, paralysis, or brachial plexus lesions (drooping shoulder).
Range	

Item	Average	Minimum	Maximum
All	9	7	11

Upper Extremity

Glenohumeral Joint Space

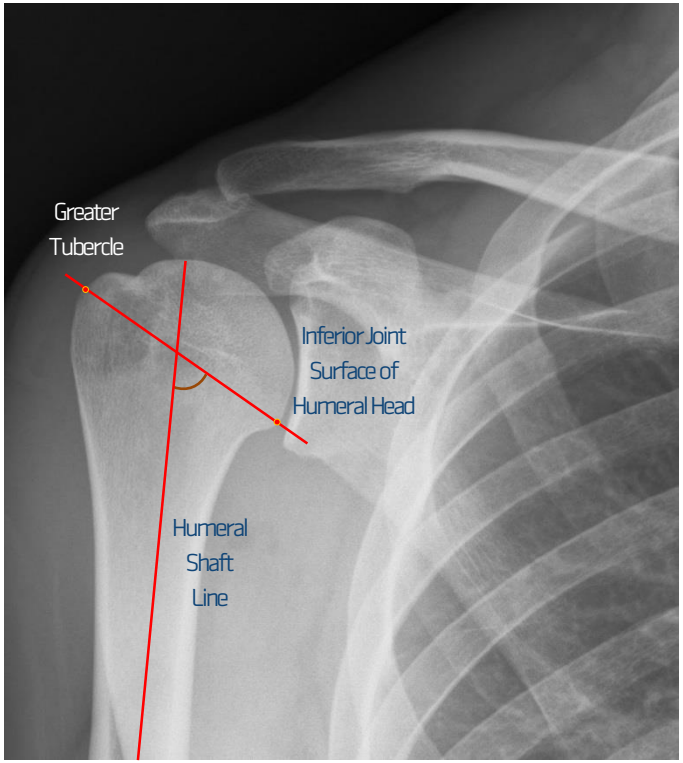


Item	Description
Also Known As	–
Object	Shoulder
Projection	AP (External Rotation)
Measurement Type	Distance (Millimeter)
Definition	Combined and averaged distance between humeral head and its opposing articular surface of glenoid fossa
Diagnosis	The joint space may be diminished in degenerative arthritis, calcium pyrophosphate dehydrate (CPPD) crystal disease, and post-traumatic arthritis. A widened space is a frequently associated finding of acromegaly and posterior humeral dislocation
Range	

Item	Average	Minimum	Maximum
All	4~5	–	–

Humeral Axial Angle

Head Shaft Angle Cross Angle with 2 Lines



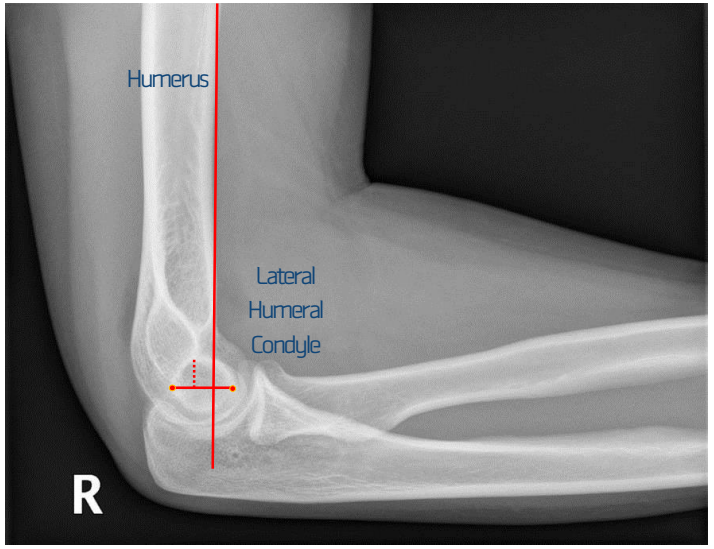
Item	Description
Also Known As	Humeral Neck–Shaft Angle
Object	Shoulder
Projection	AP
Measurement Type	Angle (Degree)
Definition	Angle formed by humeral shaft line and line drawn between greater tubercle (tuberculum majus) and inferior joint surface
Diagnosis	This relationship may be altered following a fracture, especially in surgical neck
Range	

Item	Average	Minimum	Maximum
Male	60	–	–
Female	62	–	–

Upper Extremity

Elbow–Anterior Humeral Line

Line

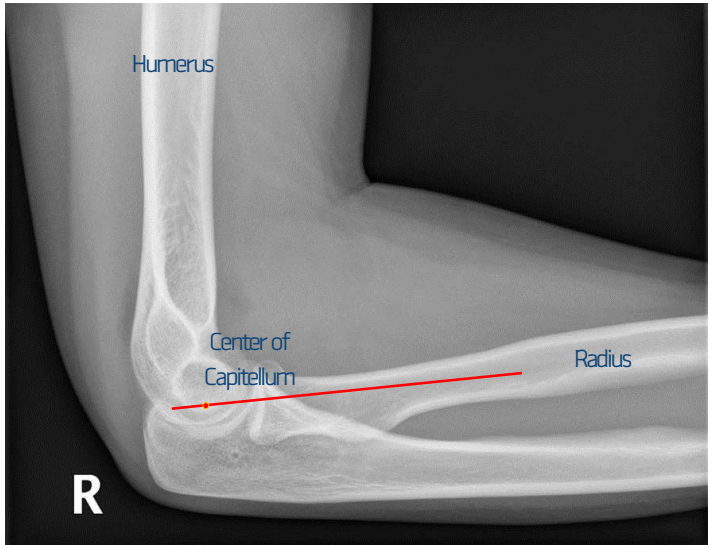


Item	Description
Also Known As	–
Object	Elbow
Projection	Lateral
Measurement Type	Location Comparison
Definition	Comparison between line drawn along anterior surface of humerus and lateral humeral condyle
Diagnosis	If the line passes anterior or posterior to the middle third of lateral humeral condyle, then a fracture may be present

Upper Extremity

Radiocapitellar Line

Line



Item	Description
Also Known As	Radiocarpal Line
Object	Elbow
Projection	Lateral
Measurement Type	Location Comparison
Definition	Line drawn through the center of and parallel to long axis of radius passing through capitellum
Diagnosis	This line should pass through the center of capitellum in all stages of flexion of elbow. This assists in determining the presence of radial head subluxation (pulled elbow) or dislocation.

Upper Extremity

Metacarpal Sign

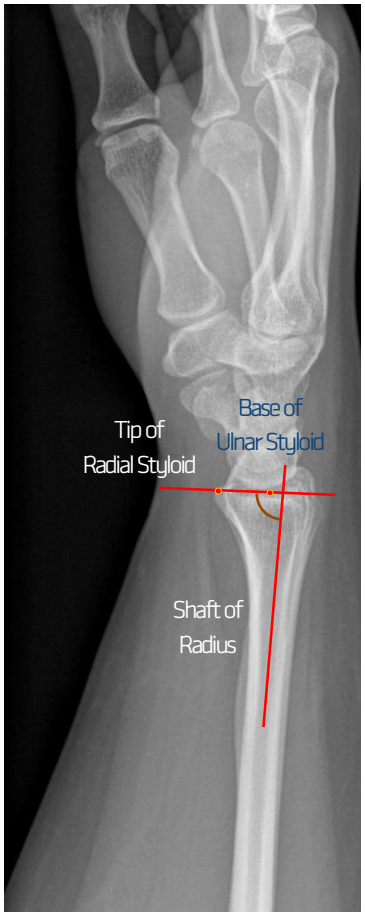
Line

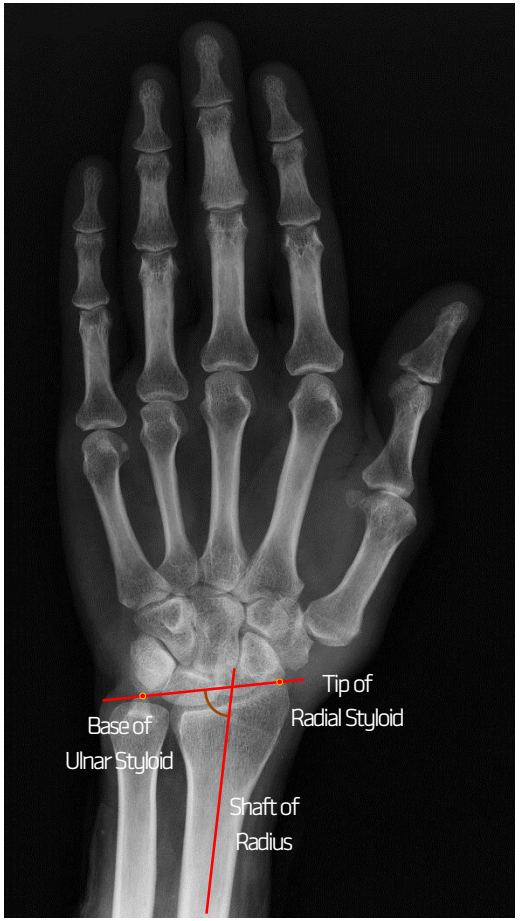
Item	Description
Also Known As	–
Object	Hand
Projection	PA
Measurement Type	Location Comparison
Definition	Line drawn tangentially through articular cortex of the fourth and fifth metacarpal heads passing distal to or just touching the third metacarpal head
Diagnosis	If the line passes through the 3rd metacarpal head, gonadal dysgenesis (Turner's syndrome), fracture deformity, pseudohypoparathyroidism, or pseudo-pseudohypoparathyroidism may be present

Upper Extremity

Axial Relationships of the Wrist

Cross Angle with 2 Lines



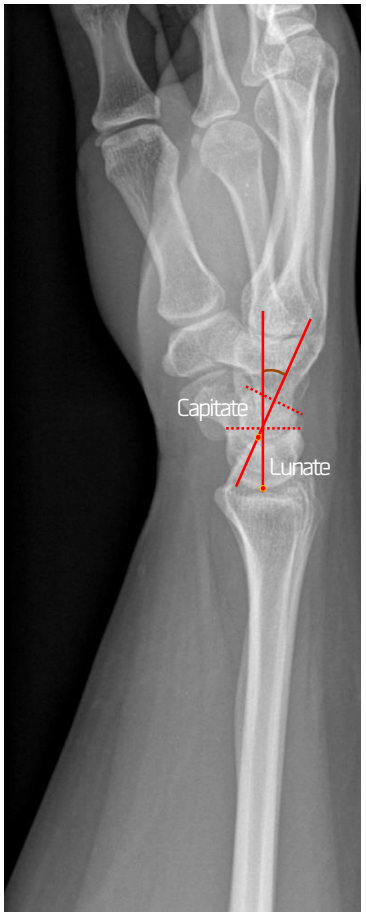


Item	Description
Also Known As	–
Object	Wrist
Projection	PA, Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by line drawn between tip of radial styloid and base of ulnar styloid and line drawn parallel to the shaft of radius
Diagnosis	These lines and angles aid in the assessment of radioulnar deformities, especially those caused by displaced fractures
Range	

