



Radiography Positioning Guide



Radiography Positioning Guides

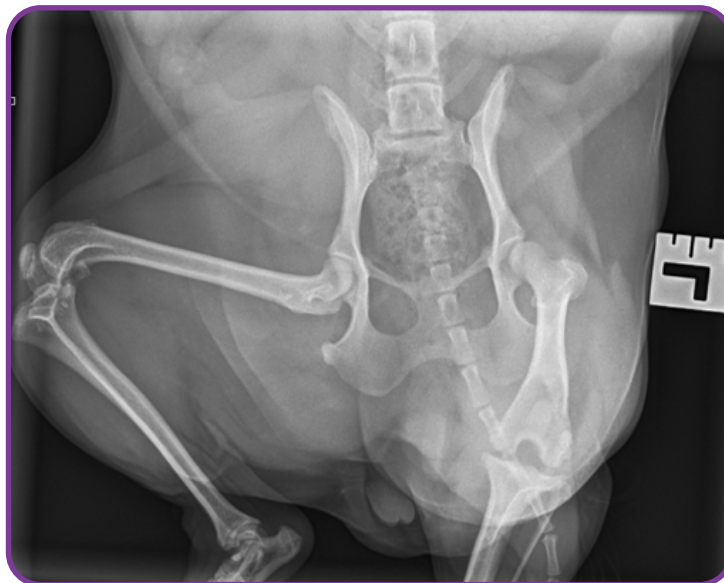
Achieving diagnostic quality images is key to being able to identify both pathology and normal anatomy, and in being able to make accurate diagnoses to inform treatment options for patients.

These radiography guides have been designed to help optimise patient positioning and achieve good quality images in practice.

The variation in anatomy of our patients sometimes results in difficulty achieving “text book” collimation, and in these instances it is the responsibility of the clinician to decide on optimal collimation. Some tips and tricks are included in this guide to help overcome these difficulties.

Common errors in radiography include:

- Incorrect patient positioning.
- Incorrect collimation.
- Incorrect placement of (or lack of) calibration marker.
- Inappropriate exposure.
- Inadequate understanding of orthopaedic landmarks and musculoskeletal anatomy.



An example of a poorly-positioned, poorly-collimated, non-diagnostic radiograph!

Correct convention for positioning/viewing/displaying radiographs.

Head:

Lateral view: rostral to the left, dorsal at the top.

Ventrodorsal / dorsoventral view: rostral at the top, patient's left to viewer's right.

Body:

Lateral view: cranial to the left, dorsal at the top.

Ventrodorsal / dorsoventral view: cranial at the top, patient's left to viewer's right.

Extremities:

Lateral view: distal down, proximal up, cranial/dorsal to viewer's left, caudal/palmar/plantar to viewer's right.

Craniocaudal/dorsopalmar/dorsoplantar view: distal down, proximal up, patient's left to viewer's right.

Top Tip

Always take orthogonal radiographs. Pathology may be missed if there is only one view.

Top Tip

Radiographs are best viewed in a room with **low lighting** in order to achieve optimal visualisation of contrast and the finer details of the image.

Top Tip

Always use a radiographic L/R marker of known dimension. It is advisable to use a standardised marker, such as those available from Vi, that incorporate an embedded ruler, and a radiographic reference ball of known diameter.

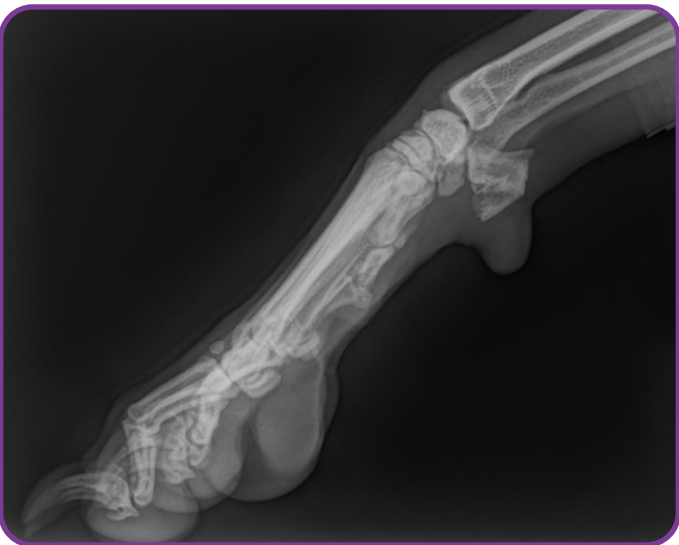
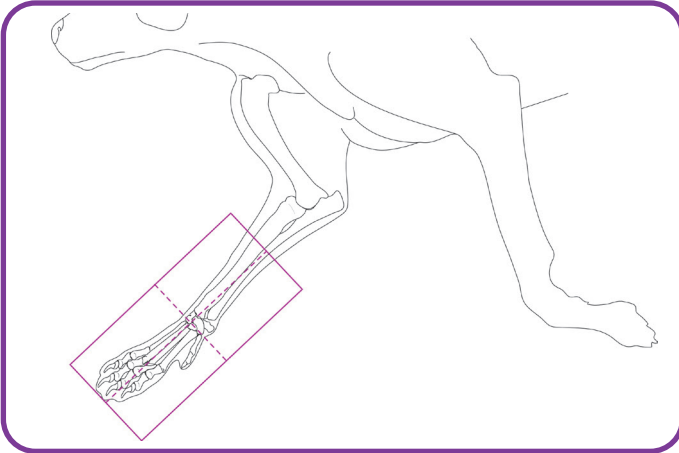
Top Tip

The radiographic marker must be placed at the **same height as the area of interest**, using cotton wool to elevate the marker if required. Including the marker in the image at the level of the bone allows accurate pre-operative measurements to be obtained ahead of surgery.

