Movora Education

KYON
A Movora Brand

KYON THR
Mentorship Program
- A Guide

MMKT-ED-0060-A

The KYON THR Mentorship Program as part of the KYON THR Education Pathway

To perform Total Hip Replacements using the KYON Zurich Cementless THR Systems, you must first complete the KYON THR Mentorship Program.

We offer two specialized mentorship programs:

- **KYON THR Mentorship Program** - Designed for the use of the KYON THR System in standard-sized dogs.
- **KYON Mini THR Mentorship Program** - Tailored for the KYON Mini THR System, specifically for small dogs and cats.

These programs ensure you receive the necessary training and expertise to perform procedures with confidence and precision.

Both Mentorship Programs follow the same structure and consist of two parts:

1. Wet Lab Case Evaluation
2. Clinical Case Mentoring

These evaluations require effort, time, and financial investment. To ensure approval by the evaluators, carefully follow the instructions given in this guide before proceeding.

Participation in the KYON Mentorship Program or KYON Mini THR Mentorship Program must commence within 12 months of attending the corresponding KYON Total Hip Replacement Workshop or KYON Mini Total Hip Replacement Workshop.

Case submissions beyond this 12-month period will require re-attendance of the respective workshop.

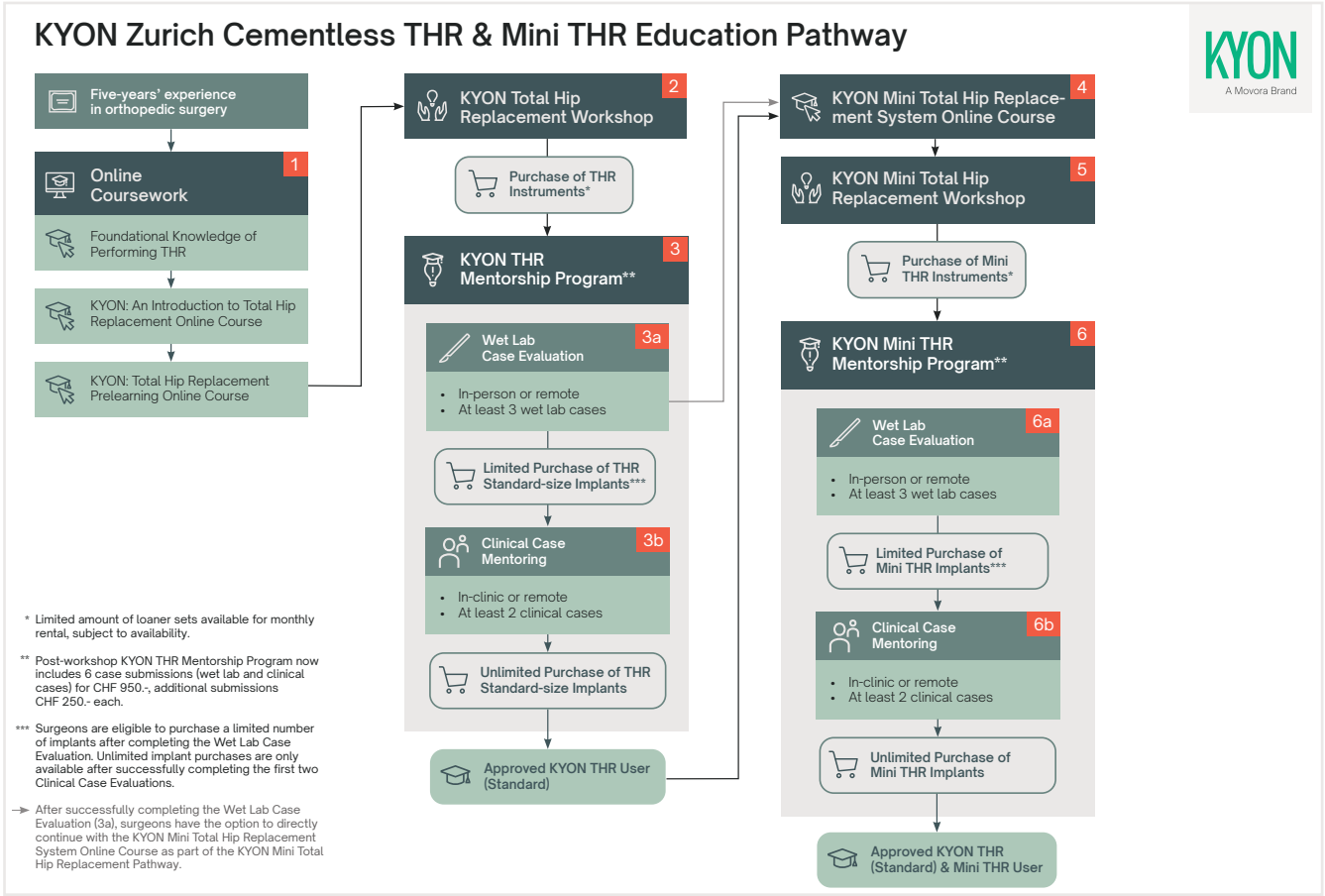

Image 1: KYON THR Education Pathway

Next steps in the KYON THR Mentorship Program

1. Acquiring a KYON THR Instrument Set:

- For purchasing a THR instrument set, please reach out to your local Movora Sales Representative and/or Movora Customer Service which can be found here: *movora.com/representatives*
- If you wish to rent a THR instrument set, please contact Movora Education (education@movora.com). Availability of sets is limited due to workshop demands and cannot be guaranteed. Rental sets must be returned promptly. The rental fee is CHF 500 per month.

2. Enrollment for Wet Lab Case Evaluation

Wet Lab Case Evaluation can be done remotely in your clinic, submitting the pre- and postoperative radiographs digitally for evaluation by the KYON THR Expert Panel. Alternatively, you can book a KYON THR In-Person Wet Lab Case Evaluation.

Remote Evaluation:

- ***Location:*** Surgeons can perform the Wet Lab Case Evaluation in their own clinic.
- ***Time/Duration:*** The time required for the Wet Lab Case Evaluation varies depending on the pace at which cases are performed and the quality of the procedures, as higher-quality cases may reduce the number of submissions needed for approval (in average a few weeks resp. months).
- ***Submission:*** Cases are submitted electronically for evaluation.
- ***Organization:*** Surgeons need to obtain the cadavers themselves.
- ***Advantages:*** Flexibility in scheduling and performing the cases.

