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EVALUATION OF COMPLIANCE WITH STANDARD POSTERIO - ANTERIOR (PA) CHEST TECHNIQUES

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Abstract The aim is to Evaluation of Compliance with Standard Posterio - Anterior (Pa) Chest Techniques

Methodology- A prospective Evaluation of compliance with standard posterior-anterior (PA) chest techniques was conducted for 8 months. During this time the data of experimented images were collected on daily basis along with the clinical history of patients and relevant vital signs also without ignoring the maintenance of equipment and factors adjustments of scanning parameters and the technique skill of the chest techniques used in the particular scan of the particular patients.

Result- This study was conducted on the sample of 35 patients of radiology department. Firstly it is observed whether patients were given instructions by radiographers or not, 33 (i.e., 94.3%) patients were instructions during X-ray while 2 (i.e., 5.7%) patients were not given any instructions during X-Ray. Then, it was observed that whether patients were informed to hold their breath during X-Ray or not, 32 (i.e., 91.4%) patients were asked to hold their breath during the time of X-Ray, whether 3(i.e., 8.6%) patients were not informed about it. At third, it was observed whether patients were able to do scapula rotated or not, 31 (i.e., 88.6%) patients were able to do so, but 4 (i.e., 11.4%) patients were unable to do so. Then it was observed whether radiographer used marker or not during X-Ray, 28 (i.e., 80%) times radiographer used marker while 7 (i.e., 20%) times marker was not used. At last, it was observed whether appropriate distance was there between patients and X-Ray tube or not, 31 (i.e., 88.6%) times there was appropriate FFD, but FFD of 4 (i.e., 11.4%) patients was not appropriate.

Conclusion- It could be concluded that the compliance with standard Posterio- anterior (PA) chest techniques was high.

Index Terms- Patient, Chest Radiography, Radiographer

Introduction: The clinical application of X-ray began almost immediately following the discovery of X-rays by Wilhelm Conard Roentgen in 1895. Since then, diagnostic X-ray equipment has developed considerably and the imaging quality of X- ray examination has been greatly improved and the method has been widely disseminated.

The role of chest radiography has gained increasing importance in trauma cases, routine check - ups, disease conditions and metastatic problems. The rationale behind this study is that many faulty diagnoses by chest radiography may be associated with inappropriate radiological techniques and application and that improvement of imaging quality of chest radiography benefits not only the patients infected by disease but also those suffering from various pulmonary disease. In terms of detection and treatment of pulmonary disease, poor imaging quality may be more harmful to patients than having the patients not diagnosed through X- ray study is to provide a simple way to assess the quality of chest radiograph as well as fundamental of chest radiography, and to lead to conducting quality assurance for chest radiography even in resource constrained settings, chest radiograph with poor image quality can cause misdiagnoses or require repeated examinations, wasting economic resources

and exposing patients to unnecessary radiation. Consequently, providing high quality imaging of chest radiograph benefits anyone who will be examined by X-ray, and the precise control of these X-ray images is an important task for the radiographers; radiological technologists or radiological technicians.

Like all methods of radiography, chest radiographs employ ionizing radiation in the form of X-rays to generate images of the chest. The typical radiation dose to an adult from a chest radiograph is around 0.06mSv. Chest radiographs are used to diagnose many conditions involving the chest wall, bones of the thorax, and structures contained within the thoracic cavity including the lungs, heart, and great vessels.

With regard to chest X-ray, the recommended distance between the tube focus and X-ray film (FFD) is in range of 140-180cm. Longer distance is more desirable for radiological chest examination. The main reason for this longer distance is that it improves the image sharpness through geometric means. The x-ray beam must be aligned straight with the X-ray film.

The penetrating power of the X-ray beam is controlled by the adjustment of X-ray tube voltage. The higher the voltage setting, the more energetic and penetrative the X-ray that is produced and the different tissues are visualized at different density levels according to the penetrating power of the X-ray beam. The difference of density levels according to the penetrating power of the X-ray beam. The difference of density levels between the light and dark areas of X-ray films is defined as contrast.

