Use of hyaluronic acid in reconstructive periodontal surgery

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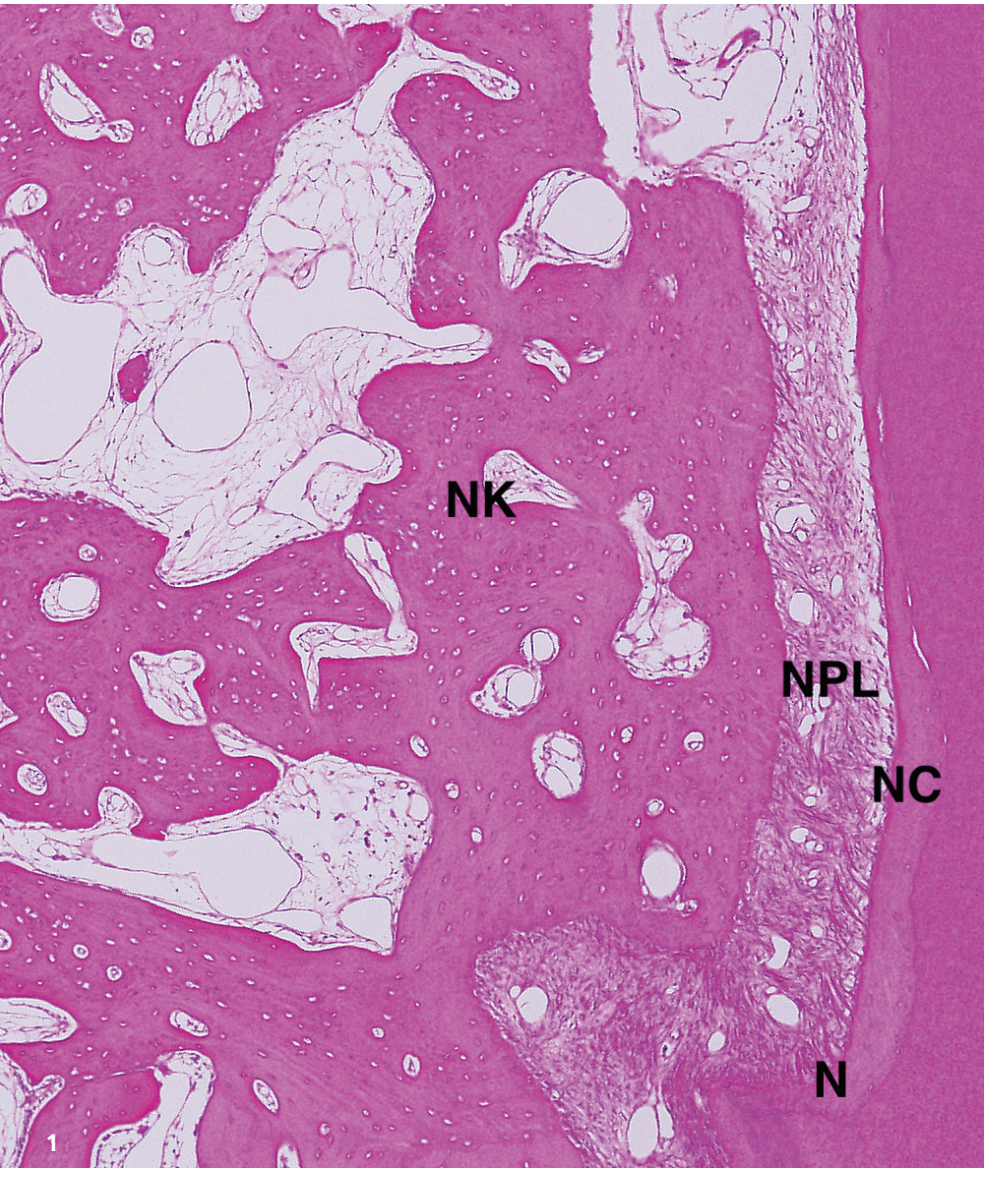
Reconstructive periodontal therapy encompasses all treatment methods that facilitate the predictable regeneration of tooth-bearing structures (i.e. the root cementum, the periodontal ligament and the alveolar bone). Recent results from preclinical and clinical studies have indicated that the auxiliary application of hyaluronic acid in periodontal surgery has a beneficial influence on wound healing and promotes the regeneration of periodontal structures. This article briefly summarises the most important findings on the use of hyaluronic acid in reconstructive periodontal surgery.



