NATIONAL INSTITUTE OF TECHNOLOGY
RAIPUR

BIOMEDICAL ENGINEERING

ASSIGNMENT

Medical Devices

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1 PACEMAKER

A Pacemaker is a device that sends small electrical impulses to the heart muscles to maintain a suitable heart rate or to stimulate the lower chamber of the heart(ventricles).A pacemaker may be used to treat fainting spells(syncope)congestive heart failure and hypotonic cardiomyopathy.

1.1 MEDICAL USES

A pacemaker is implanted to help control your heartbeat. your doctor mat recommend you a temporary pacemaker when you have a slow heart(bradycardia) after a heart attack,surgery or medication overdose but your heartbeat is otherwise expected to recover.

1.2 MECHANISM

it sends an electrical impulse to make your heart beat.the job of pacemaker is to artificially take over teh role of sinus node if it's not working properly. Electrical impulse are sent by the pacemaker device to tell the heart to contract and produce a heartbeat.

1.3 TYPES OF PACEMAKER

1.3.1 SINGLE CHAMBER PACEMAKER

This types of pacemaker has one lead that connects the pulse generator to one chamber of your heart. For most we use the single- chamber pacemaker tocontrol heartbeat pacing by connecting the lead to your right ventricle(lower heart chamber).

1.3.2 DUAL CHAMBER PACEMAKER

with two leads, this device connect to both chamber on the right side of your side of your heart,the right atrium and the right ventricle. the doctor programe the dual-chamber pacemaker to regualte the pace of contraction of both chambers.

1.4 ADVANTAGES

By regulating the heart rhyme a pacemaker can often elimate the symptoms of bradycardia.This means individuals often have more energy and less shortage of breath.

2 CT SCANNER

A Computerized tomography(CT) Scan combines of aseries of Xray images taken from different angles around your body and uses computer processing to create cross-sectional images(slices) of the bones ,blood vessels and soft tissues inside your body. CT SCAN imags provides more detailed information the plain Xray do.

2.1 HOW DO CT SCAN WORK?

They use a narrow X-ray beam that circles around one part of the body.this provides a series of images from many different angles. A computer uses this information to create a cross -sectional picture.Like a piece in a loaf of bread, this two dimensional(2D)scan shows"slice" of the inside of body.This process is repetedto produce a number of slices.the computer stacks these scan one on top of the other to create a detailed image of your organ,bones or blood vessels. For example,a surgeon may use this type of scan ton look at all sides of atumor to prepare for an operation.

2.2 HOW DO I PRAPARE FOR CT SCAN?

your healthcare provider will give your instructions on how to prapare for your scan On the day of the exam,you should pay attention to:

2.2.1 ARRIVAL

you should plain arrive early,depending on your healthcare provider's instructions.Arriving early helps the testing stay on schedule.

2.2.2 BLOOD TEST

you may need a blood test before act scan the blood test will make sure the healthcare providers to choose the right dye.

2.2.3 DIET

for four hours priors to your exam please do not eat solild foods. You should drinks fluids such as water,juice,or black decaffeinted coffee or tea. some CTscan exams, particularly abdominal CT scans may require that you drink water or an oral contrast so we may better visualize structure within the abdominal area.

2.3 HOW LONG DOES IT TAKE TO GET RESULT

The result of the scan usually take 24 hours. A radiologist a physicians who specializes in reading and interpreting CT scan and other radiologic images,will review your scan and prepare a report that explains them. In an emergency setting such as, hospital or emergency rooms,healthcare providers often receives results within an hour.

2.4 USE OF CT SCANER

Doctor order CT scan for along list of reasons:

2.4.1 CT Scan can detect bone and joint problems, like complex bone fractures and tumors

2.4.2 if you have a conditions like cancer,heart diseases,emphysema or liver masses,CT scan can spot it or help doctors see can changes

2.4.3 they show internal injuries and bleeding,such as those caused by car accident

2.4.4 they can help locate a tumor blood clot,excess fluid, or infection

2.4.5 Doctors use them guide treatment plans and procedures,such as biopsies,surgeries, and radiation therpy.

2.4.6 Doctors acan compare CT scan to find out if certain treatment are working.for examples,scan of a tumor over a time can show wheather its responding to chemotherpy or radition

2.5 ARE THERE ANY RISK?

CT SCAN use Xray, which produce ionzing radition. Research shows that kind of radition may damage your DNA and leaads to cancer.But the risk is still very small–your chances of developing a fatal cancer because of CT scan are about 1 to 2,000.

3 VENTILATOR SYSTEM

Ventilator system are machines that blow air-or air with extra oxygen-into your airways and your lungs. your airways are pipes that carry oxygen-rich air to your lungs when you breath in. they also carry carbon dioxide(a waste gas)out of your lungs when you breath out.

3.1 WHAT DO VENTILATOR D0?

a ventilator is a device that supports or creates the process of breathing by pumping air to the lungs. sometimes,peoples refers to it as a vent or breathing machine.

3.2 ROLE OF VENTILATORS IN COVID-19

A ventilators is a device that supports or takes over the breathing process,pumping air into the lungs.People who stay in (ICU) may needs the supports of a ventilators.this includes peoples with severe COVID-19 symptoms.Before COVID-19 became a pandemic a need for ventilation was one of the most common reason people received treatment in ICUS. since then, the demand for ventilators has increased.

