

## Evaluation of a light activated and elastomeric tissue sealant for vascular surgery

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**Objectives:** Tissue adhesives (TA) and sealants may offer advantages over sutures during surgery, particularly in the reduction of operative time and procedural simplification, improving patient safety and faster recovery. However, commercially available TA still show limitations such as low adhesive strength and sealing performance, limited control over activation and poor biocompatibility. GB02 is a novel hydrophobic light activated sealant developed and provided by Gecko Biomedical (Paris, France) that aims to fill this unmet clinical need. In this study, the performance of GB02 for sutureless closure of vascular incisions is compared with a commercially available sealant.

**Methods:** 2 mm defects of the carotid artery (CA) and jugular vein were created and closed with GB02 or bovine serum albumin and glutaraldehyde (BSAG) without the use of sutures in an in vivo porcine model. Animals were survived for 7 days and 5 weeks (n=4 per time point and experimental group). Vessel diameter, wall thickness and flow velocity were determined after 5 weeks by means of magnetic resonance imaging. Histopathology of the explanted vessels was performed after 7 days and 5 weeks.

**Results:** In vivo closure of the defects was successful in all cases, with immediate hemostasis after clamp release. Neither postoperative bleeding nor thrombi have been observed. For CA closure, there were signs of stenosis for BSAG in contrast to GB02 as revealed by differences in vessel diameter ( $6.4 \pm 0.4$  mm for GB02, n=4 and  $4.2 \pm 0.1$  mm for BSAG, n=2), wall thickness ( $0.8 \pm 0.1$  mm for GB02, n=4 and  $2.2 \pm 0.1$  mm for BSAG, n=2) and flow velocity ( $71.8 \pm 0.1$  cm/s for GB02, n=4; no residual flow for BSAG in three cases, 102 cm/s in the fourth case). In two CA closures with BSAG, there was a complete occlusion of the CA. Closure with GB02 was associated with a low inflammatory reaction limited to the adventitia. In contrast, BSAG caused a moderate to severe inflammatory reaction ( $p=0.010$ ).

**Conclusions:** GB02 effectively seals 2 mm defects of vessels. Preliminary results demonstrated no signs of stenosis and a low inflammatory reaction for closure with GB02 in contrast to BSAG. Thus, this study revealed benefits of GB02 for the surgical practice.