

# Orthopedic Marker Placement for Orthopedic Templating

## Purpose

To provide Medical Imaging (MI) Departments orthopedic marker placement information.

## Site Applicability

This procedure applies to all Lower Mainland Medical Imaging (LMMI) departments within Fraser Health (FH), Providence Health Care (PHC), Provincial Health Services Authority (PHSA) and Vancouver Coastal Health (VCH).

## Practice Level

Profession	Basic Skill
Medical Radiation Technologists (MRT) Certified in Radiology Technology	<ul style="list-style-type: none"> <li>How to use an orthopedic marker</li> </ul>

## Need to Know

- Orthopedic templating is the pre-surgical planning process performed by the orthopedic surgeon that allows to more accurately select the type and size of the prosthetic implant required for the patient.
- Radiopaque markers are placed at specific locations along the mid plane of joints, long bones or anatomical landmark of interest prior to imaging to provide a known reference measurement for the surgeon during pre-surgical planning. In situations whereby the patient body habitus makes visualizing the radiopaque marker difficult, the MRT will place the marker above or below the area of interest while remaining in the mid plane of the joint or long bone.
- Radiopaque marker of known size is only used in imaging when agreed upon between Medical Imaging and the orthopedic surgeons on specified body parts and upon specific request.

**Refer to [Appendix I](#) for additional orthopedic templating information**

## Equipment and Supplies

- A Radiopaque marker of known size and type is chosen by the imaging center in agreement with Orthopedics.
- Radiopaque marker preferential size is 25mm.
- The radiopaque marker is mounted on a baton, a large disc or used alone taped to the patient along the mid plane of the joint or long bone of interest.




## Feet

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## Orthopedic Radiopaque Marker Placement: Ortho Disk Example: Pelvis

<ul style="list-style-type: none"> <li>Position the 25 mm white disk in the bone plane.</li> <li>Make note of the etched number in the 12 o'clock position. (This is the distance in centimeters from the centre of the 25 mm disk to the table.)</li> </ul>	
<ul style="list-style-type: none"> <li>Position the Ortho Disk with the 25 mm white disk in the field of view Ensuring the noted number is in previous step in the 12 o'clock position.</li> <li>Instruct the patient to hold still for the radiographic exposure.</li> <li>Ensure the disk does not rotate after positioning.</li> </ul>	
<ul style="list-style-type: none"> <li>Review the image ensuring the 25 mm marker is visible and completely within the field of view.</li> </ul>	

## Ortho Disk Example: Extremity

<ul style="list-style-type: none"> <li>Tape the disk in the bone plane. (AP Knee shown in image.)</li> </ul>	
<ul style="list-style-type: none"> <li>Review the image.</li> <li>Ensure the 25 mm marker is visible and completely within the field of view.</li> </ul>	 

## Ortho Baton Example: Pelvis

<ul style="list-style-type: none"> <li>Instruct patient to hold baton.</li> <li>Palpate for bony plane and place the ortho disc end of the baton at that location.</li> </ul>	
<ul style="list-style-type: none"> <li>Instruct patient to press the baton tightly against the hip during the exposure.</li> <li>Review the image ensuring the 25 mm marker is visible and completely within the field of view.</li> </ul>	

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## Documentation

- Document the size of the marker in metric units electronically on the image.
- In addition to electronic documentation of size of marker on the images, an MRT may document this information in the radiographer's comment field as per site PACS/RIS specific processes.  
RIS Documentation Example: "radiopaque orthopedic marker 25 mm placed at the right greater trochanter"

## Definitions

Radiopaque orthopedic marker (also referred to as a scaling marker), is a metallic round object; either a ball or a disc shape and is most often 25mm in diameter.

## Related Documents

- Technical Challenges of Orthopedic Templating; Kevin Hammerstrom - Quality Coordinator and Lorie Marchinkow - Radiology and Interventional Radiology Regional Practice Leader, Vancouver General Hospital. June 18, 2010.
- Radiography department's Orthodisk, diskette and baton protocol-Vancouver General Hospital of British Columbia, Canada.

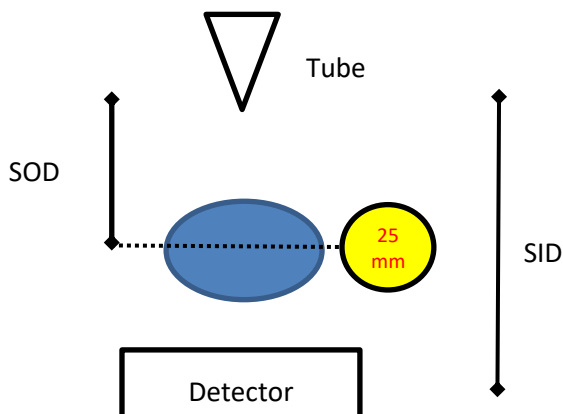
## References

1. Digital Planning and Templating for Orthopaedics. Embracing digital imaging and improving efficiency <http://www.orthoview.pl/wp-content/uploads/2011/09/Digital-Planning-and-Templating-for-Orthopaedics.pdf>
2. Wikipedia: Orthopaedic templating [https://en.wikipedia.org/wiki/Orthopaedic\\_templating](https://en.wikipedia.org/wiki/Orthopaedic_templating)

## Appendix I –Orthopedic Templating

- An Orthopedic template is created by the orthopedic surgeon using acetate templates and film or software packages that apply digital template libraries to PACS images.
- The Orthopedic Template is required because preferences for smaller incision sizes have made sizing during some surgical procedures more difficult to perform. Sometimes the need for non-standard-sized or specialty implants means pre-surgical planning is required to ensure the correct implant is available so that the patient has the best outcome possible.
- Geometric Magnification of the body part in the image can vary from 110-130% and can result in inaccurate orthopedic template measurements. Factors affecting image magnification are source image distance (SID), Source Object Distance (SOD), patient size, mattress thickness, PACS printing options, laser printer magnifications.
- Image magnification is a product of the distance of the bony anatomy from the x-ray detector and the diverging x-ray beam

$$\text{Magnification (\%)} = \frac{\text{Source-to-Image (detector) Distance (SID)}}{\text{Source-to-Object Distance (SOD)}} \cdot 100$$



- Calculating magnification factor is essential to ensure accuracy of an orthopedic template.
- Placing a radiopaque marker of known size against the patient in the plane of the joint or area of interest during imaging provides a good measure of the magnification present in the image ensuring accurate resizing of images should the surgeons use computer software or manual image printing to perform template creating and will assist radiologists and surgeons to accurately scale the anatomy from the orthopedic template.
- Radiopaque marker size used at the imaging center is communicated in advance to radiologists and surgeons.

## PROCEDURE

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