JURNAL
Pendidikan, Sains, Sosial dan Agama
SEKOLAH TINGGI AGAMA BUDDHA NEGERI RADEN WIJAYA WONOGIRI

# Abdomen Radiography With Suspension Of Corpus Alienu (Implicated By An Arrow) at Adam Malik General Hospital Medan 2024

**Fitler Aritonang[1], Sahat Sinaga[2], Ismadi Sihombing[3], Syafril[4], Sarma Dewi Kemala S[5]**
**Program Studi D-III Radiodiagnostik Dan Radioterapi Sekolah Tinggi Ilmu Kesehatan (STIKES) Senior Medan, Indonesia**
Email: ismadisihombing@gmail.com,

**Article History:**
*Accepted: 16 July 2024* *Revised: 12 October 2024* *Published: 21 June 2025*

***Abstract***

Injuries caused by stuck arrows are rare but potentially life-threatening, especially when they hit vital organs. This study aims to evaluate the abdominal radiographic examination procedure in cases of corpus alienum, where there is a foreign object (arrow) stuck in the patient. The study was conducted at the Radiology Installation of H. Adam Malik Hospital Medan, using conventional X-ray modalities and image processing with Computed Radiography (CR). The study emphasized the importance of using appropriate projections, such as Antero-Posterior (AP) erect, Antero-Posterior (AP) supine, and lateral projections to ensure accurate diagnosis. The results show that these projections provide optimal images in determining the location and condition of the corpus alienum, which is crucial for further medical treatment. This study makes a practical contribution as a reference in performing abdominal radiography procedures in similar cases and enriches the literature related to radiographic examination in corpus alienum cases.

**Keywords** : Abdominal Radiography, Corpus Alienum, Computed Radiography (CR)

## INTRODUCTION

Arrows have considerable penetrating power in soft tissue and flat bones. Depending on the type of arrowhead, tissue elasticity can narrow the wound channel around the arrow shaf (Reski & Sugianto, 2022). Arrow injuries are rare in developed countries due to the development of modern firearms and ballistic missiles. However, they are still common among rural populations in developing countries, due to ongoing inter-communal clashes. However, some researchers believe that arrow injuries in some regions are underreported. Arrow injuries are low-velocity but can be life-threatening, especially when vital organs are hit. Arrows can hit any part of the body. Cases of arrow injuries involving different areas or organs have been reported (Wati, 2023).

Abdominal assessment for potential intra-abdominal injuries resulting from abdominal trauma is a common clinical challenge for emergency radiology. Physical examination is notoriously inaccurate in diagnosing intra-abdominal injuries. Based on the mechanism of injury, abdominal trauma can be classified as blunt or penetrating. In Europe, blunt abdominal trauma is reported eight to ten times more frequently than penetrating abdominal trauma (Manik, Hariyanto, & Abdullah, 2021).

In Eastern Nigeria, 37 cases of arrow-related injuries were found in two years, an average of one case per month. The age group most affected was 10-19 years, with nine cases.

(27.27%) which found the 21-30 age group to be the most numerous (36.8%). This study revealed 27 (81.81%) patients under 40 years of age, but supports the fact that this age group is the most active (Hyperastuty, Mukhammad, & Sugeng, 2021).
The national prevalence of injuries in Indonesia is 8.2%, the cause of injury due to being hit by a sharp/blunt object has a figure of 7.3%.
100%, The highest proportion of areas with injuries from sharp/blunt objects occurred in Papua (29%) and the lowest in DI Yogyakarta (4.7%). In the North Sumatra region, the prevalence of injuries from sharp or blunt objects was (10.1%). In terms of the cause of injury, the age group that often experiences sharp/blunt injuries is 35 to 44 years old (10.6%) and 15 to 24 years old (5.7%), and the proportion of places where injuries occur most often occurs on highways (42.8%) (Ariza et al., 2020).
Corpus alienum stuck with an arrow can cause death, the probability of survival after being stuck with an arrow is 80.6% in the abdomen with an entry interval of 16 hours and within 4 hours of death after treatment caused by multi-organ dysfunction syndrome or a condition where two or more organ systems in the body do not function normally (Purba, 2022). Other body parts when hit by arrows can also cause death such as the head and neck (41%), chest (42%), abdomen (33%), extremities (50%), and several other body parts (Joshua, 2024). Therefore, the author is interested in making it into a scientific paper with the title Abdominal Radiography with Suspected Corpus Alienum (Arrow Impaled) at H. Adam Malik General Hospital, Medan in 2024 (Irsal, 2020).

