



Essential of Muskelesketal Ultrasound

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ABSTRACT

Ultrasound is not an ideal imaging modality for an air-filled bowel or obtuse bowel organs. In most cases, barium test, CT scan and MRI are the methods of choice in such an environment. Also, this method is difficult to penetrate the bone and therefore can only see the outer surface of bony structures and not what is inside, except in infants. To visualize the internal structure of certain bones or joints, other imaging methods such as MRI are usually used. Ultrasound tools can help physiotherapists at the bedside in examining the morphology and quality of muscles and soft tissue and even muscle function from initial evaluations and following up the treatment process to evaluating the outcome of the treatment, and it plays an important role in quantifying and increasing the accuracy of physiotherapy evaluations. Also, this tool can significantly increase accuracy in finding trigger points and guiding the needle in dry needling of muscles, especially deep muscles, and can be effective in feedback to patients.

Introduction

Ultrasound is a safe and reliable tool. So far, ultrasound has been used repeatedly for research in the field of physiotherapy, but the clinical use of musculoskeletal ultrasound (MSK) in physiotherapy has recently received attention in the world [1], and there are recommendations to introduce this tool in the physiotherapy clinic. Therefore, the advantages of ultrasound in physiotherapy include the following:

- ❖ Evaluation of many muscle injuries, tendons, fascia and even bones and joints.
- ❖ Investigating the improvement rate of musculoskeletal injuries during treatment sessions [2-4].
- ❖ Qualitative and quantitative evaluation of muscles statically and dynamically in order to check motor control and also give feedback for proper muscle contraction and check the amount of muscle changes during therapeutic exercise [5].
- ❖ Finding trigger points and dry needling with a sono guide in order to insert

acupuncture needles with great precision into the target muscles and trigger points.



Figure 1. Ultrasounds during Pregnancy: What You Need to Know - Century Medical & Dental Center

Types of ultrasounds

There are basically seven different methods, but the basic process is the same. The different types of methods are:

1- Transvaginal ultrasound: They are used to produce ultrasound images inside the vagina, and

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transvaginal ultrasound is often used during early pregnancy [6-8].

2- Conventional ultrasound: an examination that uses a transducer and takes place in different areas of the body such as the abdomen to produce two-dimensional images of the developing fetus [9-11].

3- Specialized ultrasound: This examination is similar to a normal ultrasound, but this type of examination targets a suspected problem and uses more complex equipment. For the ultrasound, you must wear comfortable clothes and suitable pants. Clothing and jewelry may have been examined in the area and need to be removed [12-15]. You can also read the following articles to prepare for ultrasound:

- ✓ Necessary preparations before doing adult ultrasound for people over 12 years old.
- ✓ Necessary preparations before doing ultrasound for children under 12 years old.



Figure 2. Transvaginal Ultrasound: Is it Necessary for Your Medical Center?

Ultrasound of the liver

Ultrasound of the liver is used to check the condition of the liver and blood vessels. Liver ultrasound is used in different conditions. Some of these conditions include:

- ✓ To diagnose hepatitis or inflammation of the liver.
- ✓ Diagnosis of fatty liver disease [16-18].
- ✓ Examination and diagnosis of liver cancer, liver fibrosis, cirrhosis and liver failure.
- ✓ To check for damage to the liver caused by the immune system's mistaken attack on it.
- ✓ If there are any symptoms of liver disease such as jaundice [19-21].

Liver ultrasound does not require special preparation. Just fast to do it. Doing this usually takes no more than 15 minutes, during which you lie on a special table and the doctor places the ultrasound probe on the upper right side of the abdomen. It should be noted that it is not possible to diagnose diseases related to the liver by only relying on the results of liver ultrasound, and other tests are also needed.

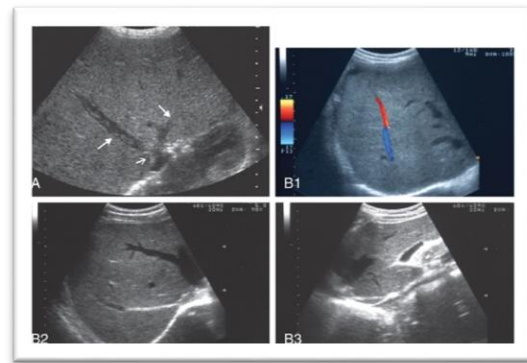


Figure 3. Conventional ultrasound findings in chronic liver disease

Abdominal ultrasound can check the condition of blood vessels and abdominal organs. Gallbladder, pancreas and spleen are among the organs that can be checked with the help of abdominal ultrasound. You should avoid eating and drinking 8 to 12 hours before the abdominal ultrasound [22-24]. The reason for fasting for an abdominal ultrasound is that the food trapped in the stomach and intestines prevent the sound waves from reaching the abdominal organs [25-27].

Of course, the reason for doing an abdominal ultrasound is whether you are fasting or not. It is better to consult your doctor about this issue. To perform an abdominal ultrasound, first a special gel is spread from the head to the head of the abdomen, and the inside of the abdomen can be seen by massaging the probe of the device [28-30]. Sound waves are reflected as soon as they hit the abdominal organs, but in some cases, this may not be done well. Food inside the stomach, flatulence or obesity are among these reasons. It takes 30 minutes to perform the entire abdominal ultrasound process [31-33].

