Diagnosis in Medical Imaging

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Abstract*: In last few years Medicinal imaging innovation has encountered a sensational change. For several medical purposes the methods or technique that uses to take the image of human body is known as Medical imaging. In diagnosis or medical purpose including the learning of functions and normal anatomy the Medical imaging is used. In the medical field it is used widely because the image technology and computer has been developed on large scale. Health problem diagnosis is completely reliant on the efficiency, accuracy and quality of image processing.

***Keywords* : Computed Tomography, Echocardiography, Medical Imaging, Magnetic Resonance, Ultrasound Imaging.**

I. INTRODUCTION

In last few years Medicinal imaging innovation has encountered a sensational change. For several medical purposes the methods or technique that uses to take the image of human body is known as Medical imaging. In diagnosis or medical purpose including the learning of functions and normal anatomy the Medical imaging is used. it is the part of incorporates radiology, microscopy, medical photography, thermograph and biological imaging on large basis. The techniques like magneto encephalography (MEG) and electroencephalography (EEG) are use for recording and Measurement. They are not made for producing the images but these techniques provide data susceptible that use for representation of maps and it can be the medical imaging type [1].

The medical imaging is basically equated to clinical imaging or radiology in clinical context. Study of medical image interpretation and application is generally the preservation of medical sub-discipline and radiology they are related to area of medical science and medical condition. The techniques that used for developing the medical image can also use for industries and scientific applications

For image processing mathematical sciences were used in a basic way, but in biomedical area it is have some importance until the isotope emission tomography, and computed tomography (CT) for the imaging of X-rays development in other modalities ruled [2]. The systems like magneto encephalography (MEG) and electroencephalography (EEG) are use for chronicle and Measurement. They are not made for creating the pictures but rather these strategies give information vulnerable that utilization to portrayal of maps and it tends to be the medicinal imaging type.

II. MEDICAL IMAGING TECHNIQUES

Without opening up the body surgically, the method that used for inside the body is known as Medical Imaging Techniques (MITs).for treatment of various medical issues and for diagnosis any part of body this technique is used. There exist several techniques of medical imaging; each technique has its own advantages and drawbacks. With laboratory tests like specimen and blood test Medical Imaging Techniques shows as most common medical tests. By developing of more accurate, less obtrusive and fast development of devices the Medical imaging has been experiencing an upheaval in the previous decade [3]. For study the human behaviors and neurobiology the Medical imaging technique can be determine as a tool. Figure 1 shows the basic concept of medical imaging. The process consist of a source or sensor of energy that use for penetrate in human body. Then the energy goes through the body and attenuated or consumed at various level of body, it creates signal according to the atomic number of the different tissues and density. The special detectors that are perfect with the energy source detect the signals. To create the image the signals manipulated mathematically. The images that are obtained are acquire through the energy from the human tissue and prompting an arrangement dependent on the energy connected to the body [4].

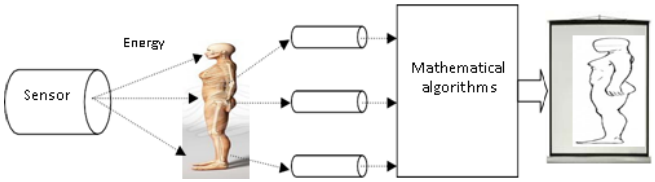

Figure 1. Concept of a medical imaging system

2.1 X-RAY IMAGING – RADIOGRAPHY

The x ray imaging is also known as radiograph. To treat some medical issues and to diagnose the body this technique is used for medical test. To create the image of inside of the body the X rays expose the body pat with small quantity of ionizing radiation. This is the most frequent and widely used ancient type of medical imaging.

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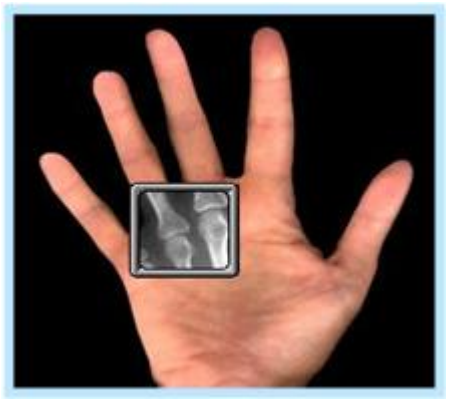
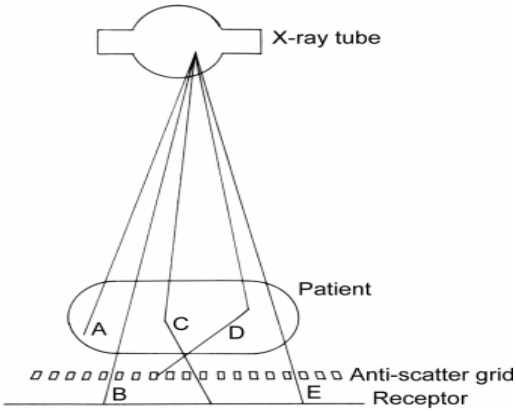