Scan the QR code to view the fully interactive version with links to all Mentorship Program courses.

In-Person Evaluation:

- ***Location:*** KYON THR In-Person Wet Lab Case Evaluations are offered in various locations several times a year.
- ***Time/Duration:*** The evaluation is completed over a few days (usually 3-4 days).
- ***Organization***: The cadavers are provided, so surgeons don't need to arrange them. All implants and instruments are provided.
- ***Advantages:*** Immediate feedback is given. Opportunity for fast completion and less logistical effort.

2a. Registration for KYON THR Mentorship Program Package (remote evaluation)

To submit cases, please register for the KYON THR Mentorship Program Package on *education.movora.com.* The price is CHF 950 and includes the evaluation of 6 cases (wet lab and clinical cases). Any additional case needed to complete the Mentorship Program is invoiced with CHF 250 per case.

REGISTRATION LINK KYON THR MENTORSHIP PROGRAM PACKAGE

Following registration, you will be enrolled in the KYON THR Wet Lab Case Evaluation and the KYON THR Clinical Case Mentoring. The Wet Lab Case Evaluation must be completed before start of the Clinical Case Mentoring.

Both can be booked as single items with the following costs:

- *KYON THR Wet Lab Case Evaluation:* CHF 750 for 3 cases, additional cases CHF 250 each.
- *KYON THR Clinical Case Mentoring:* CHF 500 for 2 cases, additional cases CHF 250 each.

If you have decided on the remote Wet Lab Case Evaluation, please proceed to 3. Wet Lab Case Submission and Evaluation Requirements.

2b. Registration for KYON THR In-Person Wet Lab Case Evaluation

Please view KYON THR In-Person Wet Lab Case Evaluation events open for registration here: ***KYON THR Mentorship Program.***

- The In-Person Wet Lab Case Evaluation is a self-paced learning assessment, not an instructed training workshop.
- Up to 4 opportunities to perform cases for assessment.
- 3 cases must meet a minimum passing score of 15 without a critical error. Submissions will be graded by assessors, and multiple cases may be needed to achieve a passing grade.
- A pass within the In-Person Wet Lab Case Evaluation depends on the quality of the cases performed and is not guaranteed.
- If less than 3 cases have been approved, further cases must be completed in your clinic or in another In-Person Wet Lab Case Evaluation.
- When booking the In-Person Wet Lab Case Evaluation, the registration fee includes the KYON THR Clinical Case Mentoring.

3. Wet Lab Case Submission and Evaluation Requirements

- ***Submission Requirements:*** Surgeons must complete and submit at least 3 wet lab cases. For every case, surgeons must complete a self-assessment using the Movora THR Case Evaluation Sheet (*Appendix 1*) and Movora THR Case Guidance Notes (*Appendix 2*) that will be reviewed within the evaluation.
- ***Evaluation Criteria:*** Cases will be assessed as either approved or not approved.
  - Approved case: scores ≥ **15 points** with no critical error
  - Not approved/failed case: Contains a critical error (see evaluation process) or scores below 15 points
- A minimum of three approved cases is required to successfully complete the Wet Lab Case Evaluation.
- If the Wet Lab Case Evaluation is not passed after submission of 3 cases, further cases must be submitted. If no improvement is detected, the THR Evaluation Board can recommend repeating the KYON Total Hip Replacement Workshop. In this case, a refresher discount of 50% is applicable.
- Upon achieving three approved cases, surgeons are eligible to purchase implants for the Clinical Case Mentoring.

If you choose to complete the evaluation remotely, please submit your wet lab cases through the ***KYON THR Wet Lab Case Evaluation*** program in the Movora Education Platform (***education.movora.com***). Once you access the program, carefully read the provided instructions and fill out the submission form with the required information.

4.Submission Process

To submit a case, access the KYON THR Wet Lab Case Evaluation on the Movora Education Platform and select the appropriate case number (e.g., Case Submission_1). On the submission page, you will find an embedded form to enter the required information as listed below.

Case details

- Full name of surgeon
- Email address
- Clinic
- Workshop Attended
- Cadaver case or clinical case
- Submission number
- KYON THR system in use (standard-size or Mini THR)
- Size of magnification marker
- Size of implants planned for procedure
- Sizes of implants used in procedure
- Case details (size, breed, age of dog, etc.)
- Description of procedure
- Own assessment of the case
- Radiographs to be provided as vPOP link or to be attached to the form

Radiographs to be submitted

- Ventrodorsal (VD) view of the pelvis frog legs
- Ventrodorsal (VD) view of the pelvis extended legs
- Lateral (LL) view of the pelvis
- Mediolateral (ML) view of the femur
- Caudocranial view of the femur (Yoga view)
- Pre-operative planning must be drawn on the calibrated radiographs
- Post-operative angle of lateral opening (ALO), cup retroversion and stem anteversion must be drawn and measured
- When fluoroscopy is used, as strongly recommended, the images must be included

Please view the brochures “THR Pre-operative Radiographs” and “THR Post-operative Radiographs” for further details and images, and review Appendix 3: Radiographic assessment – Instructions.

Note:

- Radiographs can be submitted as .jpeg or .dcm (dicom) files, or uploaded to vPOP, provided with a sharable link. Please ensure the link-sharing is set to importable.
- Omitting any required radiograph will prevent the submission from being evaluated.
- Submit only 1 case at a time, to allow implementing received feedback into subsequent cases.
- Submit only cases of the highest quality. Thoroughly evaluate your cases before submitting them. Correct any detected complications or mistakes (e.g., fissures, diverging ALO).

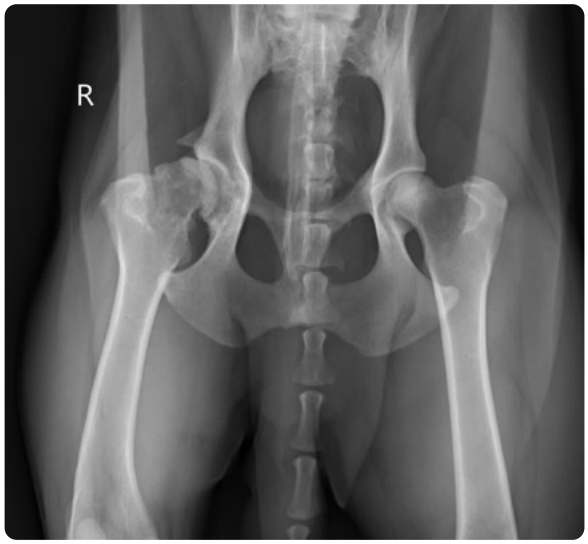

Image 2: Example of (VD) view of the pelvis Frog Legs

5. Evaluation process:

Submitted cases will be evaluated anonymously by the KYON THR Expert Panel. An evaluation form is used to collect feedback and document the results of the evaluation (see Appendix 1, Movora THR Case Evaluation Sheet).

