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Diagnostic study of diseased Popliteal arteries of human leg

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Abstract

This research study was carried out to see the effect of diseased Popliteal arteries on the type of waveforms, so produced as a result of received echoes, during the Ultrasound procedure. The effect of diseased Popliteal arteries on the Ultrasonic waves was observed during the Ultrasound. The method targeted to find any change in the complete triphasic shape of waveform. 10 cases of diseased Popliteal arteries were observed by this method. The Result was the production of monophasic shape of waveform with little or prolonged portion of diastole on ultrasound image. This does not normally happens in the case of healthy Popliteal arteries. It is been concluded the formation of monophasic waveform with some portions of little or prolonged diastoles during the Ultrasound procedure is a clear and good symbol of diseased Popliteal artery.

Keywords: Diseased Popliteal arteries, Popliteal arterial Ultrasound, Effects of unhealthy Popliteal arteries, MW study of Popliteal arteries.

Introduction

A diseased Popliteal artery means which is unable to provide a required oxygenated blood supply for the connective tissues of knee and the next lower limb arteries. This happens due to cholesterol or fat deposition inside the walls of Popliteal arteries. Such depositions lower the radius of the Popliteal artery and thus provides a narrow path for the flow of blood. This problem is very dangerous for normal human movement, because the Popliteal arteries surrounds the portion of knee, which plays a very critical role in the motion. In case the Popliteal artery is diseased, then a required oxygenated blood supply is not received by the connective tissues of knee, which further lowers the efficiency and growth of that tissue to help in the movement. In this way a part of human leg remains unable to help in the movement. So the diagnosis of such diseased Popliteal arteries is very important for treatment.

The use of Ultrasound to evaluate the blood flow inside the arteries was described by Satomura in 1959. Satomura concluded that this diagnostic method could be used to diagnose arterial disease.^[1] Johnston studied the effect of arterial diseases by using ultrasound waveform analysis in 1981, he concluded this method as an indicator of arterial disease.^[2] Evans studied the effect of stenosis present in arteries by using ultrasound waveform analysis method and concluded that changes correspond to existence of arterial disease.^[3] Waqas Akhtar studied the presence of blockages in lower limb arteries by Doppler Ultrasound and concluded that blood velocity, pressure and corresponding waveform assessment as an appreciable method in order to identify the presence of blockage in lower limb arteries.^[4] And later he studied the effect of atherosclerotic changes inside femoral arteries of lower limb and concluded that this method is easy and accurate for the detection of arterial diseases.^[5]

Popliteal arteries

Popliteal arteries start at the end of thigh region after the Femoral arteries and surround the knee portion of human leg. These arteries are responsible for the flow of oxygenated blood to the connective tissues of knee, which is most important part of human leg. Hence if the Popliteal artery is diseased then it will easily affect the performance of knee and movement is disturbed. So diseased Popliteal arteries gets much importance to be diagnosed by Ultrasound.

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Method and Materials

Cases under study were diagnosed with the help Logic 200 and Madison ultrasound machines. Method of locating the production of monophasic waveform with some diastole portions was used. Every patient was explained briefly about the procedure of the examination and the patient was laid straight for the diagnosis of diseased Popliteal arteries. The normal undiseased Popliteal arteries and its types show following pattern on ultrasound image waveform. This shape of waveform is called triphasic form of waveform.

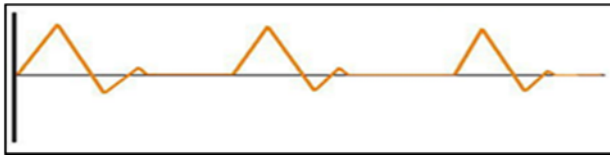


Fig: Triphasic type waveform of Popliteal arteries

The peak type portions above mean line are called as systole portions and downward peak type portion is termed as diastole portion. Diseased Popliteal artery produces a change in triphasic shape of waveform during ultrasound. This change is the production of monophasic shape with little or prolonged diastole for newly occurred or old diseased Popliteal artery. Sometimes a mild spectrum also occurs which makes it difficult to recognize the shape of waveform and thus indicates a completely diseased Popliteal artery. It can be said that production of such monophasic shape of waveform during the ultrasound of Popliteal arteries is a evident symbol for these arteries to be diseased. During this study each case was observed in this way, so as to have an indication of diseased of Popliteal arteries.

