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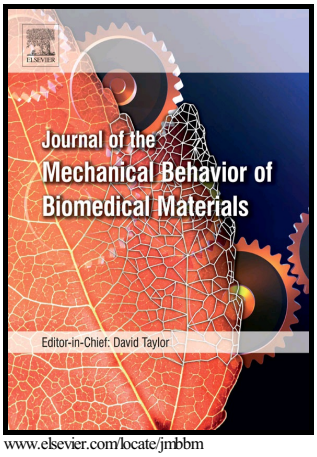

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PII: S1751-6161(16)30369-1
DOI: http://dx.doi.org/10.1016/j.jmbbm.2016.10.016
Reference: JMBBM2114

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

Received date: 28 June 2016
Revised date: 24 October 2016
Accepted date: 26 October 2016

Cite this article as: Mohammad Mirjavan, Azita Asayesh and Ali Asghar Asgharian Jeddi, The effect of fabric structure on the mechanical properties of warp knitted surgical mesh for hernia repair, *Journal of the Mechanical Behavior of Biomedical Materials,* http://dx.doi.org/10.1016/j.jmbbm.2016.10.016

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Abstract

Surgical mesh is being used for healing hernia, pelvic organ prolapse, skull injuries and urinary incontinence. In this research the effect of fabric structure on the mechanical properties of warp knitted surgical meshes in comparison to abdominal fascia has been investigated. For this purpose, warp knitted surgical mesh with five different structures (Tricot, Pin-hole-net, quasi-Sandfly, Sandfly and quasi- Marquissite) were produced using polypropylene monofilament. Thereafter, their mechanical properties such as uniaxial tensile behavior in various directions (wale-wise (90°), course-wise (0°) and diagonal (45°)), bending resistance and crease recovery were analyzed. The meshes demonstrated different elastic modulus in various directions, which can be attributed to the pore shape (pore angle) and underlap angle in the structure of mesh. Except Pin-hole-net mesh, other produced meshes exhibited better level of orthotropy in comparison to abdominal fascia. The most flexible mesh in both wale-wise and course-wise directions was quasi-Sandfly and thereafter quasi-Marquissite. Tricot and Pin-hole-net manifested the highest crease recovery in wale-wise and coursewise directions respectively. The most desirable mesh in terms of porosity was quasi-Marquissite mesh. Overall, the quasi-Marquissite mesh was selected as the most suitable surgical mesh considering all advantages and disadvantages of each produced mesh in this study.

Keywords: Surgical mesh, Warp knitted, Fabric structure, Polypropylene, Mechanical properties, Elastic modulus.

1. Introduction

Surgical mesh is a medical device which is used either as a permanent or temporary support for weakened or damaged tissue. Surgical mesh can be used for all kinds of hernia and urogynecologic procedures, including repair of pelvic organ prolapse (POP) and stress urinary incontinence (SUI). The majority of surgical meshes currently available for use are made from synthetic materials or animal tissue. Synthetic surgical meshes are typically warp knitted structures constructed from polypropylene or polyester monofilament. Biological scaffold materials obtained from dermis, pericardium, and small intestine submucosa of human, bovine, and porcine origin are another alternative for hernia repair and other soft tissue repairs (Deeken et al., 2012).

Surgical meshes are produced with various weights and pore sizes. Pore size is the determinant factor in tissue reaction and biocompatibility of mesh structure (Klinge et al.2002). Mesh with