Timeframe of socket corticalization after tooth extraction. A retrospective radiographic study.

Kristina Bertl^{1,2}, Edmund Kukla³, Rajaa Albugami¹, Florian Beck², André Gahleitner⁴, **Andreas Stavropoulos¹**

- 1)
- Department of Periodontology, Faculty of Odontology, University of Malmö, Sweden
- 2)
- Division of Oral Surgery, School of Dentistry, Medical University of Vienna, Austria
- 3)
- Comprehensive Center Unit, School of Dentistry, Medical University of Vienna, Austria
- 4)
- Dept. of Diagnostic Radiology, Division of Osteoradiology, General Hospital, Medical University of Vienna, Austria

Background

The formation of a hard-tissue bridge covering the tooth extraction socket is termed corticalization. In dogs this process takes >60d; however, this process has hardly been investigated in humans. Recent reports have indicated increased primary implant stability and reduced bone strain after immediate implant loading in the presence of a (thick) cortical layer; thus, knowledge of the timeframe between tooth extraction and hard-tissue bridging of the extraction socket appears clinically relevant in some situations.

Aim

Assess the timeframe between tooth extraction & radiographically detectable socket corticalization in humans.

Methods and Materials

- 250 patients with a CT scan ≤ 36m after tooth extraction.
- 3 orthoradial multiplanar reconstruction slices per extraction socket (mesial/orange, central/blue, distal/green).

- Each single cross-section was scored regarding the degree of corticalization as: a) healed (f-i), i.e., complete/continuous corticalization of the socket entrance, or b) non-healed (a-e).
- Each extraction socket was classified as (1) non-corticalized (a-c), i.e., all 3 slices classified as non-healed, (2) partially corticalized (d-f), i.e., 1 or 2 slices classified as non-healed, or (3) corticalized (g-i), i.e., all 3 slices classified as healed.

- The possible effect of several independent parameters, i.e., age, gender, timeframe between tooth extraction and CT scan, tooth type, periodontal status, gap type, smoking status, presence of any systemic disease, and medication intake, on the corticalization status was statistically evaluated.

Results

- 3 to 6m after tooth extraction, 27% of the sockets were judged as non-corticalized & 53% were judged as partially corticalized.
- After 9 to 12m, > 80% of the sockets were corticalized.

- Non-corticalized sockets were detected up to 15m post-extraction.

- Each additional month after tooth extraction contributed significantly to a higher likelihood of a more advanced stage of corticalization, while periodontal attachment loss of ≥ 75% significantly prolonged corticalization time. No other independent variable had a significant effect on the corticalization process.

Independent variables		OR	95% CI	p-value
Age (+ 1 year)		0.998	0.972-1.025	0.890
Gender	Male	1.0		0.533
	Female	0.825	0.451-1.510	
Timeframe from tooth extraction to CT scan (+ 1 month)		1.645	1.471-1.841	< 0.001
Tooth type	Lower anterior	1.0		0.680
	Upper anterior	1.676	0.451-6.230	
	Premolars	0.977	0.288-3.312	
	Molars	1.169	0.331-4.137	
Periodontal status	≥ 75% radiographic bone loss	1.0		0.047
	< 75% radiographic bone loss	1.984	1.011-3.896	
Gap type	Simultaneous multiple neighboring tooth extraction	1.0		0.443
	Both neighboring teeth missing	2.485	0.793-7.794	
	One neighboring tooth missing	1.280	0.481-3.409	
	Both neighboring teeth present	1.485	0.576-3.832	
Smoking status	Smoker	1.0		0.213
	Non-smoker	1.514	0.788-2.908	
Systemic disease	Negative impact on bone tissue healing	1.0		0.198
	No systemic disease or no impact on bone tissue healing	0.275	0.038-1.966	
Medication intake	Positive effect on bone tissue healing	1.0		0.971
	Negative effect on bone tissue healing	1.020	0.103-10.132	
	No intake or no effect on bone tissue healing	1.210	0.197-7.441	

Conclusions

The results indicate a **considerably long timeframe until corticalization** of the extraction socket is completed, i.e., 3 to 6m after tooth extraction 1 out of 4 sockets was still not corticalized, and only **9 to 12m** after tooth extraction **full corticalization** was observed in about **80%** of the sockets.

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