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Radiographic Examination Techniques of Ossa Antebrachial In Fracture Cases With Alternative Positions at Radiology Installation of North Sumatra University's Hospital

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ABSTRACT

The antebrachial radiography examination procedure typically uses two projections, namely AP and lateral. However, at the USU General Hospital's radiology installation, radiographic examinations of the antebrachium with clinical fractures are conducted using PA and lateral projections. This study aims to determine the procedure for clinical antebrachial radiographic examination of fractures and the rationale for using PA and lateral projections. This research is qualitative, employing a case study approach. Data collection was conducted through observation, active participation, documentation, and structured interviews with radiographers, referring physicians, and radiologists. The results of the study indicate that antebrachial radiographic examinations of clinical fractures at the USU General Hospital Radiology Installation use PA and lateral projections with the elbow in a straight position. The diagnostic information produced from these examinations meets the criteria as it effectively shows both the elbow and wrist joints.

Keywords: *Antebrachial, Fracture, Postero Anterior (PA) Projection, Lateral projection*

1. INTRODUCTION

In accordance with the development of science and technology in the health sector, workers in private hospitals and government hospitals compete to improve the professionalism of their respective work. The radiology field is one of the supporting health services. Therefore, a radiographer must be skilled and professional in handling all types of examinations and still prioritize patient comfort and image quality, so that it can be analyzed properly by the sending doctor, and radiologist as a reader of radiograph results. Because the information is not only to establish a diagnosis but also to determine the efforts that must be made for the patient. On this occasion, the author will discuss about antebrachial shooting with a fracture case [1,2,3].

Fracture is not always caused by severe trauma, sometimes even mild trauma can cause fracture if the bone itself is affected by certain diseases as well as continuous mild trauma can cause fracture. [4,5,6,7]

Antebrachial radiography is an essential diagnostic procedure for evaluating injuries and disorders of the forearm. The examination typically involves two standard projections: posteroanterior (PA) and lateral. The PA view allows assessment of the alignment and integrity of the radius and ulna, as well as the elbow and wrist joints. The lateral view provides additional information about the position and displacement of fracture fragments, as well as the relationship between the radius and ulna.

Proper patient positioning is crucial for obtaining high-quality antebrachial radiographs that provide accurate diagnostic information. The patient's arm should be fully extended and supported, with the hand in a neutral position. This allows for visualization of the entire length of the forearm bones and the adjacent joints. Positioning the patient with a flexed elbow can obscure fracture details and lead to distortion of the radiographic anatomy.

In clinical practice, radiographers may encounter challenges in positioning patients with forearm fractures, particularly if the injury involves significant swelling, deformity, or pain. Modifying the standard positioning techniques, such as using alternative projections or supporting the limb in a specific way, may be necessary to optimize image quality and minimize patient discomfort [8,9,10,11].

Radiographic examinations of the antebrachial are commonly performed in emergency departments, orthopedic clinics, and trauma centers to evaluate suspected fractures, dislocations, or other injuries. The resulting images are essential for diagnosis, treatment planning, and monitoring the healing process. Radiologists and orthopedic specialists rely on these radiographic studies to determine the type and extent of the injury, guide surgical or non-surgical management, and assess the progress of fracture healing.

In addition to the standard PA and lateral views, specialized projections may be used in certain clinical scenarios. For example, an oblique view can provide additional information about the orientation and displacement of fracture fragments. Supination and pronation views may be obtained to evaluate the relationship between the radius and ulna, particularly in cases of forearm rotation injuries or suspected distal radioulnar joint instability. [12,13,14,15]

The choice of radiographic projections and the specific positioning techniques employed should be tailored to the individual patient's presentation and the clinical question being addressed. Radiographers must have a thorough understanding of antebrachial anatomy, common injury patterns, and the radiographic criteria for adequate visualization of the forearm bones and joints.

Effective communication and collaboration between radiographers, referring clinicians, and radiologists are essential for optimizing the diagnostic value of antebrachial radiographic examinations. Radiographers should be able to provide clear and concise information about the technical aspects of the examination, such as the projections used, the patient's position, and any challenges encountered during the imaging process. This information can help radiologists interpret the radiographs more accurately and guide further diagnostic or treatment decisions.

