A comparison of a cyanoacrylate [corrected] glue (Glubran) vs. fibrin sealant (Tisseel) in experimental models of partial pulmonary resection and lung incision [corrected] in rabbits.[Erratum appears in J Invest Surg. 2010 Apr;23(2):124]

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Abstract:

INTRODUCTION: Bronchopleural fistulas (BPF) and air leaks (AL) present major complications after pulmonary resection. Various tissue sealants have been proposed for their prevention, e.g., fibrin sealant (FS) and cyanoacrylate glues (CA). Contrary to the safety record of FS, substantial side effects such as foreign body reaction and impaired tissue integration have been reported for CA. This study compares the sealing efficacy and biocompatibility as well as side effects of FS and CA in experimental partial pulmonary resection and lung incision in rabbits.

METHODS: 26 New Zealand white rabbits (3 kg) were randomized to one of the three groups: partial pulmonary resection (A, acute model; n = 7 FS/ 7CA), lung incision [2 (B; n = 3 FS/ 3 CA)], and 14-day observation period (C; n = 3 FS/ 3 CA). In all groups (A, B, and C), FS was considered as control and CA as treatment. Surgery was carried out in general anaesthesia and mechanical ventilation. For partial lung resection a median thoracotomy was performed and the apex of the left median lobe was resected and the parenchymal surface covered with 0.09 ml of FS and CA. The thoracic cavity was filled with ringer solution after 5 minutes. The inspiratory minute volume (IMV) was increased by 0.02 l after every 4th inspiration. In groups B and C, a left lateral thoracotomy was performed in the 4th intercostal space and the left median lobe was incised with a scalpel. The incision was covered with 0.5 ml of FS or CA. At autopsy (B and C) the operation site was assessed

macroscopically. Histology was performed in all animals.

RESULTS: In terms of sealing purposes, FS and CA yielded comparable results in all groups. CA elicited a substantial increase of tissue temperature in the acute phase immediately after application (A). After 14 days CA residues were found, whereas FS was completely degraded. Histology showed a pronounced inflammatory response to CA but not to FS. We conclude that although the effect of airtight sealing was equally satisfying, our results emphasize that FS is preferable to CA for the prevention of BPF and AL due to superior biocompatibility and degradability. Longterm effects of CA residues on pulmonary tissue require further experimental testing.