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Radiography Technique Of Ossa Cruris Sinistra With Suspected Fracture Of The Medial 1/3 Tibia And Fibula And 1/3 Proximal In Radiology Installation Efarina Etaham Hospital Pematangsiantar In 2026

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Abstract

Cruciate bone fractures are a common trauma encountered in radiology and require precise radiographic examination to confirm the diagnosis and determine appropriate medical treatment. The cruciate bone consists of the tibia and fibula, which play a crucial role in supporting body weight and locomotion. This study aims to determine the examination procedures, radiographic techniques used, and image quality in suspected medial and proximal thirds of the tibia and fibula fractures at the Radiology Department of Efarina Etaham Hospital, Pematangsiantar. This study used a descriptive qualitative method, collecting data through observation, interviews, documentation, and literature review. The examination was performed on Mrs. S, a patient with a traffic accident who experienced pain, swelling, and limited mobility in her left leg. The radiographic techniques used included anteroposterior (AP) and lateral projections with an exposure factor of 58 kV, 200 mA, a time of 56 s, and a FFD of 100 cm. Radiographs revealed a comminuted fracture of the medial third of the tibia with angulation and lateral displacement of the distal fragment, a complete and incomplete oblique fracture of the proximal third of the fibula with minimal fragment displacement, and soft tissue swelling in the crus region.

Keywords: Radiography, Crus, Tibia Fracture, Fibula Fracture, AP Projection, Lateral Projection

INTRODUCTION

Radiology services are a vital part of the medical care system, particularly in the

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diagnostic field, as they play a significant role in facilitating clinicians in formulating diagnoses, establishing treatment plans, and monitoring the progress of a patient's condition. Diagnostic radiology examinations allow for non-invasive visualization of the body's internal structures, allowing for the accurate identification of abnormalities in bones, joints, and soft tissues (Patel et al., 2023). The most commonly used X-ray examination in radiology facilities is the radiography of the extremities, particularly in cases of trauma (Sebayang, 2020).

The cruciate bones or lower leg bones include a pair of major bones, the tibia and fibula. The tibia is the main bone in the lower leg, acting as the primary support for physical weight, while the fibula serves as a support for stability and a place for muscle attachment in the lower leg (Hermansen & Mahajan, 2015). Because of their crucial role in daily movements, including standing, walking, and running, these bones are susceptible to injury, especially from traffic accidents, falls, or direct trauma.

Fracture of the cruris bone is one of the cases that is often found in hospitals, especially in emergency installations. Fractures can occur in various parts of the bone, such as the proximal part, diaphysis (middle 1/3), or distal, with various forms of fractures such as transverse, oblique, spiral, or comminuted. Fractures in the tibia and fibula are often accompanied by shifting bone fragments and soft tissue swelling, so they require an appropriate radiographic examination to assess the location, type, and severity of the fracture (Pongkunakorn et al., 2021).

Tibia and fibula fractures are one of the most common types of fractures encountered in radiology practice. Fractures can occur in various parts of the bone, such as the proximal third (1/3 proximal), middle third (1/3 medial), or distal third (1/3 distal). In certain cases, fractures can occur simultaneously in the tibia and fibula in different locations, for example in the medial third and proximal third. This condition requires a precise radiographic examination to determine the location, type, and severity of the fracture so that it can help the doctor in determining the appropriate diagnosis and treatment plan (Sharma et al., 2018a).

Radiographic examination of the cruris bone generally applies Anteroposterior (AP) and Lateral projections oriented to show the entire tibia and fibula bones, including the joints in the proximal and medial parts, so that abnormalities such as fractures can be seen clearly (Kenneth L. Bontranger, 2018). These two projections are very important to provide a comprehensive picture of bone continuity, the position of fracture fragments, the presence of dislocation or angulation, and the condition of the surrounding soft tissue. The accuracy of the examination technique, including patient position, object arrangement, selection of exposure factors, and application of radiation protection principles, greatly determines the quality of the resulting radiographs and the accuracy of the diagnosis (Willesen et al., 2024).