Viewing chest radiographs under good conditions is important in order to detect the maximum amount of information.

The X-ray film viewer requires a minimum of 2 vertically mounted 15W (watts) fluorescent tubes and the light intensity of x-ray film should be sufficient and even across the entire surface of it.

(PA) projection

The patient is too unwell to stand.

The chest X-ray, X-rays pass from PA projection

Posterior –Anterior: the posterior to the anterior of the patient - hence Posterior-Anterior (PA) projection. The image is viewed as if looking at the patient face-to-face. The patient is image. Sometimes it is not possible for radiographers to acquire a PA chest X-ray. This is usually because is still viewed as if looking at the patient face to face.

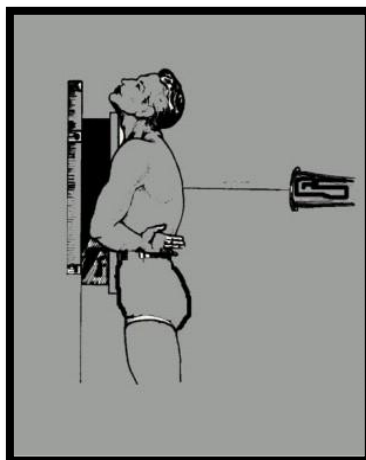


Fig 1.1: Chest X-ray PA projection

AP projection

- X-rays pass from the anterior to the posterior of the patient - hence Anterior-Posterior (AP) projection. The image is still viewed as if looking at the patient face.

AP v/s PA - Heart size

The heart, being an anterior structure within the chest, is magnified by an AP view. Magnification is exaggerated further by the shorter distance between the X-ray source and the patient, often required when acquiring an AP image. This leads to a more divergent beam to cover the same anatomical field.

As a rule of thumb, you should never consider the heart size to be enlarged if the projection used is AP. If however the heart size is normal on an AP view, then you can say it is not enlarged

AP vs. PA projection

- The upper diagram shows an AP projection. Heart size is exaggerated because the heart is relatively farther from the detector, and also because the X-ray beam is more divergent as the source is nearer the patient.
- The lower diagram shows a conventional PA projection. The apparent heart size is nearer to the real size, as the heart is relatively nearer the detector. Magnification of the heart is also minimized by use of a narrower beam, produced by the increased distance between the source and the patient.

AP v PA - Scapular edges

Radiographers will often label a chest X-ray as either PA or AP. If the image is not labeled, it is usually fair to assume it is a standard PA view. If you are not sure then look at the medial edges of each scapula.

AP projection - example

- AP projection images are of lower quality than PA images. Compare this image with the PA view below.
- The image has been acquired by a mobile X-ray unit in the resuscitation room. Note the AP SITTING label.
- The scapulae are not retracted laterally and they remain projected over each lung.
- Heart size is exaggerated (cardiothoracic ratio approximately 50%). If seen on a PA image this would be at the borderline for cardiac enlargement.
- The radiograph was repeated..

In order to take a PA view the patient places his or her arms around the side of the detector plate, or stands with hands on hips. This ensures the scapulae are rotated laterally and no longer overlap the lungs.

1.2 Positioning

Antero-posterior (AP) chest radiographs can be made in the intensive care unit, the operating suite, or the patient's room using mobile equipment. They are often known as a portable film when performed with a mobile unit. They are generally of lesser quality than a postero-anterior (PA) radiograph or recumbent films made in the radiology department. Hence, it is preferable to obtain a film in the radiology department unless the patient cannot be moved without hazard.

Patient preparation

Ask the patient to remove clothes from the waist up, put on a hospital gown, remove any jewelry (necklace, earrings), and, if necessary, tie hair up on top of the head.

Patient position considerations

Instruct the patient to lie supine or upright, with the back against the grid. If the patient's condition allows, raise the head end of the cart, as the semi-erect position will improve the anatomical details.