Item	Average	Minimum	Maximum
PA Radioulnar	83	72	95
Lateral Radius	86	79	94

Hand-Capitolunate Sign

Cross Angle with 2 Lines

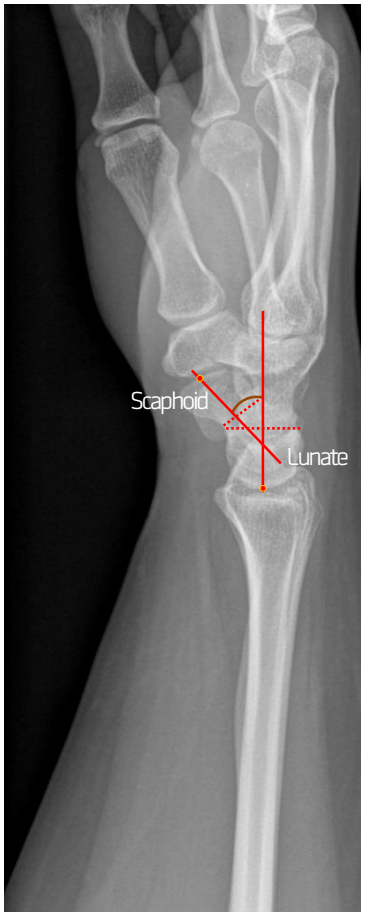


Item	Description
Also Known As	-
Object	Wrist
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by lines drawn to approximate long axes of lunate and capitate
Diagnosis	Assessment assists in determining the presence of fracture or dislocation
Range	

Item	Average	Minimum	Maximum
All	-	-	30

Scapholunate Angle

Cross Angle with 2 Lines

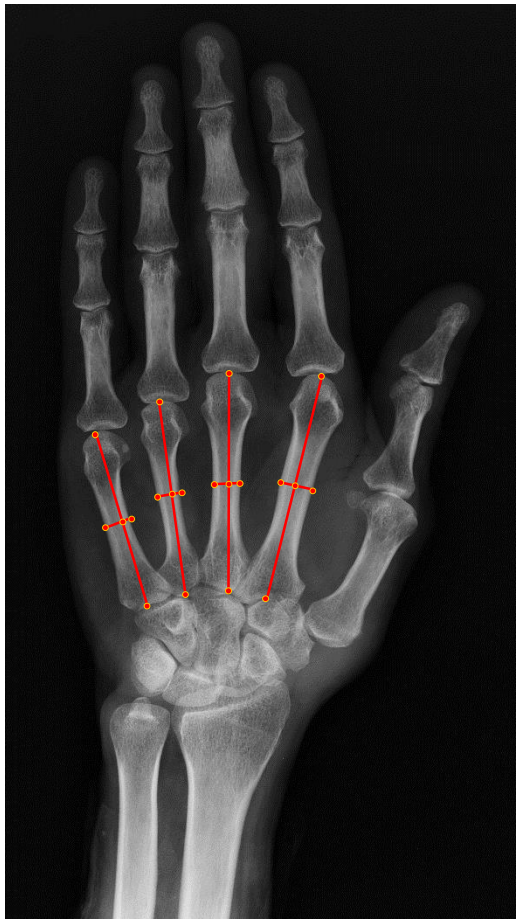


Item	Description
Also Known As	Scaphoid Tilt
Object	Wrist
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by lines drawn to approximate long axes of scaphoid and lunate
Diagnosis	If the angle is greater than 80 and the lunate is also extended (dorsiflexed), dorsal intercalated segmental instability is suggested
Range	

Item	Average	Minimum	Maximum
All	-	-	80

Upper Extremity

Metacarpal Index



Center Point Line

Item	Description
Also Known As	–
Object	Hand
Projection	PA
Measurement Type	Ratio of Length
Definition	Average of the last four metacarpals' lengths divided by their width at its midpoint of each metacarpal
Diagnosis	Marfan's patients are often greater than 8.4
Range	

Item	Average	Minimum	Maximum
All	–	–	8

Upper Extremity

Metacarpal Index by Combined Cortical Thickness

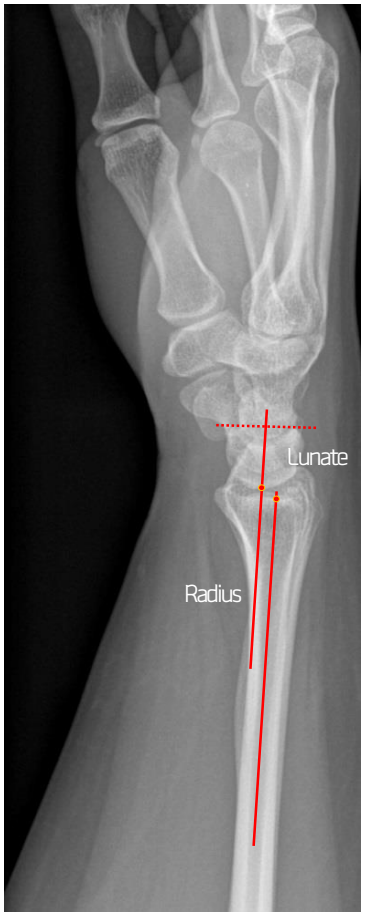
Line

Item	Description
Also Known As	–
Object	Hand
Projection	PA
Measurement Type	Ratio of Length
Definition	Difference between outer diameter and inner diameter of metacarpal divided by outer diameter
Diagnosis	–

Upper Extremity

Radiolunate Angle

Line



Item	Description
Also Known As	Lunate Tilt
Object	Wrist
Projection	Lateral
Measurement Type	Parallelity
Definition	Parallelity between line drawn along long axis of radius and line drawn along lunate
Diagnosis	If lunate is flexed more than 15 degrees, volar intercalated segment instability (VISI) is suggested. If the angle is greater than 10 degrees in extension, dorsal intercalated segment instability (DISI) is suggested. Occasionally VISI and usually DISI occur with scapholunate dissociation VISI is also related to triquetrolunate dissociation.

Upper Extremity

Radioulnar Variance

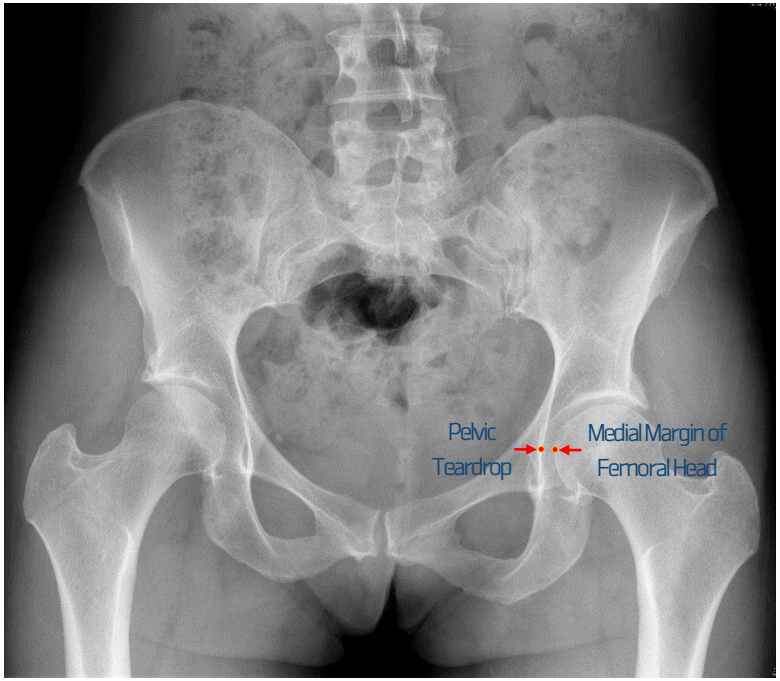
Free Line Curve Line

Item	Description
Also Known As	–
Object	Wrist
Projection	AP
Measurement Type	Location Comparison
Definition	Alignment between distal ulnar articular surface and inner portion of distal radial articular surface
Diagnosis	Short ulna may indicate avascular necrosis of lunate (Kienbock's disease) or greater carpal stress distribution to radius Long ulna may indicate greater carpal stress distribution to ulna
Range	

Item	Average	Minimum	Maximum
All	–	–	5

Teardrop Distance

Line

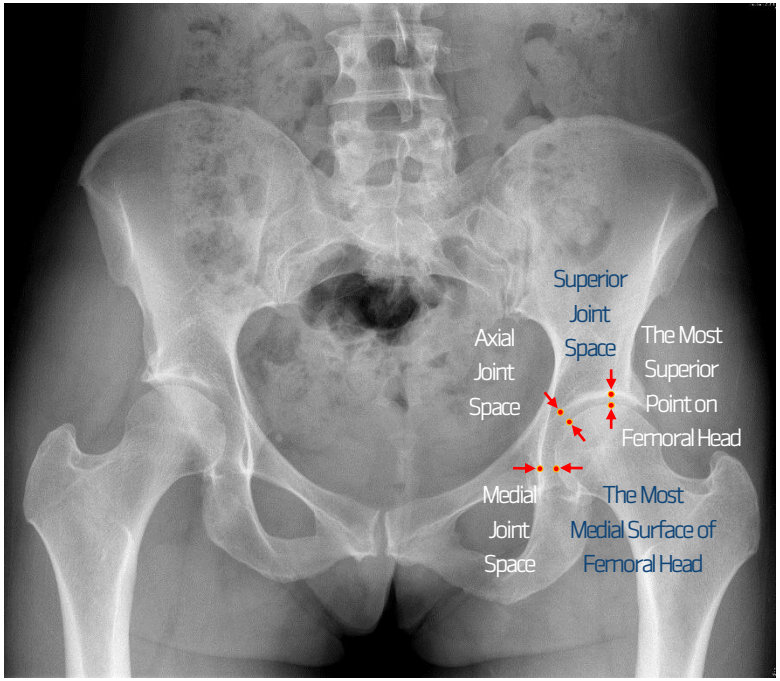


Item	Description
Also Known As	Medial Joint Space of Hip
Object	Pelvis
Projection	AP
Measurement Type	Distance (Millimeter)
Definition	Distance between the most medial margin of femoral head and outer cortex of pelvic teardrop
Diagnosis	>11mm or >2mm discrepancy from right to left may indicate Waldenstrom's sign. Left to right discrepancies of >1mm will be present in 90% of hip joint effusions, Legg–Calve–Perthes disease, septic arthritis, and other inflammatory diseases.
Range	

Item	Average	Minimum	Maximum
All	9	6	11

Hip Joint Space Width

Line

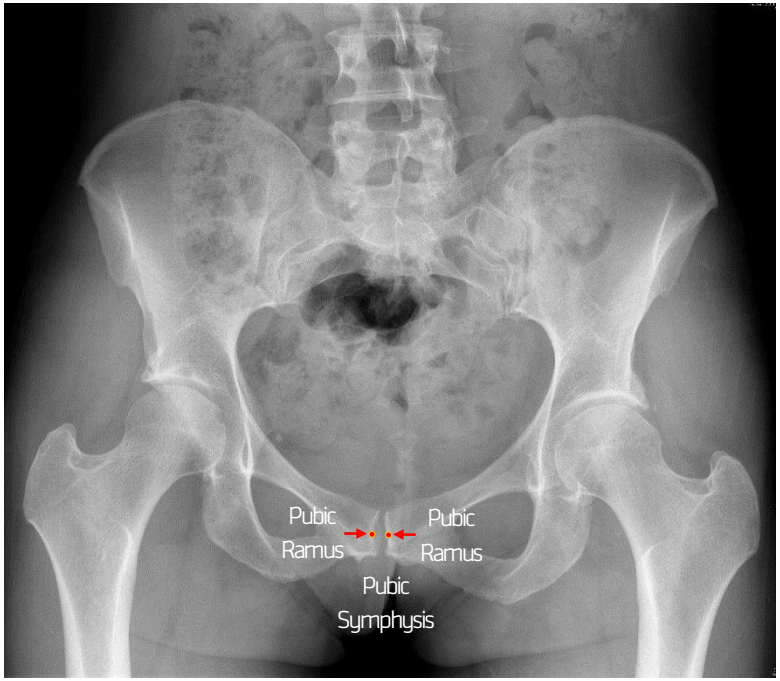


Item	Description
Also Known As	–
Object	Pelvis
Projection	AP
Measurement Type	Distance (Millimeter)
Definition	**Superior Joint Space**: distance between most superior point on femoral head and adjacent acetabular cortex. **Axial Joint Space**: distance between femoral head and acetabulum immediately lateral to acetabular notch. **Medial Joint Space**: distance between the most medial surface of femoral head and opposing acetabular surface.
Diagnosis	Superior and axial compartments are approximately equal, medial space is twice the distance. Reduction of superior joint space may indicate degenerative joint disease, reduction of axial or medial joint space may indicate degenerative arthritis or inflammatory arthritis.
Range	