Results and Discussion

This study uses the process of Ultrasound for diagnosing diseased Popliteal arteries by observing any characteristic change in the triphasic shape of waveform. Any change in this pattern is due to decrease in the radius of Popliteal arteries.

In case if the Popliteal artery is completely diseased or diagnosed very late then the mild spectrum is obtained in the ultrasound image. It should be clearly noticed that second portion of systole does not occur in the formation of monophasic shape of waveform, however a little or prolonged diastole can appear on the mean line.

A patient (see image-01) whose Popliteal artery is diagnosed by ultrasound and monophasic shape of waveform with prolonged diastole is obtained, which indicated that old diseased Popliteal artery.

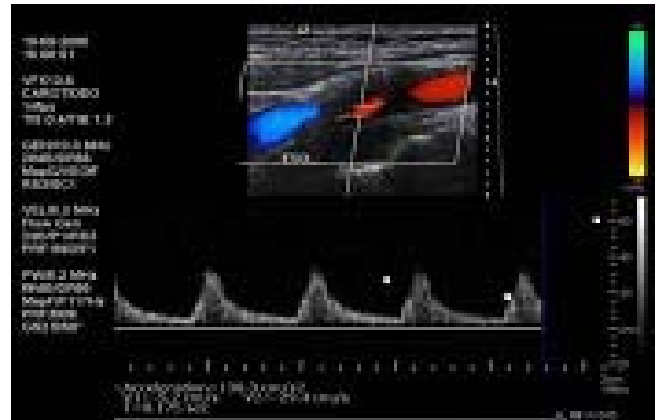


Image 1: Diseased Popliteal artery

A Patient (see image-02) whose Popliteal artery is diagnosed and it is seen that monophasic shape of waveform with prolonged diastole is obtained, thus indicating old diseased Popliteal artery.

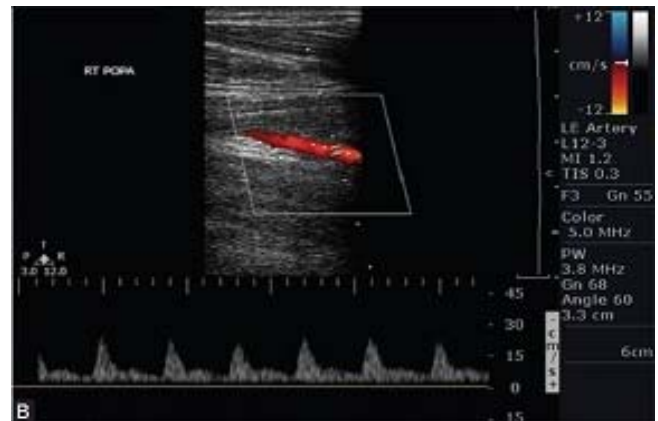


Image 2: Diseased Popliteal artery

A patient (see image-03) whose Popliteal artery is diagnosed by ultrasound and a monophasic shape of waveform with prolonged diastole is obtained, hence indicating a old diseased Popliteal artery.

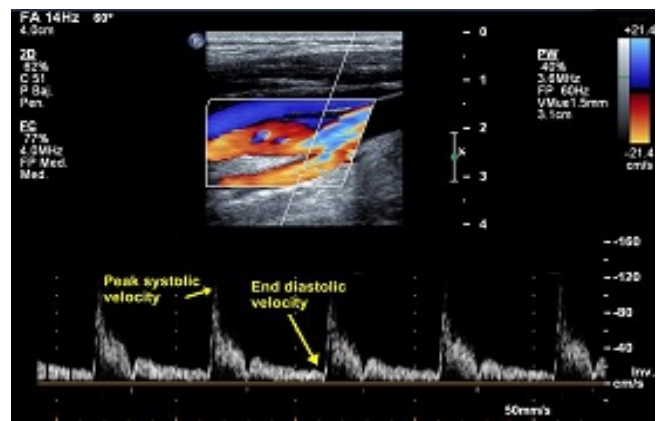


Image 3: Diseased Popliteal artery

A patient (see image-04) whose Popliteal artery is diagnosed by ultrasound and it is seen that a monophasic shape with prolonged diastole and little mild spectrum of peak systole is obtained. Thus indicating a late diagnosed diseased Popliteal artery.

