Ultrasound Imaging

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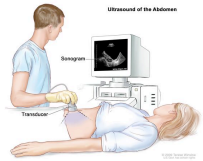
***Abstract*— Ultrasound imaging is a very important technology that many medical professional utilize regularly. This technology has been around for decades. This technology is used in various forms including checking on pregnancies, aiding with distributing medicine into the body, and in surgery to get to specific places.**

I. Introduction

Ultrasound has been around for a very long time. In 1942 Karl Dussik used the ultrasound for the first time to diagnose a patient with brain tumors off this machine [1]. Since then it has been used to treat and determine all types of medical problems. It is a non-invasive procedure to diagnose problems within the body, however it does not work well on bone or organs that have air pockets [2]. The transducers produce sound waves that run a frequency much higher than humans can hear, and from there the sound waves reflect off the internal organ and return towards the transducer and the signals are then turned into images to the tissue and organs [2]. The images can be displayed in 2D and 3D images.

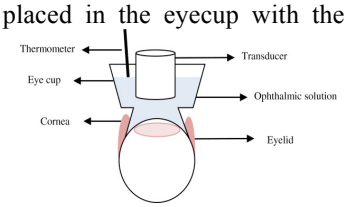


II. Ultrasound-guided tendon fenestration

Many people relate ultrasounds to pregnant women. Which is very true. They are very good at showing how the baby is doing and if there are any troubles with the pregnancy. However they can be used for much more than that. In one case study dealing with the injections the ultrasound aided in injecting the medicine the best way possible for the patient. The ultrasound is first used to establish that the patient has tendinitis. Once it is established the transducer is used to figure out the most optimal to insert the needle into the arm. Once found a mark is put on the skin to indicate where the needle to be put, the skin is prepped and then the needle is inserted into the arm and using the ultrasound the needle is guided the arm to the troublesome area and the steroid is injected into the arm. This minimalizes the pain and problems the can occur if the ultrasound is not used [3].

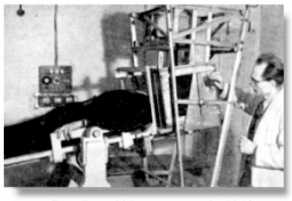
III. Drug Delivery

People are using ultrasounds to deliver drugs throughout the body. One particular case study is being used to deliver drugs to the eye of a rabbit. The drug would be delivered to the cornea. An eyecup is placed over the eye and the transducer is placed in the eyecup with the medicine. The transducer is set to several different frequencies. This study proves that ultrasound can be an effective tool in ocular drug delivery. However damage was done to the cornea of the rabbit's eye. More testing needs to be done on this matter to prove that is safe for people to use but it is a very good start towards making a very complicated area of the body more feasible to get drug delivery towards [4]. This can be very helpful dealing with different eye diseases that were before very difficult to treat.



IV. Discussion

Ultrasound technology has come a long way over the years. This technology has become more [5]


Dussik and his apparatus in 1946

[6]accurate and more precise. In the picture above and to the left was one of the first ultrasound machines used; it is very bulky and very large. The picture above and two the right is a new ultrasound and it is on wheels and very mobile. It is utilized in many different ways now than it was before. Before it could be used to help detect pregnancies and any issue that ensue with that. Today it does that but also aids in different procedures. Many doctors use it to distribute medicine in tough areas of the body with guiding needles to the specific area. Another new development is to use it in drug delivery. This creates a whole new field for ultrasounds and it shows that there are many possibilities for the uses of ultrasounds and they are very important to medicine today.

References

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[3] Mary M. Chiavara and Jon A. Jacobson Ultrasound-Guided Tendon Fenestration
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