Local delivery of antibiotics incorporated in fibrin glue; better feasiblity of combination with ABPC/SBT rather than CEZ.

Authors: Motomura N., Saito A., Nawata K., Hisagi M., Ono M.

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Abstract:

Objective: Local delivery of antibiotics has strong potential to reduce the risk of disaster in surgery for prosthetic valve or graft infection. A fibrin glue is a good material to deliver antibiotics in a local setting if used properly. But some antibiotics do not dissolve within the fibrin glue and others would inactivate hemostatic performance. We examined feasibility of antibiotics for a local delivery system with fibrin glue, especially in the target of broad spectrum antibiotics. Methods: Two kinds of antibiotics (ABPC/SBT, CEZ) were incorporated into liquid-A (fibrinogen component) or liquid-B (thrombin component) of a fibrin glue (5 ml, CSL Behring). Solubility, clotting time, tensile strength, thrombin activity were measured. For anti-bacterial performance, size of disk diffusion inhibition zone (the larger, the more effective of antibiotics) using Bacillus subtilis ATCC6633 was compared with control (no glue). Results: While both antibiotics did not dissolve into liquid-A, both antibiotics dissolved into liquid-B within 1 min. Clotting time of liquid-B in ABPC/SBT and CEZ was within 50 s. Tensile strength of ABPC/SBT and CEZ increased by 127% and 160% compared with control, respectively. Thrombin activity in ABPC/SBT and CEZ decreased to 54% and 82%. Size of inhibition zone showed that effectiveness of ABPC/SBT reduced to 76% and that of CEZ disappeared. Conclusions: As a local delivery system using fibrin glue, antibiotics should be dissolved into liquid-B (thrombin component) and not liquid-A (fibrinogen component). To cover broad spectrum antibiotics, ABPC/SBT was preferred to CEZ when locally delivered using the fibrin glue.