Item	Average	Minimum	Maximum
Superior	4	3	6
Axial	4	3	7
Medial	8	4	13

Symphysis Pubis Width

Line



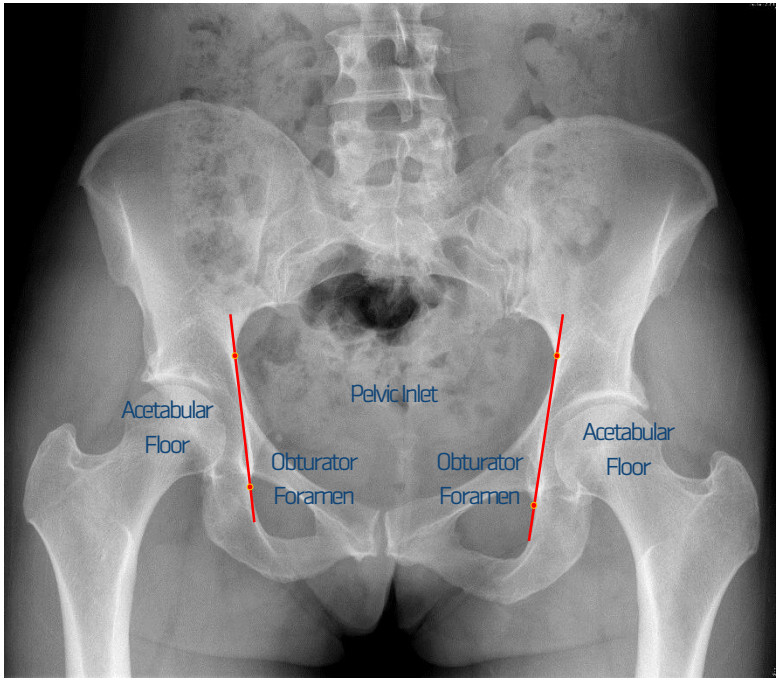
Item	Description
Also Known As	–
Object	Pelvis
Projection	AP
Measurement Type	Distance (Millimeter)
Definition	Distance between two pubic ramus in the middle of superior and inferior margins of joint
Diagnosis	Widening of symphysis may indicate cleidocranial dysplasia, bladder exostrophy, hyperparathyroidism, post-traumatic diastasis, or inflammatory resorption (ankylosing spondylitis, osteitis pubis, gout)
Range	

Item	Average	Minimum	Maximum
Male	6	4.8	7.2
Female	5	3.8	6

Pelvis

Köhler's Line

Line

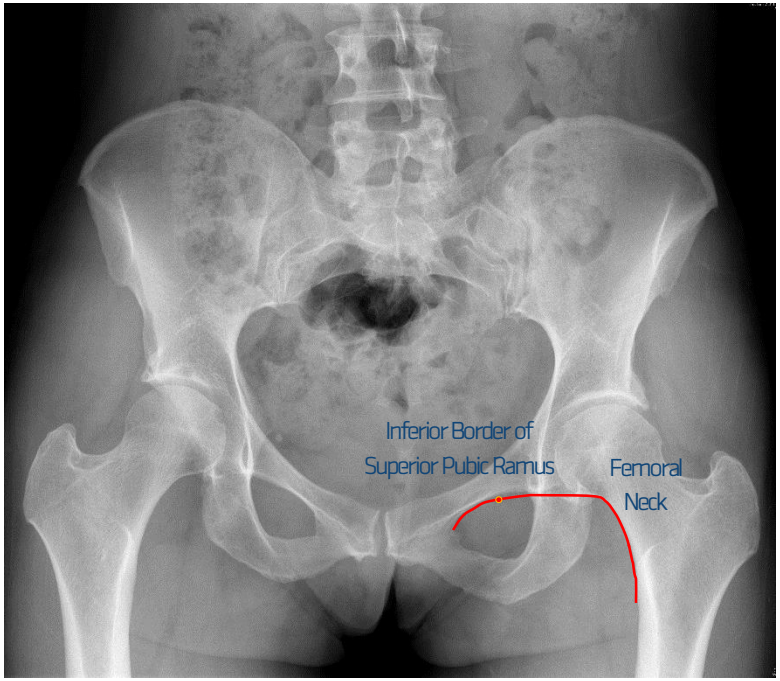


Item	Description
Also Known As	Measurement of Protrusio Acetabuli
Object	Pelvis
Projection	AP
Measurement Type	Location Comparison
Definition	Line drawn tangentially to cortical margin of pelvic inlet and outer border of obturator foramen
Diagnosis	If acetabular floor crosses the line, then protrusion acetabuli is present. The most common causes are idiopathic form, rheumatoid arthritis, Paget's disease, ankylosing spondylitis.

Pelvis

Shenton's Line

Free Line Curve Line

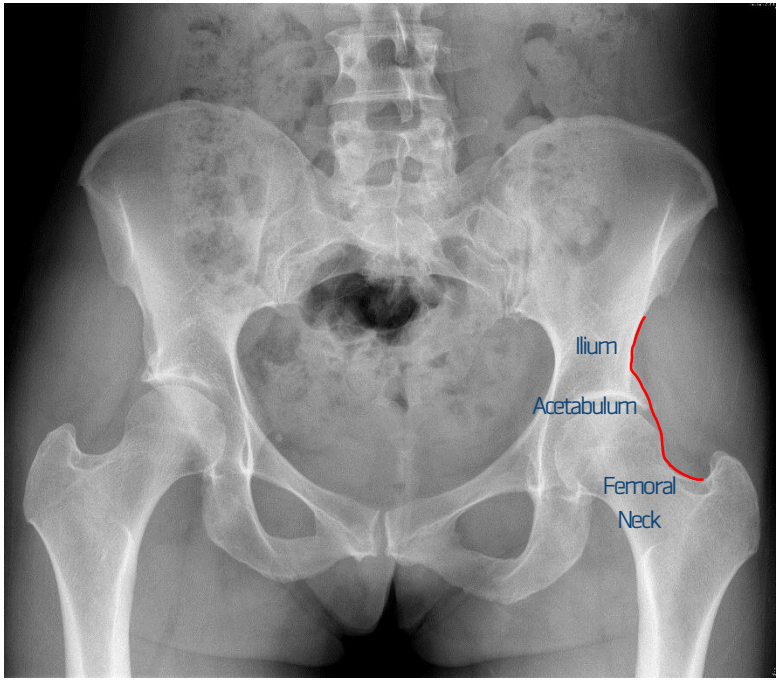


Item	Description
Also Known As	Makka's Line, Menard's Line
Object	Pelvis
Projection	AP
Measurement Type	Curve
Definition	Curvilinear line drawn along the undersurface of femoral neck and inferior border of superior pubic ramus
Diagnosis	Interrupted or discontinuous line may indicate hip dislocation, femoral neck fracture, or slipped femoral capital epiphysis

Pelvis

Iliofemoral Line

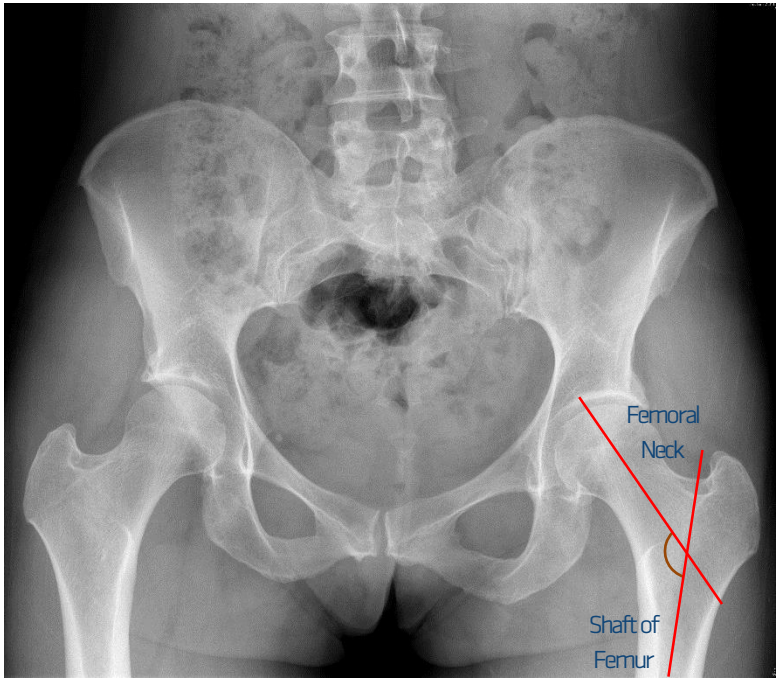
Free Line Curve Line



Item	Description
Also Known As	–
Object	Pelvis
Projection	AP
Measurement Type	Curve Symmetry
Definition	Curvilinear line along the outer surface of ilium, across acetabulum, and onto femoral neck
Diagnosis	A discrepancy in symmetry may be the result of congenital dysplasia, slipped femoral capital epiphysis, dislocation, or fracture

Femoral Angle

Head Shaft Angle



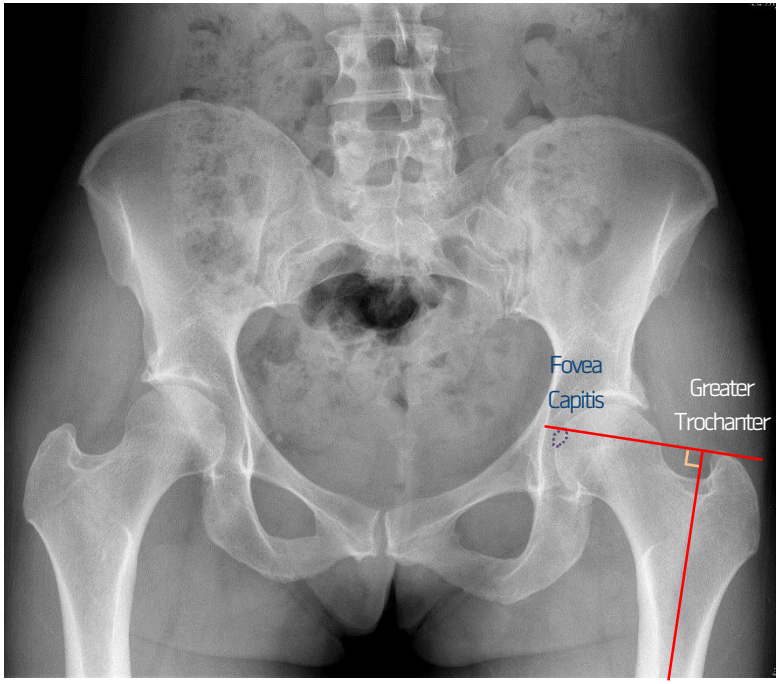
Item	Description
Also Known As	Femoral Angle of Incidence, Femoral Neck Angle, Head Shaft Angle, Mikulicz's Angle
Object	Pelvis
Projection	AP
Measurement Type	Angle (Degree)
Definition	Angle formed by line drawn along the axis of femoral neck and line drawn along the shaft of femur
Range	