Radiography of the Carpus: standard views

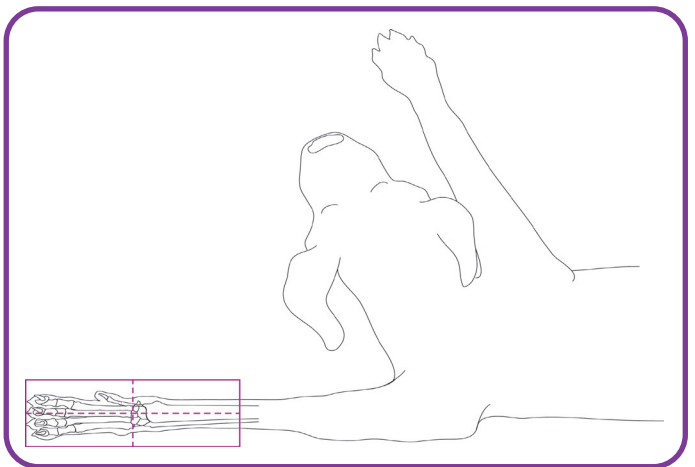
Mediolateral view

- Place the patient in lateral recumbency with the affected limb down, against the plate.
- The contralateral thoracic limb should be secured caudally using a sandbag or tie.
- Centre the beam over the carpal joint; collimate to include the digits and the distal third of the radius and ulna, and the skin edges dorsally and ventrally



Dorsopalmar view

- Place the patient in sternal recumbency using sandbags as necessary to support the chest and abdomen. Allow the pelvic limbs to rest however they are comfortable.
- Gently rotate the patient's head and contralateral limb away from the affected limb, and secure them with a sandbag.
- Extend the affected limb cranially, either using a sandbag behind the elbow to 'push', or a tie around the paw to gently 'pull', the limb forwards.
- Centre the beam over the carpal joint; collimate to include the digits, the distal third of the radius and ulna and the lateral and medial skin edges

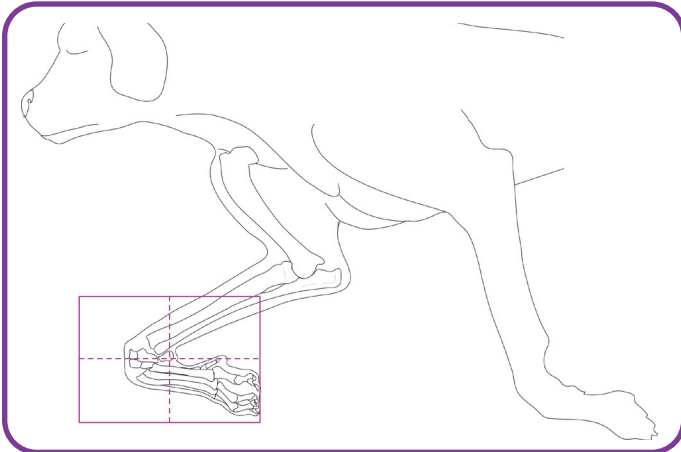


Radiography of the Carpus: stressed views

In some cases, additional views are required for further assessment. Stressed views enable us to see if there is any disparity of the joint space that may indicate instability. These views can also help to identify articular and physal fractures. It is recommended to obtain these views if the cause of lameness cannot be established with standard mediolateral and dorsopalmar views.

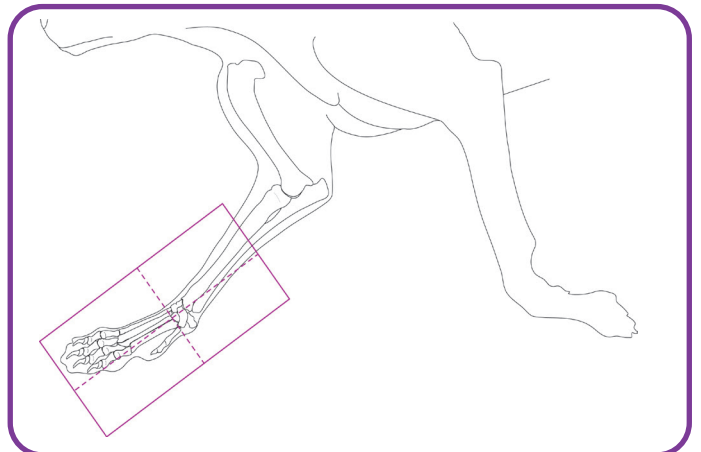
Flexed mediolateral view

- Maintaining the same position as for a standard medio-lateral carpus view, flex the carpal joint so that the palmar aspect of the manus touches the distal radius/ulna.
- Secure the limb in position with adhesive tape or a foam wedge placed against the dorsal aspect of the manus and held in place by a sandbag.
- Centre the beam over the carpal joint and collimate to include the distal third of the radius/ulna and the entire carpal and metacarpal regions.



Hyper-extended mediolateral view

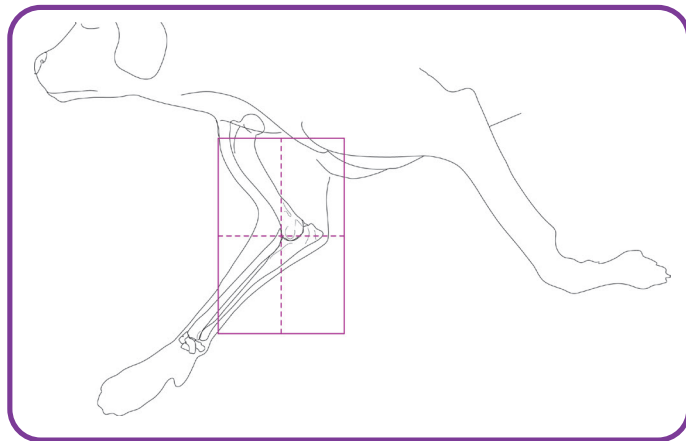
- Maintaining the same position as for a standard medio-lateral carpus view, apply a piece of adhesive tape or tie to the distal aspect of the radius/ulna exerting a pull towards the palmar/caudal aspect of the limb.
- With another piece of tape or a tie around the metacarpals, exert a pull on the manus dorsally, so that the carpus is extended
- Centre the beam over the carpal joint and collimate to include the distal radius/ulna and the entire carpal and metacarpal regions.



