International Journal of Public Health Excellence (IJPHE)
Vol. 3, No. 1, December 2023, pp. 375~380
Journal Homepage: https://ejournal.ipinternasional.com/index.php/ijphe
ISSN: 2809-9826, DOI: 10.55299/ijphe.v3i1.680

Elbow Joint Radiography with Suspection of Olecranon Process Fracture in the Hospital Columbia Asia Medan

Liberti Tarigan[1], Nelida Pasaribu[1]
[1]Akademi Teknik Radiodiagnostik Dan Radioterapi Yayasan Sinar Amal Bhakti Medan, Indonesia

Article Info

Article history:

Received November 27, 2023
Revised December 01, 2023
Accepted December 28, 2023

Corresponding Author:

Liberti Tarigan
Akademi Teknik Radiodiagnostik Dan Radioterapi Yayasan Sinar Amal Bhakti Medan, Indonesia
Email:
libertitarigan@gmail.com

ABSTRACT

Elbow Joint Radiography with a suspected Olecranon Process Fracture, in order to get an optimal image requires the right equipment to support the smooth running of health services such as using a General X-ray Unit X-ray. The aim of elbow joint radiography research is to show the anatomy and obtain a radiographic picture of the elbow joint with abnormalities that occur in the elbow joint. The type of research used is descriptive qualitative research. Qualitative research techniques are research that is descriptive in nature and tends to use analysis and the subject's perspective is emphasized more. The results obtained from a radiographic examination of the elbow joint with suspected olecranon process fracture using a machine with a capacity of 500mA. In radiographs of elbow joints with suspected olecranon process fractures, it is necessary to adjust the size of the radiation field as needed so that the radiation dose received by the patient is smaller.

Keywords: *Elbow Joint, Olecranon Process Fracture, Computer Radiography*

1. INTRODUCTION

The Elbow Joint is a hinge joint, between the trochlear surface above the lower end of the humerus and the trochlear notch of the ulna [1]. The function of the elbow joint or elbow joint is as a hinge joint, so that the hand can be closed (flexed) and opened (extended). The elbow joint consists of 3 bones, namely the humerus, ulna and radius bones which are interconnected and these three bones are together. are in one joint space. The direction of the elbow has a spur called the olecrano process, which is a place where the muscles attach and prevents the elbow from bending backwards [2]. A fracture is a break in the continuity of bone tissue caused by force damage (Mansjoer, 2000). If a fracture occurs in the elbow joint, the patient will feel prolonged pain and swelling or bruising. To determine whether or not there is a fracture in the elbow joint and to find out where the fracture is, a radiographic examination of the elbow joint is carried out using X-rays. The data from this study is based on the results of observations, namely appropriate data that occurred, such as when a radiographic examination of the elbow joint was carried out with a suspected olecranon process fracture [3]. The writing also describes the problems that occurred during this examination, namely the patient's difficulty in being positioned properly [4]. The place of research for scientific papers on elbow joint radiographs with suspected olecranon process fractures is at the Radiology Installation at Columbia Asia Hospital, Medan because the facilities at the radiology installation are quite good.

Anatomy is a science that studies the shape and structure of the body both as a whole and part by part as well as the relationship of one body organ to another [5]. The elbow joint is a joint that connects the upper arm bone (humerus) with the lower arm bones (antebrachio bone) which are connected by ligaments. The elbow joint is a composite articulation because this joint meets three bones, namely the distal O s h umerus, proximal Os r radius and proximal Os u lna [6].

The distal humerus or also called the distal epiphysis, is a flat part, at the end of which there is a knob called the humeral condyle [7]. The humeral condyle has two joints, namely : the humeral capitulum on the lateral side articulates with the radius bone, the humeral capitulum has a depression called the radial fossa, where it articulates with the radius bone, while on the ventrocranial side of the humeral trochlea there is a deep depression, namely the olecranon fossa where the olecranon enters. In the epiphysis there is the ulnar nerve sulcus. The medial and lateral edges of the humeral condyle appear strongly protruding, called the medial epicondyle and lateral epicondyle [8].