## RESEARCH METHODS

This research uses a qualitative descriptive method. Qualitative descriptive methods use qualitative data to describe phenomena based on existing reality. Qualitative descriptive research methods focus on problems based on facts obtained through observation, interviews, and documents (Hajare, Jadhav, Patil, & Das, 2023).
This research will be conducted from February to June 2024 at the Radiology Installation of the H. Adam Malik Central General Hospital (RSUP) in Medan City. The population is the entire object to be studied (AULIA, 2021). The population in this study is all patients who undergo abdominal radiography examinations (Nordio, Tumanska, & Kichangina, 2018).
A sample is a part or representative of the population being studied (Stephanie Christina Sulaiman, 2019). The sampling technique used is purposive sampling, which is the sampling of data sources with certain scientific considerations. Therefore, the sample in this study amounted to one person, namely a patient who experienced Corpus alienum (Arrow Implantation) in the Abdomen during an Abdominal examination at the Radiology Installation of H. Adam Malik General Hospital, Medan City.
To obtain correct and accurate data in compiling scientific papers, the author uses several techniques as follows: Observation, the author obtains data by observing and following the implementation of abdominal radiography examinations at the Radiology Installation of H. Adam Malik General Hospital, Medan City (Nurmalasari & Apriantoro, 2020).
The data obtained is descriptive data that is analyzed qualitatively in the form of a series of sentences and statements that can explain and describe the characteristics of the case being analyzed. In this case, the author analyzed the data in the following ways:

1. Observation of patient identification and general condition of the patient
2. A detailed examination of an abdominal X-ray with suspected foreign body (an arrow stuck in the abdomen), starting with the projection used, markers used, and the imaging results and expertise. This is then explained according to the conditions of the radiograph.

## RESULTS AND DISCUSSION

**Research result**

**Patient Data**

Based on the results of the research that has been conducted, the following data was obtained regarding patient identity:

Name: Mr. IS

Medical Record No.: 009209XX

Age: 19 years 9 months

Male gender

Examination Time: April 4, 2024

Type of Examination: Abdominal Radiography

Diagnosis: Penetrating wound with impaled object

**Examination Procedure**

The examination procedure on the patient is carried out based on the following steps:

a) The patient and the patient's family came to the Emergency Installation at H. Adam Malik Medan General Hospital, the patient's family was taken to the emergency installation because the patient suffered an arrow stab injury.
b) Then the patient is examined by the doctor on duty to determine the patient's diagnosis.
c) Then the doctor provides a referral letter or request for an abdominal examination to the Radiology Installation.
d) Nurses, patients and the patient's family come to the radiology installation using a stretcher and the patient is in a supine position and using oxygen through a nasal cannula, then the nurse gives a referral letter or request for examination to the radiology officer.
e) The radiology officer read the examination request letter, then asked the patient's name and age again, and cross-checked the patient's identity bracelet and then gave directions to the patient and the patient's family to follow the written examination procedure, namely the 3-position abdomen.

**Patient Preparation**

For a radiographic examination of the abdomen with suspected *foreign body (an impaled arrow),* no special preparation is required. All that is needed is communication with the patient and their parents to ensure their cooperation during the examination. Then, explain the procedure to obtain optimal images (Sebayang, 2020).

**Tool Preparation**

Before conducting an examination of the case being handled, it is necessary to prepare equipment in the form of a General X-ray Machine and a *Computed Radiography (CR) Cassette*. The specifications of the X-ray machine at H. Adam Malik Medan General Hospital are: *Siemens Machine Brand,* Unit Model *E7886X,* Serial No./Insert Model *16A1177/E7886* , Year

of Manufacture 2016, kV/mAs Max *150 kV/800 mAs,* Frequency *50/60 Hz,* Machine Type *Multix Fusion Digital* X-ray Tube.

Type of Aircraft *M ul t ix F u s ion Digi t a l*


**Figure 1. General X-Ray machine at H. Adam Malik General Hospital, Medan**

**Figure 2. *Computed Radiography (CR) Cassette* Size 35 cm x 43 cm at H. Adam Malik General Hospital, Medan**

**Radiographic Examination**

Abdominal radiography examination with suspected *Corpus Alienum (Arrow Implantation)* using Abdominal Radiography Without Preparation (Acute) with *Antero-Posterior (AP) Abdomen Supine, Antero-Posterior (AP) Abdomen Erect* and *Lateral Abdomen projections* (Shafiee et al., 2022). Where these projections can show the anatomy, establish the diagnosis of *Corpus Alienum (Arrow Implantation)* and determine the location of *the Corpus Alienum* (Alsleem et al., 2020).

