

## LITERATUR

**Ausgabe:** Implantologie Journal 5/20

**Thema:** Laterale Augmentation von stark atrophierten Kieferkämmen  
GBR-Protokoll mit Hyaluronsäure

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1. Aghaloo TL, Moy PK. Which hard tissue augmentation techniques are the most successful in furnishing bony support for implant placement. *Int J Oral Maxillofac Implants* 2007;22:49–70.
2. Alcântara CEP, Castro MAA, Noronha MS, Martins-Junior PA, Mendes RM, Caliari MV, Mesquita RA, Ferreira AJ. Hyaluronic acid accelerates bone repair in human dental sockets: a randomized triple-blind clinical trial. *Braz Oral Res.* 2018;32:e84.
3. Aya KL, Stern R. Hyaluronan in wound healing: Rediscovering a major player. *Wound Rep Reg* 2014;22:579-593.
4. Benic GI, Hämerle CH. Horizontal bone augmentation by means of guided bone regeneration. *Periodontology 2000* 2014;66:13–40.
5. Carlson GA, Dragoo JL, Samimi B, Bruckner DA, Bernard GW, Hedrick M, Benhaim P. Bacteriostatic properties of biomaterials against common orthopaedic pathogens. *BiochemBiophys Res Commun* 2004;321(2):472–478.
6. Chen F, Ni Y, Liu B, Zhou T, Yu C, Su Y et al. Self-crosslinking and injectable hyaluronic acid/RGD-functionalized pectin hydrogel for cartilage tissue engineering. *Carbohydr Polym.* 2017;166:31-44.
7. Croce MA, Dyne K, Boraldi F, Quaglino D Jr, Cetta G, Tiozzo R, Pasquali Ronchetti I. Hyaluronan affects protein and collagen synthesis by in vitro human skin fibroblasts. *Tissue Cell* 2001;33(4):326–331.
8. Dahlin C, Andersson L, Linde A. Bone augmentation at fenestrated implants by an osteopromotive membrane technique. A controlled clinical study. *Clin Oral Implants Res* 1991;2:159–165.
9. de Brito BB, Mendes Brazao MA, de Campos ML, Casati MZ, Sallum EA, Sallum AW. Association of hyaluronic acid with a collagen scaffold may improve bone healing in critical-size bone defects. *Clin Oral Implants Res* 2012;23(8):938–942.
10. Dechert TA, Ducale AE, Ward SI, Yager DR. Hyaluronan in human acute and chronic dermal wounds. *Wound Repair Regen.* 2006;14(3):252-258.

11. Deed R, Rooney P, Kumar P, Norton JD, Smith J, Freemont AJ, Kumar S. Early-response gene signalling is induced by angiogenic oligosaccharides of hyaluronan in endothelial cells. Inhibition by non-angiogenic, high-molecular-weight hyaluronan. *Int J Cancer* 1997;71(2):251–256.
12. Eliezer M, Imber JC, Sculean A, Pandis N, Teich S. Hyaluronic acid as adjunctive to non-surgical and surgical periodontal therapy: a systematic review and meta-analysis. *Clin Oral Investig*. 2019;23(9):3423-3435.
13. Esposito M, Grusovin MG, Coulthard P, Worthington HV. The efficacy of various bone augmentation procedures for dental implants: A Cochrane systematic review of randomized controlled clinical trials. *Int J Oral Maxillofac Implants* 2006;21:696–710.
14. Falcone SJ, Palmeri DM, Berg RA. Rheological and cohesive properties of hyaluronic acid. *J Biomed Mater Res A*. 2006 Mar;76(4):721-728.
15. Friedmann A, Gissel K, Soudan M, Kleber BM, Pitaru S, Dietrich T. Randomized controlled trial on lateral augmentation using two collagen membranes: morphometric results on mineralized tissue compound. *J Clin Periodontol*. 2011;38(7):677-85.
16. Hä默le CH, Jung RE, Feloutzis A. A systematic review of the survival of implants in bone sites augmented with barrier membranes (guided bone regeneration) in partially edentulous patients. *J Clin Periodontol* 2002;29(suppl 3):226–231.
17. Hä默le CH, Jung RE, Yaman D, Lang NP. Ridge augmentation by applying bioresorbable membranes and deproteinized bovine bone mineral: a report of twelve consecutive cases. *Clin Oral Implants Res*. 2008;19:19-25.
18. Kang JH, Kim YY, Chang JY, Kho HS. Influences of hyaluronic acid on the anticandidal activities of lysozyme and the peroxidase system. *Oral Dis* 2011;17(6):577–583.
19. Kawano M, Ariyoshi W, Iwanaga K, Okinaga T, Habu M, Yoshioka I, Tominaga K, Nishihara T. Mechanism involved in enhancement of osteoblast differentiation by hyaluronic acid. *Biochem Biophys Res Commun* 2011;405(4):575–580.
20. Kim J, Kim IS, Cho TH, Lee KB, Hwang SJ, Tae G et al. Bone regeneration using hyaluronic acid-based hydrogel with bone morphogenic protein-2 and human mesenchymal stem cells. *Biomaterials*. 2007;28(10):1830-1837.
21. Kim JJ, Song HY, Ben Amara H, Kyung-Rim K, Koo KT. Hyaluronic Acid Improves Bone Formation in Extraction Sockets With Chronic Pathology: A Pilot Study in Dogs. *J Periodontol*. 2016;87(7):790-795.
22. Kim JJ, Ben Amara H, Park JC, Kim S, Kim TI, Seol YJ, Lee YM, Ku Y, Rhyu IC, Koo KT. Biomodification of compromised extraction sockets using hyaluronic acid and rhBMP-2: An experimental study in dogs. *J Periodontol*. 2019 Apr;90(4):416-424.
23. King SR, Hickerson WL, Proctor KG. Beneficial actions of exogenous hyaluronic acid on healing. *Surgery* 1991;109(1):76-84.

