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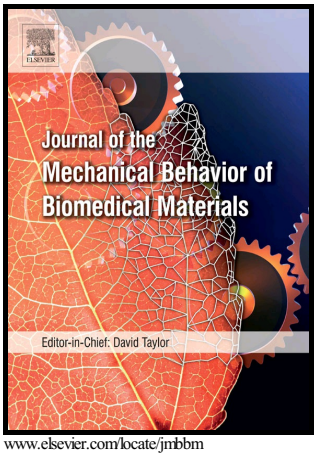


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PII: S1751-6161(18)31038-5
DOI: https://doi.org/10.1016/j.jmbbm.2018.09.003
Reference: JMBBM2968

To appear in: *Journal of the Mechanical Behavior of Biomedical Materials*

Received date: 14 July 2018
Revised date: 29 August 2018
Accepted date: 2 September 2018

Cite this article as: Fan Zhao, Wen Xue, Fujun Wang, Jing Sun, Jing Lin, Laijun Liu, Kun Sun and Lu Wang, Braided bioresorbable cardiovascular stents mechanically reinforced by axial runners, *Journal of the Mechanical Behavior of Biomedical Materials,* https://doi.org/10.1016/j.jmbbm.2018.09.003

# Braided bioresorbable cardiovascular stents mechanically reinforced by axial runners

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**Abstract:** Polymeric bioresorbable stents (BRSs) can eliminate the long-term stent restenosis by degrading after vascular remolding and have been recommended for the congenital heart disease treatment. However, the mechanical weakness remains one of main inferiorities of their applications. So, the aim of this study was to develop mechanically reinforced bioresorbable stents (MRBSs) based on poly(*p*-dioxanone) (PPDO) monofilaments and braiding technology. Axial runners were introduced and MRBSs showed greatly higher compression force and relatively lower viscous performance, as well as longer mechanical stability during degradation, compared with controls. Besides, stent compression behaviors were analyzed experimentally and numerically to investigate their deformation mechanisms. The results showed increased contacting points and friction force among yarns in MRBSs. Also, the skeleton formed in MRBSs attributed to higher yarn bending degree, strain energy and better structure stability during compression. Combined with the non-linear PPDO material stress-strain ratio and thermodynamic theory, yarn based stent compression modes were discussed. In addition, the autocatalysis and nonrandom chain scission degradation behaviors of MRBSs were revealed.

*Key words: Bioresorbable stents; mechanically reinforced; Congenital heart disease; Computational simulation*

## 1. Introduction

Stent angioplasty is being widely used to treat the congenital heart disease (CHD),