Radiography of the Elbow

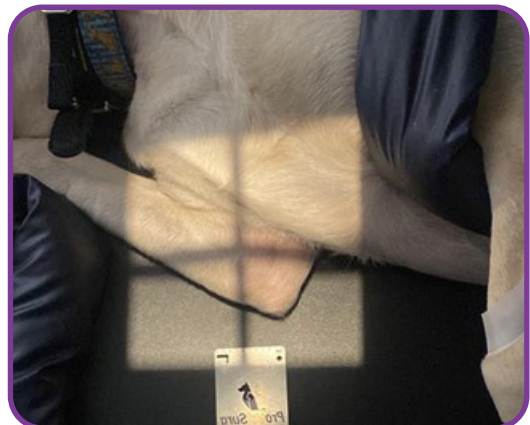
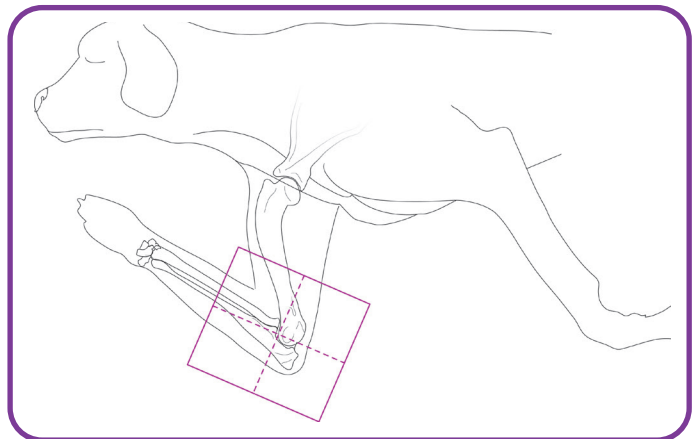
Mediolateral view: standard

- Place the patient in lateral recumbency with the affected limb down. Allow the limb to rest naturally.
- Extend the upper limb caudally and secure it with a tie or sandbag.
- Gently extend the patient's neck dorsally and support it with a sandbag. If necessary use a small wedge underneath the nose,, to ensure that the head is parallel to the table.
- Gently extend both pelvic limbs caudally. If necessary, place a foam wedge between the stifles and a sandbag over the top to keep them parallel to the table.
- Centre the beam over the affected elbow joint and collimate to include the skin margins and the proximal half of the radius/ulna and the distal half of the humerus.



Mediolateral view: flexed

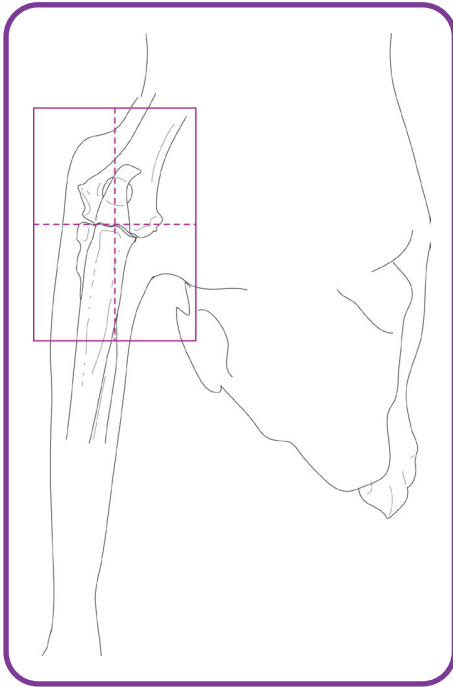
- Position the patient in lateral recumbency as for a standard mediolateral view.
- Flex the elbow of interest and secure the limb in a flexed position using a foam wedge and a sandbag to stabilise the wedge and prevent artefact.
- Centre the beam over the affected elbow joint and collimate to include the skin margins and the proximal half of the radius/ulna and the distal half of the humerus.



Radiography of the Elbow

Craniocaudal view

- Place the patient in sternal recumbency, supporting the chest with sandbags either side.
- Extend the affected limb cranially and leave the non-affected limb in a natural flexed position.
- Gently rotate the patient's head and neck in the direction of the non-affected, caudally-positioned limb. Stabilise the head in this position on sandbags or towels, using a sandbag alongside the head to secure this position. Take care not to compromise the patient's airway.
- Centre the beam over the affected elbow joint. Collimate the field to include the distal half of the humerus and the proximal half of the radius/ulna, including the skin margins medially and laterally.



Elbow: Top Tip

Ensure that the affected elbow is comfortable against the table. A piece of cotton wool placed under the point of the olecranon can help to support and maintain correct positioning.

Elbow: Top Tip

If rotation of the limb is preventing correct positioning for the craniocaudal view, a sandbag or piece of tape can be used over the distal radius/ulna, to stabilise the distal limb.

Elbow: Top Tip

If rotation of the elbow itself is preventing correct positioning, a radiolucent object (such as a roll of cotton wool) can be placed against the lateral aspect of the affected elbow and secured in place with a sandbag (out of the field of view), to keep the elbow correctly aligned.