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Based on data on cases of left cruris fracture at Efarina Etaham Hospital, Pematangsiantar, the number of patients was 90 cases. Of this total, patients from the Emergency Room (IGD) were 52 patients or around 57.8%, outpatients were 11 patients or around 12.2%, and inpatients were 27 patients or around 30%. This percentage shows that cases of left cruris fracture are more often found in emergency room patients compared to outpatients or inpatients (Tabard-Fougère et al., 2023). The high number of cases in the emergency room illustrates that left cruris fracture is an emergency case that requires fast and accurate treatment and radiographic examination to help establish the diagnosis and determine further medical action. Therefore, radiographic examination in cases of left cruris fracture has an important role in radiology services in hospitals (Tavana et al., 2023).

Considering the description above, the author feels compelled to comprehensively study the radiographic procedure of the left cruris ossa with suspected medial 1/3 and proximal 1/3 tibia and fibula fractures at the Radiology Installation of Efarina Etaham Hospital, Pematangsiantar, so that it can provide an overview of the examination procedure, the techniques used, and the quality of the radiographic images produced to support medical diagnosis (Shafiee et al., 2022).

RESEARCH METHODS

Types of research

The type of research conducted in the preparation of this Scientific Paper is qualitative research. Qualitative research uses descriptive research methods, namely observation, interviews or document review. This research method is used because it is able to provide a deep, comprehensive understanding and describe systematically, factually and accurately without manipulating variables (Sharma et al., 2018b).

Location and Time of Research

The location of this research was carried out at the Radiology Installation of Efarina Etaham Hospital, Pematangsiantar (Elshami et al., 2020). The time of research and data collection of the left ossa cruris radiography technique with suspected cases of medial 1/3 and proximal 1/3 tibia and fibula fractures was carried out at the Radiology Installation of Efarina Hospital, Pematangsiantar in November 2025-May 2026 (Alsleem et al., 2020).

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Research Ethics

1. Attach a cover letter document addressed to Efarina Etaham Pematangsiantar Hospital with the aim of applying for permission to carry out scientific research.
2. Maintaining the privacy of patient subject data contained in medical record files, so that it is estimated that no party will feel disadvantaged by the research that has been carried out.

Data collection technique

Data collection techniques utilize secondary data. Secondary data is information collected through a third party, generally sourced from institutions involved in data collection activities, both government and private agencies. Considering related matters, in qualitative research, the approach commonly applied to respond to problem formulation is through data collection and analysis methodologies through (Alashban et al., 2022):

1. Observation method, this technique can provide a satisfactory picture of conditions, meaning it provides a comprehensive picture (Meomartino et al., 2021).
2. Interviews, this technique is a common and powerful way to understand desires and needs.
3. Literature study, namely by studying books, journals and other sources to obtain information on examining the ossa cruris.
4. Field notes, this technique is used to obtain a concrete picture of events in the field.
5. Documentation, in qualitative research, is often called library research (Rosenfield et al., 2020).

RESULTS AND DISCUSSION

This chapter will discuss the results and discussion of the case study conducted at Efariina Hospital, Pematangsiantar, entitled "Ossa Cruris Sinistra Radiographic Technique with Suspected Medial 1/3 and Proximal 1/3 Tibia and Fibula Fractures at the Radiology Installation of Efarina Etaham Hospital, Pematangsiantar in 2026". With a processing framework such as research location, patient identity, patient clinical, examination procedures, examination tools and materials and evaluation of photo results and reading results from doctors(Wati, 2023).

Overview of Research Location

Radiology Installation of Efarina Etaham Hospital, Pematangsiantar.

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Research result

4.2.1 Patient Identity

1	Name	: Mrs. S
2	Address	: Village II of Bahapal-Simalungun Island
3	Female gender	
4	Date of birth	: October 9, 1988
5	Age	: 37 Years
6	RM No	.: 0005***9
7	Type of Examination	: X-ray of the left crusade AP/LAT
8	Clinical	: Traffic accident, The leg, specifically the calf, was swollen and could not be moved.
9	Sending Doctor	: Dr. Saddal Qous, Sp.OT
10	Examination Date	: November 14, 2025
11	4.2.2 Patient Clinical	
12	On November 13, 2025, the patient came to the Emergency Room after experiencing KLL while riding a motorbike. The patient was conscious/not unconscious and complained that his left leg looked swollen and painful and could not be moved. (Keyal et al., 2019) The patient was hit to the left and the patient's legs and body were hit (Larson, 2015).	