Positioning is difficult in a hospital bed, thus the patient's true position is often unknown, which causes difficulty in assessing pulmonary vascularity or the presence of pleural fluid. If a portable film must be done, an upright portable film is preferable to a supine film. The patient's position and the distance from the X-ray tube to the film should be recorded on the film cassette.

Position of chest

1. The mid-sagittal plane of the chest should be in the center of the cassette.
2. If the patient's condition allows, ask the patient to relax the shoulders and place hands on hips (to move the scapula away from the lung fields).
3. Place a lead shield between the X-ray tube and the patient's pelvis for gonadal protection.
4. If the patient cooperates, instruct him or her to take a deep breath and then hold it to fully aerate the lungs. The patient should then take a second deep breath. (This allows for a deeper inspiration, as more air is inhaled during the second breath.) The exposure is made at the end of the second full inspiration to ensure maximum expansion of the lungs.



Fig-1.2 centering point

3.3 Centering Point

The central ray (CR) is set perpendicular to the long axis of the sternum and the center of the cassette. The jugular notch is the recommended landmark for the location of the CR for AP chest radiographs. The notch is used for locating the center of the lung fields at the T7 level.

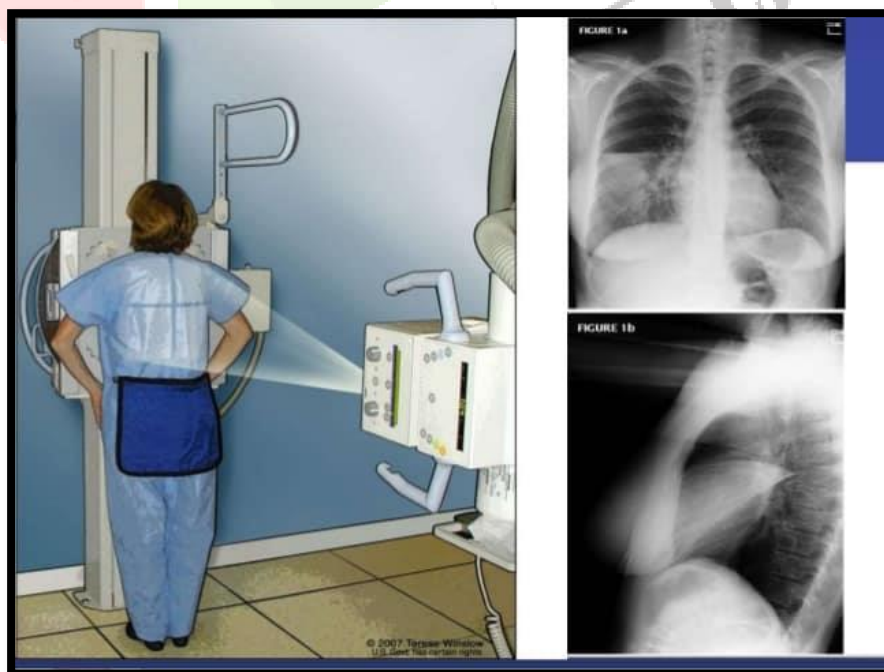


Fig-1.3

1.4 Radiographic description of chest

Chest X-ray uses a very small dose of ionizing radiation to produce pictures of the inside of the chest. It is used to evaluate the lungs, heart and chest wall and may be used to help diagnose shortness of breath, persistent cough, fever, chest pain or injury. It also may be used to help diagnose and monitor treatment for a variety of lung conditions such as pneumonia, emphysema and cancer. Because chest X-ray is fast and easy, it is particularly useful in emergency diagnosis and treatment.

This exam requires little to no special preparation. Tell your doctor and the technologist if there is a possibility you are pregnant. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown. fig 1.4 showing radiographic description of chest.