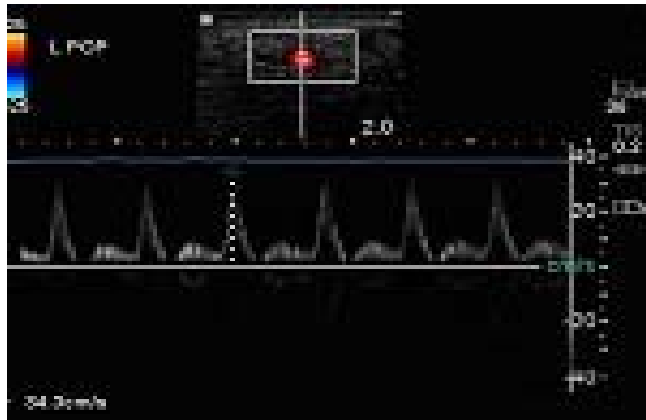


Image 4: Diseased Popliteal artery

A patient (see image-05) whose Popliteal artery is diagnosed with the help of ultrasound and it is seen that monophasic shape of waveform with little diastole is obtained, indicating a newly diseased Popliteal artery.

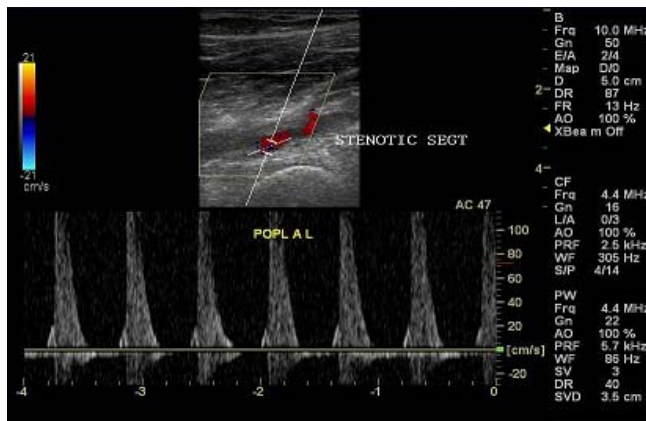


Image 5: Diseased Popliteal artery

A patient (see image-06) whose Popliteal is diagnosed by ultrasound and it is seen that a monophasic shape of waveform with a little portion of diastole is obtained, thus indicating newly diseased Popliteal artery.

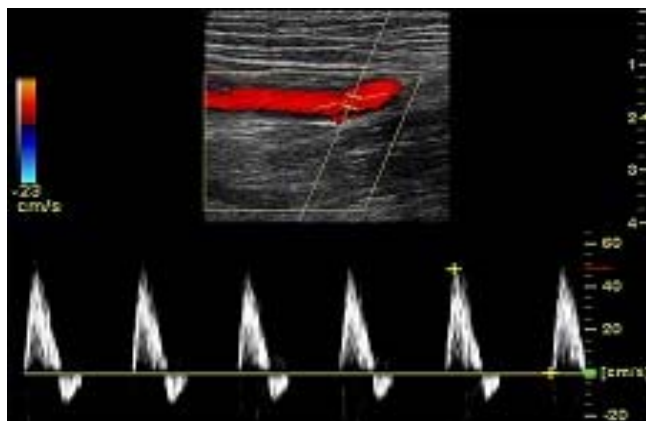


Image 6: Diseased Popliteal artery

A patient (see image-07) whose Popliteal is diagnosed by ultrasound and it is seen that a monophasic shape of waveform with prolonged diastole is obtained, thus indicating a old diseased Popliteal artery.

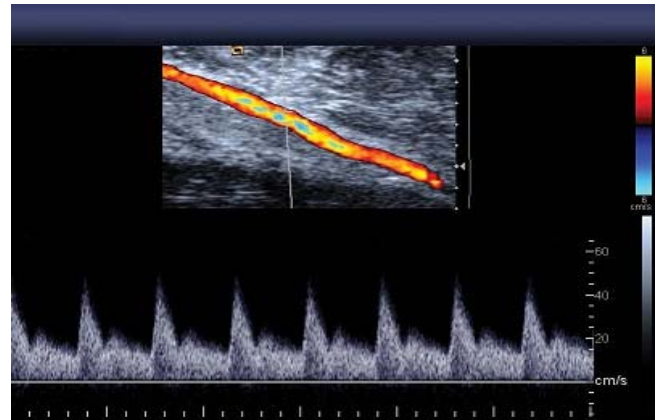


Image 7: Diseased Popliteal artery

A patient (see image-08) whose Popliteal is diagnosed by ultrasound and it is seen that a monophasic shape of waveform with little diastole is obtained, thus indicating a newly diseased Popliteal artery.