Examination Procedure

Before conducting a radiographic examination of the left cruris examination in a fracture case, first prepare everything needed to carry out the examination.

Tool Preparation

1. Roentgen plane

Unit Brand	: EST.Medcare
Unit Type	: EX-5000S DDR
Unit Serial No	: 202171402
Cylinder Brand	: Siemens
Tube Type	: SDR15030500Maximum Condition : 150 Kv/500 Ma s

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Figure 1. Roentgen plane of Efarina Etaham P.Siantar Hospital



Figure 2. Ef ar ina Etaham P.Siantar Hospital Expose Button

Examination Techniques

Projection inspection

In this examination, the projections used are AP and Lateral projections.

AP Projection

Patient Position : Patient is supine on the examination table, both legs straight.

Object Position : The lower leg is photographed straight in True AP by setting the lateral meliolus, lateral and medial condyles at the same distance on the cassette.

Central point (CP) : The middle of the Ossa cruris with the upper limit of the knee joint and the upper and lower limits of the ankle joint (Nurmalasari & Apriantoro, 2020).

Central Ray (CR) : Vertical perpendicular to the cassette.

FFD :100 cm

Cassette Size : 35 x 43

Exposure factors :

kV:58

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mA:200
s: 0.04
Radiographic Criteria:
-The tibia and fibula run parallel along the shaft of the bone.
-The cortex and trabeculae of the bone appear clear and sharp.
-The medial and lateral malleolus appear symmetrical.
-No visible shortening or deviation of the bone due to rotation or angulation.



Figure 3. AP Projection of Ossa Cruris Examination *(Kenneth L. Bontranger and John Lampignano)*

Lateral Projection

Patient Position : -Patient supine on the examination table.
-Position the patient's body in a lateral/slightly oblique position.
-The unexamined leg steps over the examined leg.
Object Position :-Adjust the body rotation to place the patella perpendicular to the cassette.
Central point (CP) : Middle of the Ossa cruris.
Central Ray (CR) : Vertical perpendicular to the cassette.
FFD :100 cm
Cassette Size : 35 x 43 cm
Exposure factors :
kV:58
mA:200
s: 0.04
Radiographic Criteria:

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-The tibia and fibula appear to overlap (superposition) along the shaft of the bone.

-The tibial condyles and femoral condyles almost overlap.

-In the distal area, the malleolus appears to almost overlap each other, indicating laterality.

-The cortical contours of the tibia and fibula are clearly visible without distortion.

-No visible shortening or deviation of the bone due to rotation.

-Details of the cortex and trabeculae of the bone appear sharp (Manik et al., 2021).



Figure 4. Lateral Projection of Ossa Cruris Examination *(Kenneth L. Bontranger and John Lampignano)*

Film processing process

Film processing process in installation Efarina Hospital Radiology Etaham Pematangsiantar with using CR (computed radiography). The cassette has been illuminated, inserted to in the CR reader which then will be processed until appears on the computer layer CR.Image Then edited and given marker as a marker marker part right and left on the examined ossa cruris. Then, the image will sent to empirical and sent to doctor specialist radiology (Ariza et al., 2020).

Radiography Examination Results

After carrying out a radiographic examination of the cruris bone in AP and lateral positions, the resulting X-ray results can be evaluated as follows:

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Figure 5. Radiography Results of Ossa Cruris AP and Lateral Projections

Radiology Specialist Doctor's Reading Results

The radiology specialist at Efarina Pematangsiantar Hospital stated that the results of the examination of the ossa cruris with AP and Lateral positions. A comminuted fracture is seen in the proximal 1/3 of the right tibia with angulation and lateral displacement of the distal fracture fragment. A complete incomplete oblique fracture is seen in the proximal 1/3 of the right fibula with minimal displacement of the fracture fragment. There is swelling of the soft tissue in the left cruris region. Bone density is good. There are no lytic, blastic or destructive lesions. There is no osteophyte formation or periosteal reaction. The joint spaces are not narrowed (Purba, 2022).