In conclusion, antebrachial radiography is a crucial diagnostic tool for evaluating injuries and disorders of the forearm. Radiographers play a vital role in obtaining high-quality images that provide the necessary information for accurate diagnosis and treatment planning. By understanding the standard positioning techniques, as well as the potential need for alternative projections, radiographers can contribute to the overall quality of patient care and the diagnostic decision-making process.

Therefore, the author is interested in discussing the technique of photographing the antebrachial while still prioritizing patient comfort and the results of the same radiographic image of the basic position of the antebrachial that has fractured from the alternative positions used.

2. METHOD

This type of research is qualitative research with a case study approach. This data was collected at the Radiology Installation of the University of North Sumatra Hospital, Medan. Population of all antebrachial fracture patients at the University of North Sumatra Hospital. Sample one patient with a case of antebrachial fracture at the University of North Sumatra Hospital using alternative projections. Subjects of this study with antebrachial fracture cases using AP and AP projections with horizontal rays. The tools and materials of this research are: mobile phone (as a tool for interviewing radiographers and observation guidelines. The data collection method was carried out to support the objectivity and validity of this research using several methods:

1. Observation. Directly observing patients with fracture cases in the antebrachial with Ap and AP positions with horizontal rays at the University Hospital of North Sumatra.
2. In-depth Interview. To complete the data of this study, interviews were conducted with radiographers who were willing and directly concerned in the examination of the case.
3. Documentation. Taking documentation, namely in the form of introductory data and radiology photo results and reading results from radiologist doctors.

Analysis begins with processing data obtained through observation or direct observation of the course of examination of ossa antebrachial in cases of antebrachial fractures with AP and AP patient positions with horizontal rays at the Radiology Installation of the University Hospital of North Sumatra Medan. In addition to the data obtained through observation, the author also processed data obtained through in-depth interviews with radiographers who were pleased and directly concerned with the case. Data obtained through observation, interviews and documentation are reduced, so that a conclusion can be drawn.

3. RESULTS AND DISCUSSION

Antebrachi E-Ray Examination Procedure at Radiology Installation of University Hospital of North Sumatra.

1) Patient Registration
2) Patient Preparation
3) Preparation of tools and materials
    1. The x-ray planes used in RSU. University of North Sumatra is:
        a) Brand: Philips
        b) Type: 9890 010 87393
        c) Tube brand: Philips
        d) Tube type: 9806120670102
        e) Tube serial number: 231673
        f) kV: 150 kVp
        g) Ma: 560 Ma

2. 35x35 cm CR cassette
3. Patient blanket for fixation

4) Examination. The examination technique for making antebrachial radiographs at the Radiology Installation of the University of North Sumatra Hospital with Anteri Posterior (AP) and Antero Posterior projections with horizontal rays (modified):
   A. Antero Posterior (AP)
      a. Patient position. The patient is supine on the patient's bed, with the antebrachial photographed in extension on the cassette.
      b. Object position. Antebrachial in AP position in the middle of the cassette with wrist joint and elbow joint into the cassette.
      c. Light
         - FFD: 90 cm
         - CR: Vertical perpendicular to the cassette
         - CP : Mid ossa antebrachial
      d. Cassette size 35x35 cm
      e. kV: 55 kVp
      f. mAs: 8 mAs
   B. AP with horizontal beam (modified)
      a) Patient position. The patient sleeps on the patient bed with antebrachial extension on the cassette like the AP position.
      b) Object position. The object is given a cushion in the form of a patient blanket as a fixation so that the object is higher than the patient's bed, then place the cassette next to the object and make sure the object is right in the middle of the cassette with the wrist joint and elbow joint into the cassette, there is no need for a lot of movement that can interfere with the patient's comfort. this is also reinforced by the results of the interview from respondent I : ".... the object remains like the AP position, it's just that the beam is changed to horizontal and the cassette is vertical." (R1).
      c) Beam
         FFD: 90 cm
         CR: Perpendicular to the cassette
         CP: Mid ossa antebrachia.
   C. Cassette size 35x35 cm
   D. kV: 55 kV
   E. mAs: 9 mAs