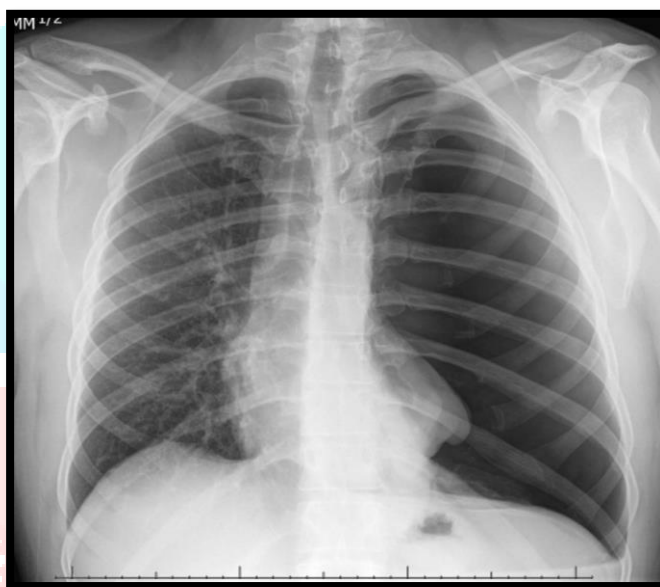


Fig-1.4

Radiographic description of chest is shown with the help of figure. In the upper right-side marker is used to differentiate right and left side.

AIM

The aim and objective of this research study is evaluation of compliance in standard chest PA technique.

MATERIALS AND METHODS

The overall data was collected with the help of radio-technologist (Evaluation of compliance with standard posterior-anterior (PA) chest techniques) of SGT University. The data was collected in daily wages with the most routine Evaluation of compliance with standard posterior-anterior (PA) chest techniques done over a period of **8 months** in the radiology department. In order to calculate the factors affecting the image quality of Evaluation of compliance with standard posterior-anterior (PA) chest techniques, probability sampling was used. This is a method of sampling where elements are chosen from the population using random methods.

A expert supervisor along with the well-educated and trained, skilled technologist assisted the researcher with the analysis, interpretation and conclusions. The results and conclusions were scrutinized and internal validity secured. It is believed that the population selected gave a true indication of the factors affecting Evaluation of compliance with standard posterior-anterior (PA) chest techniques.