Proximal to the ulna (ulna) , this part is large and rough, towards the volaris it has a notch called the semi incisura or incisura trochlearis which articulates with the humeral trochlea [9]. This incisura on the side of the volair has a tapered end called the coronoid process, while on the dorsal side it ends protruding, called the olecranon, which forms the elbow protrusion [10]. On the radial side and slightly distal to the incisura there is a notch called the incisura radialis ulnae which articulates with the radius bone. Dorsal to the radial incisura there is a cudal-directed ridge called the crista musculi supinatoris, and ventrodistally to this part there is a rough plateau called the ulnae tuberosity.

The proximal radius (lump bone) or also called the proximal epiphysis, this small part is called the head of the radius [11]. At the end of the head there is a depression called the fovea articularis where it articulates with the humerus. But the cranial head is covered by a joint plate called the circumferentia articularis radii, to articulate with the proximal ulnae bone. The distal part of the head is narrowed, called the collum radius [12]. On the ventrodistal side of the column, which is the boundary with the diaphysis, there is a rough protrusion called the tuberosity radius [13].

To show a fracture of the olecranon process at an elbow joint, this is done radiographic examination of the elbow joint using Antero-Posterior and Lateral projections and must also take into account the problem of exposure factors, The X-ray aircraft used is a General X-Ray Unit type so that abnormalities, especially fractures, occur in the elbow joint [14].

Based on the description above, the author found several problems that arise in making photos. The problems found can be formulated as follows: " What efforts should be made to obtain an optimal radiographic image of the elbow joint with suspected olecranon process fracture ? " [15].

2. METHODS

Types Of Research

Radiographic examination of Elbow Joint with suspected Olecranon Process Fracture uses a descriptive qualitative examination type. Qualitative examination technique is a systematic scientific examination of parts and phenomena and their relationships. Descriptive examination is one method of examination using an object in accordance with the existing reality [16].

Time And Place Of Research

Research Time : In May 2020
Research Place : Radiology Installation at Columbia Asia Hospital- Medan

Data Collection Techniques

For get data with Correct And accurate in preparation work write this, writer do a number of method like below this : Learning Observatio, By applying the knowledge gained during lectures and clinical practice. Interview. The author conducted interviews with patients, the patient's family concerned with the disease they were suffering from and related parties. Observation. Writer Obtain data by observing and directly following the implementation of left elbow joint radiography with olecranon process fracture cases at Columbia Asia Hospital-Medan [17].

Results Analysis

In the results of the elbow joint image, it appears that the elbow joint image in the lateral projection is less flexed, the elbow joint image appears white so that the boundary between the bone and skin tissue is clearly defined and the elbow joint image looks good [18].

Therefore, it is necessary to select the right equipment, prepare the patient and carry out the procedures carried out on the patient appropriately according to the patient's general condition. However, sometimes there are also results that are not optimal in establishing a diagnosis from the resulting image, so more in-depth research is needed on Sinistra Elbow Joint Radiography with Suspected Olecranon Process Fracture [19].

3. RESULTS AND DISCUSSION

RESULTS

1. Patient identification

Read the Photo Request Letter. The radiographer carefully reads the radiology examination request letter. When carrying out an examination, it is necessary to know the identity of the patient clearly, which is useful for identifying one patient from another so that mistakes do not occur. understanding. At this time the author explains or describes the patient's identity after examining the left elbow joint in a case of olecranon process fracture at Columbia Asia Hospital Medan with the following data:

Name: NY.OBL
Age: 61 years old
Female gender
Examination Date: 20 May 2020
Type of Examination: Elbow Joint Radiography Antero Posterior Lateral Position
Diagnosis: Olecranon Process Fracture

A temporary diagnosis will be carried out mainly from the doctor who ordered a photo of the left elbow joint in the case of an olecranon process fracture which was carried out at the Columbia Asia Hospital in Medan.

2. Patient Preparation

When examining the elbow joint with a suspected olecranon process fracture , the patient does not carry out special preparations, only during the examination the patient's clothes that interfere with the image of the elbow joint are removed and the examination procedure is explained to the patient .

