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RADIOGRAPHY OF OSSA PEDIS WITH SUSPECTIVE CORPUS ALIENUM AT DRS. H. AMRI TAMBUNAN REGIONAL HOSPITAL LUBUK PAKAM

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ABSTRACT

A foot X-ray (lower extremity) is an examination of the foot, which consists of 26 bones and is divided into 3 parts, namely 7 tarsal bones, 5 metatarsal bones, and 14 phalanges, using general X-ray projections that aim to display or describe the structure of the foot bones. The purpose of this study is to examine the anatomy and physiology of the foot bones (ossa pedis) in more detail, assuming the presence of a foreign object within the foot bones, along with the X-ray field criteria to be used. The radiography techniques used were dorso-plantar and lateral projections, with X-ray fields using standard radiography with a capacity of 500 mA, but the author only used 200 mA and recorded the images using digital radiography. The type of research used was qualitative and descriptive research through observation, interviews, and data analysis. This study was conducted from April 10 to May 10, 2025, in the radiology department of Drs. H. Amri Tambunan Lubuk Pakam Hospital using a general X-ray unit. The results found that the examination was performed using dorso-plantar and lateral projections. Before the radiography examination was performed, the radiology technician informed the patient about the examination procedure. The conclusion of this study proved that in foot radiography, if there is a suspicion of a foreign object, high detail and sharpness are required to be able to display the corpus on the foot.

Keywords: Ossa Pedis, Corpus Alienum, Digital Radiography.

INTRODUCTION

The foot bone is a part of the lower limb that consists of several parts, namely the tarsal bone, the phalange bone, and the metatarsal bone [1]. The foot bone consists of 26 bones and is divided into 3 parts, namely the tarsal bone, the metatarsal bone, and the phalanges bone [2]. These bones are arranged, shaped, and placed so that they can provide an upright body shape [3].

The foot bone functions to support the body and balance it while walking, providing a surface for muscle, tendon, and ligament attachment [4]. Corpus alienum is the entry of foreign objects into the body such as the eyes, throat, stomach, and legs without being accidentally shot, stabbed, or even swallowed in the form of iron metal bullet pins, the purpose of examining the Corpus Alienum is to determine the location and depth of the foreign object that entered, in this case there are 2 basic projections carried out, namely (anterior-posterior) to see where the foreign object is located, while the lateral projection is used to see the depth or distance of the foreign object [5].

From the description of the problem above, the author wants to study more deeply the anatomy and physiology of Ossa pedis with the suspicion of corpus alienum ossa pedis, along with the criteria for the x-ray plane that will be used in the form of a scientific paper entitled "Radiography of Ossa Pedis with the suspicion of corpus alienum at Drs. H. Amri Tambunan Lubuk Pakam Regional General Hospital".

Understanding the Concept

Definition of Examination

Pediatric radiography is a radiological examination of the foot area using an X-ray machine that produces images of bones and soft tissues, along with any abnormalities within them [6].

Anatomy

Anatomy comes from Greek which consists of ana which means to separate or reduce and tomos which means to cut up anatomy means to break down and cut up the science of the shape and structure of the body can be obtained by breaking down the body through the parts of the body and the relationship of one body part to another [7].

The foot is part of the lower extremity, consisting of the phalanges, metatarsals, and tarsals [8]. The foot consists of 26 bones divided into three sections.

Physiology.

Physiology is the science that studies the function or work of each body tissue or part of the organ [9]. Anatomy and physiology is the science that studies the human body and its parts, how the organs work and their function [10].

Pathology

Pathology is the science of structures and changes related to disease or injury. Corpus alienum on the pedis, specifically in metatarsal III, can cause dangerous conditions if left untreated or no action is taken. In general, corpus alienum is immediately subjected to surgery or medical action with minimal risk. From the description above, it states that corpus alienum is a pathological system where it is accidentally entered or shot by a sharp object which can cause corpus alienum (foreign object) if the bone itself is hit by a certain foreign object, and the presence of a mass can cause pain according to [11]

Etiology

Etiology is the science or theory of factors that cause disease and the methods by which these factors enter the host's body. Corpus alienum enters the body in several ways according to [12].

a. Network (Shot)
b. Digestion (Swallowed)
c. Breathing (Inhalation)
d. Eyeball (Welder's shard)

Most foreign bodies enter by swallowing, for example: metal pins, false teeth, rings, bullets or air rifles.

