

Original Article: Diagnostic and treatment methods in inversion ultrasounds

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ABSTRACT

During the examination by these imaging methods, the patient can be treated in parallel, when the catheter enters the brain to rupture. Blood vessels (aneurysms) or blocked blood vessels can also be used for injections. Medicines to the treated area (e.g. spine). In addition to these classic diagnostic options, it is possible to intervene measures to eliminate pathological conditions: Widening of the narrowing of vessels, re-evaluation of vascular obstruction (thrombosis), and closure of vascular malformations (aneurysm). Whenever we find out what is happening in the brain, the patient is sent to a neurologist. Has the patient had bleeding in the brain or trauma, or is it flaccid paralysis, MS or a suspected brain tumor? A neuro radiologist uses imaging techniques to find out which disease is present. Patients are also referred to neuroradiology in cases of acute injury, for example after an accident, to find out if there is a circulatory disorder and what its nature is. Neuroradiology is still used X-ray diagnosis, but has declined in favor of modern diagnostic techniques because it cannot visualize the brain itself. However, imaging of the skull bones is very accurate. Therefore, this examination method is often used for suspicious accidental patients. Skull base fracture angiography is standard for examining cerebral hemorrhage in the form of a vascular bulge. (Aneurysm) is also based on x-rays where contrast material is used for marking. The vessels in order to produce an X-ray image on this basis computed tomography (CT) detects both the bones of the brain and what is happening inside, such as bleeding. The patient is placed through an X-ray tube. It creates cross-sectional images. CT angiography can also be used to visualize the vessels responsible for blood flow in the brain after a contrast agent is administered. However, CT has its limitations in seeing minimal changes or injuries, in which case MRI is created.

Introduction

The Magnetic resonance imaging (MRI) visualizes the brain. Contrast density within high-resolution brain tissue using iodine-containing contrast agents. Hydrogen atoms are excited using a powerful magnet and placed

in an external magnetic field, atomic nuclei emit signals necessary for examination and allow cross-sectional images to be made. Functional magnetic resonance imaging (fMRI) shows how the brain works and increases blood flow [1-3]. Brain function is indirectly measured by blood flow. Nerve cells need energy to function

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properly. The brain is the organ that consumes the most energy. Positron emission tomography produces cross-sectional images just like MRI [4-6]. However, the difference is that synthetic tracers are injected to visualize the process of brain metabolism. The doctor will first clarify whether the patient has a history of allergic reactions to contrast agents, individual components, or tracers. Some diabetes drugs such as Juformin, Siofor [7-9], Glucophage or Diabesin cause a contraindication for the contrast material. In conditions of kidney failure, the contrast material of imaging techniques based on it should not be used because it is excreted through the kidneys. If the patient takes medication regularly, he should not stop it at his own risk before the examination, but should consult his family doctor. Tracers are mixed, exogenous (synthetic) or endogenous radioactive materials used to treat or visualize cancer cells [10-13].

What is radiology used for?

Radiology is used for a wide range of conditions and is classified depending on the type of radiology and imaging test used. Various imaging tests are:

X-rays: X-rays or plain radiographs are used to view the bones, chest, or abdomen. X-rays are mostly used to examine denser structures, such as bones, which appear white. X-rays may be used alone to diagnose conditions such as fractures, pneumonia, or intestinal obstruction. But for a definitive conclusion, additional imaging studies are needed. For example, chest X-rays may sometimes detect lung cancer, but 20 to 23 percent of these tumors were missed in people with lung cancer symptoms in one study. Some fractures (such as hairline fractures) may only be seen with an MRI [14-17]. Specialized X-ray techniques are used to screen for specific conditions. For example, digital mammography is an X-ray technique that uses low-dose radiation to detect breast cancer. Also,

panoramic X-rays are used to diagnose dental diseases.

CT (Computed Tomography): CT takes pictures of the patient from several angles of X-ray radiation using a solvent-shaped device and then creates computer-processed images. A CT scan provides more detail than an X-ray or radiograph and can better define areas where tissues overlap. A CT scan can detect smaller abnormalities than a regular X-ray.

Magnetic Resonance Imaging (MRI): MRI uses computer-processed magnetic fields and radio waves to create images. MRI is often a better test for evaluating the soft tissues of the body, such as the brain, spinal cord, nerves, muscles, tendons, and breast tissue [18-20].

By diagnosing disorders of the brain and spinal cord and peripheral nerves, MRI allows doctors to examine the patient's condition and treatment process. For example, doctors can now diagnose multiple sclerosis with an MRI, a diagnosis that before MRI was available was limited to evaluating symptoms (and could only be confirmed by autopsy) [22-25]. For breast cancer screening, MRI is more accurate than mammography, but its higher price makes it impractical for people without underlying breast cancer risk factors such as a strong family history, BRC mutation, or a history of childhood cancer. Mammography is a quick and very inexpensive technique that may be more accurate in the early detection of breast cancer in the future [26-28].

Mammography: X-rays with special power that are irradiated to the breast tissues and will be photographed.

Ultrasound: Ultrasound uses sound waves to create moving images that are displayed on a monitor, which is commonly used for echocardiograms and examination of the uterus during pregnancy. Ultrasound, known as a method of examining the fetus during

pregnancy, is especially useful for certain conditions. Medicine is useful [29-31].

What is interventional or international radiology?

