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Title of Abstract

BIOCELULOSE GRAFTS: THE FUTURE IN ARTIFICIAL VASCULAR GRAFTS? PRELIMINAR RESULTS

Introduction:
Vascular grafts, autogenous or artificial, are used to replace, bypass or maintain function of occluded, damaged, or diseased blood vessels of small, medium and large diameter. Vascular prostheses may be manufactured from synthetic, biological or biosynthetic materials. To our knowledge this is the first study to look at the hemocompatibility of bacterial cellulose membrane reinforced by the presence of polyvinyl alcohol.
Materials/ methods
The first aim of this study was to assess the hemocompatibility of a BC/PVA nanocomposite. Whole blood clotting time, plasmarecalcification, Factor XII activation, platelet adhesion and activation, hemolytic index and complement activation are all determined. The bacterial cellulose hydrogel serves as the base material of the nanocomposite and is impregnated with polyvinyl alcohol forming a crosslinked network of both polymers.
We tested this new device on the common and superficial artery of pigs.
Experimental surgery protocol on pigs was approved by Local Veterinary Ethical Committee.
Results
Initially a patch of BC/PVA of 2 cm length was sutured to the common femoral artery of 6 pigs. Changes in the fabrication of BC/PVA made possible the construction of cylinder tubes of different diameters. 4 pigs were submitted to 5 cm termino-terminal bypass in the femoral superficial artery immediately after bifurcation and distally.
Patch surgery was patent for 2 weeks in 2 pigs, one had a false aneurism and 3 thrombosed. Regarding bypass surgery 1 pig died per-operative, 1 thrombosed per-operative, 1 had 2 weeks patency with futher development of a false aneurism and 1 thrombosed before 2 weeks.
Conclusions
BC/PVA may be in the near future a suitable alternative vascular graft with better hemo and biocompatibility, cheaper, with lower infection risk than the existing artificial grats, and an option when the autogenous graft is not available. A new model of cylinder tube is now being tested and we believe we will improve substantially these preliminary results, improving patency rate and lowering post-operative complications namely false aneurisms due to alteration in mechanical structure of these new developed BC grafts.