Radiography Techniques

According to [13]radiography techniques are the science that studies the procedures for photographing objects being examined using X-rays to obtain radiographic images, so as to be able to establish a diagnosis precisely and accurately [14].

The purpose of a radiographic examination of the pedis with suspected corpus alienum is as follows:

1. To evaluate the presence of a foreign body on the ossa pedis.
2. To find out the location and depth of the foreign body in the pedis.

The projection used is antero posterior.

High Voltage Transformer

A High Tension Transformer (HTT) is a device used to increase and decrease the voltage. A high-voltage transformer consists of two coils, the primary coil and the

secondary coil. High-voltage transformers are used to increase or decrease the voltage, and there are high-voltage transformers (step-up transformers) used to increase the voltage from several volts to several kilovolts and quickly move electrons through an X-ray tube. There are low-voltage transformers (step-down transformers) used to decrease the voltage and provide current to the filament [15].

Control Table

The Control Table is a diagram of the X-ray machine unit used to control the amount of X-ray output needed to control each exposure. In general, the control table is placed behind a shield so that the officer is protected from radiation during the examination [16].

Examination Table

The examination table is designed for easy, safe, and comfortable use. The table top can be moved by an electric motor upwards or vertically, horizontally, or tilted backward. Table equipment includes:

a. Bucky (moving grid), which is a tool for filtering X-rays, a stationary grid that functions to reduce secondary radiation.
b. The examination table is equipped with fixation tools so that the object being photographed does not move, the tools include: sand bags, sponge pillows, pressure belts and head clamps.

Radiodiagnostic Physics and Radiation Protection

Radiodiagnostic Physics

Radiodiagnostic physics comes from two words: physics and radiodiagnosis. Physics is the science that studies symptoms. Radiodiagnostics is the use of X-rays produced by an X-ray tube to help establish a diagnosis [17].

The creation of radiographs is expected to produce sharp images with the same shape as the actual object.

RESEARCH METHODS

Type of Examination

Research on Radiography *of bones pedis* with suspected *corpus alienu m* using qualitative research techniques, data collection techniques based on the results of observations and interviews [18].

The type of qualitative research is research that is descriptive in nature and tends to use analysis and the subject's perspective is more emphasized. In research in accordance with the facts in the field and the theoretical basis is also useful for providing a general overview of the research as material for discussing the research results [19].

Time and Place of Examination

Research Time: 10 APRIL-10 MAY 202 5

Research Location: Radiology Installation, Drs . H. Amri Tambunan Hospital, Lubuk Pakam

Data collection

In this study, the data collection technique is based on the results observation , interviews , and documentation:

1. Observation

Observation is a method of collecting data by observing or reviewing carefully and directly at the research location to find out conditions that prove the truth. from an ongoing study carried out [18].

2. Interview

In collecting data, the researcher conducted interviews with patients regarding the diseases they suffered from, the author also consulted with radiographers and supervising lecturers [20]

3. Documentation

By studying the radiographic results *of the bone pedis* found at Drs. H. Amri Tambunan Lubuk Pakam Regional Hospital , both normal and corpus a lienum [21].