Item	Average	Minimum	Maximum
Coxa Vara	-	-	120
Coxa Norma	-	120	135
Coxa Valga	-	135	-

Pelvis

Skinner's Line

Line

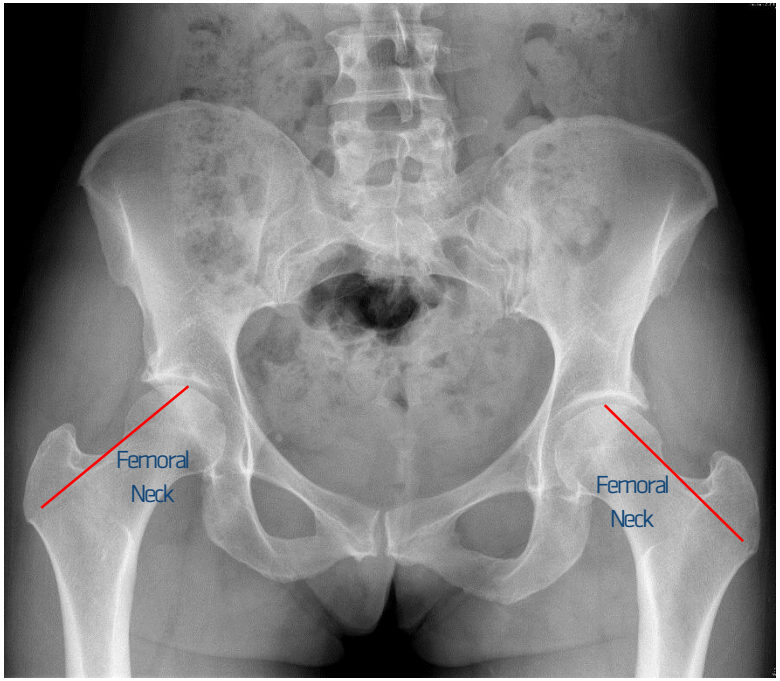


Item	Description
Also Known As	–
Object	Pelvis
Projection	AP
Measurement Type	Location Comparison
Definition	Line drawn tangential to greater trochanter and perpendicular to line drawn through and parallel to femoral shaft
Diagnosis	Fovea capitis lies below this line when there is a superior displacement of femur relative to femoral head, caused by fracture or coxa vara

Pelvis

Klein's Line

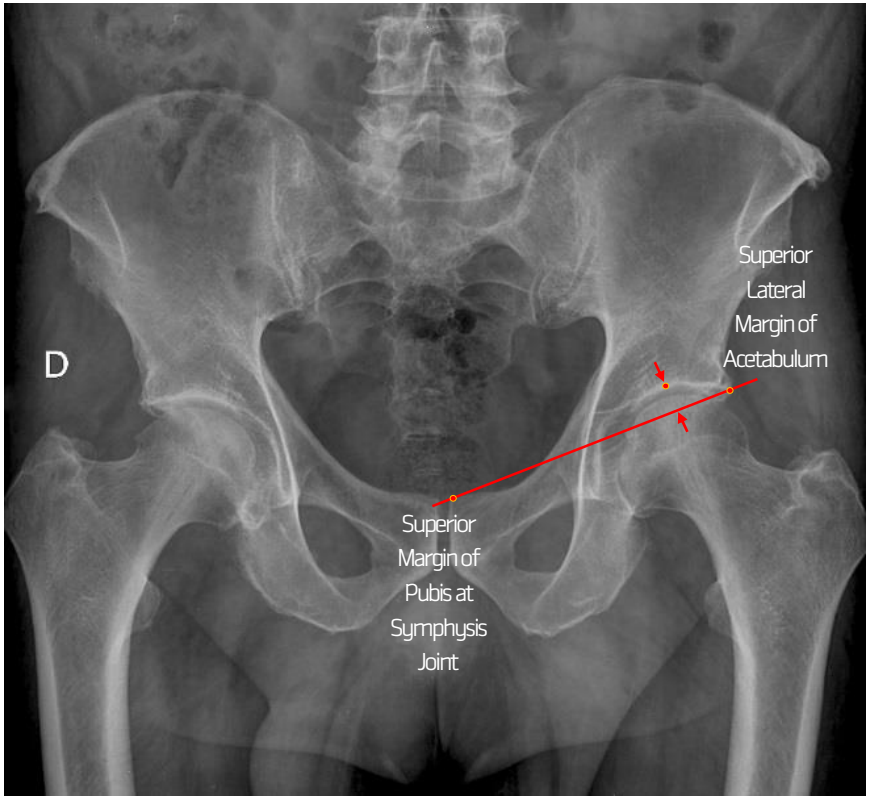
Line



Item	Description
Also Known As	–
Object	Pelvis
Projection	AP, Frog-Leg Projection
Measurement Type	Overlap Comparison on Both Side
Definition	Line drawn tangential to lateral cortical margin of femoral neck
Diagnosis	If femoral head does not overlap the line or if there is asymmetry from side to side, then slippage of femoral capital epiphysis should be suspected

Acetabular Depth

Line

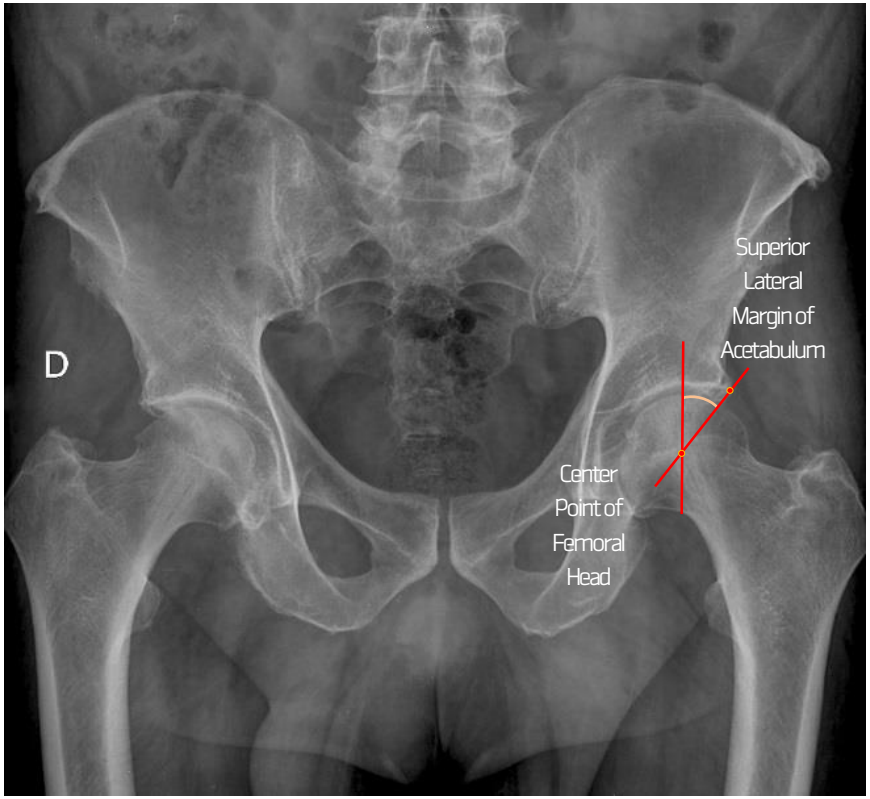


Item	Description
Also Known As	–
Object	Pelvis
Projection	AP
Measurement Type	Distance (Millimeter)
Definition	The greatest distance from acetabular floor to line drawn from superior margin of pubis at symphysis Joint to superior lateral acetabular margin
Diagnosis	Acetabular depth <9 mm in females and <7 mm in males is considered to be shallow and dysplastic, which may be a factor in precipitating degenerative joint disease of hip
Range	

Item	Average	Minimum	Maximum
Male	13	7	18
Female	12	9	18

Center-Edge Angle

Center Edge Angle

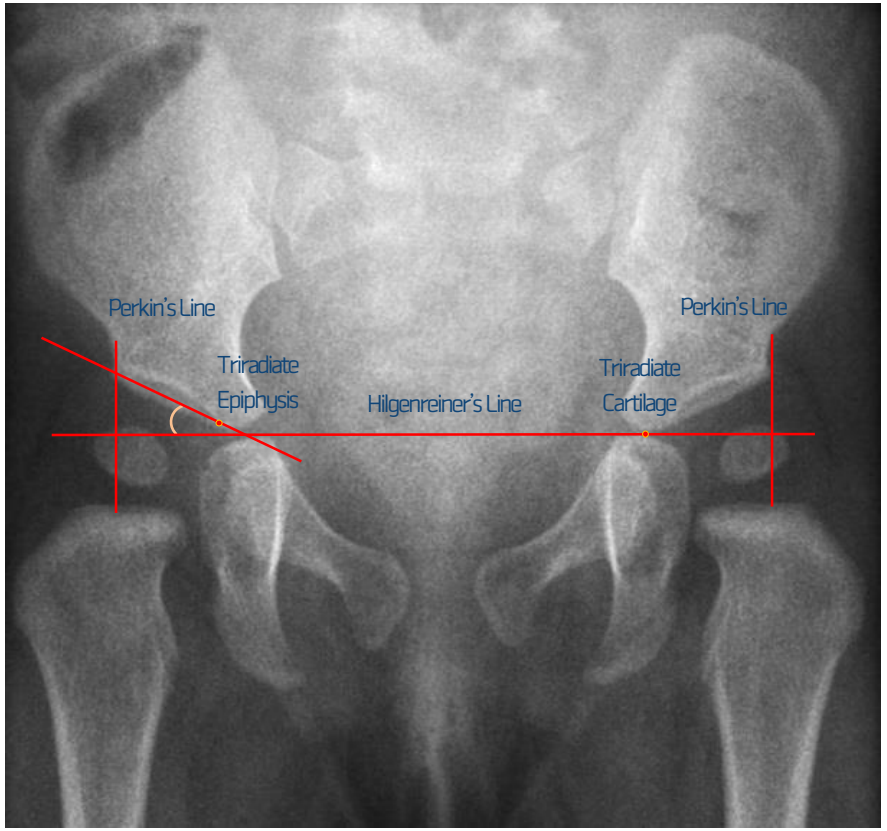


Item	Description
Also Known As	Wiberg's Angle, Acetabular Center-Edge Angle
Object	Pelvis
Projection	AP
Measurement Type	Angle (Degree)
Definition	Angle formed by vertical line drawn through the center point of femoral head and line drawn through femoral head center to superior lateral margin of acetabulum
Diagnosis	Shallow angle may indicate acetabular dysplasia (degenerative joint disease)
Range	