Radiography of the Shoulder

Mediolateral view

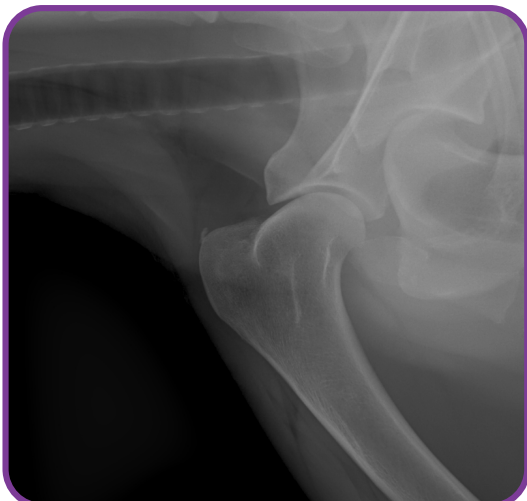
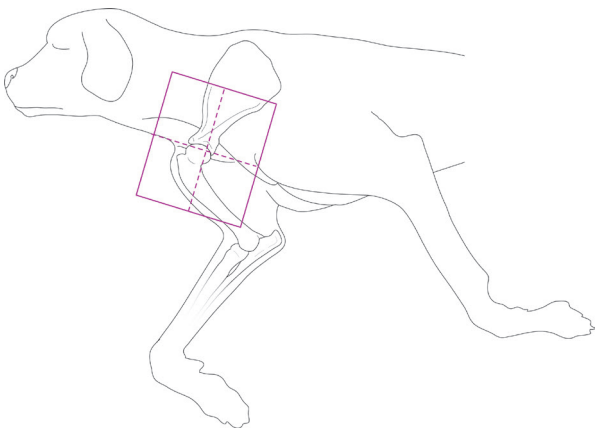
- Place the patient in lateral recumbency with the affected limb against the plate.
- The contralateral thoracic limb should be extended caudally using a sandbag or tie to secure it.
- The patient's head and neck should be extended dorsally using a sandbag to support. This helps to prevent the cervical spine and trachea from interfering with the view of the shoulder joint.
- Palpate the proximal aspect of the humeral head and centre the beam over the affected shoulder joint.
- Collimate to include the distal third of the scapula and the proximal half of the humerus.

Shoulder:Top Tip

In the mediolateral view, ensure that the patient's head and neck are gently extended to prevent the trachea and cervical spine from overlying the shoulder joint.

Shoulder:Top Tip

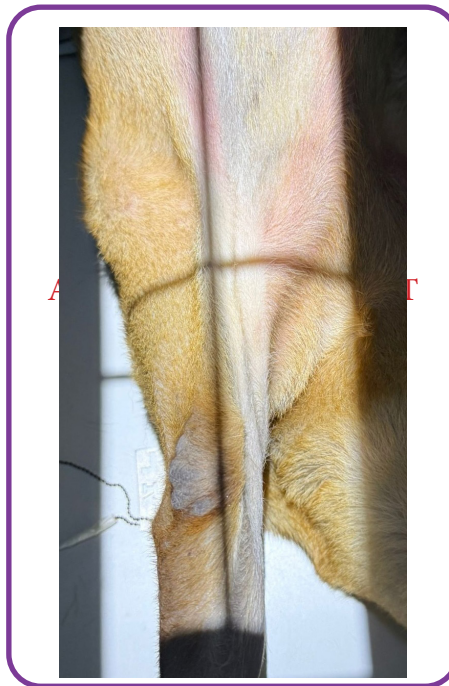
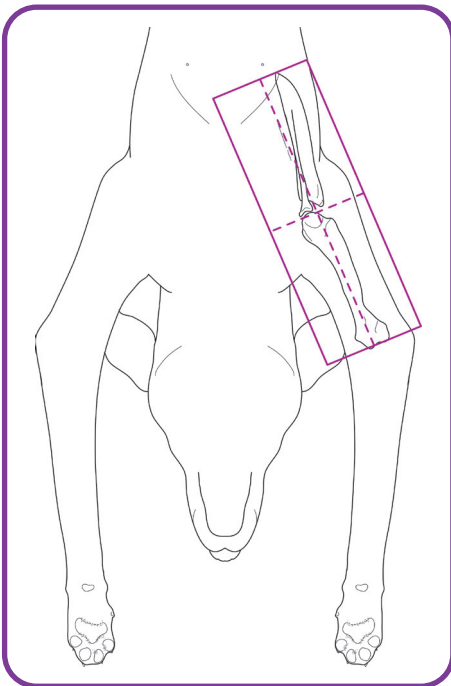
To increase the chances of seeing an OCD lesion, place a wedge under the dependant elbow in the mediolateral position. This achieves a supinated view of the shoulder joint and improved visualisation of the caudal aspect of the humeral head, where OCD lesions often occur.



Radiography of the Shoulder

Caudocranial view

- Place the patient in dorsal recumbency using a trough or sandbags to support the abdomen and pelvic limbs. The chest and thoracic limbs must be free to allow accurate positioning.
- Gently extend both thoracic limbs cranially. The head and spine should be aligned, and the thoracic limbs extended in line with the head and neck.
- Place sandbags cranial to the head, piled if necessary to bring them to the appropriate height. Place ties around the metacarpal regions and secure the ties to the sandbags. Ensure that there is no downward pull on the limbs, as this may affect the views obtained.
- Once the limbs are secured, palpate the shoulder on the lateral aspect, feeling for the indentation between the scapula and humeral head. Centre the beam over this point.
- Collimate to include the proximal half of the humerus and the distal aspect of the scapula, the skin edges laterally and the thoracic inlet medially.



Shoulder: Top Tip

If you are struggling with abduction of the forelimbs during caudocranial positioning, it can be helpful to apply some adhesive tape in a tensioned loop around the elbows, to keep the limbs better aligned.