Scientific background

Hyaluronic acid is an anionic, non-sulphated glycosaminoglycan (GAG) that is found in virtually all tissues. It plays a key role in wound healing. Recent results from cell-culture studies have shown that hyaluronic acid is highly biocompatible, promotes the proliferation and migration of periodontal and gingival fibroblasts, positively influences angiogenesis, and stabilises the blood clot.[1] Histological data from preclinical studies have provided evidence that the use of a cross-linked hyaluronic acid in the surgical treatment of intrabony and recession defects promotes the regeneration of the periodontal ligament, root cementum and bone (Fig. 1).[6,7]

More recently, a positive effect of cross-linked hyaluronic acid in class III furcations has been demonstrated, although complete regeneration (i.e. complete closure of the defect) was not achieved.[8]

Fig. 1: The histological image shows the regeneration of periodontal structures in an intrabony defect after treatment with a cross-linked hyaluronic acid (HyaDENT BG; *REGEDENT*). N: Notch showing the deepest point of the defect during the surgical procedure. NC: new root cementum. NPL: new periodontal ligament. NB: new bone.

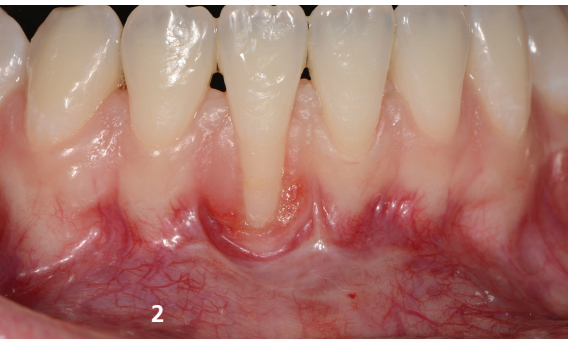
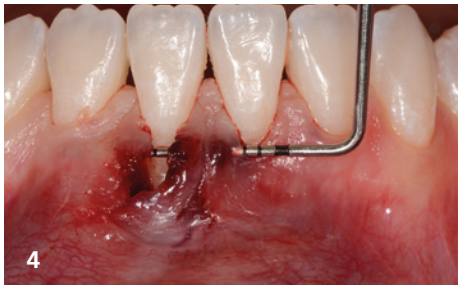


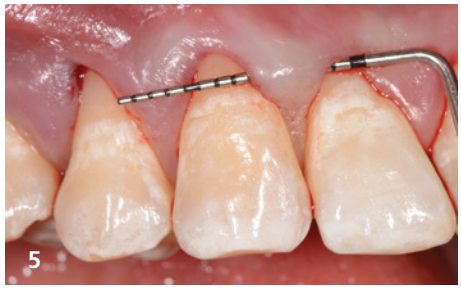
Fig. 2: Deep class II recession in the anterior mandible. Pronounced gingivitis and loss of height of the interdental papilla. **Fig. 3:** Multiple class I recessions in the anterior maxilla compromise the aesthetic appearance.

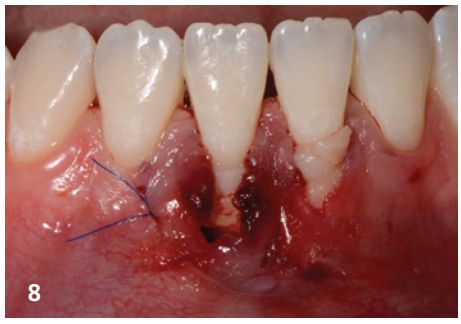
Clinical applications

Due to the previously mentioned biological properties, cross-linked hyaluronic acid (HyaDENT BG; *REGEDENT*) has been applied in reconstructive periodontal surgery of intrabony defects and of singular and multiple recessions.[2–5] For example, applying a cross-linked hyaluronic acid in the reconstructive periodontal surgery of intrabony defects and class I recessions resulted in significantly reduced probing depths, clinical attachment gains and recession coverage.[4,5] A randomised clinical trial has shown that the treatment of Miller class I recessions with a coronally advanced flap in combination with the application of hyaluronic acid resulted in a greater reduction in recession depths and more frequent complete recession coverage than the application of the coronally advanced flap alone.[4]

