Title: The design of a novel stenosis flow phantom

Abstract:

Carotid stenosis and intracranial atheroscelorosis are lethal diseases that associated with high mortality and morbidity rates worldwide. There are various degrees of carotid stenosis(50%, 70%,and 90%), early and accurate diagnosis of these disease are vital to save human’s lives.

The purpose of this project is to conduct a literature review into the suitability of Doppler ultrasound flow phantoms for use in developing 3D angiography. Primarily conducting a search to explore the suitability of designing a flow phantom of the carotid artery with both branches and a stenosis. In order to gain a clear idea about the effects of disease in the continuity of the flow and producing a model of continues flow that is going to be tested with the Ultrasound machine.

Discussion: An electronic search of scientific databases was performed, including publications between (1970-2014) A simple model of carotid vessels have been developed primarily to try to adjust the main parameters for the rest of the search. Ultrasound is the first line investigative technique for the diagnosis of the carotid diseases in UK. Angiogram and computed tomography angiogram are available and provide a ‘route map’ of the vessels. However, the high cost and the high radiation doses the patients receive are main drawback of these two techniques. At present no Doppler angiogram has been produced, which is related mainly to the subjectivity of the ultrasound and the effects of heart rate on the continuity of the blood flow inside the vessels.

Conclusion: Based on the findings of this review, while there are flow phantoms, and anatomically correct phantoms, no combined phantom suitable for 3D ultrasound angiography has yet been made. Designing a flow phantom of the carotid with stenosis and bifurcation with acoustical properties that are close to the international electro-technical commission (IEC), might provide a robust method of producing a ‘Doppler angiogram’, which is he main purpose of the planned designed phantom.