Points are given for the following criteria:

- Evaluation of pre-op radiographs (0-5 points)
- Evaluation of post-op radiographs (0-5 points)
- Evaluation of acetabular cup: ALO, retroversion, depth of reaming/impaction, and proper cup size (0-5 points)
- Evaluation of femoral stem: Anteversion, contact with medial cortex, level of insertion, caudal tilt, proper stem size (0-5 points)

Critical errors include:

- Strong deviation from appropriate ALO
- Too superficial reaming or partial cup impaction
- Strong deviation from proper cup retroversion with missed coverage of cranial or caudal pillars
- Strong deviation from appropriate stem anteversion
- Wrong cup or stem size

If a critical error is identified, the submitted case will not be approved, even if the other criteria are met.

Each case evaluation can earn a maximum of 20 points. The case will be approved if it achieves a minimum of 15 points.

As soon as the evaluation is complete, results including points achieved and feedback will be communicated to you.

6. Completion of Wet Lab Case Evaluation

When the requirements for completion of Wet Lab Case Evaluation have been met (3 cases have been approved with ≥ 15 points), the surgeon is eligible to purchase the implants for Clinical Case Mentoring.

The next step is to submit cases in the KYON THR Clinical Case Mentoring program on education.movora.com.

Scan the QR code to view the fully interactive version with links to all Mentorship Program courses.

7. Enrollment for Clinical Case Mentoring

Before performing your first two clinical cases, you must submit the preoperative radiographs and planning via email to ***education_zh@movora.com*** to receive support and feedback before attending the surgery. Depending on the complexity, the feedback will be given in an email or during a video call with one of the KYON THR Experts.

After the surgeries, cases will be assessed based on the pre- and postoperative radiographs and case details, and feedback given.

- ***Clinical Case Mentoring can be done remotely in your clinic***. After the surgery, pre- and postoperative radiographs must be submitted digitally for evaluation by the KYON THR Expert Panel.

- ***Alternatively, you can opt to perform your clinical cases with the support of a mentor***, who will assist with planning and attend the surgery, either at the surgeon's or the mentor's clinic. Mentoring surgeons must be approved by Movora and accepted by the Movora Education Department. The mentor must report back to the Movora Education Department to determine if clinical cases have been approved, and the surgeon can go on to perform clinical cases without mentoring.

Movora can provide a list of regional surgeons willing to serve as mentors, along with their contact details, upon request. All other arrangements (payment, date, location, etc.) must be made directly between the surgeon and mentor.

7a. Registration for KYON THR Clinical Case Mentoring (remote evaluation)

If you have purchased the KYON THR Mentorship Program Package on education.movora.com, you have already been registered for the KYON THR Clinical Case Mentoring and can access it in your profile on education.movora.com.

If you had purchased the KYON THR Wet Lab Case Evaluation and not the KYON THR Mentorship Program Package, you need to purchase the KYON THR Clinical Case Mentoring program to start case submission.

- ***KYON THR Clinical Case Mentoring:*** CHF 500 for 2 cases, additional cases CHF 250 each.

7b. Registration for In-Clinic KYON THR Clinical Case Mentoring

If you prefer to perform your first 2 clinical cases with the support of a mentor, please contact the Movora Education Department at ***education_zh@movora.com*** to set up mentoring.

8. Clinical Case Submission and Evaluation Criteria

- ***Submission Requirements:*** Surgeons must complete and submit at least two clinical cases.

  For every case, surgeons must complete a self-assessment using the Movora THR Case Evaluation Sheet (*Appendix 1*) and Movora THR Case Guidance Notes (*Appendix 2*) that will be reviewed within the evaluation.

- ***Evaluation Criteria:*** Cases will be assessed as either ***approved*** or ***not approved***.

  - Approved case: scores ≥ ***15 points*** with no critical error
  - Not approved/failed case: Contains a critical error (see evaluation process) or scores below 15 points

- A minimum of 2 approved cases is required to complete the Clinical Case Mentoring.
- The THR Evaluation Board will review the provided clinical cases and determine if additional case(s) are required.
- Once the KYON THR Evaluation Board confirms that the surgeon has achieved the status of "***Approved KYON THR User***", a certificate will be issued, making the surgeon eligible for unlimited purchases of standard-sized KYON THR implants.

9. Certificate of Completion

Upon completion of the KYON THR Mentorship, a Certificate of Completion will be issued. You are now an approved KYON THR User.

Scan the QR code to view the fully interactive version with links to all Mentorship Program courses.

Version date: April 2, 2025

Appendix 1

THR Case Evaluation

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SURGEON **CASE#** Movora Use **REVIEWER** Movora Use **DATE**

Select System	CANDIDATE SELF-EVALUATION	REVIEWER EVALUATION	SCORE	MAX
1. PRE-OP RADIOGRAPHIC TECHNIQUE/IMAGES				
			-	PASS or FAIL
2. POST-OP RADIOGRAPHIC TECHNIQUE/IMAGES				
			-	PASS or FAIL
3. ACETABULUM & CUP				
Cup Orientation				2.5
Reaming				2.5
Seating				2.5
Implant Sizing				2.5
Cement Mantle				COMMENT ONLY
TOTAL FOR ACETABULUM & CUP			0	10
Critical Errors			-	PASS or FAIL

3. FEMUR & STEM				
Femoral Preparation				2
Stem Orientation				3
Stem Insertion				2.5
Implant Sizing				2.5
Cement Mantle				COMMENT ONLY
TOTAL FOR FEMUR & STEM			0	10
Critical Errors			-	PASS or FAIL
TOTAL FOR CASE			0	

(Pass ≥ 15 plus pass both radiographs and no critical errors)

Additonal General Comments from Reviewer

Appendix 2

THR Case Evaluation

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GUIDANCE NOTES – ZURICH CEMENTLESS