24. Longaker T et al. Studies in Fetal Wound Healing: V. A prolonged presence of hyaluronic acid characterizes fetal wound healing. *Ann. Surg.* 1991;April:292–296.
25. Meijndert L, Raghoobar GM, Meijer HJ, Vissink A. Clinical and radiographic characteristics of single-tooth replacements preceded by local ridge augmentation: a prospective randomized clinical trial. *Clin Oral Implants Res.* 2008;19:1295-1303.
26. Mendes RM, Silva GA, LimaMF, CalliariMV, Almeida AP, Alves JB, Ferreira AJ. Sodium hyaluronate accelerates the healing process in tooth sockets of rats. *Arch Oral Biol* 2008;53(12):1155–1162.
27. Mertens C, Braun S, Krisam J, Hoffmann J. The influence of wound closure on graft stability: An in vitro comparison of different bone grafting techniques for the treatment of one-wall horizontal bone defects. *Clin Implant Dent Relat Res.* 2019;21(2):284-291.
28. Mir-Mari J, Wui H, Jung RE, Hämmeler CHF, Benic GI. Influence of blinded wound closure on the volume stability of different GBR materials: an in vitro cone-beam computed tomographic examination. *Clin. Oral Impl. Res.* 2016;27:258–265.
29. Miron RJ, Sculean A, Cochran DL, Froum S, Zucchelli G, Nemcovsky C, Donos N, Lyngstadaas SP, Deschner J, Dard M, Stavropoulos A, Zhang Y, Trombelli L, Kasaj A, Shirakata Y, Cortellini P, Tonetti M, Rasperini G, Jepsen S, Bosshardt DD. Twenty years of enamel matrix derivative: the past, the present and the future. *J Clin Periodontol.* 2016;43(8):668-683.
30. Naik B, Karunakar P, Jayadev M, Marshal VR. Role of Platelet rich fibrin in wound healing: A critical review. *J Conserv Dent.* 2013;16(4):284-293.
31. Pasquinelli G, Orrico C, Foroni L, Bonafè F, Carboni M, Guarnieri C et al. Mesenchymal stem cell interaction with a non-woven hyaluronan-based scaffold suitable for tissue repair. *J Anat.* 2008;213(5):520-530.
32. Pilloni A, Schmidlin PR, Sahrmann P, Sculean A, Rojas MA. Effectiveness of adjunctive hyaluronic acid application in coronally advanced flap in Miller class I single gingival recession sites: a randomized controlled clinical trial. *Clin Oral Investig* 2018;30. doi: 10.1007/s00784-018-2537-4. [Epub ahead of print] Erratum in: *Clin Oral Investig.* 2018;22(8):2961-2962.
33. Pirnazar P, Wolinsky L, Nachnani S, Haake S, Pilloni A, Bernard GW. Bacteriostatic effects of hyaluronic acid. *J Periodontol* 1999;70(4):370–374.
34. Prince CW. Roles of hyaluronan in bone resorption. *BMC Musculoskelet Disord.* 2004 Apr;5(1):12.
35. Sanz-Sánchez I, Ortiz-Vigón A, Sanz-Martín I, Figuero E, Sanz M. Effectiveness of Lateral Bone Augmentation on the Alveolar Crest Dimension: A Systematic Review and Meta-analysis. *J Dent Res.* 2015;94(9 Suppl):128S-142S.

36. Sasaki T, Watanabe C. Stimulation of osteoinduction in bone wound healing by high-molecular hyaluronic acid. *Bone* 1995;16(1):9–15.
37. Dahiya P, Kamal R. Hyaluronic acid: a boon in periodontal therapy. *N Am J Med Sci* 2013;5(5):309–315.
38. Stiller M, Kluk E, Bohner M, Lopez-Heredia MA, Müller-Mai C, Knabe C. Performance of  $\beta$ -tricalcium phosphate granules and putty, bone grafting materials after bilateral sinus floor augmentation in humans. *Biomaterials*. 2014;35(10):3154–3163.
39. Urban IA, Nagursky H, Lozada JL. Horizontal ridge augmentation with a resorbable membrane and particulated autogenous bone with or without anorganic bovine bone-derived mineral: a prospective case series in 22 patients. *Int J Oral Maxillofac Implants*. 2011;26(2):404-414.
40. Urban IA, Nagursky H, Lozada JL, Nagy K. Horizontal Ridge Augmentation with a Collagen Membrane and a Combination of Particulated Autogenous Bone and Anorganic Bovine Bone-Derived Mineral: A Prospective Case Series in 25 Patients. *Int J Periodontics Restorative Dent* 2013;33:299–307.
41. Yildirim S, Özener HÖ, Doğan B, Kuru B. Effect of Topically-Applied Hyaluronic-Acid on Pain and Palatal Epithelial Wound Healing: An Examiner-Blind, Randomized, Controlled Clinical Trial. *J Periodontol*. 2017;15:1-14.
42. Zhai P, Peng X, Li B, Liu Y, Sun H, Li X. The application of hyaluronic acid in bone regeneration. *Int J Biol Macromol*. 2019 Nov 18. pii: S0141-8130(19)36625-5.
43. Zhao N, Wang X, Qin L, Zhai M, Yuan J, Chen J et al. Effect of hyaluronic acid in bone formation and its applications in dentistry. *J Biomed Mater Res A*. 2016;104(6):1560-1569.
44. Zou L, Zou X, Chen L, Li H, Mygind T, Kassem M, Bünger C. Effect of hyaluronan on osteogenic differentiation of porcine bone marrow stromal cells in vitro. *J Orthop Res*. 2008 May;26(5):713-20.