Figure 2: first x-ray image

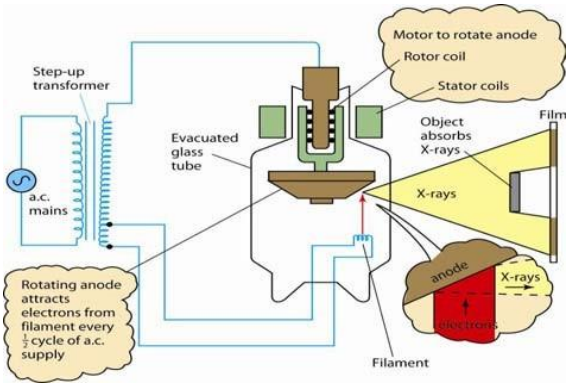
In 1895 Wilhelm Conrad Roentgen's wife first developed the concept of radiography.

Some advantages of the x-ray technique are as follows:

1. This process is quick, painless and Noninvasive
2. This process include surgical treatment planning and medical planning
3. To cure many medical problems like tumor in the body or remove blood clots Radiography guide the medical personnel.



(a) X-ray imaging concept



(b) Rotating X-ray tube

Figure 3. X-ray radiographic medical imaging

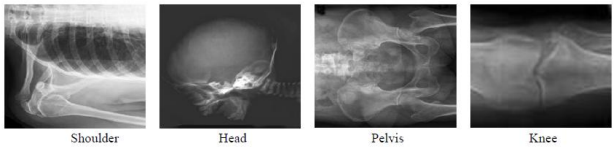


Figure 4 : X-ray images examples

Common uses of the procedure

To evaluate the chest wall, heart and lungs the chest x-ray is performed.

To diagnose the symptoms of many medical issues the chest x-ray is generally used as the first imaging test like:

1. If there is some injury or pain in chest
2. If any person has fever
3. If any person has persistent or bad cough
4. If there is some problem in breathing

To monitor the treatment and diagnose in many conditions the Physicians use the examination like:

1. air collection around the lungs
2. lung cancer
3. medical devices positioning
4. emphysema
5. heart failure or other heart related problems
6. pneumonia

There also exists some risk will using the X-Ray Radiography techniques:

1. ionizing radiation exposure cause the risk of producing the cancer
2. By using this technique there is the risk of affecting the tissue like skin reddening, cataracts, and hair loss.

2.2 X-RAY COMPUTED TOMOGRAPHY (CT SCAN)

To create the slice by slice images of any part of the body multiple x-rays technique is used. The slice is knows as scan. If it is looking by the side of feet of a person to see the cross section the slices are viewed. So the organs that are on the right side appear on the left side like liver. To take an accurate biopsy this technique can be used [5]. The figure 5 shown the sample of CT scan images.

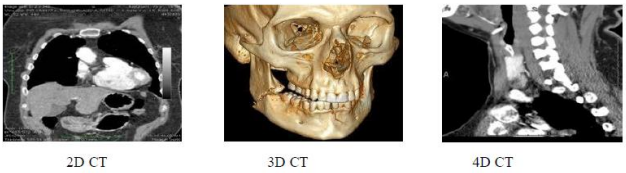


Figure 5. Example of CT scan

Benefits of CT scan are:

1. It is quick, painless and Noninvasive process
2. in physical density Distinguished by small differences
3. it give Good spatial resolution
4. it avoid invasive insertion of an arterial catheter
5. it provide Global view of veins

There also exists some risk will using the CT techniques

1. this process do not produce real time information
2. this technique Cannot detect intra-luminal abnormalities
3. ionizing radiation exposure cause the risk of producing the cancer
4. This technique cannot be performed without contrast [4].

2.3 MAGNETIC RESONANCE IMAGING (MRI)

To image the tissue of body and monitor the chemistry of body the diagnostic technology that use magnetic and radio frequency is known as Magnetic Resonance Imaging (MRI) [5-7]. This technology provides 3 detailed anatomical images and it is not using damaging radiation. It is a non-invasive imaging technology. This technology used for treatment monitoring, diagnosis and detecting the diseases. This technology is depending on the sophisticated technology. Sophisticated technology excites and recognizes the proton's change in the direction of the rotational axis. The protons are found in the water that makes the living tissue [8].

