In-vitro release pharmacokinetics of amikacin, teicoplanin and polyhexanide in a platelet rich fibrin-layer (PRF)-a laboratory evaluation of a modern, autologous wound treatment.

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Abstract:

Objectives: Platelet rich fibrin (PRF) is an autologous fibrin glue, produced from patients' blood, which, besides intraoperative use, has applications in the treatment of infected wounds. The combination with antimicrobial agents results in a prolonged antibacterial effect allowing for wound dressing change intervals of seven days even in infected wounds. The aim of this study was to evaluate release kinetics of amikacin, teicoplanin or polyhexanide from a PRF-layer. Methods: PRF mixed with teicoplanin, amikacin or polyhexanide was sprayed on a silicon gauze patch and put on a colombia agar with bacteria with known minimal inhibitory concentration (MIC) and incubated for 24 hours and afterwards transferred to another agar with the same bacterial strain. Inhibition zones were measured every 24 hours. This was repeated on 7 consecutive days. Antibiotic concentrations were calculated by interpolation. Results: More than 1000 mg/L teicoplanin were released within the first 24 hours and 28.22 mg/L after 168 hours. Amikacin release was above 10,000 mg/L within the first 24 hours and still 120.8 mg/L after 120 hours. A release of polyhexanide could be verified for the first 24 hours only. Consequently teicoplanin and amikacin released from PRF showed antimicrobial in-vitro effects for almost a week, whereas an antimicrobial effect of polyhexanide could only be verified for the first 24 hours. Conclusions: Our Results show that a weekly dressing regimen may be justified in wounds treated with PRF plus amikacin or teicoplanin, since bacteria will be eradicated over a considerable period of time after a single application of PRF.