Analysis of Results

According to **(Moelong, 2011)** at the data analysis stage is stage the most important and determining factor in a study. The data obtained is then analyzed with goal managing data into information, so that the characteristics or properties of the data can be easily understood and are useful for answering problems related to researc [22].. This analysis is carried out based on observations in the field or experience based on data obtained from interviews and observations. then compiled and drawn to a conclusion [23]. This qualitative analysis begins with direct observation of the radiographic examination of *the ossa pedis* with the suspicion of *corpus alienum* in the Radiology Installation of Drs. H. Amri Tambunan Lubuk Pakam Hospital with *antero-posterior (ap) projection* and aposterior (ap) projection. *Lateral* , a decent and good image is obtained to be read in establishing a diagnosis , because in this study the image recording process uses digital radiography so that the image can be adjusted according to needs and can produce an image with optimal sharpness and detail, so that from the results of the author's observations, several scientific problems were found [24].

RESULTS AND DISCUSSION

Results

Patient Identity

Before conducting an examination, it is very important to know the patient's identity to make it easier for us to identify one patient from another so that there are no data errors between one patient and another.

Name : Mrs. SU
No.rm : 452251
Female gender
Examination time : April 24 , 2025
Type of examination : Radiography of the foot bone
Diagnosis : Corpus Alienum
Referring doctor : Dr. Putri Yolanda

Inspection procedures

a. Chronological

A nurse brought a patient from the outpatient room of Drs . H. Amri Tambunan Hospital, Lubuk Pakam, on a patient bed with a nail still embedded in the board . The referring physician examined the patient and recommended an x-ray of the foot [13].

b. Reading a Photo Request Letter

The radiologist reads the radiology examination request letter from the referring doctor who requested a radiology examination of the ossa pedis with suspicion of *corpus alienum* which was carried out at R SUD Drs. H. Amri Tambunan Lubuk Pakam .

c. Patient Preparation

On radiographic examination of the ossa pedis with suspected *corpus Alienum* does not require special preparation, but it is important to remember to remove objects that can cause artifacts in the area of the object to be examined so as to avoid repeating the photo [25].

Tool Preparation

1. X-ray machine

Before performing a radiographic examination, the x-ray machine is first heated so that the components in the x-ray machine can work optimally, then the exposure factor conditions are adjusted. The x-ray machine used in this examination is a general x-ray unit with the following specifications:

X-ray machine : Indoray
Types of X-ray Machines : General X-Ray 500-540 mAh
No, Series : 3k0441
Aircraft Brand Capacity : 40-125 Kv / 50-500 mA
Aircraft Service : Radiography

Figure 1. X-ray machine at UD Drs. H. Amri Tambunan Hospital , Lubuk Pakam

Image plate

Before the patient is positioned, a 35 x 43 cm *image plate* is prepared for radiographic examination *of the foot bones* . This image plate serves to capture the image after exposure [26].

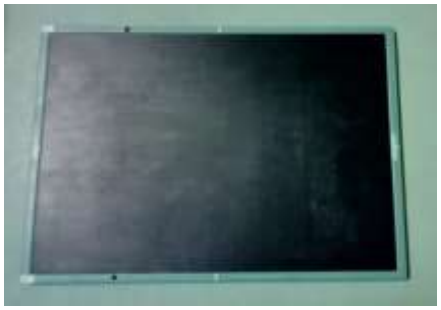

Figure 2. Image Plate 35x45 cm UD Drs Hospital. H. Amri Tambunan Lubuk Pakam

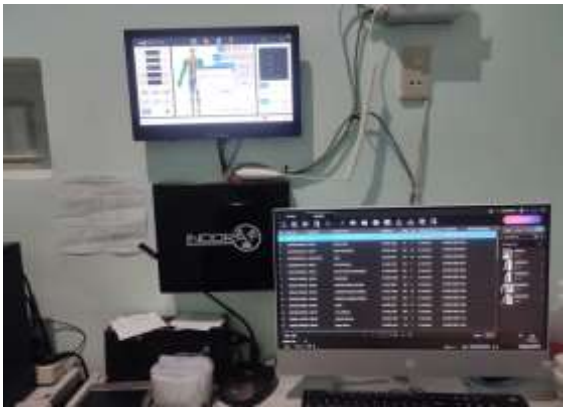

Figure 3. Control Table of UD Drs. H. Amri Tambunan Hospital Lubuk Pakam

Examination Techniques

In this examination, several projections were made, including:

a. Anterior – Posterior Projection

Purpose of the examination : To show the overall picture leg bones, helps to see the location of foreign objects [17].
Patient Position : The patient lies on the examination table flexes the leg being examined.
Object Position : Place the object on the imaging plate covering the entire pedis and place the foot on the surface of the cassette.
FFD : 100 cm.
Beam direction : Vertical, perpendicular to the cassette.
Ray center : Metatarsal phalangeal digiti 3
Cassette : 35 x 43 cm.
Condition : 46 kV, 8 mAs.
Image criteria : The image of the pedis bone is shown in an antero-posterior projection, the image of the calcaneus bone and the talus bone in superposition, the corpus alienum is seen, the navicular bone is seen, the medial cuneiform bone is seen, the lateral cuneiform bone is seen, the cuboid bone is seen [27].

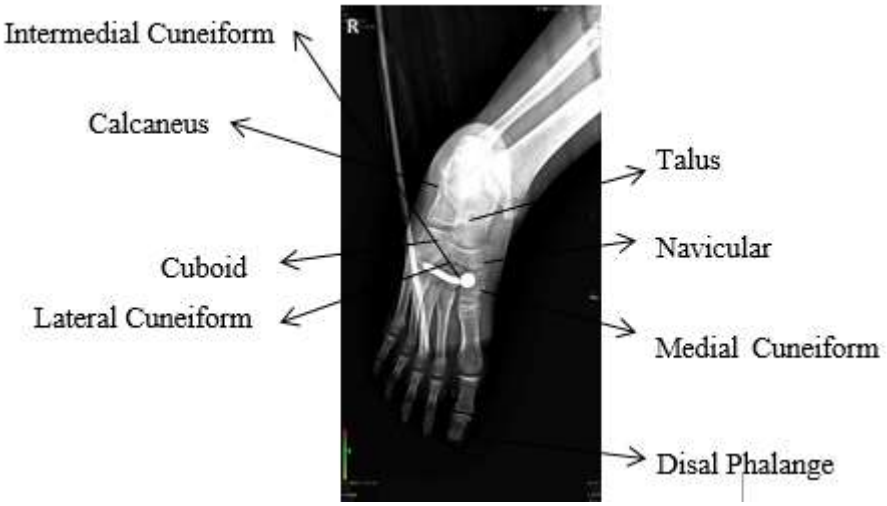

Figure 4. Antero-Posterior Image Criteria

1. Radiographic quality is poor due to overlapping anteroposterior projections. Detail in the calcaenus is poor due to overlapping. Contrast is adequate in the corpus alienum area [28].
2. The field area has been reduced according to the object being photographed to reduce the radiation dose received by the patient.
3. There are artifacts that make the image of the ossa pedis less good.
4. Density is very visible in the black and white differences of the object.

b. Lateral Projection (Right)
Purpose of examination : To show the depth
from *the corpus alienum*
Patient Position: Patient lies on the examination table.
and stick the right foot in a la- position
teral then flex
Object Position: Pedis attached to the imaging plate, adjust
pedis in true lateral position, adjust pedis
right in the middle of the imaging plate
FFD : 100 cm
Direction of light : Vertical perpendicular to the cassette
Ray center: At the level of the third metatarsal digit
Condition : 46 kV, 8 mAs.
Image criteria: Super alien corpus is clearly visible
position with the navicular bone, visible bone
calcaneus clear, metatarsals appear to be fused together
superposition, distal cruris visible, visible
ossa pedis in lateral position, visible
tibia and fibula bones are in superposition with each other