Item	Average	Minimum	Maximum
All	36	20	40

Acetabular Index

Cross Angle with 2 Lines

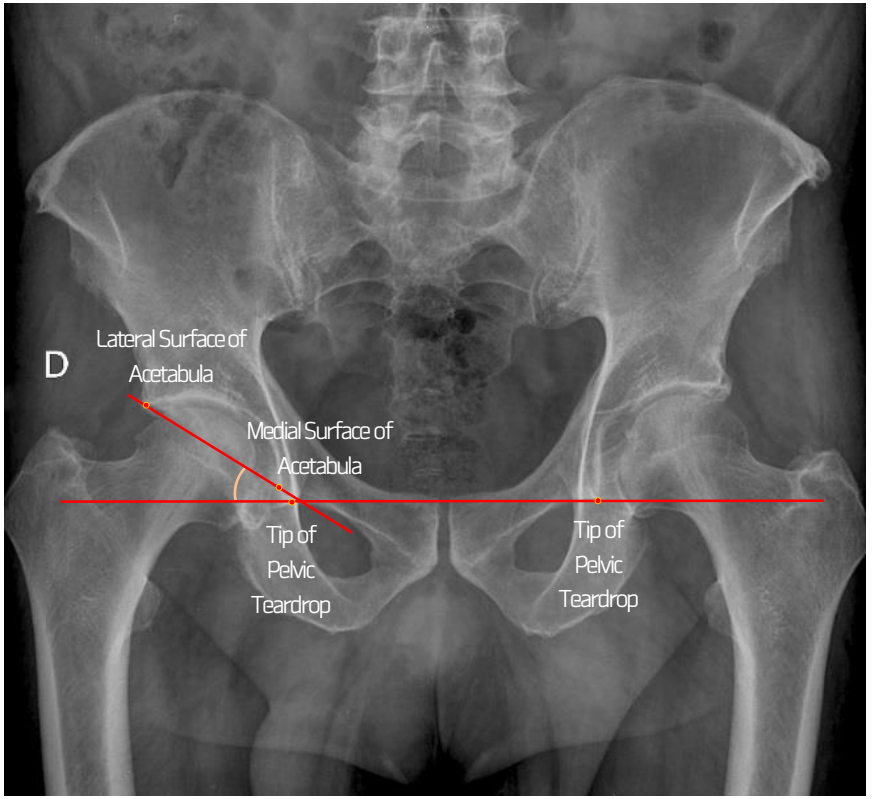


Item	Description
Also Known As	Hilgenreiner's Line
Object	Pelvis (Children)
Projection	AP
Measurement Type	Angle (Degree)
Definition	**Hilgenreiner's Line**: horizontal line drawn through right and left triradiate cartilage **Perkin's Line**: line drawn along each of acetabuli to intersect Hilgenreiner's Line Angle between Hilgenreiner's Line and a line drawn from triradiate epiphysis to lateral edge of acetabulum
Diagnosis	Enlarged angle may indicate acetabular dysplasia or congenital dislocation of hip. Shallow angle may indicate Down's syndrome.
Range	

Item	Female	Male
Birth	<36	<30
6 Months	<28	<25
1 Year	<25	24
7 Years	<19	<18

Acetabular Angle

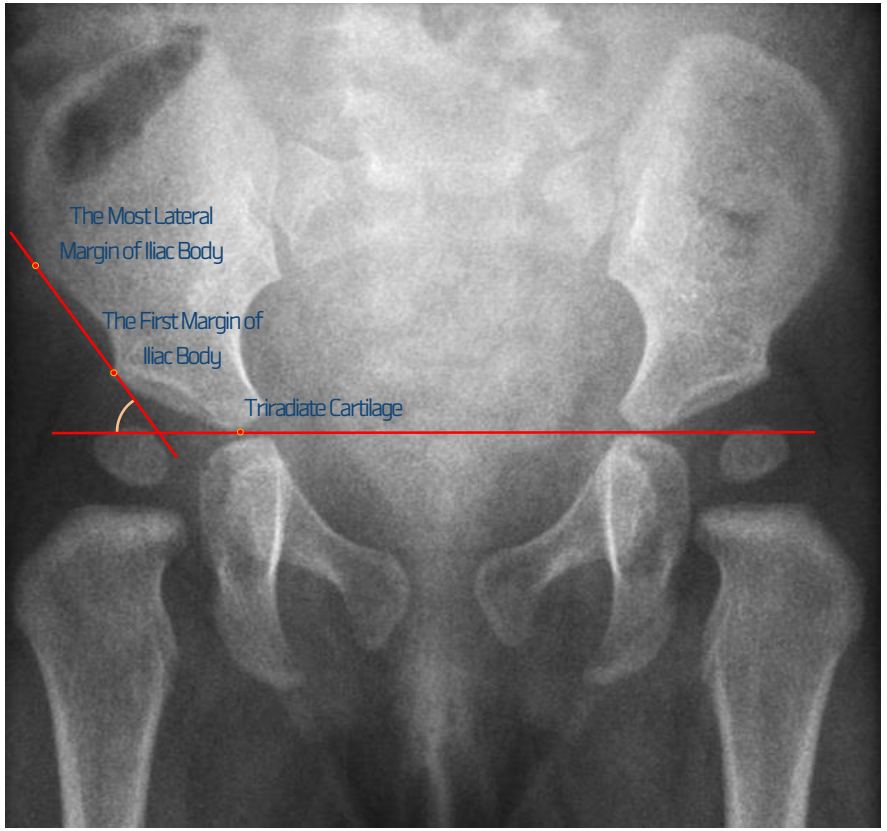
Acetabular Angle Cross Angle with 2 Lines



Item	Description
Also Known As	–
Object	Pelvis
Projection	AP
Measurement Type	Angle (Degree)
Definition	Angle formed by line drawn through triradiate cartilages (or tips of pelvic teardrop) and line connecting lateral and medial acetabular surfaces
Diagnosis	Increased angle may indicate acetabular dysplasia or congenital dislocation of hip. Decreased angle may indicate Down's syndrome.

Iliac Angle and Index

Iliac Angle Cross Angle with 2 Lines



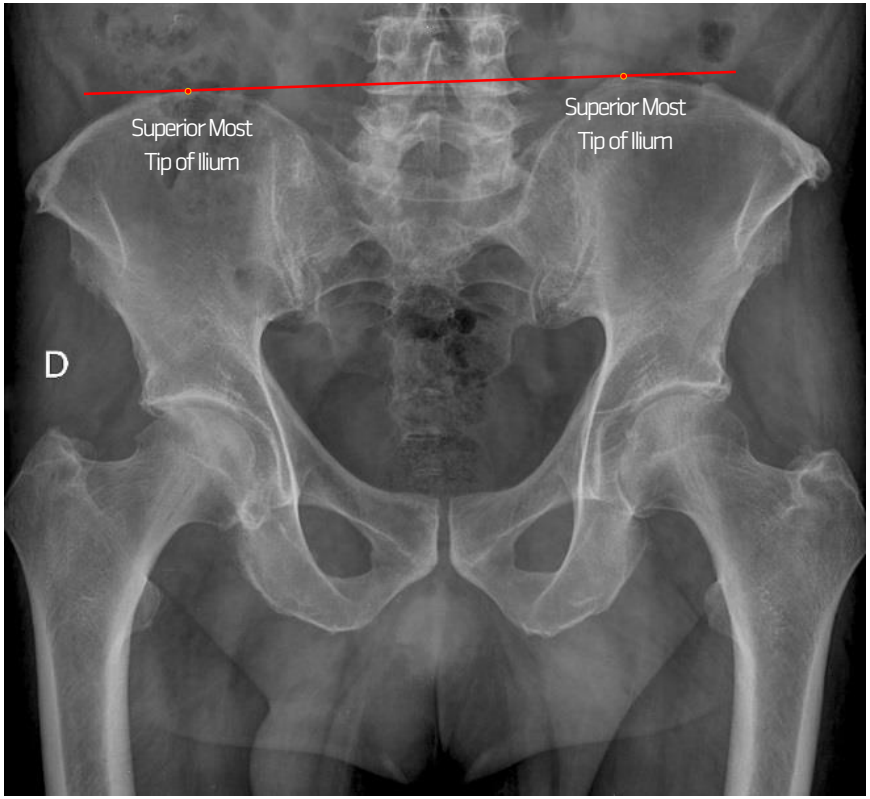
Item	Description
Also Known As	–
Object	Pelvis (Children)
Projection	AP
Measurement Type	Angle (Degree)
Definition	**Iliac Angle**: angle formed by line drawn through triradiate cartilages and line tangential to the most lateral margin of iliac wing and iliac body **Iliac Index**: sum of both iliac angles and acetabular angles divided by 2
Diagnosis	When the index is <60, Down's syndrome is probable, when the index is 60~68, the syndrome is possible, if the index is >68, the syndrome is unlikely
Range	

Category	Item	Average	Minimum	Maximum
Iliac Angle	0~3 Months	44	35	58
	3~12 Months	55	43	67
Iliac Index	0~3 Months	60	48	87
	3~12 Months	81	68	97

Pelvis

Intercrestal Line

Line

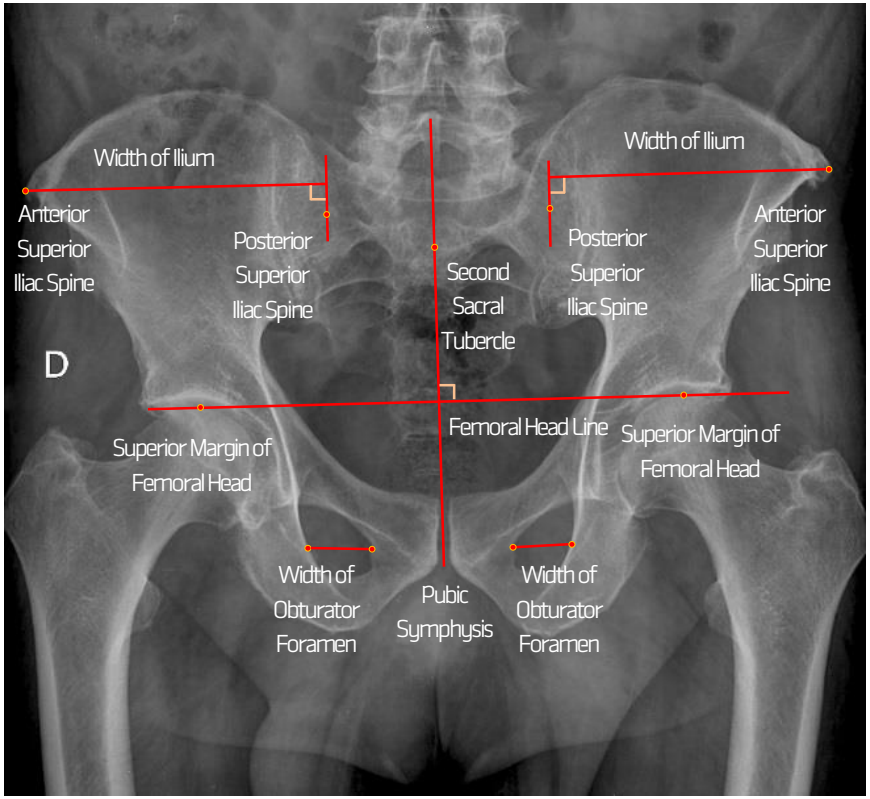


Item	Description
Also Known As	Jacoby's Line, Tuffier's Line
Object	Pelvis
Projection	AP
Measurement Type	Location Comparison
Definition	Line connecting both superior most tips of ilium
Diagnosis	If the line is higher than horizontally bisecting line through L4, then spinal disc herniation may be present between L4 and L5. If the line is lower than superior endplate of L5 then spinal disc herniation may be present between L5 and S1.