Conclusion: Comminuted fracture of the medial 1/3 of the right tibia with angulation and dislocation of the distal fracture fragment to the lateral side. Complete incomplete oblique fracture of the proximal 1/3 of the right fibula with subluxation of the fracture fragment. Soft tissue swelling of the left cruris region.

DISCUSSION

Based on the results of the radiographs that have been carried out with the examination of the ossa cruris in suspected tibia and fibula fractures 1/3 Medial and 1/3 proximal at the Efarina Etaham Pematangsiantar Hospital installation. In general, the examination of the ossa cruris uses the AP and Lateral projection methods because these projections can show abnormalities such as suspected fractures in the suspected fracture event in the ossa cruris (Wati, 2023).

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According to the author, if seen from the results of Mrs. S's x-ray using AP and Lateral projections, it is very beneficial to show the position of the bones more clearly. In the examination of the ossa cruris, the position to be carried out should be in accordance with the patient's comfort so that there is no rotation, error or repetition of the shooting. And also limit the shooting time to reduce the radiation that will be received by the patient (Hyperastuty et al., 2021).

Based on the results of the radiographic examination of the Cruris Sinistra AP and Lateral at the Radiology Installation of Efarina Etaham Pematangsiantar Hospital, a fracture was found in the tibia and fibula bones. The results of the reading by a radiologist showed a comminuted fracture in the middle 1/3 of the tibia with angulation and lateral displacement of the distal fracture fragment. In addition, a complete incomplete oblique fracture was also found in the proximal 1/3 of the fibula with a slight displacement of the fracture fragment (Reski & Sugianto, 2022). In the soft tissue around the cruris region, swelling or soft tissue swelling was also seen (Irsal, 2020).

CONCLUSION

After conducting a radiographic examination of the left cruris bone with suspected medial 1/3 and proximal 1/3 tibia and fibula fractures at the Radiology Installation of Efarina Hospital, Pematangsiantar, the author concluded:

1. Radiographic examination of the left cruris bone is carried out using two main projections, namely Anteroposterior (AP) and Lateral. Both projections aim to show the entire tibia and fibula bones along with the joints in the proximal and distal parts so that abnormalities such as fractures can be seen clearly.
2. The radiographic techniques used include the patient's supine position, proper object positioning, central point in the middle of the cruris bone, central ray perpendicular to the cassette, FFD 100 cm, and exposure factors of 58 kV, 200 mA, and 56 s. The use of proper techniques greatly affects the quality of the resulting radiographs.
3. Radiographic examination of the cruris bone with suspected fracture of the tibia and fibula 1/3 medial and 1/3 proximal is different from the normal condition of the cruris bone.
4. Radiographic results showed a comminuted fracture in the middle 1/3 of the tibia with angulation and lateral dislocation of the distal fragment and a complete incomplete oblique fracture in the proximal 1/3 of the fibula with minimal fragment displacement accompanied by soft tissue swelling in the left cruris region.

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5. Radiographic examination with AP and lateral projections is able to provide clear information regarding the location of the fracture, the type of fracture, the direction of fragment displacement, and the condition of the surrounding soft tissue, thus greatly assisting radiologists in establishing a diagnosis and determining the appropriate medical action.
6. Radiographic examination of the cruris bone has an important role in radiology services, especially in cases of trauma and emergencies because it can help speed up the diagnosis and management of patients.

Suggestion

1. Radiographers are expected to always pay attention to the accuracy of patient position, object position, and exposure factors in order to produce optimal radiographic image quality and reduce the possibility of repeat examinations.
2. Examination of the cruris bone with suspected fracture is better done using a sandbag to obtain clear radiographic results because the patient's condition does not allow for proper positioning.
3. When examining fracture cases, radiographers must continue to pay attention to patient comfort because patients generally experience pain and limited movement due to trauma.
4. The application of radiation protection principles must be carried out optimally for patients, radiology staff and the surrounding environment to minimize unnecessary radiation exposure.

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