1. PRE-OP RADIOGRAPHIC TECHNIQUE/IMAGES		
	VD View of the Pelvis: The pelvis should appear symmetrical, without any rotation. If the width of the wing and body of the ilium differs from one side to the other, it indicates that the pelvis is tilted towards the wider side. The same applies to the obturator foramina. **VD Frog Leg View of the Pelvis:** Ensure that the pelvic limbs are slightly extended and not flexed. Flexion of the limbs can cause the ischium to lift away from the table, leading to rotation of the pelvis on its short axis leading to distortion of the acetabulum. **LL View of the Pelvis:** The wings and bodies of the ilium, and ischium should be superimposed. To achieve this view, insert radiolucent supports under the lumbar area, cranial to the wing of the ilium, and slightly elevate the sternum with a sandbag. (We should include the image from Steve demonstrating the position of the wings of the ilium and tuber ischii) **LL View of the Femur:** The stifle should be flexed at 90°, with the femoral condyles overlapping. **Yoga View of the Femur:** The trochanteric fossa and the femoral neck should be clearly visible, distinct from the greater trochanter, and not superimposed. Ensure that the femur is perpendicular to the pelvis and externally rotate the femur 60°-70°. Place the calibration marker as close as possible to the acetabulum and proximal femur.	**PASS or FAIL**
2. POST-OP RADIOGRAPHIC TECHNIQUE/IMAGES		
	As Pre-op guidance. In the Yoga projection, position the X-ray beam tangentially to the femoral stem to clearly visualize the contact between the stem and the medial cortex of the femur. In the tangent radiograph, the caudal part (spines) of the stem should appear as a single line, not two lines.	**PASS or FAIL**
3. ACETABULUM & CUP		
Cup Orientation	**Angle of Lateral Opening (ALO):** The surgeon must provide a precise measurement. The cup opening should be between 40° and 50°, aiming for 45° ± 3°. **Point Deductions:** 1 point: If the ALO is between 37.5° and 39.5° or between 50° and 52.5°, 2 points: If the ALO is between 35° and 37.5° or between 52.5° and 55°. **Angle of Retroversion:** The surgeon must provide a precise measurement. The angle varies depending on individual anatomy, but the cup should be well-centred between the cranial and caudal acetabular pillars. **Point Deductions:** 1 point: If the cup is not centred between the cranial and caudal pillars by 2°, 2 points: For a deviation of 3° to 4°, 2.5 points: For a deviation of 5° to 9°.	**2.5**
Reaming	**Central or Eccentric Reaming:** Evaluated by assessing the location of the reaming, specifically looking for equal removal of cartilage and subchondral bone cranially and caudally. • Compare to the opposite acetabulum (if it is normal or less degenerative) to determine the relative position of the reamed bed in relation to the pubis. • If the cranial notch or subchondral plate is preserved, this indicates that reaming was directed caudally. • If the caudal acetabular rim is preserved, this indicates that reaming was directed cranially. • **Point Deductions:** 1 to 2.5 points for eccentric reaming. **Relative Depth of Reaming in Relation to the Medial Acetabular Wall:** • Up to the medial wall: indicates optimal depth. • Through the medial wall: may be necessary in cases with a very shallow acetabulum or may be necessary if an oversized cup is placed. • Lateral to the medial wall: Most often seen when an undersized cup is used or failure to remove all the articular and subchondral bone. • **Point Deductions:** 2 to 2.5 points if the reaming did not extend up to the medial cortex.	**2.5**

Seating	**Does the Cup Fully Match the Reamed Bed?**
	Ensure there is no polar gap, and that full insertion depth has been achieved.
	• If a polar gap is present, quantify its size.
	• **Point Deductions:** Minimal: 1 point, Moderate: 2 points, Large: 2.5 points
	• **Reasons for a polar gap:**
	  ○ Insufficient impacting.
	  ○ The acetabulum was initially reamed too deeply with an undersized reamer.
	  ○ Inadequate reaming or failure to use the check ball.
		2.5

Implant Sizing	**Correct Size** • The cup is at the craniocaudal acetabular borders with complete removal of the subchondral bone. **Undersized** • The cup is within the acetabular borders with incomplete removal of the articular surface and subchondral bone but central portion of the acetabulum is reamed. • **Point Deductions:** 2 to 2.5 points or may be considered a critical error	**2.5**

	Oversized • Involves excessive reaming and removal of available bone stock beyond the borders of the acetabulum. • **Point Deductions**: 2 to 2.5 points or may be considered a critical error	
Cement Mantle	N/A	**COMMENT ONLY**
TOTAL FOR ACETABULUM & CUP		**10**
Critical Errors	• **ALO:** An ALO of less than 35 degrees or greater than 55 degrees is considered a critical error. • **Retroversion**: Retroversion exceeding or less than 10 degrees relative to the acetabular pillars. • **Cranial or caudal peripheral ribs of the cup out of the cranial or caudal pillars** • **Incomplete Cup Seating**: Presence of a large medial polar gap of 4mm or more. • **Unrecognized Acetabular Fracture**: Failure to identify an acetabular fracture. • **Cup Size**: either too small or too large in relation to the acetabular size and body weight.	**PASS or FAIL**
3. FEMUR & STEM		
Femoral Preparation	**Level of Femoral Neck Ostectomy** • For stems X-S, S, and M: Perform the femoral neck ostectomy flush with the lesser trochanter. • For an L stem, perform the ostectomy 1-2 mm proximal to the lesser trochanter. • It is crucial to rasp the caudal wall of the neck inside the trochanteric fossa, extending up to the caudal intertrochanteric crest. Lateral rasping in the trochanteric fossa should reach the tendons of the gemelli and internal obturator muscles without damaging them. • **Point Deductions**: Incomplete reaming in this area can prevent the stem from aligning properly in the centre of the femur, resulting in varus orientation and a point deduction in the final score. Insufficient preparation of the femoral canal may cause caudal and lateral tilting of the stem distally, also leading to a point deduction (1-2 points). **Extent of the Femoral Canal Preparation** • Reaming of the femoral canal should not exceed the length of the stem distally. • **Point Deductions**: Excessive distal reaming creates a radiolucent area in the femoral canal distal to the stem, risking bone infarction in actual cases and resulting in a deduction of 1-2 points from the case submission.	**2**
Stem Orientation	**Medial to Lateral Orientation** • The stem should contact the medial cortical bone of the femur from proximal to distal. A stem not contacting the medial cortex of the femur will incur a deduction of 2 points. A separation of more than 2 mm is considered a critical error. **Stem Anteversion** • Verify that the stem exhibits the correct anteversion of 15° to 25° before fixing the stem. • Flex the stifle to 90°, with the tibia parallel to the table, and measure the angle between the jig and the tibia using the angle template. • An anteversion angle outside the range of 10° to 30° will result in the failure of the submission. • **Point Deductions:** 1 point for stem anteversion between 12.5° and 14.5° or between 25.5° and 27.5°. 2 points for stem anteversion between 10.5° and 12.5° or between 27.5° and 30°.	**3**
Stem Insertion	**Stem Insertion:** • Ensure complete insertion of the stem at the level of the neck ostectomy. The stem base should be at the level of the intertrochanteric fossa. • **Point Deductions:** Incomplete or excessively distal insertion will impact the score: a discrepancy of up to 2 mm (proximal to distal) will result in a deduction of 2 points. A discrepancy of 3 to 5 mm (proximal to distal) will result in a deduction of 3 points. **Stem Fixation:** • All screws must be fully inserted into the stem's conical seat. Inadequately tightened screws will result in the failure of the submission. If post-operative radiographs reveal that one or more screws are not fully inserted, an immediate revision is required to properly tighten the screws and avoid submission failure.	**2.5**