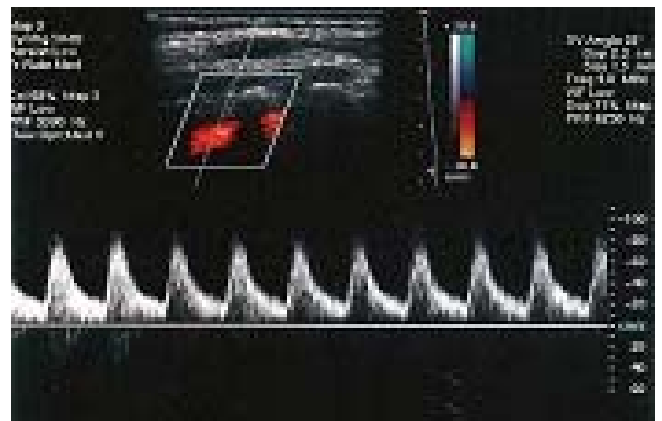


Image 8: Diseased Popliteal artery

A patient (see image-09) whose Popliteal is diagnosed by ultrasound and it is seen that a monophasic shape of waveform with prolonged diastole is obtained, thus indicating a old diseased Popliteal artery.

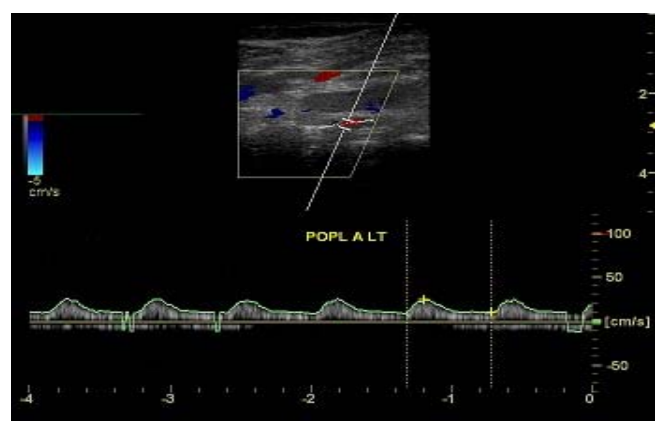


Image 9: Diseased Popliteal artery

A patient (see image-10) whose Popliteal is diagnosed by ultrasound and it is seen that a monophasic shape of waveform with little diastole is obtained, thus indicating a newly diseased Popliteal artery.

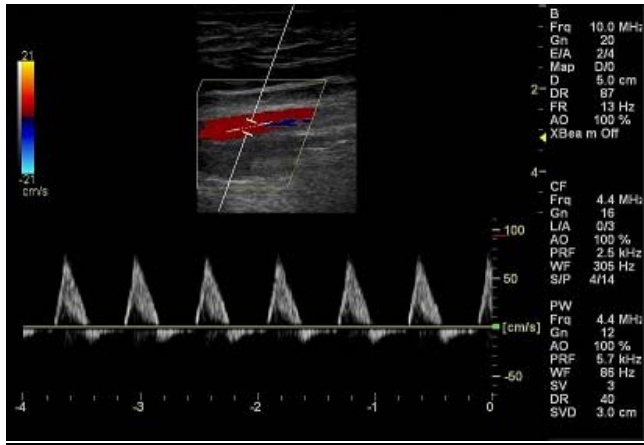


Image 10: Diseased Popliteal artery

Conclusion

It is been concluded that when any of diseased Popliteal artery is diagnosed, then it produces a change in triphasic shape of waveform. Instead of forming a complete triphasic shape, it produces of monophasic shape with little or prolonged portion of diastole depending upon the status of disease in Popliteal artery. Little diastole in monophasic means newly diseased and prolonged diastole means old

diseased Popliteal artery. So whenever such change is produced during the ultrasound of Popliteal artery, then it means that the Popliteal artery is diseased.

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