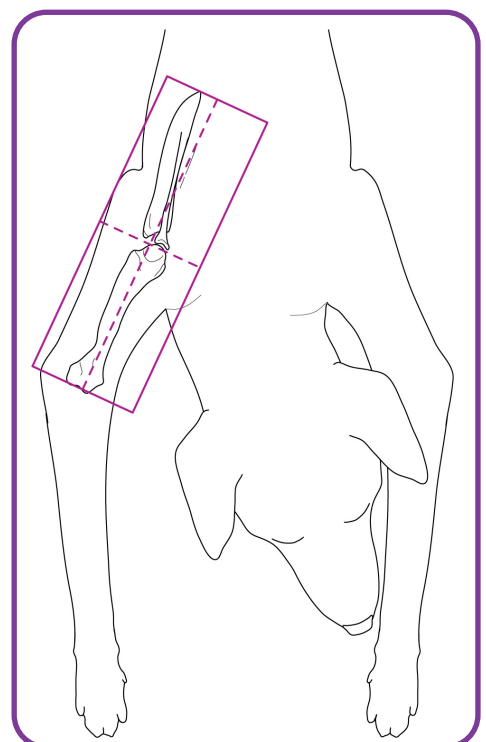
Shoulder: Top Tip

Caudocranial positioning may be preferable in large, well-muscled dogs, or those with particularly deep chests, as it may be difficult to achieve full shoulder extension in these dogs in sternal recumbency. If the shoulder is not fully extended, there will be foreshortening of the scapula and humerus and distortion of the shoulder joint itself. Positioning in dorsal recumbency to achieve full extension of the shoulder will mitigate these possible issues.

Radiography of the Shoulder

Craniocaudal view

- Place the patient in sternal recumbency using a trough or sandbags to support the abdomen and pelvic limbs.
- Extend the limb of interest cranially maintaining the shoulder in a straight position with no mediolateral rotation.
- Stabilise the head by gently flexing the head and neck to the side of the non- affected limb use sandbags or foam wedges to maintain this position. Take care not to compromise the patients airway.
- If necessary, use a tie around the manus to gently pull the shoulder into extension.
- Palpate the humeral head at the point of the shoulder and collimate to include the proximal half of the humerus and the distal aspect of the scapula, the skin edges laterally and the thoracic inlet medially



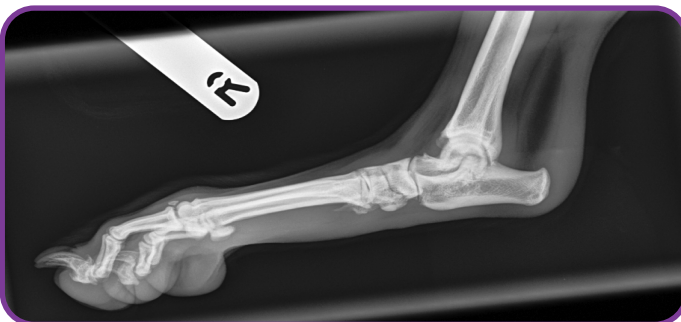
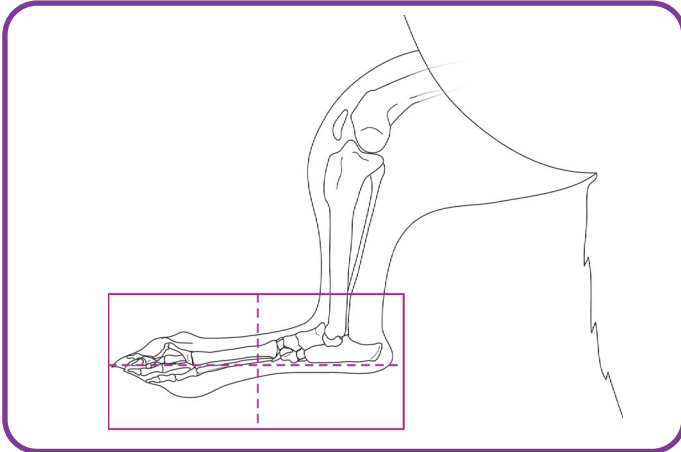
Shoulder:Top Tip

Cotton wool or other soft padding placed underneath the patient's head can help keep the head immobile and correctly aligned with the spine when positioning for the caudocranial view.

Radiography of the Tarsus: standard views

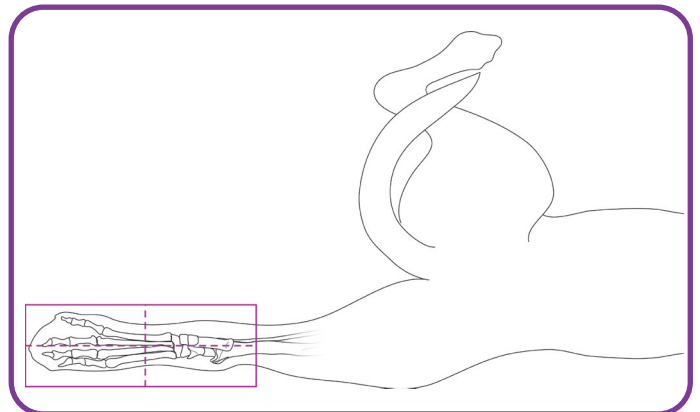
Mediolateral view

- Place the patient in lateral recumbency with the affected limb against the plate.
- The contralateral pelvic limb can either:
 - Be abducted and positioned caudally, or
 - Be flexed and positioned cranially.
- Centre the beam on the tarsal joint and collimate the field to include the digits.
- It can sometimes help to place a small foam wedge under the stifle in order to achieve good positioning.



Plantero-dorsal view

- Place the animal in sternal recumbency using a trough or sandbags to support the abdomen and chest. It is important that the body does not rotate.
- Extend the hind limb of interest caudally.
- Place a sandbag underneath the unaffected limb and flex it laterally and cranially.
- Position the tail and secure it out of the field of view.
- Centre the beam over the level of the proximal intertarsal joint.
- Collimate to include the proximal third of the metatarsal bones and the distal third of the tibia/fibula.