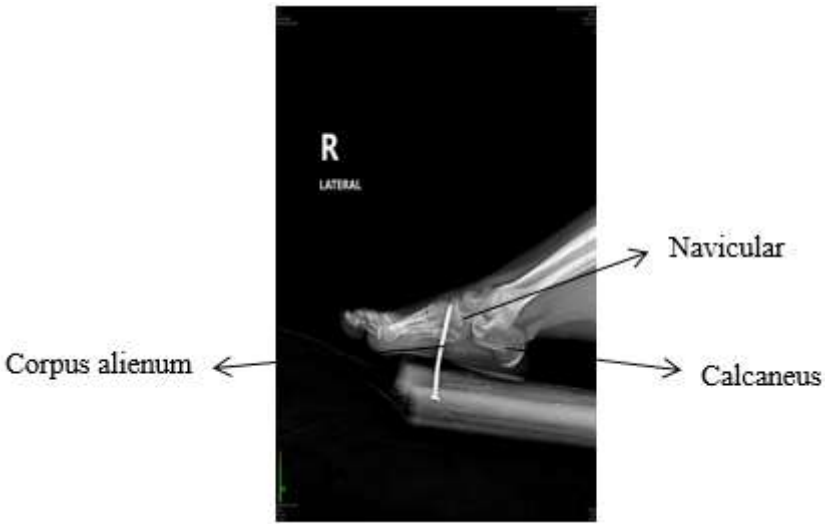

Figure 5. Lateral projection image criteria

Problem Discussion

1. Problem formulation

After conducting a radiographic examination of the ossa pedis with suspected corpus alienum at Drs. H. Amri Tambunan Lubuk Pakam Regional Hospital, " **What efforts**

were made to obtain an optimal radiographic image of the ossa pedis with suspected *corpus alienum ?"*

a. Before carrying out the examination, the radiographer must first explain the procedure to the patient [29].
b. The patient is given local anesthesia so that he does not feel pain from the bullet during the examination.
c. Then the radiographer sets the exposure factor to be used so that it does not affect the photo. If it is too high, the photo will become black or the photo will repeat.
d. The radiographer adjusts the radiation field as optimally as possible to avoid being exposed to excessive radiation doses.

2. Causes of problems

In this examination, no marker is provided to mark the exact location *of the corpus alienum and* to calculate the depth of *the corpus alienum* [13].

3. Efforts made to overcome the problem

The efforts that can be made to overcome this problem in the Ossa Pedis radiography with suspected corpus are [30]:

a. Radiographer AspectsTo facilitate the examination, the radiographer must provide an explanation (anamense) of the procedure to be carried out, so that the examination can run smoothly and there is no repetition of the photo. It is best for patients affected by corpus alienum to be given anesthesia as soon as possible so that they do not feel pain during the examination [31].
b. Patient Comfort Aspect. Because there is a foreign body in the foot area, to reduce pain, a comfortable device such as a sponge is needed to position the foot and allow the entire object to fit within the radiation field.
c. Image Sharpness Aspect [32]. To obtain image sharpness, it is best to limit the area of the illumination field or adjust it to the size of the object being photographed to obtain image sharpness [33].
d. Aspects of digital radiography (DR) image recording . The equipment used by general X-ray units uses digital radiography to record images to improve the quality of X-ray images while increasing work efficiency and the exposure of X-ray images [34]. The correct exposure factor is also selected to prevent photo repetition.

CONCLUSION

From the research results and discussion that have been described in this paper with the title "Radiography of the ossa pedis with suspected corpus alienum of the left bullet at the Medan Adventist General Hospital, the following conclusions can be drawn: The examination was performed using Dorso-Plantar and lateral projections. Before the radiographic examination is carried out, the radiographer informs the patient about the examination procedure. In pedis radiography, if there is a suspected foreign body, high detail and sharpness are required to be able to show the corpus on the pedis. Examination of the corpus pedis bone does not require any special preparation. Image recording using *Digital Radiography* (DR)

Suggestion

1. It is better to add a marker point at the entrance of the foreign body so that you can know the location of the foreign body.
2. To increase image sharpness, it is best to use a small mA focus.

3. It is recommended that patients affected by corpus alienum undergo an examination using dorso-plantar and lateral projections to determine the depth of the bone affected by the corpus.
4. It is recommended that the family accompanying the patient be given protective equipment, namely an apron, to avoid radiation.

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