

DESIGN OF HYBRID BRAIDED STENTS

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Most of the deaths that occur due to heart disease are due to atherosclerosis of the coronary arteries. Nowadays one of the principal treatments of obstructive coronal atherosclerosis is the coronal transluminal percutaneous angioplasty (APTC) with the use of stents. Stents are metallic tubular structures that are inserted in the arteries with the purpose of performing an adequate radial strength to reduce the acute or chronic retraction on the vessel wall, and so re-establishing the normal blood flowing. However, long-term success of coronal stent has been limited by the restenosis or reocclusion of stents. It consists on a complex process as well as multi factorial, which lead to the growth of cells in the stent interior. The reocclusion of the arteries has as consequence significant high rates of mortality and huge expenses in medical treatments. In this context, the main goal of this work consisted in the development of hybrid braided stents based on textile materials, namely polyester and polyamide combined with a shape memory material – nitinol. A 16 yarns vertical braiding machine was used. Several braided stent models were developed varying the composition (PES, PA, Nitinol), braiding angle (25°, 35°, 45°) and diameter of the yarn (0.27mm, 0.35mm, 0.55mm, 0.3mm, 0.4mm, 0.5 mm). Tests were undertaken concerning tensile, compression and wrinkle resistance. Achieved results showed that textile braided fabrics have enough potential to be used as stents, since they present an excellent mechanical behaviour and are also biocompatible.