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Postoperative perfusion of collagen matrices in a peri-implant vestibuloplasty situation - a pilot study.

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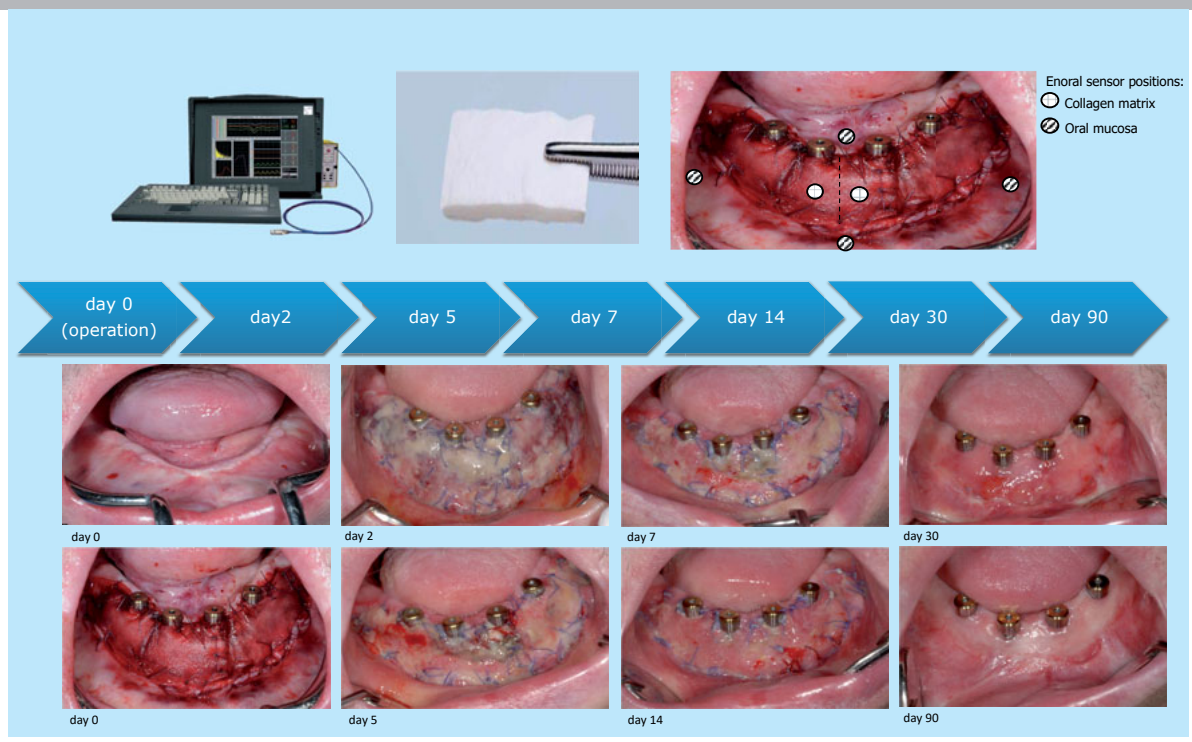
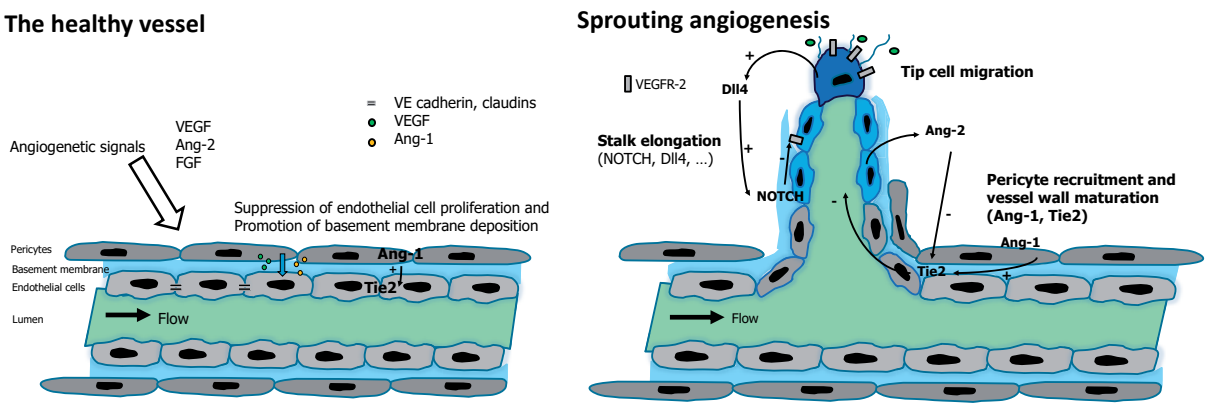
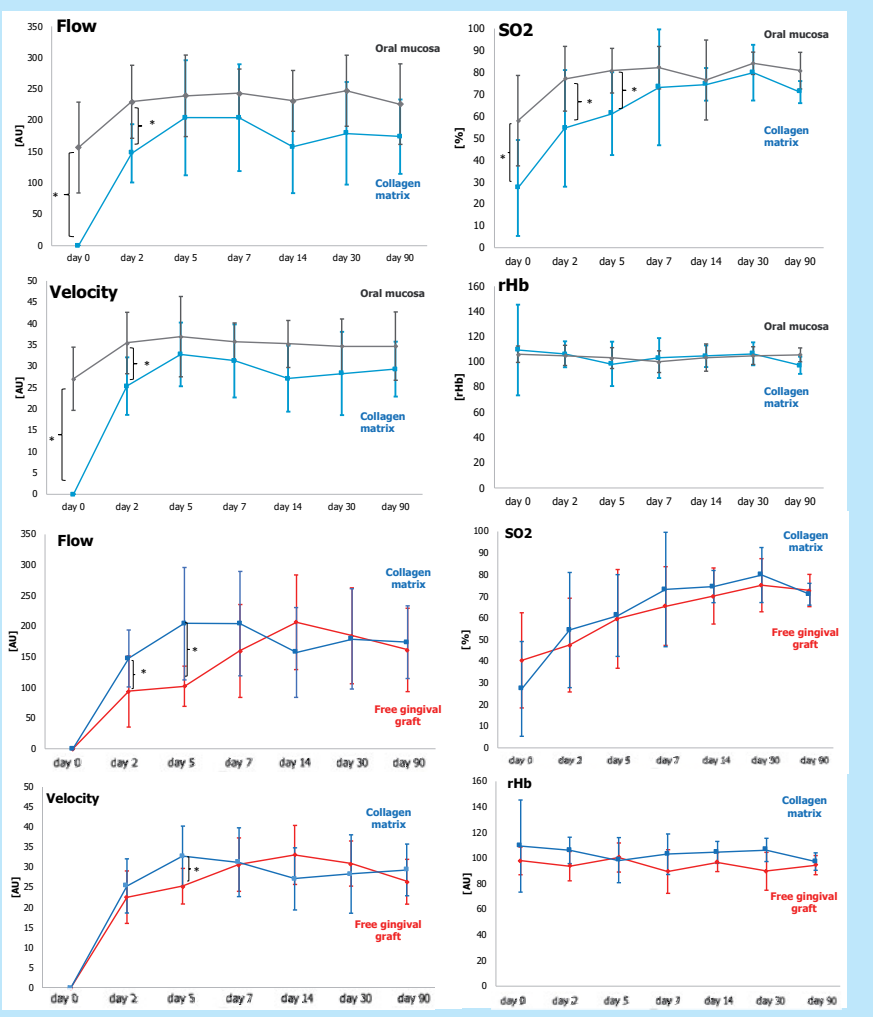
Introduction:
Vestibuloplasty is a frequently performed surgical procedure to create, restore or even increase the soft tissue sealing around dental restorations if possible with keratinized mucosa. Avascular porcine collagen matrices reveal comparable clinical result as free gingival grafts in the context of tissue regeneration around dental implants. The process of graft vascularization presenting the basic requirement for local healing and colonization of collagen grafts is still incompletely understood.