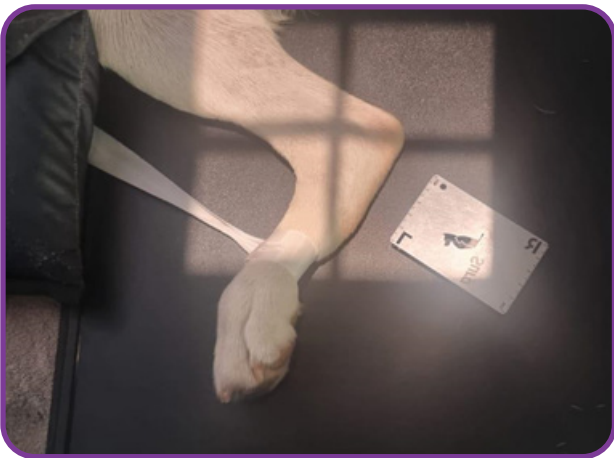
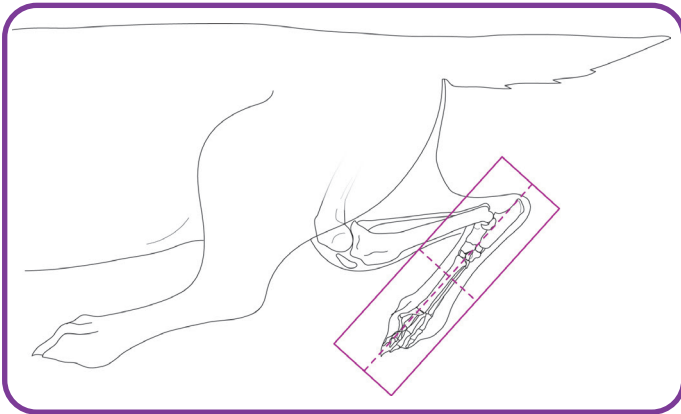


Radiography of the Tarsus: stressed views

In some cases, additional views are required for further assessment. Stressed views enable us to see if there is any disparity in the joint space that could indicate instability. These views can also help to identify physeal and articular fractures. It is recommended to obtain these views if the cause of lameness cannot be established with standard mediolateral and dorsopalmar views.

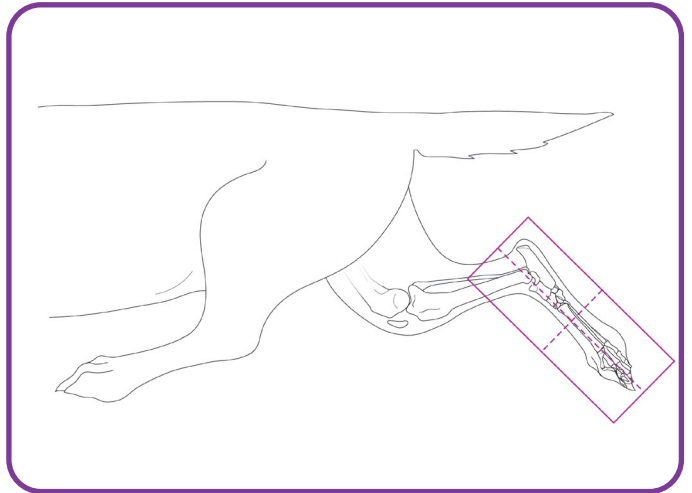
Flexed mediolateral view

- Maintain the same positioning as for the standard mediolateral view, and flex the pes.
- Use tape, or ties and sandbags, to maintain the tarsus in this position.
- Collimation should include the the digits, tarsus, and distal tibia/fibula.



Extended mediolateral view

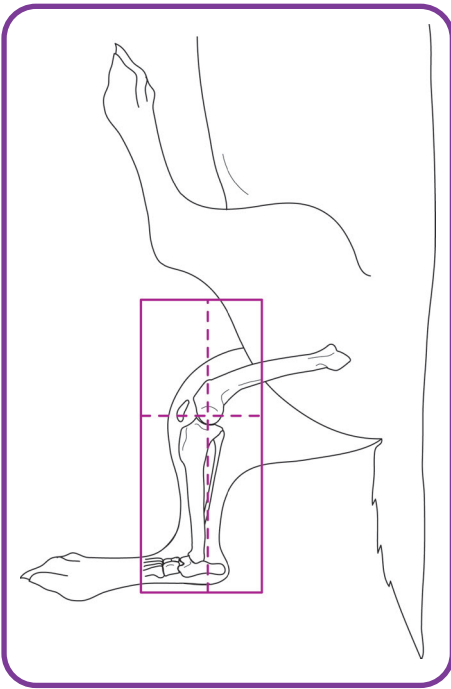
- Maintain the same positioning as for the standard mediolateral view, and place a sandbag alongside the stifle to stabilise the proximal limb.
- Apply tape, or a tie and sandbag, around the distal aspect of the pes and extend the tarsus. Use the tape or tie to maintain the extension of the tarsus.
- Collimate to include the digits, tarsus, and distal tibia/fibula.
- This positioning allows observation of hyper-extension of the talocrural, intertarsal and tarso-metatarsal joints.



Radiography of the Stifle

Mediolateral view

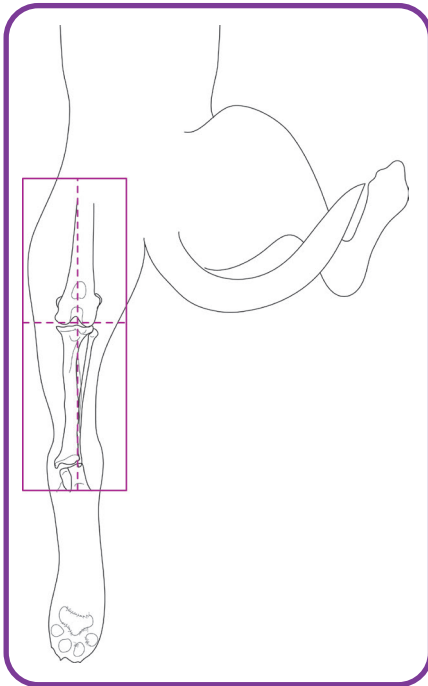
- Place the patient in lateral recumbency with the affected limb down against the plate.
- The contralateral pelvic limb can either:
 - Be abducted and positioned caudally, or
 - Be flexed and positioned cranially (as pictured below).
- Keep the genitals and abdomen out of the field of view using foam wedges or positioning aids.
- Centre the beam on the stifle joint and collimate the field to include the hock joint.
- The femoral condyles must be superimposed directly over each other in a straight mediolateral view of the stifle. A small foam wedge under the dependent hip can help achieve this.