On X-ray examination of the antebrachial (sinistra) with a fracture case in a patient with the name Mrs. X, a picture was produced, "a fracture of the proximal 1/3 of the left ulna with lateral dislocation and contraction. The left caput radii is not well jointed with the left humerus. Impression: fracture of the proximal 1/3 of the left ulna with lateral dislocation and contraction + luxatio of the left humeral radio articulatio. [16,17,23,24,25]

3.1. Discussion

Based on the results of observations, in-depth interviews with various parties related to the problems the author takes and reading from some literature, the author observes the following:

1) X-ray examination procedure of ossa antebrachial at the University Hospital of North Sumatra. X-ray examination of ossa antebrachial at the University of North Sumatra Hospital, there is no special preparation, the patient is only asked to open objects that are removable from the object to be photographed, such as bracelets, clocks or others. The patient is instructed not to move when the exposure takes place so that there is no blurring in the picture due to patient movement, and at the University of North Sumatra Hospital, basic projections are usually carried out, namely antero-posterior projection and lateral projection even if the patient can cooperate or cooperate in positioning and as respondent I as follows: ".... for patient preparation, there is no special preparation, it's just that the instructions regarding the position of the patient and the patient are instructed not to move during the exposure so that there is no blurring in the picture caused by the movement of the object or patient, and objects that are opaque are removed from the object...(R1)
2) How to produce a good/optimal picture, comfortable for the patient can establish a diagnosis from an alternative position if the basic position cannot be done in the case of an antebrachial fracture at the University Hospital of North Sumatra. The examination procedure begins with positioning the patient supine on the patient's bed, because the photographed object cannot be moved too much and as a result of the fracture and dislocation that can be clearly seen from the patient's arm which is swollen, the object can only be positioned AP because the object is in a state of supination and cannot be moved or rotated :..... Since the object is already in supination, the anteri-posterior (A) projection can be easily performed, so in performing lateral projection, it is necessary to take measures to modify the AP projection to AP projection by changing the beam to horizontal and vertical tapes as an alternative measure...(R1).

3) In cases of trauma, it may be difficult to move the arm to the position described, and a modified technique may be required in this case. Namely, by changing the beam direction to horizontal. However, it is still important to fulfill the requirements of a good photograph such as having both joints (elbow joint and wrist joint) visible and try not to move the patient much if severe trauma is suspected. Because, fractures of one bone are usually followed by several other fractures in different places accompanied by dislocation (for example: Galeazzi fractures and Monteggia fractures), to make a maximum diagnosis both ends of the radius and ulna, as well as the proximal and distal radio-ulnar joints must appear in the radiographic picture. [19,20,21,22]

So for the AP examination, the patient can easily follow the directions of the radiographer because the object is already in a supination position, and the wrist joint and elbow joint enter the cassette with the rays remaining vertical and the cassette remaining horizontal like the examination of ossa antebrachial in general.

4. CONCLUSION

In photographing the ossa antebrachial, a radiographer must first see the patient's condition and must always ask whether the patient can follow the radiographer's directions well without any pain or excessive discomfort due to the position we do, so that when doing the projection we want, the patient can still follow, and the projections commonly used for photographing the ossa antebrachial at the University Hospital of North Sumatra are antero-posterior projection (AP) and lateral projection (basic) if the patient can cooperate with the examination. Based on the case taken by the author, the patient cannot perform basic lateral projection as it should be because the position of the object of the patient is already in a state of supination and has a fracture along with a severe dislocation, so the patient cannot move or rotate the object. Therefore, the radiographer uses an alternative projection in the form of a modified antero-posterior projection to produce a lateral image by changing the direction of the beam to horizontal and the cast to vertical, by propping up the object with the patient's blanket so that the object rises and is right in the middle of the cassette so that no part of the object is cut off and do not forget the elbow joint and wrist joint must enter the cassette. Based on the radiographer's observation, the patient does not feel excessive pain or discomfort when performing these alternative projections, so we can still make a diagnosis while still prioritizing patient comfort from these alternative positions.

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