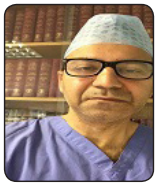
Pulsus Journal of Surgical Research

Abstract



Characterisation of a low-cost synthetic mesh for abdominal wall repair Z.

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Abstract:

INTRODUCTION: Every year almost 20 million hernia surgeries are performed worldwide [1]. These utilise expensive surgical meshes which are not affordable to healthcare systems or patients in the developing world. For this reason, surgeons operating in those areas of the world have tried to find a more affordable alternative, using mosquito nets. Sorensen and Rosenberg [2] reviewed different studies involving implantation of mosquito nets in humans and found that, overall, the rate of short-term complications was similar to that associated with commercial meshes and the cost was much lower. However, these materials are not characterised. This study aims to characterise the mechanical properties and ultrastructure of a low-cost synthetic meshes.

METHODS: Micrographs of the meshes (Mountain Warehouse, UK; Purple Turtle, UK) (Figure 1) were taken with the Scanning Electron Microscope (SEM) (FEI XL30 FEGSEM, FEI UK, UK). Mechanical properties of the nylon fabrics were tested with a uniaxial tensile system (BT1-FR5.0TN, Zwick Roell Group, Ulm, Germany) where the samples (N=8) were held to a 0.5 kN loading cell in position controlled mode. Figure 1. Micrographs of large pores (left) and small pores (right) meshes (35x). RESULTS: Figure 1 shows the micrographs of the large and small pores meshes which have a pore size of 2.52 ± 0.048 mm and 1.160 ± 0.069 mm respectively, considering the longest distance between two opposite angles of a pore. Figure 2 (left) shows the average break stress between large and small pore meshes, 13.78 ± 1.09 MPa and 17.22 ± 2.19 MPa respectively, indicating that the small pore mesh has greater tensile strength than the large pore mesh. Average break strain (Figure 2, right) for the large pores mesh was 130.49 ± 16.56 %, demonstrating greater extensibility than the small pores mesh at 110.26 ± 8.87 %. Figure 2. Average break stress (left) and strain (right) of large and small pores nylon meshes.

DISCUSSION & CONCLUSIONS: The large pores mesh appears to be the more appropriate for abdominal wall repair since it has mechanical properties, in particular break stress, closer to that of the rectus sheath, the abdominal wall layer mostly involved in hernia formation [3]. This characteristic may provide better integration and compatibility with the host tissue because its structure would allow improved cell infiltration, thereby reducing complications after implantation [4]. Future works will involve biocompatibility tests of the mesh with human dermal fibroblasts

Biography:

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Recent Publications:

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6 th International Surgery and Surgeons Meet | August 20-21, 2020 | Osaka, Japan

Citation: Zargham Hyder, Characterisation of a low-cost synthetic mesh for abdominal wall repair Z. Surgeons meet 2020, August 19, 2020, Osaka.