



veteducation
.com.au™

Online Veterinary Nurse & Technician Conference 2021

October 12 – 14, 2021



Radiographic Positioning and Quality Control: What Should I Be Looking for in the Images?

Danielle Mauragis
CVT

With digital imaging replacing film and changing the detail of the radiographic image, it seems that the subject of the radiograph has not followed suit. It is time to take back quality control! Fortunately, this is not a difficult task but, it does require some dedication and pride in producing a quality radiographic image.

Producing a quality radiographic image is of the utmost importance for the individual interpreting the image. A well-positioned radiograph gives a true representation of the anatomy and reduces the risk of misinterpretation. For example, obliquity of the thoracic cavity can skew the size of the heart and make it appear to have enlargement that is untrue. The secret to a diagnostic quality radiographic image is being aware of the anatomy of the exam, palpating your landmarks, setting the collimation to those landmarks before ever making an exposure. It is important to remember that there are many different techniques to teaching how to radiograph a patient, but as long as the end result is a well-positioned quality image it does not matter how you get there.

There are three steps to quality controlling an image. With the understanding that the patient has been measured in the technique on the x-ray machine has been correctly set and the exposure made, the first step is to make sure the exposure is correct. Depending on what DR system you are using this could be a number or a histogram scale. Whether you are using film or DR is still matters how the image looks to your eye. Are the blacks black, are the grays gray, and are the whites white. In other words, the grayscale is correct. The second step is to make sure that all the anatomy that is needed within the radiographic image is present. For example, a thoracic image should include from the manubrium to the caudal dorsal lung tip and should include the spinous processes. The third and final step is to check laterality and straightness of the body part and if warranted the exposure is made on inspiration or expiration. If you use these three steps every time you quality control the film your results should improve.

The most common radiographic exams that are performed in general veterinary practice are the thorax, abdomen, pelvis, stifle, and elbow. Of course, there are numerous other body parts that are radiographed such as the skull, spine, and the distal extremities but not as commonly.

A routine thoracic exam includes 3 projections: right and left lateral and a ventral dorsal or dorsal ventral views. The thoracic cavity should include from the manubrium to caudal dorsal lung tip in the cranial to caudal direction. It should include the spinous processes dorsally and the xiphoid ventrally. The landmarks for positioning are the same for lateral recumbency and ventral dorsal recumbency. The center of the beam should be placed over the heart. To accomplish this place the vertical line of the collimation light at the caudal aspect of the scapula.

To check yourself, place your hand over the heart to feel the heartbeat. The horizontal line of the collimation should be placed so as to bisect the thorax evenly between dorsal and ventral on the lateral projection and left and right on the ventral dorsal projection. The cranial edge of the beam should be placed at the manubrium and the caudal edge of the beam placed at the 13th rib head where it attaches to the thirteenth vertebral body. Some caveats that must be mentioned here, is that large breed dogs may need a separate view to include the spinous processes and deep- chested dogs may need a cranial and caudal projection with the detector placed in a vertical direction in the cassette tray. To quality control the lateral projection for perfect positioning, ensure that the redheads at the level of the vertebral bodies or even and the caudal lung tips reach to the level of T-11 to T-13 the vertebral bodies for a full inspiratory effort. To quality control the ventral dorsal view or dorsal ventral view, the spinous processes should be superimposed over the sternum and resemble a diamond shape. The caudal lung tips should reach the level of the 11th to 13th rib for a full inspiratory effort.