Radiography of the Stifle

Caudocranial view

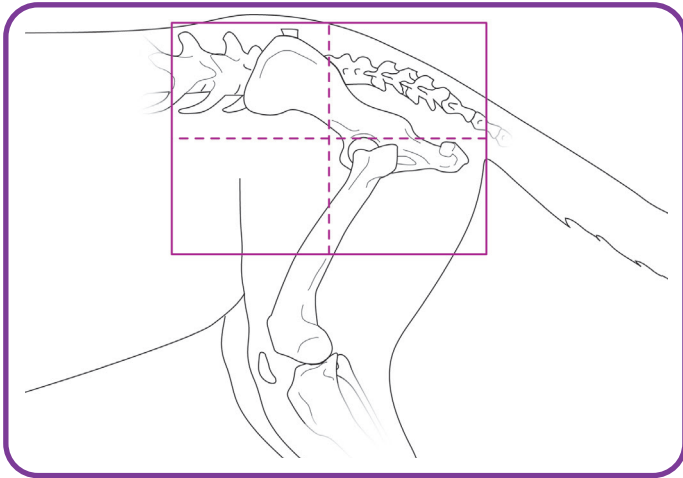
- Place the animal in sternal recumbency using a trough or sandbags to support the abdomen and chest if necessary. It is important that the body does not rotate.
- Extend the pelvic limb of interest caudally.
- Place a sandbag or foam wedge underneath the unaffected limb and flex it laterally and cranially.
- Secure the tail away from the affected stifle, and out of the field of view.
- Centre the beam on the stifle joint and collimate to include the hock joint.
- In a straight caudocranial view, the fabellae are bisected by the femoral cortices and the medial wall of the calcaneus bisects the talar ridges.



Radiography of the Hips/Pelvis

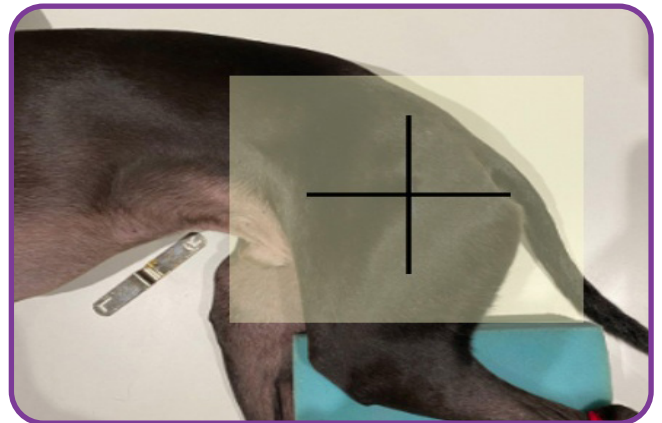
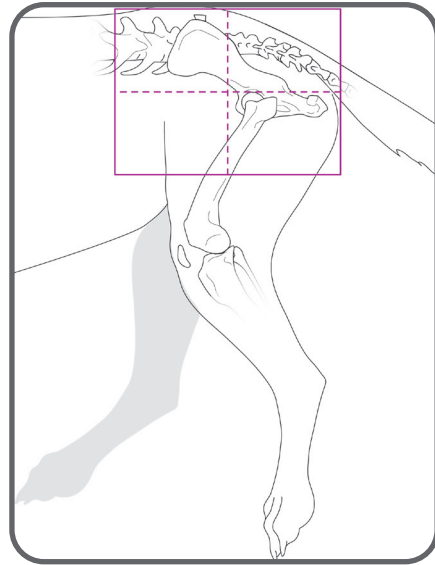
Lateral view; stacked hind limbs

- Place the patient in lateral recumbency with the affected limb down against the plate.
- The contralateral pelvic limb should lie directly over the top of the affected limb.
- Place a foam block/wedge or wad of cotton wool between the stifles to ensure the limbs lie straight and parallel to the table.
- Centre collimation on the greater trochanter. The field should include the wing of the ilium cranially, the caudal skin margin (tail base) caudally, the skin margin of the dorsum dorsally, and the proximal half of the femora.