3. Tool preparation

Before the radiographic examination is carried out, the X-ray plane is first heated so that the components the components on the Rongten aircraft can work optimally, then proceed with setting the kV and mAs conditions. The type of aircraft used for radiographic examination of the left elbow joint in cases of olecranon process fracture is the general x-ray type. The X-ray aircraft data used in this examination [20]:

Airraft brand : GE
Aircraft Type : 9890-06522 SN11000043 Buckdiagnost CS N
Incoming voltage : 230 Kv
MA range : 500 MA
Frequency : 50-60 Hz
Current Source : PLN

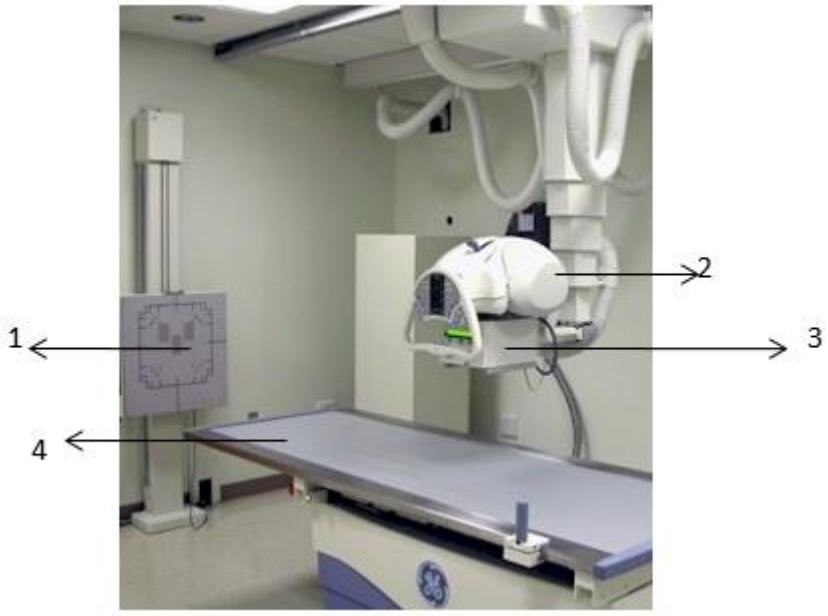

Figure 1. X-ray plane image at Columbia Asia Hospital in Medan

Image caption: 1. bucky stand
X-ray aircraft
collimator
examination table

Radiography Equipment

Types of radiographs used in radiographic examination of the elbow joint with suspected olecranon process fracture include:

1) Cassette measures 24 cm x 30 cm.
2) X-ray film measuring 24 cm x 30 cm.
3) Functioning marker for patient identity and anatomical location to be photographed.

Examination Techniques

The projections carried out during radiographic examination of the elbow joint with suspected olecranon process fracture are:

Antero Posterior Projection

Purpose of examination: To show an anatomical picture of the elbow joint from the anterior position.
Patient position: The patient sits sideways on the examination table with the elbow joint placed on the examination table.
Object position: Elbow joint is fully extended or straight, forming anteroposteriorly in the middle of the cassette, shoulders are lowered, a sand bag is placed on the forearm for immobilization.
Cassette size: 24 cm x 30 cm

Film focus distance: 90 cm
Central Ray : Vertical and perpendicular to the cassette.
Central point t : In the joint cavity below the arm point between the lateral epicondyle and the medial epicondyle.
Condition factors : 50 kV, 10 mAs
Image Criteria : Antero-posterior view of the Elbow joint with an avulsion fracture of the olecranon process ,

Lateral projection

Purpose of examination : To show a good and clear picture of the elbow joint in a lateral position
Patient position : Sit sideways on the examination table by placing the elbow joint on the examination table.
Object position : Elbow jointflexio 80 ^{0}, forearm and hand laterally with the ulnar edge attached to the examination table, the shoulder joint is lowered so that the humerus bone is attached to the cassette, the elbow joint is arranged in the middle of the cassette and the cassette is horizontal on the examination table [21].
Cassette size : 24 cm x 30c m
Film focus distance : 90 cm
Central Ray : Vertical and perpendicular to the cassette.
Central point : Olecranon Process
Condition facto : 50 kV, 10 mAs
Image criteria : The image of the Lateral Elbow Joint is an avulsion fracture of the olecranon process, the other bones are intact, the joint space is good

