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MOSQUITO NET FOR ABDOMINAL WALL REPAIR: A COMPARISON OF THEIR CHEMICAL, PHYSICAL, MORPHOLOGICAL AND MECHANICAL PROPERTIES TO COMMERCIAL MESHES

B-32

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Summary

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Meshes are the actual standard in abdominal wall repair. Commercial medical meshes are however either unavailable or unaffordable too expensive for developing countries. Therefore in most resource-poor developing countries a traditional sutured repair is still commonplace although with significantly inferior results. Sterilized mosquito nets have been recently proposed by several authors to replace medical meshes in low-income countries (Sanders et al, World J Surg, January 24th 2013 ; A. N. Kingsnorth et al. Hernia (2011) 15:491–494 ; Clarke et al., Hernia, December 16th 2008). However in the perspective of their clinical use a better understanding of this mosquito net is obviously requested both in terms of material properties and of in vivo biocompatibility. Mosquito nets were purchased in Kinshasa, and were compared to regular polypropylene (PP) meshes (Biomesh®, Cousin) and to polyethylene terephthalate (PET) meshes (Parietex®, Covidien).

The different materials have been evaluated in term of their chemistry (FTIR analysis), morphology (SEM and optical microscopy), thermal characteristics (Differential Scanning Calorimetry DSC) and of mechanical resistance (traction). Analyses of the nets have been carried out before and after autoclave sterilisation.

Mosquito nets were made of PET, chemically equivalent to Parietex. DSC data support the fact that PET net will better resist to autoclave sterilisation compared to mosquito nets made of polyethylene recently tested by Sanders et al (World J Surg, January 24th 2013). Due to their lower fiber density and mode of organisation, maximum force at rupture of nets is at least two times lower compared to the commercial meshes. Interestingly enough these latter ones have demonstrated large anisotropic behaviour in during these traction tests, information which would be valuable to take into account for their clinical use.

In vivo testing carried out on mouse has highlighted that the comparison of the 3 materials did not show significant difference in terms of abdominal wall repair and biocompatibility. As a conclusion this exploratory study supports the usefulness of sterilised pieces of PET mosquito net in abdominal wall repair for low-income countries.

Valorization

The results of this research will find direct applications in low-income countries.