Properties of Meshes used in Hernia Repair: A Comprehensive Review of Synthetic and Biologic Meshes

Ahmed M.S. Ibrahim, MD[1] Christina R. Vargas, MD[2] Salih Colakoglu, MD[3] John T. Nguyen, MD[1] Samuel J. Lin, MD[1] Bernard T. Lee, MD, MBA[1]

[1] Division of Plastic and Reconstructive Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts
[2] Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts
[3] Department of Surgery, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts

Address for correspondence Bernard T. Lee, MD, MBA, FACS, Division of Plastic and Reconstructive Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, 110 Francis Street, Lowry Suite 5A, Boston, MA 02215 (e-mail: blee3@bidmc.harvard.edu).

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Abstract

Background Data on the mechanical properties of the adult human abdominal wall have been difficult to obtain rendering manufacture of the ideal mesh for ventral hernia repair a challenge. An ideal mesh would need to exhibit greater biomechanical strength and elasticity than that of the abdominal wall. The aim of this study is to quantitatively compare the biomechanical properties of the most commonly used synthetic and biologic meshes in ventral hernia repair and presents a comprehensive literature review.

Methods A narrative review of the literature was performed using the PubMed database spanning articles from 1982 to 2012 including a review of company Web sites to identify all available information relating to the biomechanical properties of various synthetic and biologic meshes used in ventral hernia repair.

Results There exist differences in the mechanical properties and the chemical nature of different meshes. In general, most synthetic materials have greater stiffness and elasticity than what is required for abdominal wall reconstruction; however, each exhibits unique properties that may be beneficial for clinical use. On the contrary, biologic meshes are more elastic but less stiff and with a lower tensile strength than their synthetic counterparts.

Conclusions The current standard of practice for the treatment of ventral hernias is the use of permanent synthetic mesh material. Recently, biologic meshes have become more frequently used. Most meshes exhibit biomechanical properties over the known abdominal wall thresholds. Augmenting strength requires increasing amounts of material contributing to more stiffness and foreign body reaction, which is not necessarily an advantage.

Keywords
- biomechanical properties
- synthetic mesh
- biologic mesh
- hernia repair

Approximately 250,000 ventral hernias are repaired yearly at a cost of $2.5 to 3 billion annually; ventral hernia is one of the most common complications resulting from abdominal surgery; approximately 2 to 15%.[1,2] Subsequently, 23% of patients who undergo incisional hernia repair will require at least one further repair.[3] Midline incisions have the highest

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