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Finite element analysis of interaction between Nitinol stent and peripheral artery: the effect of hyperelastic model

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Abstract

Peripheral artery stenting (PAS) is an effective alternative to peripheral endarterectomy. Nitinol stents can be used for minimizing the problems of interaction between peripheral arteries and stent. In order to evaluate biomechanical properties of Nitinol peripheral stents and their interactions with peripheral artery, a finite element method (FEM) model was built which was composed of a peripheral artery and a Nitinol stent. In the present paper, the effects of hyperelastic model and friction coefficient on the interaction between Nitinol stent and peripheral artery were studied. It was found that Mooney-Rivlin model had a better mechanical performance than Ogden model owing to its good agreement with experimental data. This FEM model can provide a convenient way for evaluating biomechanical properties of peripheral stents given the effect of hyperelastic model type of artery.

Key words: finite element analysis; interactions; Nitinol stent; peripheral artery, hyperelastic model