Pelvis

Pelvic Misalignment – Innominate Rotation

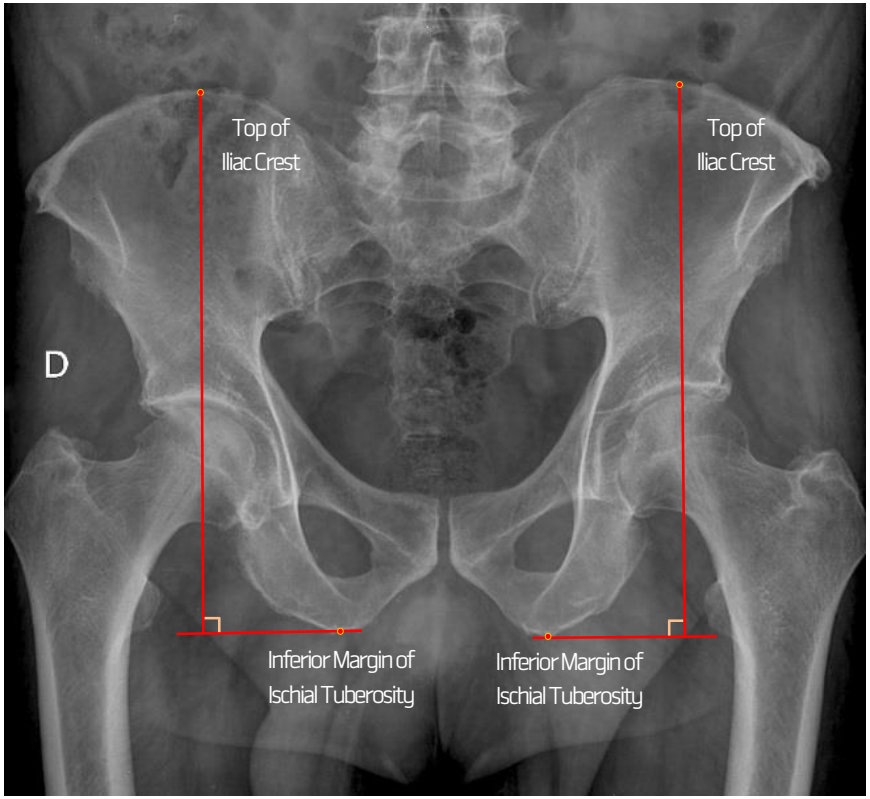
Pelvis Analysis



Item	Description
Also Known As	Gonstead Pelvic Analysis, Ilium Analysis
Object	Pelvis
Projection	AP
Measurement Type	Location Comparison
Definition	**Femoral Head Line**: line drawn along superior margins of femoral heads bilaterally. Line drawn from second sacral tubercle perpendicular to Femoral Head Line.
Diagnosis	If the perpendicular line intersects pubic bone instead of symphysis, the innominate is externally rotated on the side the line crosses through. Rotation can be double-checked by measuring the width of ilium and obturator foramen.

Pelvic Misalignment – Innominate Flexion–Extension

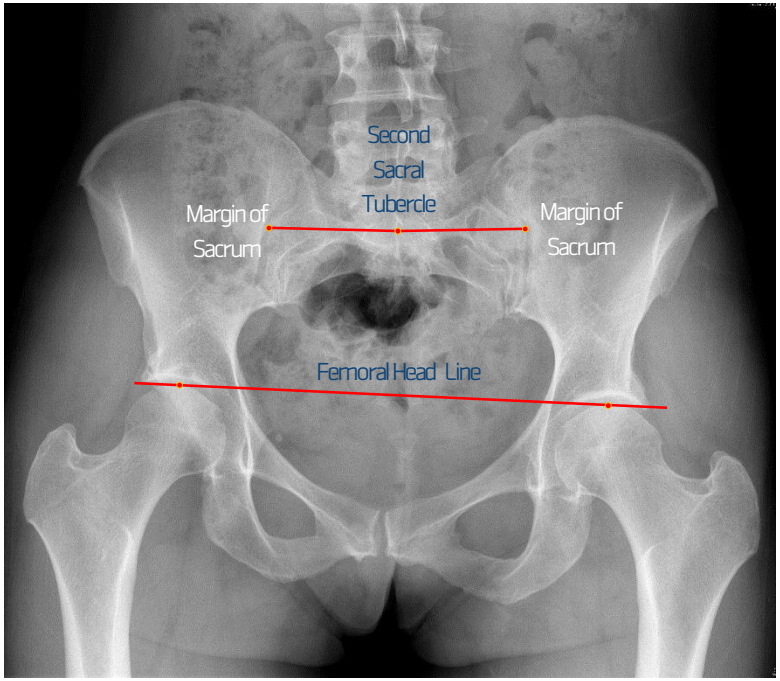
Pelvis Analysis



Item	Description
Also Known As	Gonstead Pelvic Analysis, Ilium Analysis
Object	Pelvis
Projection	AP (Weight Bearing)
Measurement Type	Distance Comparison
Definition	Vertical Distance from the top of Iliac crest to inferior margin of ischial tuberosity
Diagnosis	The vertical measurement of innominate is larger on the flexed side and smaller on the extended side

Pelvic Misalignment – Sacrum Rotation

Pelvis Analysis | 3 Points Ratio | 4 Points Ratio

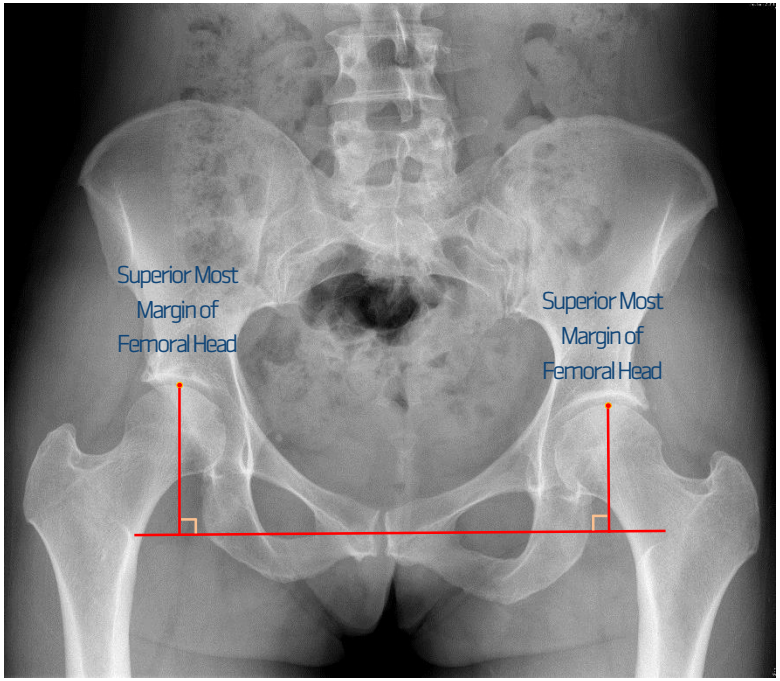


Item	Description
Also Known As	–
Object	Pelvis
Projection	AP
Measurement Type	Distance Comparison
Definition	Distances from lateral margins of sacrum to second sacral tubercle
Diagnosis	If the distances are different, then rotation of sacrum may be present

Pelvis

Pelvic Misalignment – Leg Length Inequality

Leg Length Discrepancy

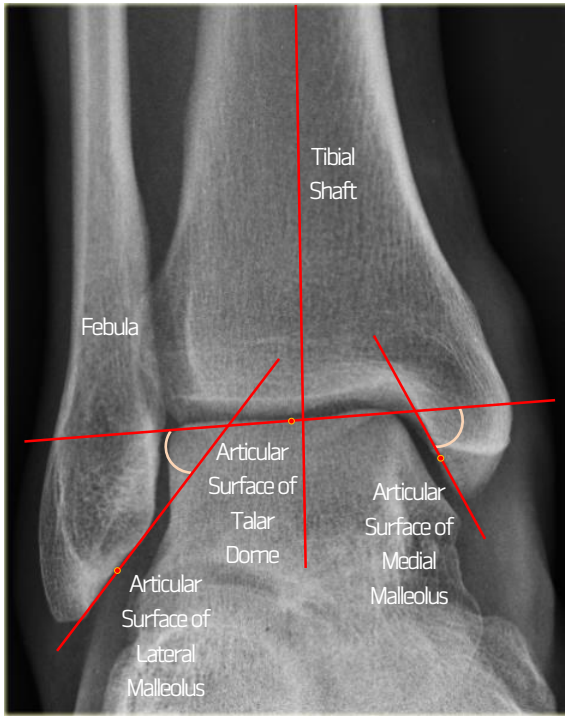


Item	Description
Also Known As	Leg Length Discrepancy
Object	Pelvis
Projection	AP
Measurement Type	Distance Comparison
Definition	Distances from vertical line to both superior most margins of femoral heads
Diagnosis	If there is discrepancy between two distances, leg lengths are not equal

Lower Extremity

Axial Relationships of the Ankle

Cross Angle with 2 Lines

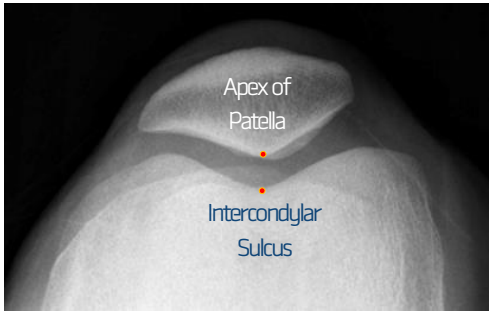


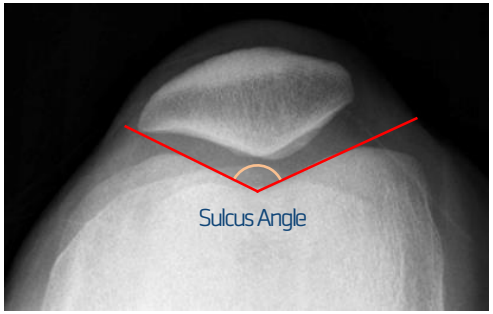
Item	Description
Also Known As	–
Object	Ankle
Projection	AP
Measurement Type	Angle (Degree)
Definition	**Tibial Shaft Line**: line drawn through and parallel to tibial shaft. **Medial Malleolus Line**: line drawn tangential to articular surface of medial malleolus. **Lateral Malleolus Line**: line drawn tangential to articular surface of lateral malleolus. **Talus Line**: line drawn tangential to articular surface of talar dome. **Tibial Angle**: angle formed medially between medial malleolus line and talus line. **Fibular Angle**: angle formed laterally between lateral malleolus line and talus line.
Diagnosis	These angles will be altered in fractures of malleoli, ankle mortise instability, and tibiotalar slant deformities. In neutral position, an angle over 6 degrees indicates significant ligamentous injury.
Range	