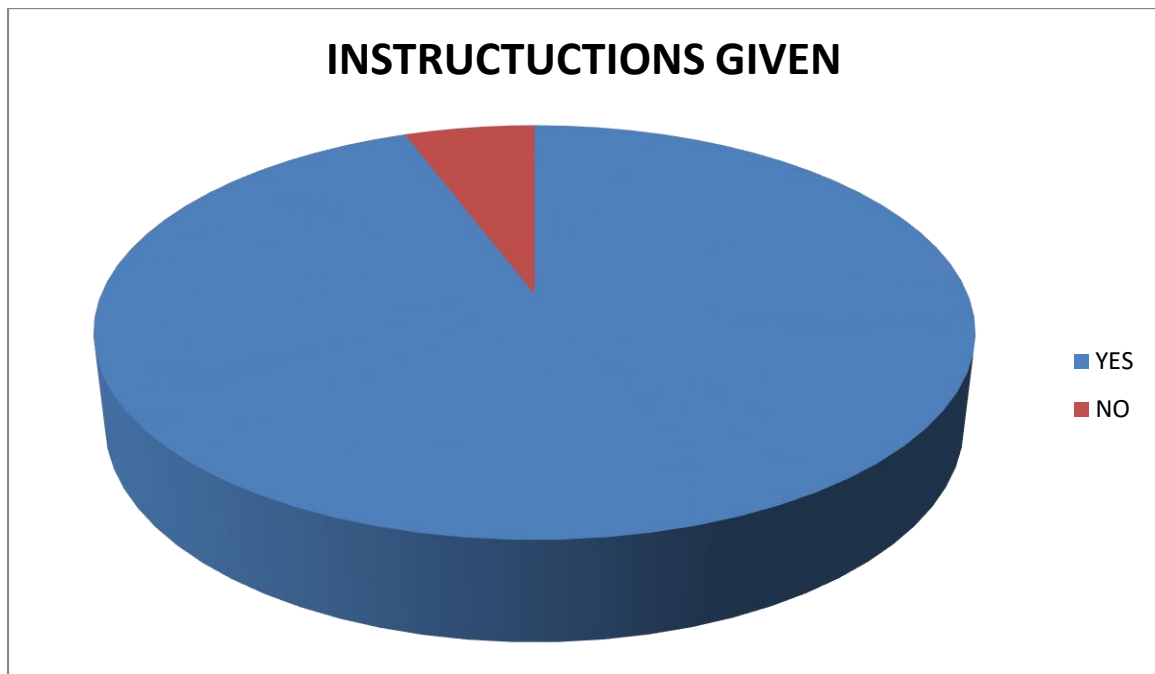
Table 5.1 Data Collection

SR NO.	INSTRUCTION YES\NO	ARRESTED INSPIRATION YES\NO	SCAPULA OUT YES\NO	MARKER	FFD\180c	MAS\ KVP
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	NO	YES
4	YES	YES	YES	YES	YES	YES
5	YES	NO	YES	NO	YES	YES
7	NO	NO	YES	YES	YES	YES
8	YES	YES	YES	NO	YES	YES
9	YES	YES	YES	YES	YES	YES
10	YES	YES	YES	YES	YES	YES
11	YES	YES	NO	YES	NO	YES
12	YES	YES	YES	NO	YES	YES
13	YES	YES	YES	YES	YES	YES
14	YES	YES	YES	YES	YES	YES
15	YES	YES	YES	YES	YES	YES
16	NO	YES	YES	NO	YES	YES
17	YES	YES	NO	YES	YES	YES

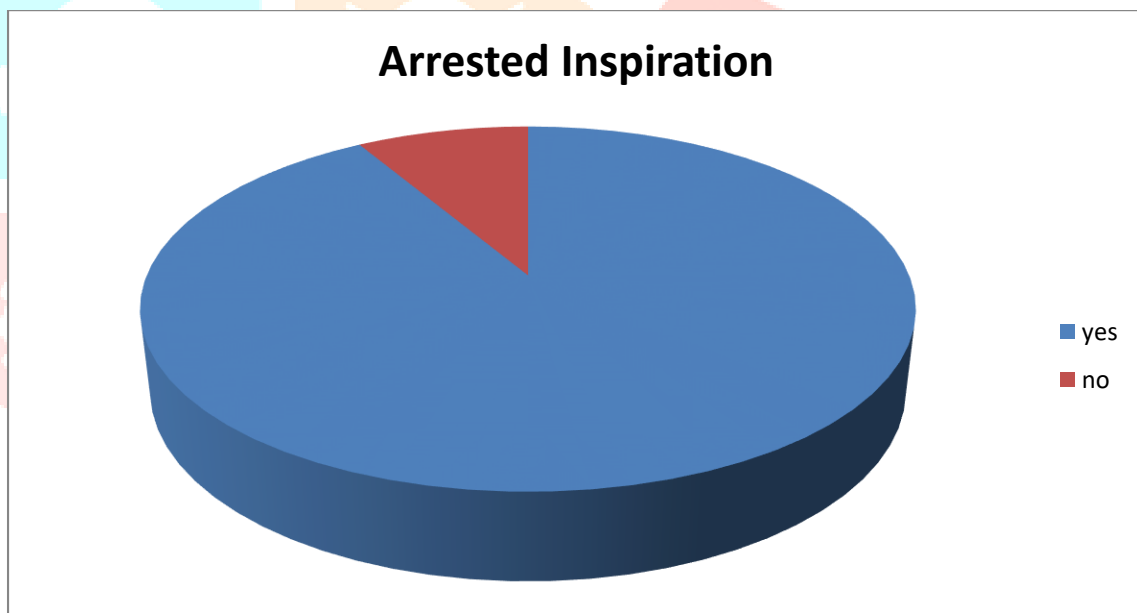
18	YES	YES	YES	YES	NO	YES
19	YES	YES	YES	NO	YES	YES
20	YES	YES	YES	YES	YES	YES
21	YES	YES	YES	YES	YES	YES
22	YES	YES	YES	NO	YES	YES
23	YES	YES	YES	YES	YES	YES
23	YES	YES	YES	YES	YES	YES
24	YES	YES	YES	YES	YES	YES
25	YES	YES	YES	YES	YES	YES
26	YES	YES	YES	YES	YES	YES
27	YES	YES	YES	YES	YES	YES
28	YES	YES	YES	YES	NO	YES
29	YES	NO	YES	NO	YES	YES
30	YES	YES	YES	YES	YES	YES
31	YES	YES	NO	YES	YES	YES
32	YES	YES	YES	NO	YES	YES
33	YES	YES	YES	YES	YES	YES
34	YES	YES	YES	YES	NO	YES
35	YES	YES	YES	YES	YES	YES