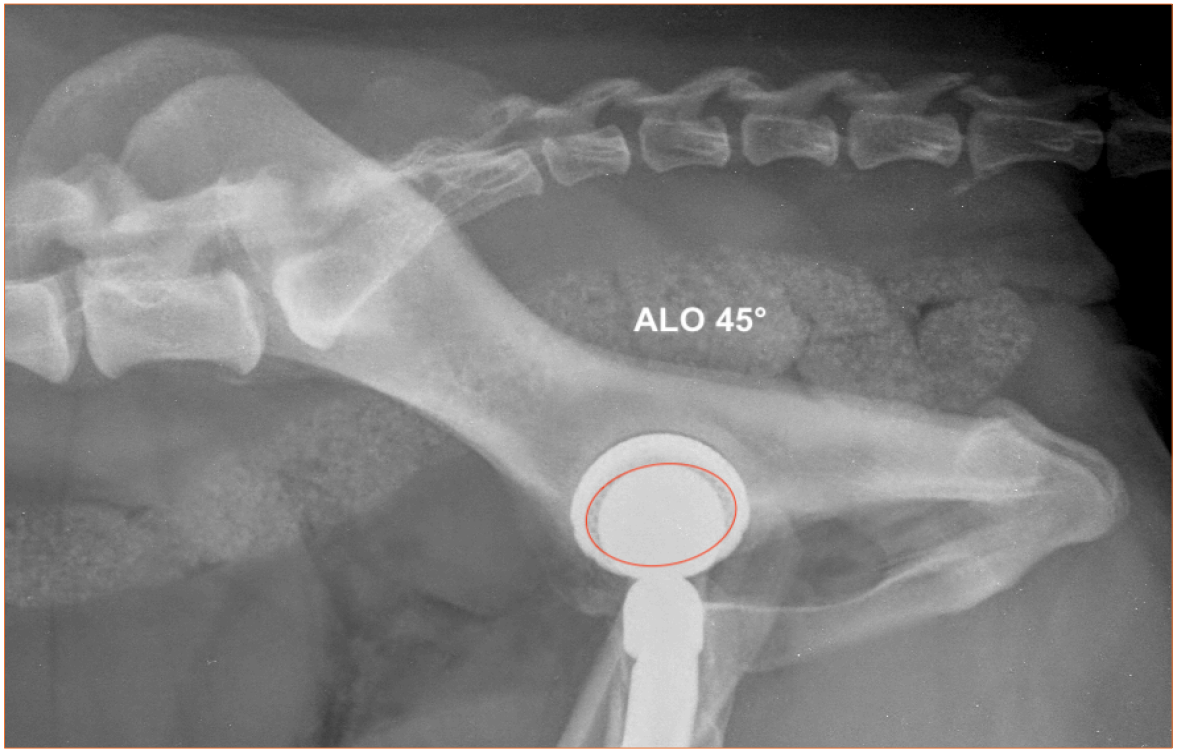
Implant Sizing	**Stem Size:**
	• The stem size should be appropriate for the diameter of the femoral canal, body weight, activity level of the patient, and cup size.
	• Examples of common combinations for cup and stem sizes:
	  ○ The X-S stem typically pairs with a 21.5 or 23.5 cup and a short neck.
	  ○ The S stem typically pairs with a 23.5 or 26.5 cup and a short neck.
	  ○ The M stem typically pairs with a 26.5 or 29.5 cup and a short or medium neck.
	  ○ The L stem typically pairs with a 26.5 or 29.5 cup and a medium neck.
	• **Point Deductions**: Improper sizing will result in a deduction of points ranging from 1 to 3 points.
		2.5

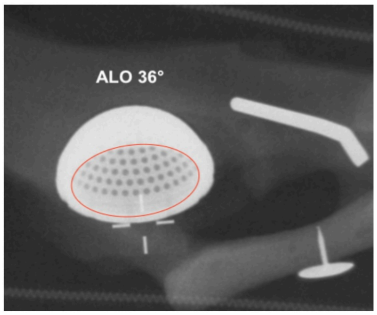
Cement Mantle	N/A	**COMMENT ONLY**
TOTAL FOR STEM		**10**

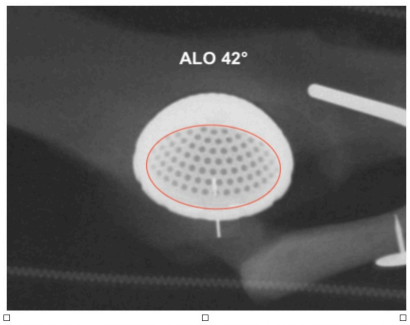
Critical Errors	• **Significant deviations from size recommendations** will result in a failed submission. • **Stem anteversion** less than 10° or greater than 30°. • **Insufficient stem insertion** (too proximal) or **excessive stem insertion** (too distal) exceeding 5 mm. • **Significantly varus** or **cranial to caudally tilted** stem. • Significant **separation of the stem from the medial cortex** of the femur exceeding 3 mm. • **One or more screws not fully inserted**. • **Unrecognized fissure or insertion of a fifth screw in a 4-hole stem**.	**PASS or FAIL**
TOTAL FOR CASE		

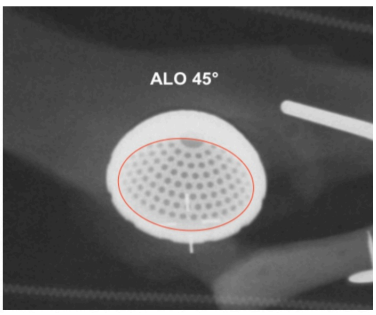
(Pass ≥ 15 plus pass both radiographs and no critical errors)