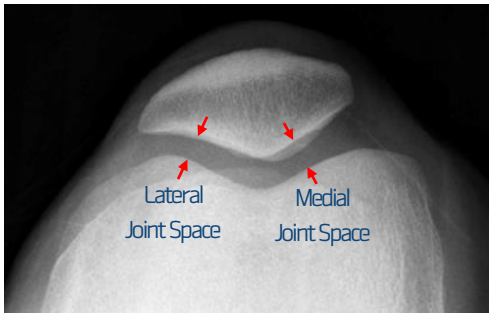
Angle	Average	Minimum	Maximum
Tibial	53	45	65
Fibular	52	43	63

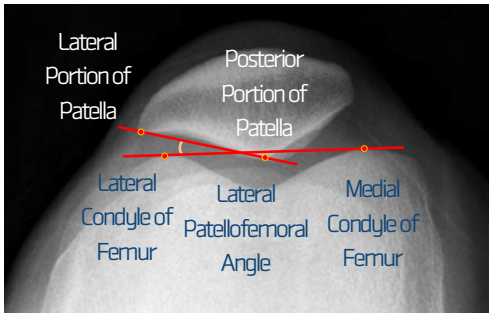
Lower Extremity

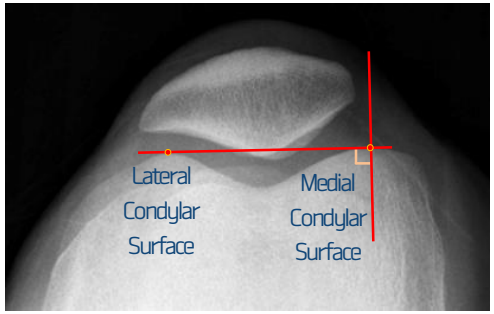
Patellar Malalignment











? Line Cross Angle with 2 Lines

Item	Description
Also Known As	Patellar Tracking, Patellar Subluxation, Patellofemoral Joint Incongruence, Tangential Knee(Skyline)
Object	Knee
Projection	Skyline
Measurement Type	–
Definition	**Patella Apex**: apex of patella is directly above the deepest section of intercondylar sulcus. **Sulcus Angle**: angle formed by tangential intersecting lines drawn into intercondylar sulcus. **Lateral Patellofemoral Joint Index**: the narrowest medial joint space divided by the narrowest lateral joint space. **Lateral Patellofemoral Angle**: angle formed by a line between femoral condyles and a line from lateral to posterior portion of patella. **Lateral Patellar Displacement**: line tangential to medial and lateral condylar surfaces and a perpendicular line at medial edge of femoral condyle
Diagnosis	The combined use of these measurements may reveal contributing causes to patellofemoral joint pain syndromes and instability. If sulcus angle is more than 144˚, then subluxation or dislocation may be present. If lateral patellofemoral joint index is more than 1, then chondromalacia patellae may be present.

Heel Pad Measurement

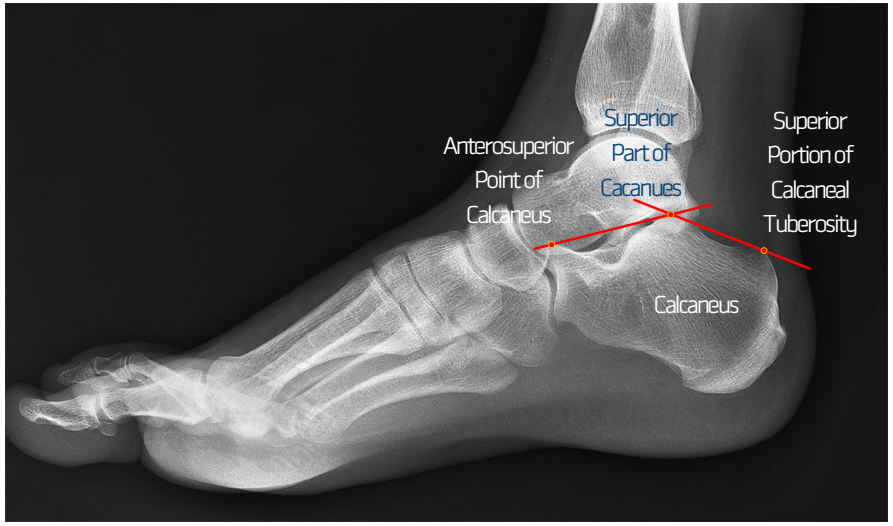
Line

Item	Description
Also Known As	–
Object	Foot
Projection	Lateral
Measurement Type	Distance (Millimeter)
Definition	The shortest distance between external skin contour and plantar surface of calcaneus
Diagnosis	Increased skin thickness is sign of acromegaly, obesity, myxedema, or local inflammation
Range	

Item	Average	Minimum	Maximum
Male	19	–	25
Female	19	–	23

Böhler's Angle

Cross Angle with 2 Lines



Item	Description
Also Known As	Axial Relationships of Calcaneus, Tuber Angle
Object	Foot
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed posteriorly by line drawn from anterosuperior point of calcaneus to the most superior part of calcaneus and line drawn from the most superior part of calcaneus to superior portion of calcaneal tuberosity
Diagnosis	Angle < 28˚ is caused by a fracture with displacement through calcaneus. Dysplastic development of calcaneus may also disturb the angle.
Range	

Item	Average	Minimum	Maximum
All	28~40	-	-

Lower Extremity

First Metatarsal Angle

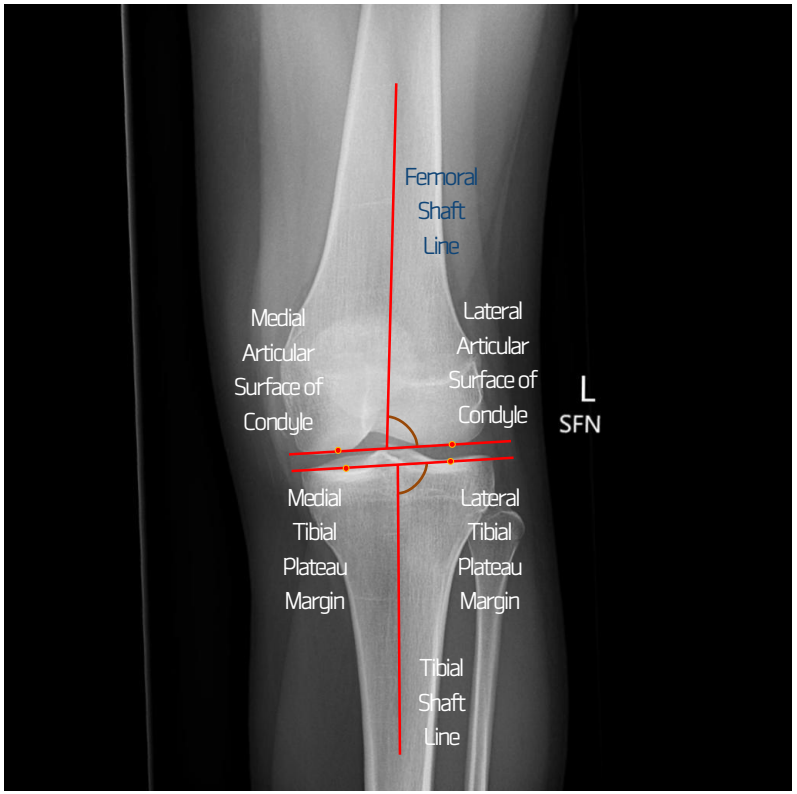
Cross Angle with 2 Lines

Item	Description
Also Known As	–
Object	Foot
Projection	AP
Measurement Type	Angle (Degree)
Definition	Angle formed by line drawn through and parallel to axis of the first metatarsal and line drawn through and parallel to axis of proximal first phalanx
Diagnosis	>15˚ angle indicates hallux valgus deformity

Lower Extremity

Axial Relationships of the Knee

Middle Angle



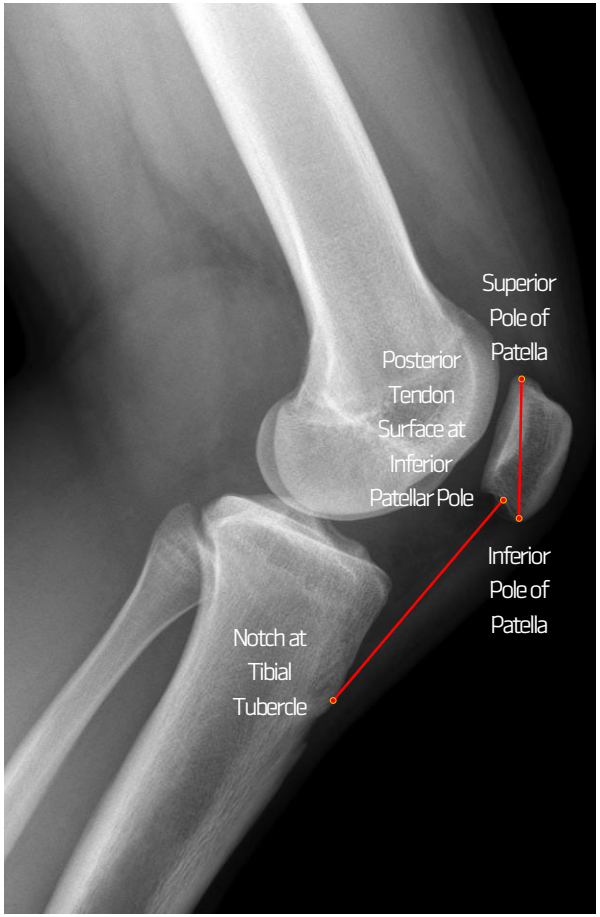
Item	Description
Also Known As	–
Object	Knee
Projection	AP
Measurement Type	Angle (Degree)
Definition	**Femoral Shaft Line**: line drawn through and parallel to femoral shaft. **Tibial Shaft Line**: line drawn through and parallel to tibial shaft. **Femoral Condyle Line**: line drawn through and tangential to articular surfaces of condyles. **Tibial Plateau Line**: line drawn through medial lateral tibial plateau margins. **Femoral Angle**: angle formed laterally between Femoral Shaft Line and Femoral Condyle Line. **Tibial Angle**: angle formed laterally between Tibial Shaft Line and Tibial Plateau Line.
Diagnosis	These angles will be altered in fractures and other deformities about knee
Range	

Item	Average	Minimum	Maximum
Femoral	81	75	85
Tibial	93	85	100

Lower Extremity

Patellar Position

4 Points Ratio

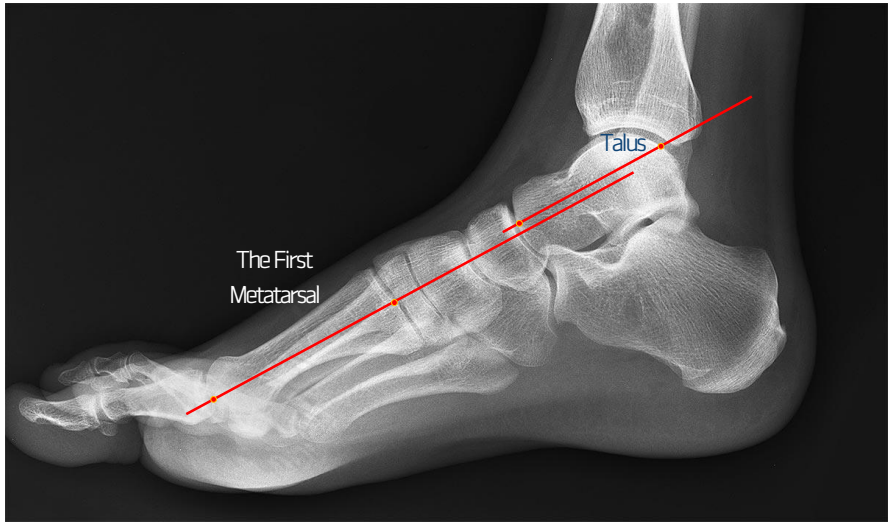


Item	Description
Also Known As	Patella Alta Evaluation
Object	Knee
Projection	Lateral (Semiflexed)
Measurement Type	Length Comparison
Definition	**Patellar Length**: the greatest diagonal length between superior and inferior poles. **Patellar Tendon Length**: distance between insertion points of posterior tendon surface at inferior patellar pole and notch at tibial tubercle.
Diagnosis	>20% variation between two lengths may indicate patella alta (chondromalacia patellae) or patella baja (polio, achondroplasia, juvenile rheumatoid arthritis, tibial tubercle transposition)