TABLE 5.2 DATA COLLECTION

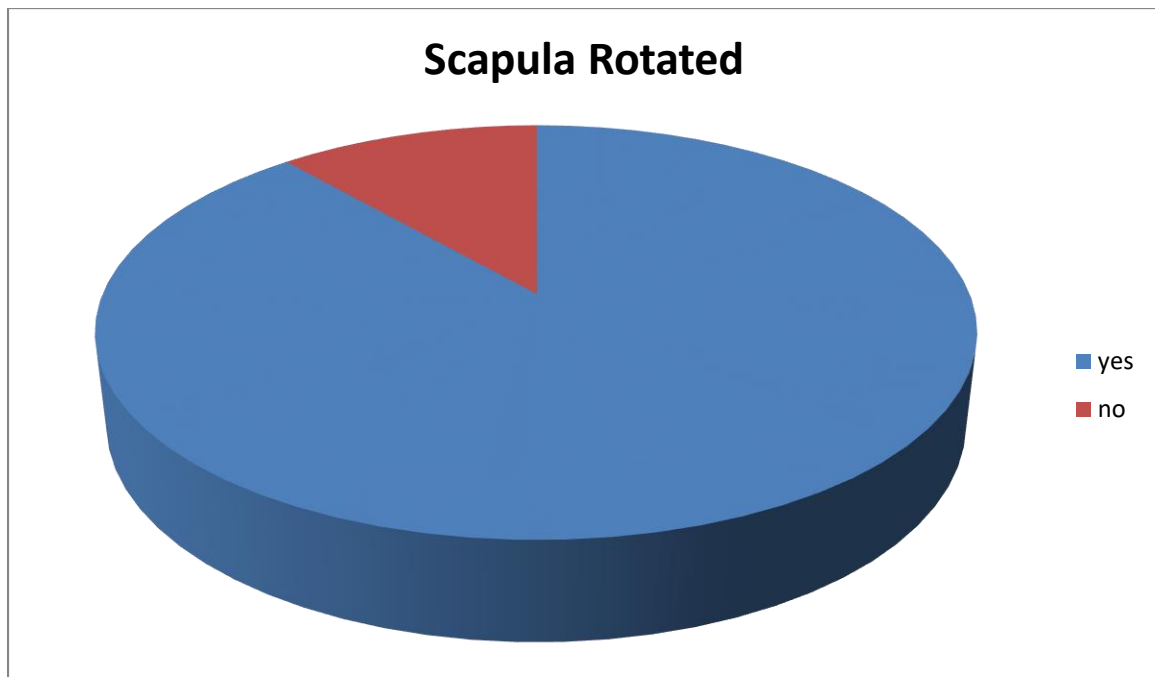
	Yes	No
Instructions given?	33	2
Arrested Inspiration	32	3
Scapula rotated	31	4
MARKER	28	7
FFD	31	4