Figure 2. P and Lateral Projections at Col u mbia Asia Hospital Medan

Evaluation of Antero-Posterior and Lateral Projection Radiographic Images

After radiography of the Elbow Joint with a suspected olecranon process fracture with antero-posterior and lateral projections, the results of the radiographic image evaluation are as follows [22]:

a. The anatomical image of the Elbow joint is visible from the Antero-Posterior and Lateral projections
b. The contrast of the radiographic image is quite good
c. Image sharpness is quite good.
d. The density of the radiographic image is quite good
e. Image details are quite good.

Expertise Results
Findings:

There is an avulsion fracture of the olecranon process. Other bones are intact Joint gaps are good.

Conclusion :

Olecranon Process Avulsion Fracture

DISCUSSION

1. Problem Formulation

By considering the background and limitations of the problem, the author formulates the problem as follows: " **What efforts are made to obtain an optimal radiographic image *of the elbow joint* with suspected *olecranon process fracture"?***

2. Cause of the problem

The causes of the problems faced by the author in radiographic examination of the Elbow Joint with suspected olecranon process fractures are Radiography of the elbow joint with suspected olecranon process fracture using two projections, namely Antero-Posterior and Lateral. The radiographic image of the elbow joint with suspected olecranon process fracture requires visible density, sharpness and contrast, so that the image of the olecranon process fracture can be seen optimally [23].

3. Efforts made to overcome the problem

There are efforts that can be made to overcome this

1. Radiographic Aspects

The results of a radiographic examination of the Elbow Joint with a suspected Olecranon Process fracture were carried out in antero-posterior and lateral projections but the fracture is more visible in the lateral projection

2. Patient Aspect

Before the examination is carried out, the radiographer must explain the examination procedures to be carried out so that the examination runs smoothly [24].

3. Radiation Protection Aspects

To minimize the radiation received, things that must be considered are that the area of the illumination field is adjusted to the size of the object, the exposure time must be short, and avoid repeating photos [25].

4. Positional aspect

When carrying out antero-posterior and lateral projections to avoid moving the patient, immobilization equipment such as a sandbag is needed [26].

5. Aspects of film processing

Recording images using Computer Radiography (CR) to obtain good density, sharpness and contrast in radiographic examinations of *Elbow joints* with suspected fractures in *the olecranon process* should allow the radiographer to set exposure factors firmly [27].

4. CONCLUSION

In closing the paper entitled "Radiography *of the elbow joint* with suspected *olecranon process fracture* , the author draws the following conclusions:

1. Radiographs of *the elbow joint* with a suspected olecranon process fracture using antero-posterior and lateral projections can show abnormalities in the elbow joint [28].
2. Good cooperation between the patient and the radiographer will make the examination smoother.
3. Patient comfort and immobilization facilitates the examination process
4. Recording images using Computer Radiography (CR)

Suggestions

The author will provide suggestions that can be used as material for consideration. These suggestions are:

1. In order to better show the anatomical shape of the olecranon fracture, an additional projection, namely the antero-posterior oblique (medial and lateral) projection, should be used.
2. Before carrying out the examination, the radiographer should explain the procedure to be carried out.
3. It is best to provide sandbags or sponges in the radiology room It is recommended that Computer Radiography be serviced regularly so that the photo results on the monitor are the same as the film results.

REFERENCES

[1] P. S. Hajare, A. V Jadhav, P. H. Patil, and S. S. Das, "A Cadaveric Study of Anatomical and Radiological Correlation of Mastoid Air Cells System in Relation to its Morphology," *Indian J. Otolaryngol. Head Neck Surg.*, vol. 75, no. S1, pp. 242–249, Apr. 2023, doi: 10.1007/s12070-022-03341-5.