A routine abdominal exam should include right and left lateral and ventral dorsal views. Dorsal ventral views are usually reserved for cases of trauma, gastric dilatation volvulus, and G.I. studies. The anatomy that should be included in the abdominal exam is just cranial to the diaphragm and caudal to the greater trochanter where the body wall attaches to the pubis and dorsal to include the spine and ventral to include the xiphoid. In large breed dogs, it may be necessary to take a cranial and caudal projection for lateral and ventral dorsal to include all the anatomy. The landmarks for the lateral projections are the same for ventral dorsal projections. Unlike the thorax, the abdomen has no set vertical line due to the various sizes of patients. For this reason the edges of the collimation beam are your borders for cranial and caudal, ventral and dorsal. For the cranial border, place the cranial edge of the beam three finger widths cranial to the xiphoid. For the caudal border, place the caudal edge of the beam at the level of the greater trochanter. Place the horizontal line of the collimation light so as to bisect the abdominal cavity from dorsal to ventral. For quality control of the lateral projection of the abdominal cavity, the transverse processes of the lumbar spine should be superimposed upon one another and the wing of the ilia superimposed as well. The portion of the caudal dorsal lung tip that can be seen should be no further caudal than the level of T-11 for a full expiratory effort. On the ventral dorsal projection the spinous processes of the thoracic and lumbar spine should be straight and resemble a diamond or teardrop shape and the wing of the ilia straight.

A routine exam of the pelvis should include lateral and ventral dorsal projections. Most clinical settings use the criteria of the Orthopedic Foundation of Animals (OFA) for the ventral dorsal projection of the pelvis, as long as the patient is tolerant of this view. For the lateral projection of the pelvis the cranial edge of the beam should include the wing of the ilia and the caudal edge of the beam just behind the tuber ischium and distal to include both stifles. In the lateral position, the down limb, or the one closest to the cassette or detector should be pulled forward and the upper limb pulled caudally. The ventral dorsal view the cranial edge of the beam is placed just cranial to the wing of the ilia and distal to include the proximal tibia. To quality control the lateral projection of the pelvis the wing of the ilia should be superimposed as well as the obturator foramen. The transverse processes of the lumbar spine should be superimposed as well.

On the ventral dorsal view the obturator foramen should be equal in size and both femurs parallel with the patella centered between the condyles of the femurs. In the case of the large breed dog, it is acceptable to not include the wing of the ilia so as not to sacrifice the femurs.

A routine stifle joint exam should include projections: lateral, caudal to cranial views. The collimation for the joints of the extremities are centered at the midpoint of the joint being radiograph and should include the proximal third of the distal limb and the distal third of the proximal limb. The landmarks for both projections of the stifle are the same. The collimation for the lateral stifle should be centered at the midpoint of the joint at the level of the cruciate ligament and the collimation opened to include the proximal third of the tibia and the distal third of the femur. The orthogonal projection is taken in the caudal to cranial direction so as to place the stifle close to the detector/cassette to avoid magnification. To quality control the lateral stifle joint the condyles of the femur are superimposed. For the caudal cranial projection the condyles of the femur should be approximately the same size with the flabella bisecting over the condyles. The patella (if not luxating) should be centered between the condyles in the trochlear groove.

A routine elbow exam consists of lateral and cranial caudal views. A flexed lateral and a pronated cranial caudal projection are added for the patient that is being radiographed for elbow dysplasia. The landmarks are the same for the lateral and cranial caudal projections. The center of the collimation should be centered at the midpoint of the elbow at the level of the humeral condyles and the collimation is opened to include the olecranon (distal third of the humerus) and the proximal third of the radius and ulna. The orthogonal projection is taken cranial to caudal direction so that the elbow is close to the detector/cassette to avoid magnification. To quality control the lateral elbow affirm that the humeral condyles are superimposed and the joint is visualized. For the cranial caudal projection the condyles of the humerus should be even in size and the olecranon superimposed and aligned straight between the humeral condyles.

Taking back quality control! Making sure that the radiographic images that you produce are the best quality, results in the best diagnosis and treatment the patient receives. You will also find that concentrating on quality control will also strengthen your ability to recognize pathology in your images and increase your knowledge!

Suggested reading:

Handbook of Radiographic Positioning for Veterinary Technicians. Nov 24, 2009 Margi Sirois, Elaine Anthony, and Danielle Mauragis

Small Animal Radiographic Techniques and Positioning. May 15, 2012 Susie Ayers

Small Animal Radiography: Essential Positioning Guide. Clifford R. Berry, DVM, DACVR