Lateral view; splayed hind limbs

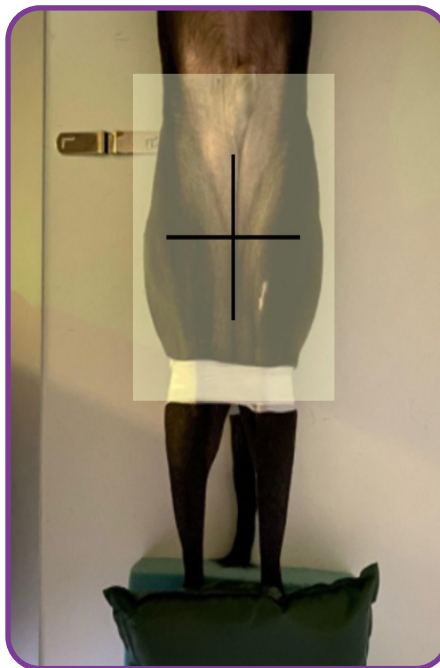
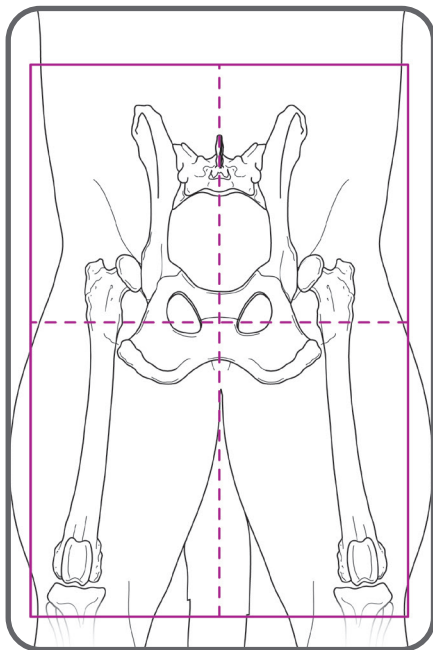
- Place the patient in lateral recumbency with the affected limb down against the plate.
- The limbs should be splayed and their position maintained with foam wedges.
- Place a foam block/wedge under the uppermost stifle to ensure the limbs lie parallel to the table.
- Centre collimation on the greater trochanter. The field should include the wing of the ilium cranially, the caudal skin margin (tail base) caudally, the skin margin of the dorsum dorsally, and the proximal half of the femora.



Radiography of the Hips/Pelvis

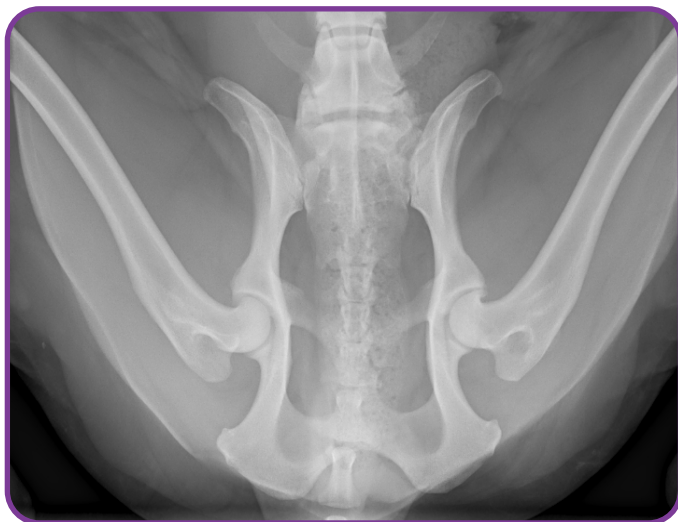
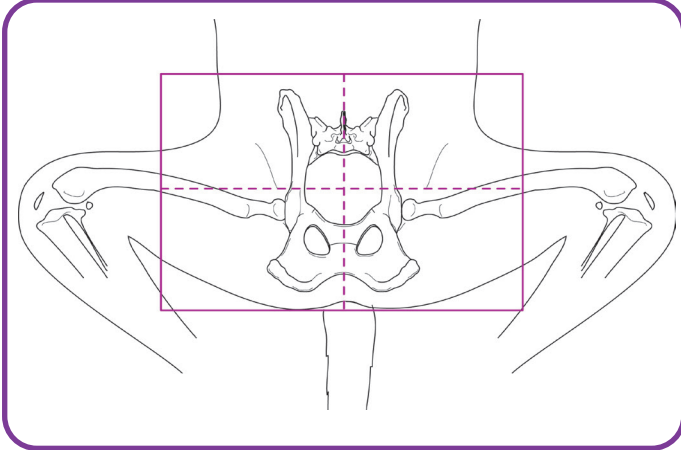
Ventrodorsal view (extended)

- Place the patient in dorsal recumbency using a trough or sandbags as necessary to keep the chest and abdomen straight.
- Gently extend both pelvic limbs caudally, applying slight inward rotation at the point of the stifles (keeping the patellae uppermost).
- Ask an assistant to apply tape around the stifles, keeping them in this extended position. If necessary, place padding or a foam wedge between the stifles to keep them apart and straight. It may be necessary to rest the patient's pes on a sandbag or foam block, to prevent over-extension at the level of the stifles.
- A sandbag can also be positioned across the hind paws to maintain stability of the limbs while the exposure is taken.
- Centre collimation on the pubis and include the wings of the ilium proximally, with the proximal half of the femora included, and extend collimation to the skin edges laterally



Ventrodorsal view (frog leg)

- Place the patient in dorsal recumbency using a trough or sandbags as necessary to keep the chest and abdomen straight.
- Allow the pelvic limbs to relax in to a 'frog leg' position, keeping the tail central on the plate.
- Centre collimation on the pubis and include the wings of the ilium proximally with the proximal half of the femora included and extend collimation to the skin edges laterally.



Radiographic Aids

Xray Marker With Scale



A reliable scale is very important, and Left/Right markers are essential. A flexible stand is also available allowing this combined marker to be positioned at the same level as the area of interest to improve accuracy.

XRAYMARKI Xray Marker With Scale Set Left & Right
XRAYHOLDI Xray Marker Stand

Radiographic Reference Ball



Reduce scaling errors when templating for implants or examining structures, using digital or analogue systems. Using a spherical object as a reference eliminates errors created by ruler orientation which might not be quite parallel with the plate.

Supplied on a stable base with a flexible neck, allowing positioning at the same level as the area of interest.

XRAY25MM Radiographic Reference Ball 25mm Diameter
XRAY10MM Radiographic Reference Ball 10mm Diameter
XRAYBALLSET Xray Ball Set 25mm & 10mm

With sincere thanks to
Nicci Meadows (ProVetSurg)
BVetMed CertAVP GSAS MRCVS
RCVS Recognised Advanced Practitioner
in Small Animal Surgery
for her time and invaluable assistance
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