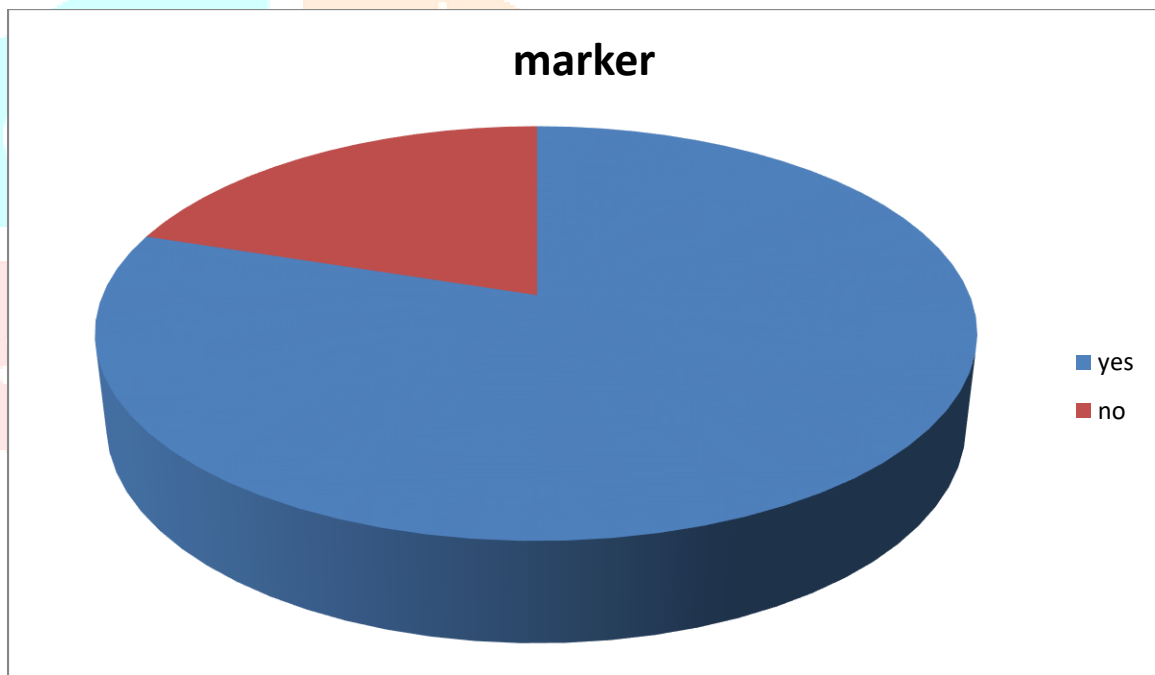
Graph 5.1, above graph represents the number of patients agreed whether they were given instructions or not, 33 patients agreed that they were instructions.