For getting an MRI image a patient should go through a large magnet and it should remain still during the process. So it should not produce a blur image. To increase the speed of protons the some Contrast agents can given to patient before or during the process.

Figure 6. MRI of the spine

Some advantages of MRI are given below:
1. In the body in soft tissue structures MRI is use for detecting and scanning abnormalities.
2. In MRI there is no use of any radiation.
3. Through blood circulation and body the MRI scan give information about the blood circulation [9].

Some risks of MRI is given below:
1. MRI scanners are very costly, so in any medical institutes there is only one or few scanners are used. There for it condition of any patient is not critical then it can take too much time for diagnose.
2. The MRI machine produces loud noise because it made through magnet.
3. In the process of MRI the patient should be stable. So this process is not suitable for the patient having investigating issues like mouth tumor because of swallowing and coughing
4. In MRI scan do not show bone and calcium [10].

2.4 ULTRASONOGRAPHY

To detect the changes in the presence of contour or size of organs, vessels and tissues Ultrasound is used. This approach detects the abnormal masses like tumor in foetus, heart, liver, kidneys and blood vessels. A transducer send sound wave and receive the echoing waves, in ultrasound examination. In internal organs of the body the ultrasound is diagnose noninvasively image. The most common use of ultrasound is during pregnancy, it is used for see the development and growth of the foetus [11].

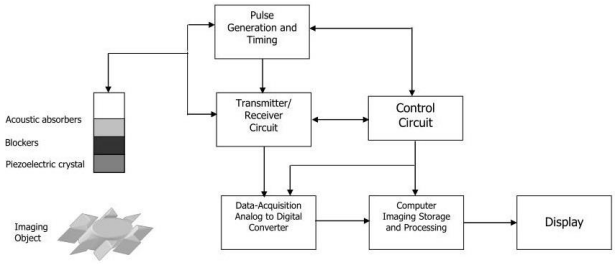


Figure 7: conventional ultrasound imaging diagram

Some benefits of Ultrasonography are given below:
1. The process give high resolution
2. This process is painless
3. This process can examine the blood flow
4. This process is good for imaging any tissue or bone that have air like lungs
5. It provide real time information

There is some risk factors in using ultrasound are:
1. This process produce image with low quality
2. This is time consuming process
3. This process is depend on operator
4. This process does not have any standard guideline

2.5 ELASTOGRAPHY

The medical imaging technique that recognizes the tissue relies on elasticity or stiffness is known as Elastography. This technique is a non-invasive medical imaging technique [12, 13]. There can be tactile imaging, elasticity imaging, optical elasticity imaging or magnetic resonance elasticity imaging. The first elasticity that is used for medical imaging is Ultrasound Elastography. To get the images of biomechanical properties of soft tissues Ultrasound Elastography is widely used in clinical diagnostic applications [14-17]. The magnetic resonance elasticity evaluates the mechanical properties of soft tissues [18-22].

Some benefits of Elastography are as follows:
1. This technique produce high frame rate
2. It produce a non-invasive medical imaging
3. By using this technique mechanical properties of soft tissues can be measure
4. This technique provide immediate Results
5. It uses non-ionizing and Noninvasive radiation

There is some risk factors in using Elastography are:
1. The images produce by this technique has low resolution
2. the Elastography is influenced by Elastography images by enhancing the applied pressure
3. this technique cause the stiffness in tissues

III. CONCLUSION

In most recent couple of years Medicinal imaging advancement has experienced a shocking change. For a few restorative purposes the strategies or strategy that utilizations to take the picture of human body is known as Medical imaging. In analysis or therapeutic reason including the learning of capacities and typical life systems the Medical imaging is utilized. In the therapeutic field it is utilized generally in light of the fact that the picture innovation and PC has been created on enormous scale. Medical issue determination is totally dependent on the productivity, precision and nature of picture processing. In most recent couple of years Medicinal imaging advancement has experienced an exciting change. For a few medicinal purposes the strategies or procedure that utilizations to take the picture of human body is known as Medical imaging. In determination or medicinal reason including the learning of capacities and ordinary life structures the Medical imaging is utilized. It is the piece of fuses radiology, microscopy, therapeutic photography, thermograph and natural imaging on enormous premise.

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