Experimental investigation of hernia meshes

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Abstract

The article represents the achievements in experimental investigation of clinically available hernia meshes in Bulgaria - Surgimech, Tecnomesh, Ampoxen and Surgipro. Uniaxial and biaxial tensile tests and relaxation experiments of hernia meshes in two orthogonal directions were performed using testing device FU1000/e. The structural, physical and mechanical properties of four hernia meshes were compared at 5% and 10% strain for each direction. A wide variation in structure and deformability, load bearing capacity and orthotropy among tested materials was shown. All investigated meshes reveal orthotropic mechanical properties except one, which possess isotropic properties up to 5% deformation.

For improvement of elastic and viscoelastic properties of hernia meshes Surgimech and Tecnomesh were grafted with PDMAPS. Using tensile tests it was obtained that the modified Surgimech became stiffer, while mechanical behaviour of Tecnomesh after modification depends on the method of grafting. PDMAPS changes also the viscoelastic mechanical properties of investigated meshes. The initial stress and stress reduction during relaxation experiments of grafted with PDMAPS meshes increase.

Keywords: Biomaterials, mechanical properties