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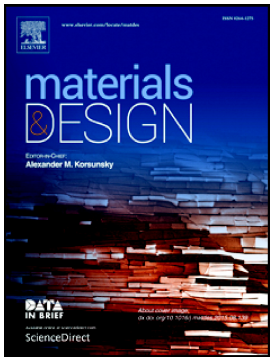

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Viscoelastic Braided Stent: Finite Element Modelling and Validation of Crimping Behaviour

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ABSTRACT: Braided stents are fabricated at their relaxed dimensions and need to be crimped in order to fit into the catheter for deployment. Once the covering sheath is removed, the braided stent self-expands at the diameter of the diseased lumen, the radial force restoring the luminal patency. The mechanical properties of the viscoelastic monofilament used in the fabrication of the braided stents are analysed. The monofilament is subjected to both uniaxial tensile and extensional creep testing, with the purpose of predicting the material's time dependent characteristics. An accurate finite element model is required to enable correct estimation of the mechanical behaviour of braided stents subjected to crimping. In this report, Abaqus (v6.14) was used to develop a linear viscoelastic constitutive material model, where the creep compliance function and stress relaxation function were derived from experimental data. The material model was validated by performing simulation of radial compression for a braided stent and a comparison between the experimentally evaluated radial forces of the braided stent and the finite element prediction is presented. The regression analysis performed for the viscoelastic material