[2] R. Tamura, R. Tomio, F. Mohammad, M. Toda, and K. Yoshida, "Analysis of various tracts of mastoid air cells related to CSF leak after the anterior transpetrosal approach," *J. Neurosurg.*, vol. 130, no. 2, pp. 360–367, 2018.

[3] M. Z. Adışen and M. Aydoğdu, "Comparison of mastoid air cell volume in patients with or without a pneumatized articular tubercle," *Imaging Sci. Dent.*, vol. 52, no. 1, p. 27, 2022, doi: 10.5624/isd.20210153.

[4] N. M. Etedali, J. A. Reetz, and J. D. Foster, "Complications and clinical utility of ultrasonographically guided pyelocentesis and antegrade pyelography in cats and dogs: 49 cases (2007–2015)," *J. Am. Vet. Med. Assoc.*, vol. 254, no. 7, pp. 826–834, Apr. 2019, doi: 10.2460/javma.254.7.826.

[5] M. Lee *et al.*, "Role of buccal mucosa graft ureteroplasty in the surgical management of pyeloplasty failure," *Asian J. Urol.*, Nov. 2023, doi: 10.1016/j.ajur.2023.09.001.

[6] C. Lemieux, C. Vachon, G. Beauchamp, and M. E. Dunn, "Minimal renal pelvis dilation in cats diagnosed with benign ureteral obstruction by antegrade pyelography: a retrospective study of 82 cases (2012–2018)," *J. Feline Med. Surg.*, vol. 23, no. 10, pp. 892–899, Oct. 2021, doi: 10.1177/1098612X20983980.

[7] L. Meomartino, A. Greco, M. Di Giancamillo, A. Brunetti, and G. Gnudi, "Imaging techniques in Veterinary Medicine. Part I: Radiography and Ultrasonography," *Eur. J. Radiol. Open*, vol. 8, p. 100382, 2021, doi: 10.1016/j.ejro.2021.100382.

[8] T. Tanaka, T. Shindo, K. Hashimoto, K. Kobayashi, and N. Masumori, "Management of hydronephrosis