Material and Methods:
In 10 patients vestibuloplasty was performed during implant uncovering using collagen matrices (Mucograft®). Tissue perfusion of the collagen matrices was measured using laser- doppler- spectrophotometer (Oxygen-to- See, Lea Medizintechnik, Gießen, Germany) intraoperatively and on postoperative days 2, 5, 7, 14, 30 and 90.
Graft perfusion expressed by oxygen saturation [SO2%], relative amount of hemoglobin [rHb], blood flow and velocity [AU] was detected and compared the surrounding mucosa. In another 10 patients vestibuloplasty was performed with free gingival grafts (FGG) as control.
On postoperative day 14 biopsies were taken from the matrices and analysed via Rt-PCR- analysis for expression of angiogentic mediators (Angiopoetin1/2, VEGF, Dll4, Notch, Tie2) and via immunhistochemistry for CD31- expression.
(Ethical committee of the University of Erlangen-Nuremberg, Germany, Ref.-No 53_16B)

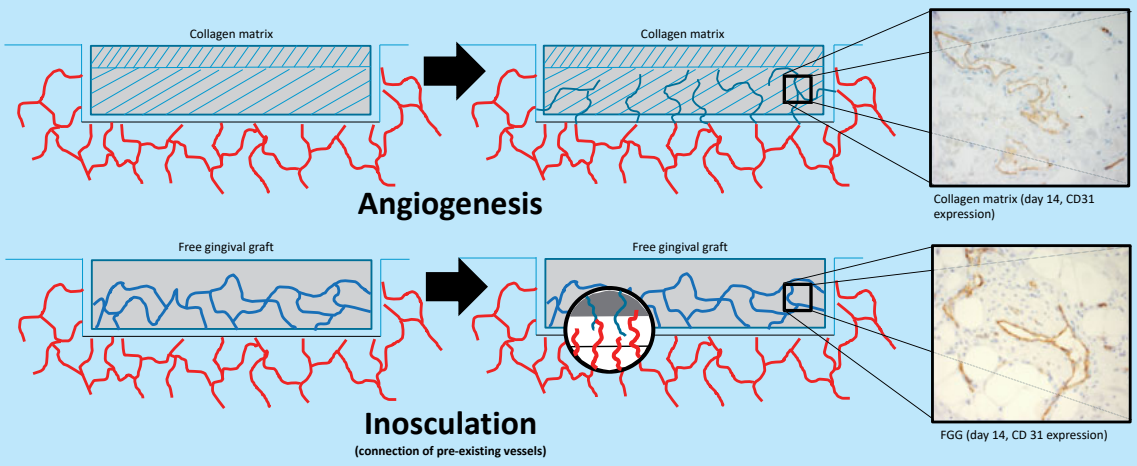


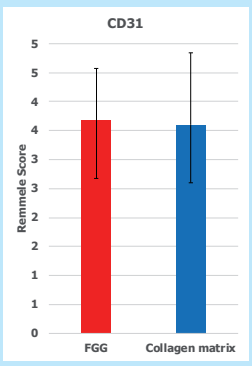


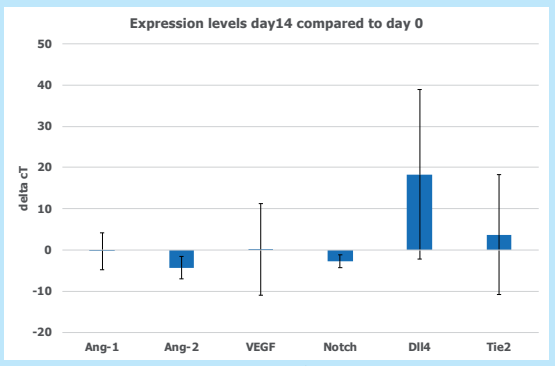


Results:
Blood flow and velocity significantly increased until postoperative day five and approximated to perfusion values of the surrounded mucosa already during the following days. Likewise, measured matrix oxygen saturation also significantly increased within the first five postoperative days whereas hemoglobin content did not show any differences during the investigated period. Two weeks after vestibuloplasty angiogenesis and vessel maturation are still progressing Dll4 and Tie2 are highly expressed in the matrices. Interestingly, CD31- expression did not differ between FGG and collagen matrices on day 14.

Conclusion:
Mucograft perfusion mainly progresses within the first postoperative week with only minimal further detectable alterations until day 90. Therefore, vessel maturation and capillary- network formation progressed from day 14 onwards without detectable alterations in matrix tissue perfusion.







Rt- PCR analysis revealed increased expression levels of Dll4 and Tie2 in collagen matrices on day 14 compared to the matrix surrounding soft tissue on day 0.

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