The patient's general condition upon arrival at the radiology facility was that he was on a stretcher and lying supine. However, he was unable to stand and was short of breath, so he was already receiving oxygen via nasal cannula at a dose of 5 liters per minute. The patient's condition upon arrival at the radiology facility can be seen in Figure below.

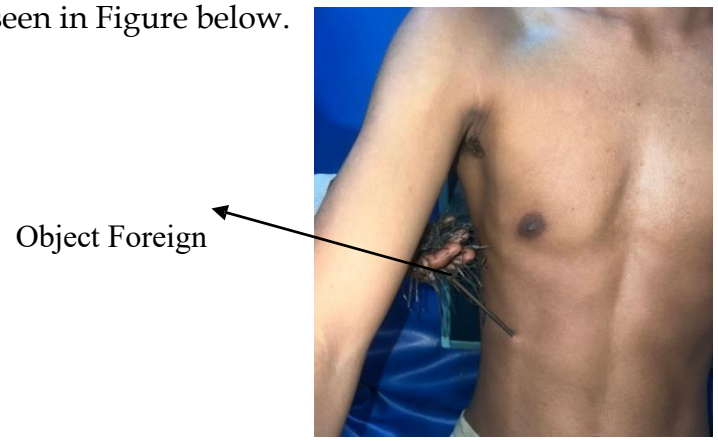


**Figure 3.** General condition of patients at H. Adam Malik General Hospital, Medan

*Anterior Posterior (AP) Erect* Projection

The purpose of this examination is to determine the location of the foreign body and establish a diagnosis of *foreign body (implanted arrow). An anterior posterior (AP)* projection of the abdomen using the *erect position* is necessary to see free air in the

abdominal cavity because free air will rise upwards, thus revealing the presence of organ perforation in the abdominal cavity.

Patient position: The patient sits on a stretcher, with the radiologist assisting the patient's family and nurses helping the patient to straighten the stretcher. The patient is positioned erect for approximately 5 minutes (Sharma, Kumar, Kalia, & Soni, 2018b).

Object position: The radiologist is assisted by the nurse and the patient's family to adjust the patient's position by carefully lifting the shoulders so that the radiologist can place the CR cassette on the back of the patient with the mid sagittal centered to the middle of the CR cassette (Sharma, Kumar, Kalia, & Soni, 2018a). Both of the patient's arms hold both sides of the stretcher, and ensure that there is no rotation seen from the shoulders in the same plane, and ensure that the oxygen tube is outside the CR cassette (Purchase, 2021).

Central Ray : Horizontal perpendicular to the middle of the cassette

Central Point: At the umbilicus

Exposure factor: 70kV / 18mAs (200mA, 0.09s) without using grid

FFD : 100 cm

Cassette size: (35 x 43) cm, Cassette position is long (Portrait).


**Figure 4. AP Erect projection abdominal radiograph**

Image criteria: Bilateral hemidiaphragms are visible, the vertebral column is in the middle, the ribs *and* iliac crest are not cut, the iliac crest is symmetrical, and there is no rotation of the object. A radiopaque, arrow-shaped *Corpus Alienum is visible* in the upper right abdomen around the vertebrae Th11 to L1.

**Radiographic evaluation:**

The radiographic evaluation obtained from the results of the image above is:

a. Density

1) Radiopaque vertebrae are visible.
2) Radiopaque rib bones are visible.
3) Radiopaque iliac crest is visible.
4) Air is seen in the radiolucent colon.

a) 5) Radiopaque but slightly radiolucent soft tissue is visible.

b. Contrast

1) There is a difference in opacity between the bone and soft tissue.
2) There is a difference between the air in the colon and the soft tissue.
3) There is a difference between the air in the colon and the iliac crest.
4) There is a difference between the air in the stomach and the vertebrae bones.
5) There is a difference between the air in the stomach and the ribs.

c. Detail

1) Radiolucent air is seen filling the colon.

1) 2) A small amount of radiolucent air appears to fill the stomach.
2) The vertebrae appear to be more radiopaque than the costal bones.
3) The iliac crest appears to be more radiopaque than soft tissue
4) d. Sharpness

1) The boundary between the costae and the vertebrae bones is visible.