after radical cystectomy and urinary diversion for bladder cancer: A single tertiary center experience," *Int. J. Urol.*, vol. 29, no. 9, pp. 1046–1053, 2022, doi: https://doi.org/10.1111/iju.14970.
[9] L. Munhoz, C. HIROSHI IIDA, R. Abdala Junior, R. Abdala, and E. S. Arita, "Mastoid Air Cell System: Hounsfield Density by Multislice Computed Tomography.," *J. Clin. Diagnostic Res.*, vol. 12, no. 4, 2018.
[10] D. Rochmayanti *et al.*, "Image Improvement and Dose Reduction on Computed Tomography Mastoid Using Interactive Reconstruction," in *Journal of Big Data*, vol. 9, no. 1, SpringerOpen, 2023, pp. 103–116.
[11] R. Tamura, R. Tomio, F. Mohammad, M. Toda, and K. Yoshida, "Analysis of various tracts of mastoid air cells related to CSF leak after the anterior transpetrosal approach," *J. Neurosurg.*, vol. 130, no. 2, pp. 360–367, Feb. 2019, doi: 10.3171/2017.9.JNS171622.
[12] F. P. Machado, J. E. F. Dornelles, S. Rausch, R. J. Oliveira, P. R. Portela, and A. L. S. Valente, "Osteology of the pelvic limb of nine-banded-armadillo, dasypus novemcinctus linnaeus, 1758 applied to radiographic interpretation," *Brazilian J. Dev.*, vol. 9, no. 05, pp. 14686–14709, 2023.
[13] E. G. Nordio, N. V Tumanska, and T. M. Kichangina, "Radiological investigation of the urogenital system," 2018.
[14] D. d'Ovidio, F. Pirrone, T. M. Donnelly, A. Greco, and L. Meomartino, "Ultrasound-guided percutaneous antegrade pyelography for suspected ureteral obstruction in 6 pet guinea pigs (Cavia porcellus)," *Vet. Q.*, vol. 40, no. 1, pp. 198–204, Jan. 2020, doi: 10.1080/01652176.2020.1803512.
[15] C. Yuan *et al.*, "Ileal ureteral replacement for the management of ureteral avulsion during ureteroscopic lithotripsy: a case series," *BMC Surg.*, vol. 22, no. 1, pp. 1–8, 2022.
[16] J. M. Elmore, W. H. Cerwinka, and A. J. Kirsch, "Assessment of renal obstructive disorders: ultrasound, nuclear medicine, and magnetic resonance imaging," in *The Kelalis--King--Belman Textbook of Clinical Pediatric Urology*, CRC Press, 2018, pp. 495–504.
[17] J. J. Crivelli *et al.*, "Clinical and radiographic outcomes following salvage intervention for ureteropelvic junction obstruction," *Int. braz j urol*, vol. 47, pp. 1209–1218, 2021.
[18] S. L. Purchase, "Point and shoot: a radiographic analysis of mastoiditis in archaeological populations from England's North-East." University of Sheffield, 2021.
[19] G. K. DOĞAN and İ. TAKCI, "A macroanatomic, morphometric and comparative investigation on skeletal system of the geese growing in Kars region II; Skeleton appendiculare," *Black Sea J. Heal. Sci.*, vol. 4, no. 1, pp. 6–16, 2021.
[20] C. Casteleyn, N. Robin, and J. Bakker, "Topographical Anatomy of the Rhesus Monkey (Macaca mulatta)—Part II: Pelvic Limb," *Vet. Sci.*, vol. 10, no. 3, p. 172, 2023.
[21] N. R. Sayal, S. Boyd, G. Zach White, and M. Farrugia, "Incidental mastoid effusion diagnosed on imaging: are we doing right by our patients?," *Laryngoscope*, vol. 129, no. 4, pp. 852–857, 2019.
[22] P. Salinas, A. Arenas-Caro, S. Núñez-Cook, L. Moreno, E. Curihuentro, and F. Vidal, "Estudio morfométrico, anatómico y radiográfico de los huesos del miembro pélvico del huemul patagónico en peligro de extinción (Hippocamelus bisulcus)," *Int. J. Morphol.*, vol. 38, no. 3, pp. 747–754, 2020.
[23] D. A. Rosenfield, N. F. Paretsis, P. R. Yanai, and C. S. Pizzutto, "Gross Osteology and digital radiography of the common Capybara (Hydrochoerus hydrochaeris), Carl Linnaeus, 1766 for scientific and clinical application," *Brazilian J. Vet. Res. Anim. Sci.*, vol. 57, no. 4, pp. e172323–e172323, 2020.
[24] [24] E. P. Lestari, D. D. Cahyadi, S. Novelina, and H. Setijanto, "PF-30 Anatomical Characteristic of Hindlimb Skeleton of Sumatran Rhino (Dicerorhinus sumatrensis)," *Hemera Zoa*, 2018.
[25] A. Patel, F. Schnoll-Sussman, and C. P. Gyawali, "Diagnostic Testing for Esophageal Motility Disorders: Barium Radiography, High-Resolution Manometry, and the Functional Lumen Imaging Probe (FLIP)," in *The AFS Textbook of Foregut Disease*, Cham: Springer International Publishing, 2023, pp. 269–278.
[26] S. Lampridis, S. Mitsos, M. Hayward, D. Lawrence, and N. Panagiotopoulos, "The insidious presentation and challenging management of esophageal perforation following diagnostic and therapeutic interventions," *J. Thorac. Dis.*, vol. 12, no. 5, pp. 2724–2734, May 2020, doi: 10.21037/jtd-19-4096.
[27] N. R. Sayal, S. Boyd, G. Zach White, and M. Farrugia, "Incidental mastoid effusion diagnosed on imaging: Are we doing right by our patients?," *Laryngoscope*, vol. 129, no. 4, pp. 852–857, Apr. 2019, doi: 10.1002/lary.27452.
[28] V. Torrecillas and J. D. Meier, "History and radiographic findings as predictors for esophageal coins versus button batteries," *Int. J. Pediatr. Otorhinolaryngol.*, vol. 137, no. 5, p. 110208, Oct. 2020, doi: 10.1016/j.ijporl.2020.110208.