ABSTRACT

The lack of realism in models of heads with neurological disorders is currently the main obstacle in carrying out aneurysm clipping procedures using keyhole surgery techniques for treating brain aneurysms. This research aims to improve head models with neurological disorders using 3D printing and optimize the concentration of silicone material in making aneurysm models. Through the application of 3D printing, a head model, a brain anatomy model and an aneurysm model were successfully developed. The use of PLA^{+} filament with 20% infill provides structural strength to the resulting head model. As a first step in making aneurysm and brain models, the mechanical characteristics of basic materials such as Silicone RTV H-00, Silicone Concrete 50, as well as additional materials such as Thickener C, Latex Liquid and Catalyst were determined, by making 17 different sample variations. Tensile tests are then carried out on the printed specimens, and the best parameters are evaluated based on the tensile modulus and tensile strength results of the material. Specifically, material stiffness of 1.01 MPa and tensile strength of 0.247 MPa was measured in the aneurysm model, where this condition was found in the Liquid Latex sample with 50% catalyst, while material stiffness was 0.00640 MPa and tensile strength of 0.0836 MPa was measured in brain model and is found in the RTV H-00 Thickener C 12.5% sample. These findings indicate the potential to develop more representative aneurysm models based on the approach used in this study.

Keywords: *Brain aneurysm, Keyhole Surgery, 3D Printing.*