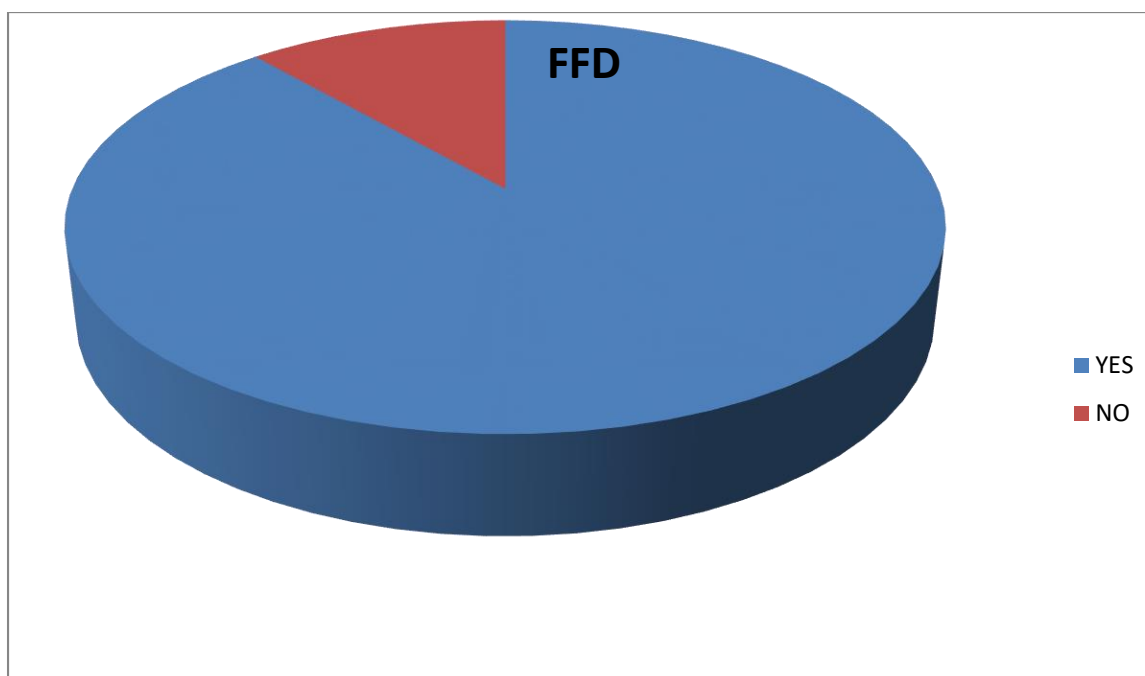
Graph 5.2 Whether patients were informed to hold their breath or not, 32 patients said yes that they were asked whether 3 patients denied.



Graph 5.3, above graph shows the number of whether patients were able to scapula rotated or not, 31 patients were able to do so, but 4 patients were unable to do so.



Graph 5.4, above graph shows whether radiographer used marker or not during X-Ray, 28 times radiographer used marker while 7 times marker was not used.



Graph 5.5, above graph shows whether appropriate distance was there between patients and X-Ray tube or not, 31 times there was appropriate FFD, but FFD of 4 (i.e., 11.4%) patients was not appropriate.

Discussion and Conclusion

According to this research chest radiograph PA view the chest radiograph should include both lung apices and both CP angles. There should be equidistant between the spine of vertebra and medial ends of clavicles. There should be at least 6th anterior ribs above diaphragm for full inspiration. There should be definition of lower intervertebral disc below to for adequate penetration. The medial border of scapula should be out of lungs field for proper position of patient.

In the case of evaluation of anatomical criteria for chest, the error was due to the improper position, small size of image receptor and patient shift in between positioning and exposure. In evaluation of arrested inspiration in chest radiograph, the error was due to inappropriate instruction given to patients by radiographer or due to the obese patients. In terms of adequate penetration error was due to the under exposure given to patients.

This research was conducted of the evaluation of compliance with standard Postero- anterior (PA) chest techniques. This study was conducted on the sample of 35 patients of radiology department. Firstly it is observed whether patients were given instructions by radiographers or not, 33 (i.e., 94.3%) patients were instructions during X-ray while 2 (i.e., 5.7%) patients were not given any instructions during X-Ray. Then, it was observed that whether patients were informed to hold their breath during X-Ray or not, 32 (i.e., 91.4%) patients were asked to hold their breath during the time of X-Ray, whether 3(i.e., 8.6%) patients were not informed about it. At third, it was observed whether patients were able to do scapula rotated or not, 31 (i.e., 88.6%) patients were able to do so, but 4 (i.e., 11.4%) patients were unable to do so. Then it was observed whether radiographer used marker or not during X-Ray, 28 (i.e., 80%) times radiographer used marker while 7 (i.e., 20%) times marker was not used. At last, it was observed whether appropriate distance was there between patients and X-Ray tube or not, 31 (i.e., 88.6%) times there was appropriate FFD, but FFD of 4 (i.e., 11.4%) patients was not appropriate.

THEREFORE, FROM AUTHOR RESEARCH IT COULD BE CONCLUDED THAT THE COMPLIANCE WITH STANDARD POSTERO-ANTERIOR (PA) CHEST TECHNIQUES WAS HIGH.

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