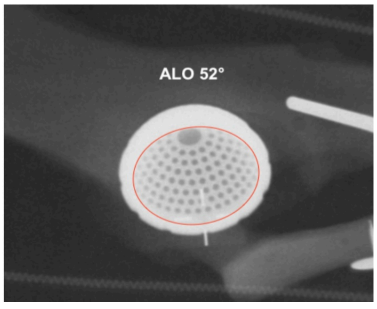
ANGLE OF LATERAL OPENING (ALO)

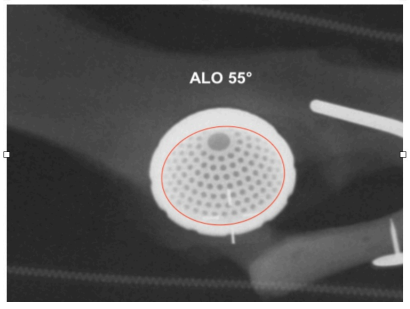


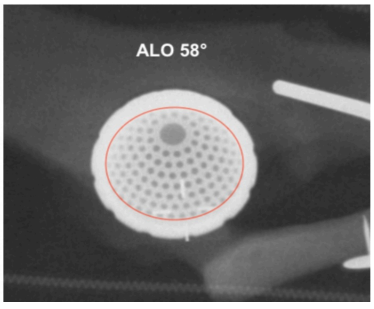




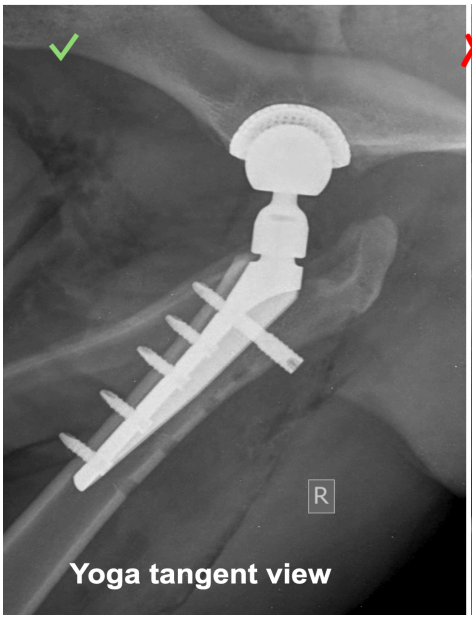


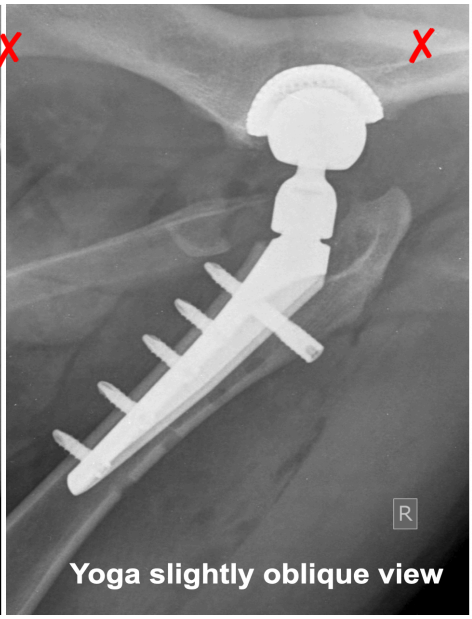


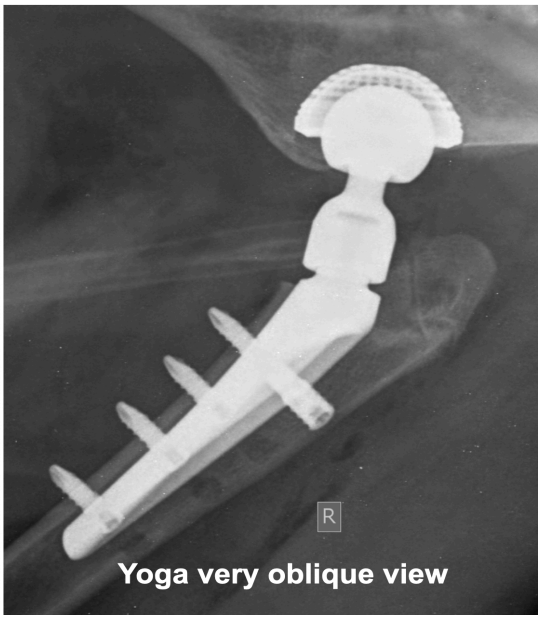




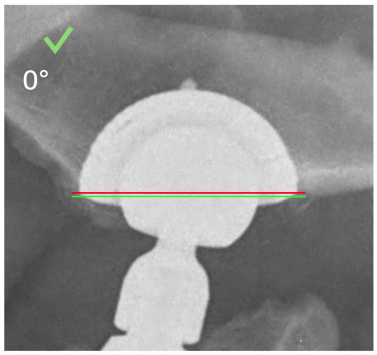
YOGA VIEW

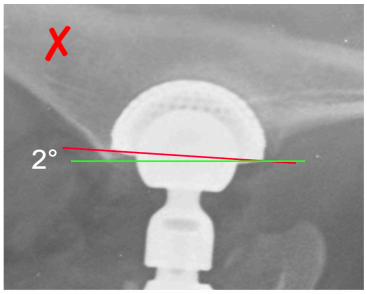


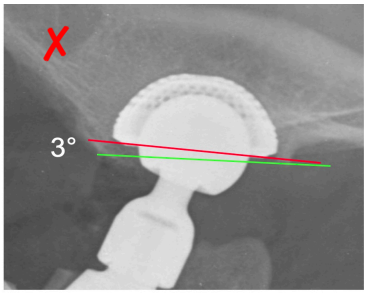


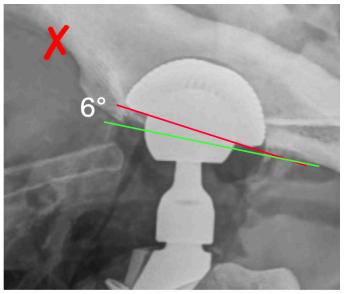


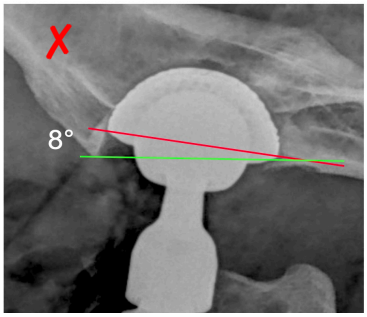
CUP VERSION

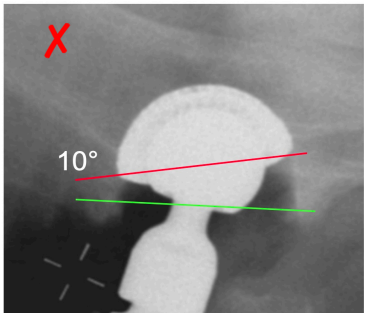


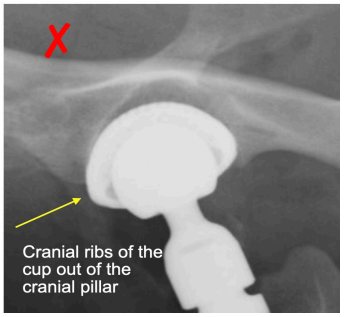












Appendix 3

Radiographic assessment - Instructions

- Before conducting pre-operative radiographs, carefully read and follow the guidelines outlined in the “Pre-operative Radiographs and Planning” brochure.

- In all radiographic views used for measurements (pelvis ventro-dorsal view, LL view of the femur, and the ‘yoga’ view), always place a radio-opaque marker at the height of the part to be evaluated. For this purpose, steel spheres with flexible supports are available to position the sphere at the desired height. Always indicate the size of the marker used.

- In sagittal projections, ensure that the dog’s right side appears to the left of the radiographic image. In lateral projections, the cranial side should appear to the left of the radiographic image.

- Ventro-dorsal projections of the pelvis should depict a symmetrical pelvis, without any rotation to the right or left. When the wing and body of the ileum differ in width from one side to the other, it indicates that the pelvis is tilted toward the wider side. To obtain a symmetrical projection, shift the thorax towards the opposite side.

- In the frog leg projection, ensure that the dog’s legs are slightly extended and not flexed. Flexion of the legs can lead to the lifting of the ischium, causing a rotation of the pelvis on its short axis and distortion of the acetabulum.

- The LL projection of the pelvis should show the wings, the bodies of the ilium, and the ischium superimposed. Achieve this view by inserting radiolucent supports under the lumbar area, cranially to the wing of the ileum, and holding the sternum slightly elevated with a sandbag.

- The LL projection of the femur should depict the stifle flexed at 90° with the condyles overlapping.

- The ‘yoga’ projection of the femur should show the trochanteric fossa and the femoral neck distinctly from the greater trochanter and not superimposed. Ensure that the femur is perpendicular to the pelvis, and the femur should be externally rotated 60°- 70°.

Pre-operative planning

- Consider the dog’s weight and refer to the table shown in the brochure “Pre-operative Radiographs and Planning.” But also bear in mind skeletal dimensions. Some dogs are light, but their skeletal size is larger and vice versa.