Lower Extremity

Meary's Angle

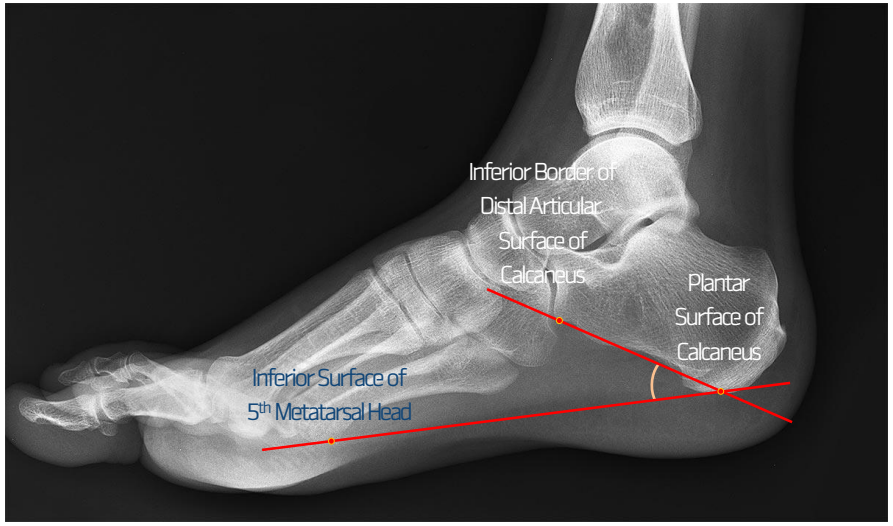
Line



Item	Description
Also Known As	–
Object	Foot
Projection	Lateral
Measurement Type	Parallelity
Definition	Parallelity between line drawn to approximate the longitudinal axis of the first metatarsal and line drawn to approximate the longitudinal axis of talus
Diagnosis	If the lines are not parallel, forefoot cavus deformity is indicated

Calcaneal Pitch

Cross Angle with 2 Lines

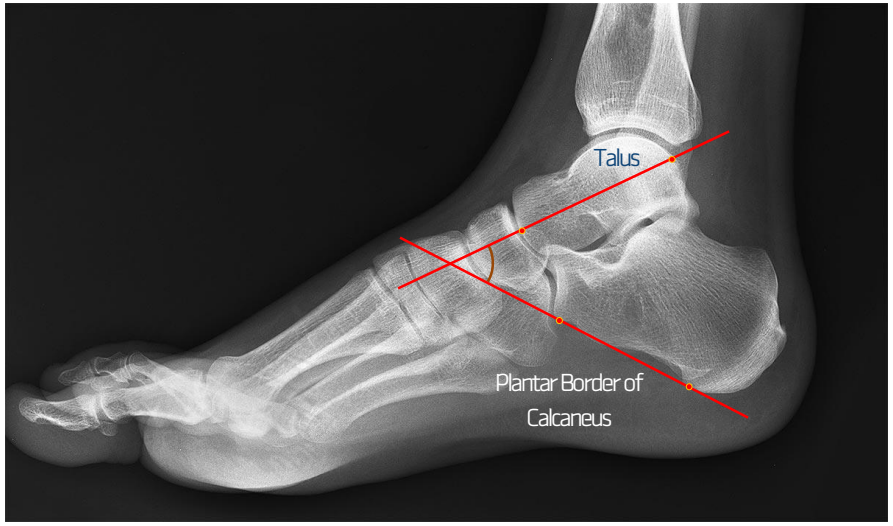


Item	Description
Also Known As	–
Object	Foot
Projection	Lateral
Measurement Type	Angle (Degree)
Definition	Angle formed by line drawn from plantar surface of calcaneus to inferior border of distal articular surface of calcaneus and line drawn from plantar surface of calcaneus to inferior surface of 5th metatarsal head
Diagnosis	Decreased calcaneal pitch is consistent with pes planus
Range	

Item	Average	Minimum	Maximum
All	–	17	32

Lateral Talocalcaneal Angle

Cross Angle with 2 Lines



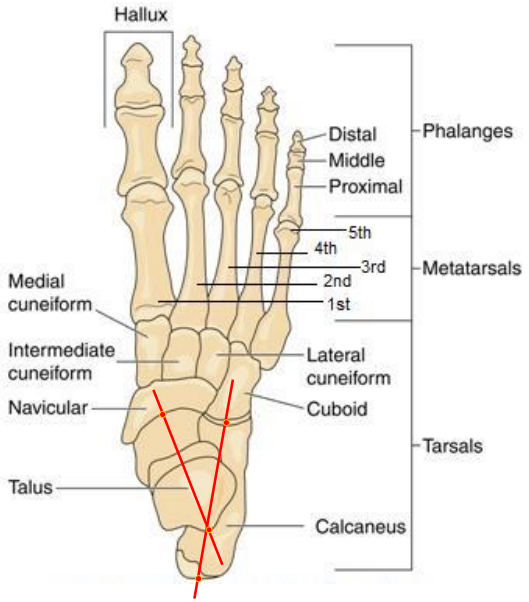
Item	Description
Also Known As	–
Object	Foot
Projection	Lateral (Weight Bearing)
Measurement Type	Angle (Degree)
Definition	Angle formed by line bisecting talus and line drawn along plantar border of calcaneus
Diagnosis	Angle over 45 degrees indicates hindfoot valgus, a component of pes planus
Range	

Item	Average	Minimum	Maximum
All	–	25	45

Lower Extremity

Kite's Angle

Cross Angle with 2 Lines



Item	Description
Also Known As	AP Talocalcaneal Angle
Object	Foot
Projection	AP
Measurement Type	Angle (Degree)
Definition	Angle formed by longitudinal axis of calcaneus and talus
Diagnosis	Angle under 15 degrees may indicate tendency to supine rearfoot. Angle over 25 degrees may indicate tendency to prone rearfoot.
Range	

Item	Average	Minimum	Maximum
All	-	15	25

Uncovered Items

Spine

- ✓ Spine Slip Angle
- ✓ T1 Tilt Angle
- ✓ Thoracic Trunk Shift
- ✓ Sagittal Balance
- ✓ Coronal Balance
- ✓ Pelvic Radius Angle
- ✓ Multiple Cobb's Angle
- ✓ Cervical Curve (C2~C7, C1~T1, C1~T2)
- ✓ Lumbar Curve (L1~S1)
- ✓ Thoracic Curve (T1~T12)
- ✓ Lumbosacral Lordosis Angle
- ✓ Sacral Inclination (Sacral Tilt Angle)
- ✓ Lateral Bending Sign
- ✓ Cervical Lordosis (C2~C7)
- ✓ C2–C7 Plumbline
- ✓ C2 Slope
- ✓ C2 Pelvic Angle
- ✓ C2 T1 Pelvic Angle
- ✓ Thoraco–Lumbar Alignment
- ✓ T9 Spino–Pelvic Inclination
- ✓ T1 Spino–Pelvic Inclination
- ✓ T1 Slope
- ✓ Pelvic Tilt
- ✓ Pelvic Incidence
- ✓ T1 Pelvic Angle
- ✓ Sagittal Vertical Axis

Pelvic Parameters

Sagittal Spine Alignment

Pelvis

- ✓ Femoral Symmetry
- ✓ Sacral Obliquity

Femoral Symmetry

Trauma

- ✓ Diaphyseal Fracture Angulation
- ✓ Metaphyseal Fracture Angulation
- ✓ Roof Arc

Skull

- ✓ Frontal Cephalic Line
- ✓ Atlas Laterality
- ✓ Atlas Rotation
- ✓ Atlas Malposition

Pediatric

- ✓ Reimer's Index
- ✓ Neck Shaft Angle
- ✓ Head Shaft (Slip) Angle
- ✓ Articulo–trochanteric Distance
- ✓ Epiphyseal Index
- ✓ Tibiofemoral Angle
- ✓ Metaphyseal–Diaphyseal Angle

Meta-Diaphyseal Angle

Podiatry

- ✓ Hallux Valgus Interphalangeus Angle (HVIA)
- ✓ Hallux Valgus Angle (HVA, Bunion Angle)
- ✓ Metatarsus Primus Varus Angle (MPVA)
- ✓ Intermetatarsal Angle (IMA)
- ✓ Distal Metatarsal Articular Angle (DMAA)
- ✓ Proximal Metatarsal Articular Angle (PMAA)
- ✓ Metatarsus Adductus Angle (MAA)
- ✓ Metatarsal Break Angle (MBA)
- ✓ Hallux Abductus
- ✓ Proximal Articular Set Angle (PASA)
- ✓ Distal Articular Set Angle (DASA)
- ✓ Tangential Angle to the Second Axis (TASA)
- ✓ Total Adductory Angle
- ✓ Metatarsal Parabola
- ✓ Metatarsal Protrusion
- ✓ Talonavicular Angle

Hallux Valgus Angle
Hallux Valgus Interphalangeus Angle
Inter Metatarsal Angle

Distal Metatarsal Articular Angle

Proximal Metatarsal Articular Angle

Lower Extremity

- ✓ High Tibial Osteotomy
- ✓ Meta–diaphyseal Angle
- ✓ Limb Deformity Analysis

High Tibial Osteotomy

Limb Deformity Analysis

Reference

Korean

- ✓ 김창국 · 진영완 · 최기수 저, *인간 움직임을 이해하기 위한 인체해부학*, 서울:대경북스, 2005
- ✓ 내부 자료, *QXLink 3.2 – Advanced Measurement Specification*
- ✓ 내부 자료, *QXLink 3.2 – Sagittal Spine Alignment Analysis*
- ✓ 내부 자료, *QXLink 3.2 – Xmaru ChiroView*
- ✓ 내부 자료, *QXLink 3.2 – VizTek Opal-CHIRO*
- ✓ 내부 자료, *QXLink 3.2 – TI-BA PACS Chiropractic Tool Set*
- ✓ 내부 자료, *QXLink 3.2 – TraumaCad*
- ✓ 내부 자료, *QXLink 3.2 – ImaSight Vision Chiropractic Power Tools*

English

- ✓ S. Thiyagaraja, *Roentgenometrics*
- ✓ Anonymous, *X-ray Measurements*
- ✓ Dennis M. Marchiori, *Clinical Imaging*
- ✓ Terry R. Yochum, *Essentials of Skeleton Radiology 3rd Edition*

Imaging Expert

Thank You

Chiropractic Measurements