Many people get diseases that may be unknown even to the doctors themselves. Medical errors or lack of correct diagnosis are common problems that plague many people. For this reason, scientists and researchers are always looking for the discovery and production of devices and methods that can be used in medical science to diagnose and treat the disease with the least complications and damage and the most accuracy. One of the achievements and methods that are used by doctors with great

accuracy and minimal side effects and are used for correct diagnosis and disease management is called interventional radiology [32-35]. Interventional or international radiology is one of the specialized branches of radiology in which diagnosis is made using diagnostic imaging devices such as ultrasound, CT scan, MRI, and fluoroscopy. The use of interventional diagnostic methods increase the accuracy of diagnosis and treatment methods are performed directly in interventional radiology. These methods include targeted drug delivery with catheters, placement of medical devices such as stents, and angioplasty of very narrow vessels [36-38].



Figure 1. Interventional Radiology for Cancer

Advantages of interventional radiology

1. Patient recovery in a much shorter time;
2. Reducing hospitalization time and reducing the amount of specialized patient care;
3. Reducing complications such as pain, infection, bleeding, etc [39-41];
4. Not using anesthesia.

Biopsy or sampling under imaging

Biopsy, or sampling with X-ray imaging devices, is one of the most accurate methods for diagnosing all types of tumors and body lesions. In this method, a thin needle is inserted into the desired tissue under the guidance of imaging devices and a sample of it or tissue tumors is

removed. This sample will be sent to the pathology laboratory for examination [42-47]. Today, biopsy has replaced sampling with open surgery.

Bile duct stenting

Metal stenting is another treatment method to remove the blockage of the bile ducts, which is performed under the guidance of an imaging device with local anesthesia [48-52]. In this way, the location of the stenosis is identified by the imaging device, then the blocked path is opened by a special spring and balloon, and a metal stent is placed in the stenosis, thus opening the natural path of bile to the intestine.

RF disk

In this method, the ruptured or herniated part of the disc is thermalized by radiofrequency waves, which is performed under the guidance of the imaging device [53-55].

Drainage of bile

For patients whose bile duct obstruction has caused jaundice and itching, a special catheter is placed under the guidance of the imaging device along with local anesthesia in the path of obstruction [56-60]. In cases where severe obstruction makes it impossible to pass the catheter through the stricture, the end of the catheter is connected to a bag and the bile is directed out of the abdomen to prevent the accumulation of bile in the bile ducts [61].

Abscess drainage

Catheterization of abdominal, pelvic, etc. abscesses is under the guidance of the imaging device with local anesthesia in order to remove the abscess and infection and is connected to the bag through an interface and drainage is established [62-68]. This catheter is fixed on the skin by suture thread and fixator so that the catheter does not come out. After the complete drainage of the abscess and imaging, the catheter is removed from the body for complete assurance [69].

Evacuation of all types of cysts

Abdominal, ovarian, breast, liver, etc. cysts are sent to the laboratory under the guidance of the imaging device with local anesthesia by special needles for evacuation and for cytology [70].

Embolization in interventional radiology

Embolization, or embolotherapy, is a semi-invasive procedure used to block blood vessels, stop or prevent bleeding. Disabling structures such as tumors is also one of the uses of embolization, which is done by reducing blood supply to the tissue. In this method, objects or

substances are introduced into the blood supply system under the guidance of imaging devices to block the target vessel [71-73]. These objects and materials include items such as coils, ethanol, microspheres such as polyvinyl alcohol (PVA), gelatin sponges (gel foam), etc.

Sampling of fetal placenta

Sampling of fetal placental villi or CVS is done to detect genetic abnormalities during pregnancy. This test is performed under the guidance of ultrasound images in the 11th week to the 14th week. First, an anesthetic is injected into the mother, and then the sampling needle is inserted into the uterine wall under ultrasound guidance and a sample is taken from the placenta. Using this method, problems and diseases that the fetus may be suffering from can be diagnosed.

Embolization

This is a method to block blood vessels to the desired area, such as uterine fibroids, hemangioma, and vascular masses that cause lack of blood supply to the desired area and thus cause that area to be inactive. In prostate artery embolization, first, under the guidance of the imaging device, a special catheter is inserted into the desired artery through the right groin, and after angiography and preparation of the necessary images, the micro catheter is inserted into the desired artery and injection of blocking substances is performed.

Amino synthesis

Amino synthesis is the same as aspiration. Pulmonary aspiration is a medical term for a situation in which an object or food enters a person's trachea and lungs; But it also has another meaning that in this section we mean aspiration refers to a medical procedure in which the doctor uses a suction tube or syringe to remove unnecessary fluids from a part of the body. Diagnosis is before birth and is done under the guidance of an ultrasound machine. It is

better to do this in the 14th to 18th weeks of pregnancy.

Angiography

Angiography is another new imaging method to diagnose vascular abnormalities such as blockage, aneurysm, AVM, etc. Angiography is performed under the guidance of an imaging device with local anesthesia. This work is done in such a way that a special catheter is inserted from the right groin into the intended vessels and by injecting contrast material, the necessary images are taken which have diagnostic value.

Conclusion

Another non-surgical method for the treatment of varicose veins is the varicose laser, which by passing the laser fiber into the defective vein and irradiating the laser beam, it blocks the path of the vein and removes this area from the blood supply network, resulting in the treatment of varicose veins. When a vascular mass (which is usually congenital and has a very slow growth) appears in the path of the artery, it causes a disturbance in the quality of life of the person. In this situation, it is necessary to take special treatment measures. In this way, first, under the guidance of the imaging device through the right groin, a special catheter enters the vascular mass, and after performing angiography and preparing the necessary images with special springs and adhesives, the vascular mass is closed and its rupture can cause bleeding. prevented. It is a very minimally invasive method that uses a special endoscope to enter the ruptured disc space and remove the parts that cause a compressive effect on the spinal cord and free the spinal canal. Usually, sampling of thyroid nodules (nodules) is done by examination by a doctor; But in cases where these nodules are not palpable or small, or are located deep in the thyroid tissue, these nodules can be sampled by ultrasound guidance with a special sampling needle.

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