Pregnancy ultrasound

One of the most common types of ultrasounds is related to pregnancy. This is done to ensure the health of the mother and fetus. Ultrasounds that are performed during pregnancy can be divided into two general categories:

Ultrasound in the second and third trimester of pregnancy: In this period of pregnancy, ultrasound is used for reasons such as gender determination, diagnosis of Down syndrome and birth defects, or diagnosis of miscarriage. Three-dimensional ultrasound, NT or gender determination ultrasound are among the types of pregnancy ultrasound that we introduce below:

1- Gender determination ultrasound: in 98% of cases, it is possible to determine whether the fetus is a girl or a boy by using gender determination ultrasound. Gender determination ultrasound is used to observe possible abnormalities and determine the gender of the baby [34-36].

2- NT ultrasound: NT ultrasound is one of the tests performed at the end of the first trimester of

pregnancy. This type of ultrasound is performed to detect chromosomal abnormalities. In many cases with chromosomal disorders such as Down syndrome, interstitial fluid accumulates in the nuchal node (a small area of the neck post). Using NT ultrasound [37-39], it is possible to detect the accumulation of interstitial water in this part. Of course, the diagnosis made through ultrasound is not definitive, but if the results are confirmed, genetic screening can be done for a definitive diagnosis.

3- 3D ultrasound: 3D ultrasound is another pregnancy ultrasound that is used to check the health of the fetus. Some problems may not be correctly diagnosed in conventional ultrasound, in which case 3D ultrasound is needed for diagnosis [40].

4- Rectal ultrasound: Another ultrasound which is one of the common imaging methods to diagnose prostate problems is called rectal or anal ultrasound. In this ultrasound, the special series of the device enters the anal canal and uses sound waves to image the anal organs [41].



Figure 4. Abdominal ultrasound

Disadvantages and advantages of ultrasound

So far, no risks or side effects have been reported for ultrasound. So, we can conclude that it is almost safe. In other imaging, X-rays are used, which are dangerous for the body, but there is no X-ray in ultrasound. Ultrasound is a valuable method, but one of its disadvantages is that it is not suitable for imaging parts of the body that are bloated. It also cannot be used to image bones. With the help of ultrasound, it is not possible to detect objects hidden deep in the body. In such situations, tests such as CT scan or MRI are needed [42].

Advantages of ultrasound

Ultrasound has many advantages, some of which are:

- ✓ They are usually painless and do not require needles, injections or incisions.
- ✓ Patients are not exposed to ionizing radiation, which makes this procedure safer than diagnostic techniques such as X-rays and CT scans. In fact, there are no known adverse effects when used directly by a health care provider.
- ✓ Ultrasound provides images of soft tissues that do not show up well on X-rays.

- ✓ Ultrasound is widely available and cheaper than other methods [43].

What is Doppler ultrasound?

Doppler ultrasound is one of the types of ultrasound methods. Doppler sonography is a type of ultrasound that is used in the diagnosis and treatment of various types of diseases. One of the most important uses of Doppler sonography is to check fetal heart rate and blood flow. In this way, the speed and direction of fetal blood flow is checked and determined in Doppler sonography [44]. In this way, the results of Doppler ultrasound are useful in checking the normality of fetal growth and the supply of sufficient blood and nutrients to the tissues during pregnancy.

Doppler ultrasound interpretation

Doppler sonography as part of an ultrasound examination that, in addition to being used to examine fetal blood flow, evaluates blood flow along major arteries and inlets in the abdomen, limbs, and neck, to identify problems such as narrowing of arteries or clots [45]. Black vein is used. To perform Doppler sonography, a hand-held transducer called a transducer is moved on the skin and above the blood vessel, and the ultrasonic waves are amplified by a microphone and sent and received through the transducer. In fact, Doppler ultrasound is such that the movement of blood cells causes changes in the reflection and return of the reflected sound waves, which is called the Doppler Effect. It should be noted that in the absence of blood flow, the return waves will remain unchanged [46].



Figure 5. Ultrasound Exposure during First Trimester Can Heighten Autism

Conclusion

Regarding how to do a pregnancy Doppler ultrasound, it should be said that the procedure is exactly the same as a normal ultrasound. In this way, you, dear lady, lie on your back or side on the bed for the Doppler ultrasound of pregnancy. The radiologist or sonographer moves a transducer device gently over your abdomen and over the blood vessels. The transducer amplifies the ultrasound waves inside the vessels and then receives it through the microphone. As we said, Sono Dalper has many

uses. In this way, Doppler sonography in pregnancy can examine the speed of blood flow in fetal vessels and detect the direction of blood flow or the presence of blood clots. Among the most important uses of Doppler sonography in pregnancy are:

- ✓ Examination of fetal blood flow.
- ✓ Placental blood flow control.
- ✓ Control of fetal umbilical cord blood flow.
- ✓ Examination of blood flow to the heart and brain of the fetus.

Maybe you have a question, what is the reason for doing Doppler sonography in pregnancy? In response, it should be said that two ultrasounds are performed to diagnose and ensure the normal growth of the fetus during pregnancy, one in the first trimester and the other in the second trimester. If the doctor detects any abnormality during these ultrasounds, he will do a Doppler sonography for the final conclusion. Be careful that the best time to do a Doppler ultrasound is 18 to 20 weeks of pregnancy at the same time as the fetal anomaly scan ultrasound. Doppler sonography can detect the restriction of blood flow in the fetus. Restricted blood flow can lead to low birth weight, stunted growth, and reduced size. A special type of Doppler ultrasound called "transcranial Doppler" is also performed to estimate stroke in children with sickle cell anemia.

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Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

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