- Use the most common combinations for cup and stem size, as shown in the brochure. For example, the X-S stem typically combines with a 21.5 or 23.5 cup and a short neck. The S stem typically combines with a 23.5 or 26.5 cup and a short neck. The M stem typically combines with a 26.5 or 29.5 cup and a short or medium neck. The L stem typically combines with a 26.5 or 29.5 cup and a medium neck.

- Deviating significantly from these recommendations, such as using an X-S stem with a 26.5 or 29.5 cup or an X-S stem in a dog weighing 30 kg or more, will most likely result in a failed submission. Similarly, using an M stem in a 20 kg dog or a 23 cup with an M or L stem will most likely lead in a failed submission.

Post-operative radiographs

- Before performing post-operative radiographs, please read and carefully follow the instructions and examples in the brochure “Post-Operative Radiographs and Measurements.”

- Verify that the frog ventro-dorsal radiograph is symmetrical, with equal-sized wings and ileum bodies, and that the femurs are slightly extended, not flexed (see pre-op instructions above).

- Check that the LL projection of the pelvis shows superimposition of the wings of the ilium, the bodies of the ilium, and the ischium (see pre-op instructions above). This radiograph is essential for measuring the prosthetic cup’s ALO and retroversion angles. Any tilt of the pelvis can result in an incorrect measurement and may lead to a loss of points in the final evaluation or failure of the submission if the ALO cannot be adequately assessed.

- For the LL projection of the femur, ensure that the stifle is flexed at 90° and the femoral condyles are superimposed. The correct positioning for this radiograph is essential to measure the anteversion of the femoral stem.

- In the Yoga projection, position the X-ray beam tangentially to the femoral stem, so that the contact of the stem to the medial wall of the femur is well visualized. In the tangent radiograph, the caudal part of the stem should be depicted as a single line and not two lines. If there are two lines, it indicates that the projection is not tangential. Additionally, an effort should be made to ensure that the X-ray beam is tangential to the cup by appropriately tilting the pelvis to the opposite side. This will allow for accurate assessment of the centering of the cup between the cranial and caudal pillars of the acetabulum and its impaction to the medial wall of the acetabulum.

Post-operative measurements

- The measurement of cup orientation, ALO, and retroversion must be accurate and performed as shown in the brochure. To measure the ALO, you should measure the short and long axes of the oval inscribed inside the cup and check the angle against the table or use the a/b x sin-1 calculation.

- The measurement of the anteversion of the femoral neck must be precise and carried out as indicated in the “Post-Operative Radiographs and Measurements” brochure.

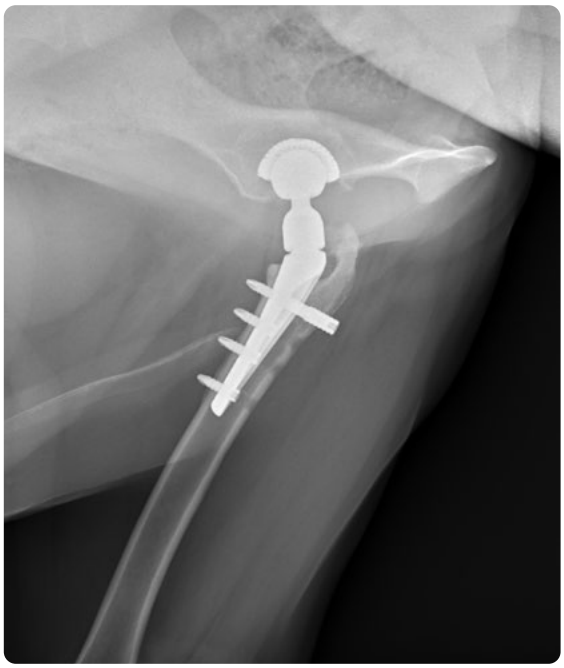


Image 3: Example of YOGA

Evaluation of the cup

- Verify the orientation of the cup intraoperatively.