2) The boundary between the iliac crest and the vertebrae is visible.

3) The air boundary with the iliac crest is visible.

4) The boundary between the air and the vertebrae bones is visible.

5) There is a difference in density between bone and soft tissue.

*Lateral* Projection

The purpose of the Lateral projection is to show the anatomy, establish the diagnosis and determine the location of the Corpus Alienum (Arrow Implant). Before the procedure is carried out, the radiologist provides an apron for the patient's family to wear when accompanying the patient in the examination room (Pongkunakorn, Aksornthung, & Sritumpinit, 2021).

Patient Position: The patient sits on a stretcher with the patient's right side attached to the bucky stand, then the stretcher is lowered slightly so as not to block the object.

Object Position: The radiologist directs the patient's family and nurse to position the patient's hands carefully to hold the pole on the bucky stand, the radiologist ensures there

is no rotation by looking at the shoulders in the same plane (Elshami, Abuzaid, & Tekin, 2020). Then set the object in the middle of the bucky stand, then the radiologist directs the patient's family to hold and hold the elbows of both patient's arms during the examination so that they do not come loose during the examination, the radiologist also ensures that the oxygen tube does not block the object (Machado et al., 2023).

Central Point: Midcoronal plane 2 fingers above the iliac crest

Central Ray: Horizontal perpendicular to the middle of the object

Exposure factor: 75kV / 20mAs (200mA, 0.1s) FFD: 100 cm

Cassette size: (35 x 43) cm, cassette position is long (portrait), cassette in

**Expertise Results**

The following expertise results were obtained: Name: Mr. IS

Age: 19 Years RM No.: 009209XX Gender: Male

Examination Date: April 4, 2024

**Description of Examination Results:**

ABDOMEN AP SUPINE + ERECT + LATERAL

The psoas line is smooth and symmetrical. A warm, opaque foreign body is visible in the right upper abdomen, approximately at the level of the Th 11-L1 vertebrae. In the lateral position, it is visible anteriorly. The contours of both kidneys are difficult to assess. The distribution of intestinal gas reaches the distal end, with no apparent widening of the caliber or thickening of the intestinal wall. There is no visible free air extraluminally. The bones and soft tissues are intact (Patel, Schnoll-Sussman, & Gyawali, 2023).

**Conclusion :**

An opaque, arrow-shaped foreign body in the right upper abdomen near the Th11-L1 vertebrae likely impinging on the liver. No perforation is visible.

**Discussion**

In abdominal radiographic examination with suspected Corpus Alienum (Arrow Impaled) at H. Adam Malik General Hospital, Medan, there is an examination flow starting with the patient and the patient's family coming to the Emergency Installation at H. Adam Malik General Hospital, Medan, the patient's family was taken to the emergency installation because the patient suffered an arrow stab injury (Yi et al., 2019). Then the doctor on duty examines the patient to find out the diagnosis and makes a referral letter or request for an abdominal examination at the radiology installation (Rosenfield, Paretsis, Yanai, & Pizzutto, 2020). Then the nurse, patient and the patient's family come to the radiology installation using a stretcher and the patient is in a supine position and uses oxygen through a nasal cannula, then the nurse submits the referral letter or request to the radiology officer. The officer reads the referral letter or request then re-identifies the patient starting from the patient's name, and age and cross-checks the patient's identity bracelet and directs the patient to follow the examination procedure to be carried out. Then gives direction to the patient and the patient's family to follow the written examination procedure, namely the 3-position abdomen (Meomartino, Greco, Di Giancamillo, Brunetti, & Gnudi, 2021).

Abdominal Radiographic Examination with suspected *Corpus Alienum (Arrow Implanted)* using Abdominal Radiography Without Preparation (Acute) with *Antero-Posterior (AP) Abdomen Supine, Antero-Posterior (AP) Abdomen Erect* and *Lateral Abdomen projections* . Where these projections can show the anatomy, establish the diagnosis of *Corpus Alienum (Arrow Implanted)* and determine the location of *the Corpus Alienum* . The general condition of the patient when he came to the radiology installation was using a stretcher and in a supine position. However, the patient was unable to stand and was short of breath so that when the patient arrived he was already using oxygen via nasal cannula at a dose of 5 liters per minute (Wati, 2023).