3.3 TYPES OF VENTILATORS

3.3.1 face mask ventilators

3.3.2 mechanical ventilators

3.3.3 manual resusciators bags

FACE MASK VENTILATORS

-A face mask ventilators is noninasive method of supporting a persons breathing and oxygen levels. to use one,a person wears a mask that fits over the nose and mouth.

MECHANICAL VENTILATORS

-A mechanical ventilators is a machine that helps a patient breathe when they are surgery or cannot breathe on their own due to critical illness.

MANUAL RESUSCIATORS BAGS

- A manual resusciators bags is used to provide air by hand,if your patient is not breathing.the bag can use to give large breath after suctioning,a trach change or when ventilators circuits is being changed.

4 ENDOSCOPIC ULTRASOUND

an endoscopic ultrasound scan uses an endoscope with an ultrasound probe attached to create detailed pictures of internal organs and structure. AN EUS does not usually hurt but it can be uncomfortable, particularly when you first swallow the endoscopic.

4.1 MECHANISM OF VENTILATORS

Mechanical ventilation works by applying a poistive pressure breath and is dependent on the compilance and resistance of the airway system , which is affected by how much pressure must be generated by the ventilators to provide a given tidal volume of air entering the lungs during inhalation.

4.2 WHAT HAPPENS DURING AN ENDOSCOPIC ULTRASOUND SCAN?

EUS is aroutine test most commonly performed by inserting the endoscope into the upper part of the gut, as is described below. see the separte leafles,called Sigmoidoscopy and Colonoscopy for more information on the way the test is carried out on the lower part of the gut(the colon and rectum).

4.3 SIDE EFFECT OF ENDOSCOPIC ULTRASOUND

Most endoscopic are done without any problems.some people have a mildly sore throat for a day or so afterwards. youbmay feel tired or sleepy for several hours if you have a sedative.there is a slightly increased risk of developing a chest infection or penumonia following an endoscopy.

4.3.1 RAISED TEMPERATURE

4.3.2 DIFFICULTING BREATHING

4.3.3 BRINGING BLOOD

4.4 USES OF ENDOSCOPIC ULTRASOUND

An endoscopic ultrasound scan (EUS) can be used for a wide range of different things.

4.4.1 TO ACCESS DIGESTIVE (GASTROINTESTINAL)

4.4.2 TO ACCESS LUNGS DISEASES

4.4.3 HIGH FREQUENCY SOUND WAVES TO PRODUCE DETAILED IMAGES OF THE LINNING AND WALL OF DIGESTIVE SYSTEM

4.5 COST OF ENDOSCOPIC ULTRASOUND IN INDIA

In india it's cost it around RS 10,000 to 50,000/- it is an non-surgical procedure that is used to either observe or operates on the internal organs, tissues or vessesls of the body.

5 OXIMETER

oximeter is a procedure for measuring the concentration of oxygen in the blood. the test is used in the evalution of various medical conditions that affects the function of heart and lungs.

HOW IS OXIMETRY DONE ?

this is done using an oximeter a photoelectric device specically designed for this purpose A reuseable probe can be placed on the finger or a single use tape prob is placed on the earlobe or finger.

5.1 WHAT IS A PULSE OXIMETER

The oximeter most commonly used today are called pulse oximeters because they respond only to pulsations, such as those in pulsating capilliaries of the area tested.

5.2 HOW DOES A PULSE OXIMETER FUNCTION

A pulse oximeter works by passing a beam of red and infrared light through a pulsating capilary bed. the ratio of red to infrared blood light transmitted gives a measure of the oxygen saturation of the blood. The oximeter works on the principal that the oxigented blood is a brighter. color of red than the deoxygenated blood, which is more blue-purple.First the oximeter measures the sum of the intensity of both shades of red representing the fractions of the blood with and without oxygen.the oxymeter detects te pulse and then subtracts the intensity odf color detected when the pulse is absent the remaining intensity of color represent only the oxgented red blood.This is displayed on the electronic screen as a percentage of oxygen saturation in the blood.

5.3 BENEFITS OF PULSE OXIMETRY

pulse oximeter are usefull for people who have conditions that affects blood oxygen levels pulse oximetry can help.

5.3.1 mointer oxygen saturation over time

5.3.2 alert to dangerously low oxygen levels, particularly in newborns

5.3.3 offer peace of mind to people with chronic respiratory or cardiovascular conditions

5.3.4 assess the need for supplemental oxygen

5.4 WHY WOULD I NEED THIS TEST

your doctor will use pulse oximetry whenever they think that your blood-oxygen levels could be too low.the device can help:

5.4.1 Diagnose suymptoms like shortage of breath

5.4.2 Track your blood oxygen level during surgery

5.4.3 Test oxygen levels when you use supplemental oxygen

5.4.4 show if you need extra oxygen when you exercise

YOU MIGHT MIGHT A PULSE OXIMETRY IF YOU HAVE

5.4.5 HEARTATTACK

5.4.6 HEARTFAILURE

5.4.7 COPD

5.4.8 LUNG CANCER

5.4.9 COVID-19

5.4.10 ASTHMA

5.5 BEST OXIMETER IN INDIA

5.5.1 DR TRUST FINGERTIP PULSE OXIMETER

5.5.2 MICROTEX FINGER PULSE OXIMETER

5.5.3 DR MICROTEK P0-09 PULSE OXIMETER

5.5.4 CHOICEMMED FINGERTIP PULSE OXIMETER MD300CN34

5.5.5 ELKO EL-560 FINGERTIP PULSE OXIMETER

5.5.6 VANDEKAN PULSE OXIMETER