- Ensure that the cup's retroversion aligns with the anatomical retroversion of the acetabulum, confirming that the cup is well-centered between the cranial and caudal pillars. To achieve this, after removing the osteophytes on the acetabular borders, position the final reamer inside the acetabulum, ensuring it is centered between the cranial and caudal pillars. Mark the orientation of the reamer bar with a hemostatic clamp on the surgical field, which will be used as a guide when impacting the cup. If the cup is not centered after partial impaction, it must be correctly repositioned. Leaving an improperly centered cup, either too far cranially (anteverted) or caudal (retroverted), will result in failure of the submission.

- The ALO can be accurately verified during surgery after partial impaction, if a fluoroscope is available. Even if the dog has been properly positioned prior to surgery, the pelvis may shift during surgical manipulations, making intra-operative assessment of the ALO unreliable. If a fluoroscope is not yet available in the operating room, and on post-operative radiographic examination, the cup is found to be either too open (>50°) or too closed (<40°), it is necessary to return to surgery to adjust the ALO of the cup accordingly, after removing the neck and head. This immediate revision demonstrates that the applicant has identified and corrected the cup positioning error. Failure to make this correction will result in failure of the submission. In case of immediate revision, both the pre-and post-revision radiographs should be attached with comments.

- Complete insertion/impaction of the cup is mandatory to avoid any gap between the cup and the medial wall of the acetabulum, which will lead to failure of the submission. To ensure complete cup insertion/impaction, carefully perform the reaming of the acetabulum, so that the check ball can be inserted by hand up to the equator of the check ball (circumferential line) and remains stable. If the check ball does not fit securely in the acetabulum, the acetabulum must be gently reamed again, aligning the reamer with the edges of the acetabulum, and then re-insert the check ball for fit. If over-reaming was the issue, it is necessary to ream in the center of the acetabulum with a reamer one size smaller, so that the cup can be inserted deeper in the acetabulum and achieve a proper press-fit. Before inserting the cup, ensure that the final reamer is at the same level (depth) at both the cranial and caudal pillars of the acetabulum. This depth should be equal at the cranial and caudal pillar of the acetabulum once the cup has been fully inserted. This observation is very useful to understand whether the cup has been inserted completely into the acetabulum.

- Conversely, if the cup is not fully impacted, additional hammering should be done on the impactor. To verify full insertion of the cup into the acetabulum, it is necessary to check with a scalpel blade to ensure there is not a gap/ space between the cup and the dorsal acetabular rim. This test does not guarantee that the cup is fully impacted to the medial acetabular wall because it may have been inserted too dorsally and not enough ventrally. However, it prevents inadequate dorsal impingement. Therefore, it is essential to check that the space between the cranial and caudal acetabular pillars and the cup is the same as it was between the final reamer and the acetabular borders.

- If post-operative radiographs show that the cup was not fully inserted, it is advisable to return to surgery and completely impact the cup. This immediate revision is also necessary in actual clinical cases as inadequate impingement can lead to cup displacement, possible dislocation of the head, or dislodgement of the cup from the acetabulum.

Evaluation of the stem

- To ensure complete and correct insertion of the stem into the femur, properly preparing the femur with the appropriate rasps is essential. Test with the trial stem to ensure smooth insertion and the ability to rotate to achieve correct anteversion (20°- 25°). It is essential to perform the femoral neck ostectomy flush with the lesser trochanter for stem X-S, S, and M, and 1-2 mm proximal to the lesser trochanter when using a L stem. It is also essential to rasp the caudal wall of the neck inside the trochanteric fossa, up to the caudal intertrochanteric crest. Lateral rasping in the trochanteric fossa must extend up to the tendons of the gemelli and internal obturator muscles, without causing injury to them. Incomplete reaming of this area will prevent the stem from entering the femur's center, resulting in varus orientation and a loss of points in the final score. This will also prevent excessive rasping of the medal cortex of the femur. Lateral tilting of the stem distally because of insufficient preparation of the femoral canal will affect your score.

- The reaming of the femoral canal should not exceed the length of the stem, and the suction tip should not be inserted any deeper. Excessive distal reaming or inserting the suction tip deeper than the femur stem, can lead to a radiolucent area inside the femoral canal distal to the stem, risking infarction of the bone in an actual case and deduction of points to the case submission.

- Ensure complete insertion of the stem, with the jig's margin at the level of the neck ostectomy. Incomplete or too distal an insertion will affect your score.

- The stem should contact the medial cortical of the femur. This is initially accomplished by properly reaming the femur and then by properly applying pressure to the jig (distal and medial pressure) when drilling and fixing the screws. Simultaneously, the assistant should elevate the femur with a Hohman retractor placed on the proximal medial aspect of the proximal femur to counteract the pressure from the jig while drilling. A stem not contacting the medial cortex of the femur is a significant error leading to failure of the submission.

- All screws must be fully inserted to secure them into the stem's conical seat. Inadequately tightened screws will result in failure of the submission. If post-operative radiographs reveal that one or more screws were not fully inserted, an immediate revision is necessary to ensure they are properly tightened, to avoid the failure of the submission.

- Assess the correct 20-25° anteversion once the stem is inserted. Flex the stifle at 90° with the tibia parallel to the table and measure the angle between the jig and the tibia using the angle template. An incorrect stem anteversion, measuring less than 10° or more than 30°, will result in failure of the submission.

- While maintaining the proper orientation and pressure to the jig, insert all screws. Keep in mind that M and L stems require five screws, while X-S and S stems require only four. If a mistake is made when drilling a fifth hole using an X-S or S stems, whether a screw is inserted or not, the femur must be protected with a plate as it should be done in real cases to prevent a postoperative fracture. A hole distal to the stem would constitute a stress raiser point. The test can only succeed if the plate is applied after the fifth hole has been accidentally drilled. Removal of the screw inserted empty could be quite difficult with the risk that it could remain free in the femoral canal. It is therefore advisable not to try to remove it.