Based on the research results obtained by the author on the abdominal examination procedure with suspected *Corpus Alienum (Arrow Implantation)* , there are differences between theory and direct practice at H. Adam Malik Medan General Hospital, reviewed from several aspects, namely:

*How to position the patient*

The theory does not explain the role of nurses and the patient's family in positioning the patient, whereas in direct practice at H. Adam Malik General Hospital, Medan, radiology staff are assisted by nurses and the patient's family in positioning the patient during the examination. There are methods used to position the patient from a supine position to an erect position and prevent the foreign body from becoming further embedded in the patient, namely by teaching the patient to breathe regularly (inhale and exhale regularly) and directing the nurse and the patient's family to lift the patient by gently holding the patient's back. This also applies to positioning the patient back to a supine position (Harahap, 2022).

The theory explains that the patient should be in an erect position for at least 5 minutes, but 10 to 20 minutes is better if possible (Pusat Teknologi Limbah Radioaktif-BATAN, 2019). In practice at H. Adam Malik General Hospital in Medan, they also do the same by positioning the patient in an erect position for approximately 5 minutes. In this case, there are similarities between theory and practice in the field. *Exposure factors* (Hermansen & Mahajan, 2015).

In theory, abdominal radiography examination requires a grid in each projection and uses a lower exposure factor, namely 70kV/300mA, 0.03s in *the Antero-Posterior (AP) abdominal projection* and in the *lateral abdominal projection* using 75kV/300mA, 0.03s, while in direct practice in hospitals there are differences in *the Antero-Posterior (AP) abdominal erect projection* and *Antero-Posterior (AP) abdominal supine projection* which do not use a grid and the exposure factor used for *the Antero-Posterior (AP) abdominal projection* is 70kV and 18mAs (200mA, 0.09s). and for the *lateral abdominal projection* using 75kV and 20

(200mA, 0.1s) using a grid. This difference occurs because the image processing technology used is *Computed Radiography (CR)* because one of the advantages *of Computed Radiography (CR)* is that it can increase contrast, sharpness, and detail without using accessories (Grid).

*Radiation protection*

In radiation protection theory, it is only used for patients, namely by using shielding to protect radiosensitive tissue, while in direct practice in hospitals there are differences, namely the use of a wide collimation field according to the object being examined so that there is no repetition of photos, the patient's family who accompanies the patient when the examination is carried out uses an apron so that they are not exposed to scattered radiation,

and radiology officers when carrying out exposure are behind a shielding room to reduce the radiation dose received by officers (Sebayang, 2020).

## CONCLUSION

Based on the research results and discussion, the author can draw several conclusions, namely:

1. For Corpus Alienum (Arrow Implanted) on the abdomen, 3 projections are used: Antero-Posterior (AP) abdomen Erect, Antero-Posterior (AP) abdomen Supine and Lateral abdomen, the aim is:
    a. Antero-Posterior (AP) Supine abdomen aims to see the position of the corpus foreignum positioned between right and left, namely starting from about thoracic vertebrae 11 to lumbar vertebrae 1
    b. The lateral abdomen aims to see the position of the corpus foreignum positioned between anterior and posterior.
    c. Antero-Posterior (AP) abdominal erection aims to see the effect of the corpus alienum, whether perforation has occurred or not.
2. To obtain an image of the foreign body in the abdominal cavity, care is needed in moving and positioning the patient because the foreign body is still embedded.
3. Effective communication is needed between radiology staff and patients, nurses and the patient's family so that during the examination the patient can be positioned properly and provide comfort to the patient.
4. The exposure factor used when the examination is carried out needs to be taken into account so that the radiation dose received by the patient is not too large.
5. The use of radiation protection needs to be considered starting from the use of collimation according to the object to be examined, the patient's family who accompanies the patient must wear an apron, and the radiology officer must be behind a shield when irradiation is carried out.
6. Image processing technology using Computed Radiography (CR) is effective in showing optimal images and confirming the diagnosis of Corpus Alienum (Arrow Implanted) even without using accessories (grid).

### Suggestion

Based on the conclusions above, the author can provide several suggestions, namely:

1. For Radiographers , radiographers should pay more attention to the use of Personal Protective Equipment (PPE) when working, such as gloves, to prevent the transmission of infection through direct contact with patients.
2. For educational institutions , institutions should pay more attention to and increase the radiology equipment and materials available in laboratories to build a better practical system.
3. For Further Researchers . It is hoped that the results of this study can be used as a reference and guideline in further research related to abdominal examination in suspected Corpus Alienum with more varied projections.

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