***NAME ; SALMAN KHALID.***

***I'd ; 15236 .***

# **Question; 1**

**Barium swallow** would be the best diagnosis for a patient having difficulty in swallowing.

Which is a contrast study of Esophagus, throat , back of mouth.

Standard protocols for this procedure are as follow ;

* First the patient will be ask not to eat after midnight before the exam, and to eat a low fiber diet for 2 to 3 days before the barium swallow test.
* The patient must remove all jewelry,hair clips ,or other objects that might show up on an X-ray.
* The examination begins with lateral view.
* The patient is asked to hold the barium in his mouth while the image is centered and the video recorder is started.
* The image should be collimated to improve resolution.
* The patient is asked to swallow once and the fluoroscopy image is recorded until the bolus disappears from the field.
* After told by the technologist, the barium liquid will have to be swallowed by the patient in the following manner:
* 1cc. 3cc. 20cc.
* Once this part get completed, the technologist will switch towards the food,requires effort swallowing like drinking through straw.
* The patient is then turned for the recording of AP view. Now a disc is placed on a muscle( left sternocleidomastoid)of the patient.
* The disc will be of known diameter. Swallowing a tablet and 20 cc liquid will be recorded.
* The video would be saved in a format called avi format. The study should be saved in an external drive. So it can be transferred easily to other computers for further studies.

***Question : 2***

 ***Positions of taking film in barium meal;***

* **Position to take film of stomach:**

 **Supine;** Taking in supine position show or capture the body of the stomach as well as the antrum.

 **Supine RAO;** This position show Antrum , Greater curvature of stomach.

 **Supine LAO;** taking film of this position shows us Lesser curvature.

* **Position to take film of fundas**

**ERECT;** This position shows the fundas part. Patient standing or sitting while taking the examination.

**Supine left lateral;** Best position to study the fundas.

* **Position to take film of Duodenum;**

**Prone:** The patient is lying on back facing upward. This position is taken with a compression pad beneath the patient,because it would not allow the flooding of barium.

**RAO:** To study the inner wall of the duodenum.

* **Position to take film of Duodenum cap:**

**Prone ;** lying on back facing upward,compression pad are used.

**RAO;** This position is taken by turning the patient slightly on left side.

**Supine** To study duedenum cap.the patient face upward which is opposite yo prone.

 **LAO.**

* ***Position to take film of Esophagus:***

 **Erect chest anterio posterior(AP)**

 **Right Anterior Oblique (RAO)**

 **Left Anterior Oblique (LAO).**

An RAO position give the images with wider space 35°-40° for the Esophagus in between the heart and the vertebrae.

***Question 3 ;***

***Classification of contrast Agents;***

 X-ray & CT

* Negative contrast media
* Positive contarst media

**Non water soluble**

 **(***Barium sulfate***)**

**(***Oil based contrast media***)**

**Water solube**

 **(***Iodine based Contrast media***)**

* **HOCM (ionic)**
* **LOCM (ionic and non ionic C.M)**
* **Iso-osmolar(non ionic C.M)**
1. **Negative Contrast Media:**

The negative contrast media includes

* Water.
* Air.
* Carbon Dioxide.
* Radiolucent Contrast Media it is.
* They have low atomic number.
* Appears black on the radiograph after examination.
* Use for double contrast studies.
1. **Positive Contrast Media:**
* All the contrast agents which lies in this positive category are Radiopaque.
* They appears white on the radiograph.

 Example of this contrast media include Barium Sulfate.

This one is used for many procedures like:

* Angiography
* Sialography
* Myelography etc.

Positive contrast media are further classified into;

1. **Non-Water soluble:**

They are those contrast agents which aren’t soluble in the water. These contrast agents do not splits in to molecules like the water soluble one.

This category includes:

1. **Barium Sulfate:**
* Barium Sulfate contrast media is used to enhance or visualize the GI tract.
* It is highly radioopaque.
* White crystalline salt insoluble in water.
* It can be use as double contrast.
* It consists of barium sulfate particles which aren’t soluble in water and aren’t absorbed by gut.
1. **Oil Based**
* Insoluble in water
* Appear white on radiograph.

Example ;**myodil** ( contrast study of spinal cord)

**Ethiodol (**contrast study of lymphatic vessels **)**

**Uses;** sialiography,bronchgraphy,myelograghy.

1. **Water Soluble:**

Water soluble contrast agent includes Iodinated Contrast Media.

1. **Iodinated Contrast Media:**
* Atomic number 53.
* Contrast Media diffuses in the extra-cellular spaces of the cells.

This mainly used for Angiography in CT and Conventional Radiography.

* Low toxicity
* High contrast study due to high atomic number.
* All of the iodinated contrast agents are made up of **benzene ring** with which three iodine are attached. A monomer consists of tri-iodinated benzene ring and a dimer consist of two tri-iodinated benzene rings.
* **Ionic Contrast Media** are water soluble because they splits into ions that’s are positive and negative ions and then these ions starts attracting the negative and positive sides or pole in the water molecule.

**The iodinated contrast agents are classified into 3 group:**

* **High Osmolar Contrast Media:**

The high osmolar contrast agents are those whose osmolality are **4 to 7 greater** than the osmolality of human blood.

They have 1300 – 2140 mOsmHg osmolality.

**“HOCM are IONIC contrast agents.”**

* High osmolar CM have **adverse effects** especially when they are administered through intravenous and intrathecal ways or routes.
* We do not use the HOCM mostly nowadays because of its high toxicity.

Beside of its adverse effects, they are still used for the GI and Cystourethal administration.

**Example:**

Grastograffin, Conray.

* **Low Osmolar Contrast Media:**

Low osmolar contrast agents are those whose osmolality are approximately **two times** greater than that of human blood.

They are less toxic than the HOCM.

**“Maximum LOCM are NON-IONIC agents”.**

All non-ionic contrast agents are LOCM but not all LOCM are non-ionic.

Example:

Iopanidol, iohexol, iopromide.

* **Iso Osmolar Contrast Media:**

These are those contrast agents which the same osmolality like the blood.

**Example:**

Visipaque.