In patients with a thin gingival phenotype, more advanced recessions and pre-existing interproximal bone loss, a combination of hyaluronic acid (HyaDENT BG; *REGEDENT*) with a subepithelial palatal







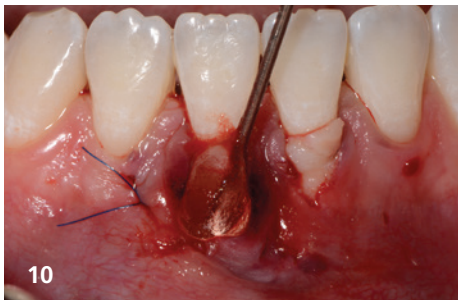
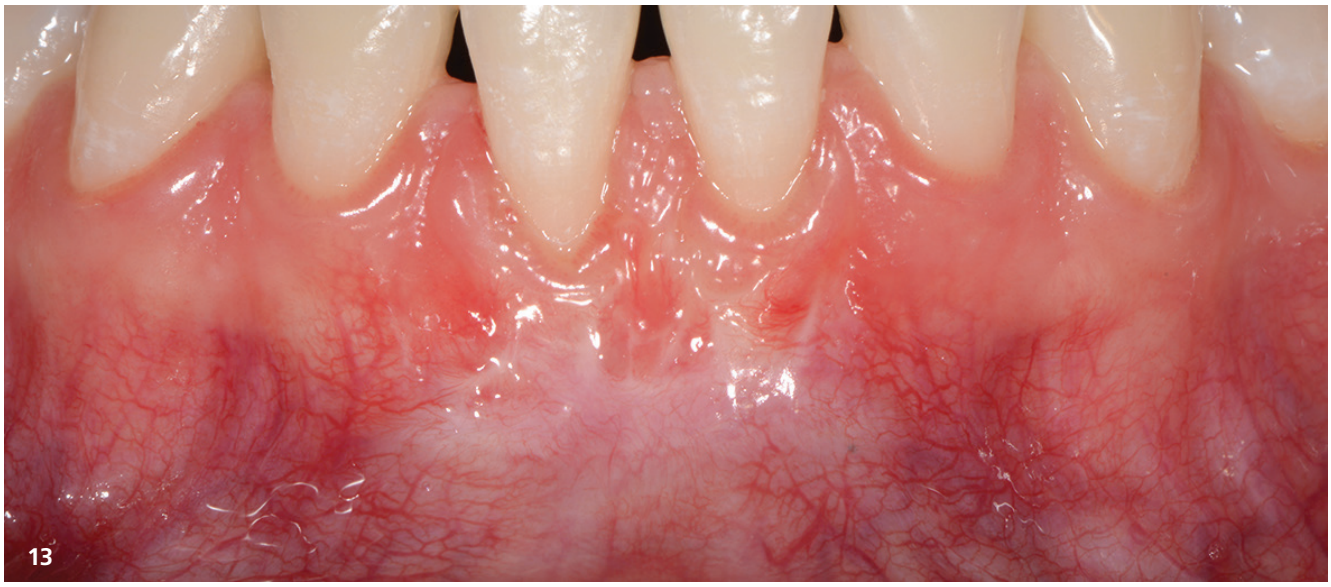


Fig. 4: Prepared tunnel at sites 41 and 31. **Fig. 5:** Prepared tunnel at sites 14 to 11. **Figs. 6 & 7:** Application of cross-linked hyaluronic acid on the root surface and inside the defect. **Figs. 8 & 9:** SBGT secured to the cervical regions with sling sutures. **Fig. 10:** EA second layer of cross-linked hyaluronic acid applied to the SBGT. **Fig. 11:** Laterally closed tunnel at site 41. **Fig. 12:** Coronally mobilised and closed tunnel at sites 14 to 12.



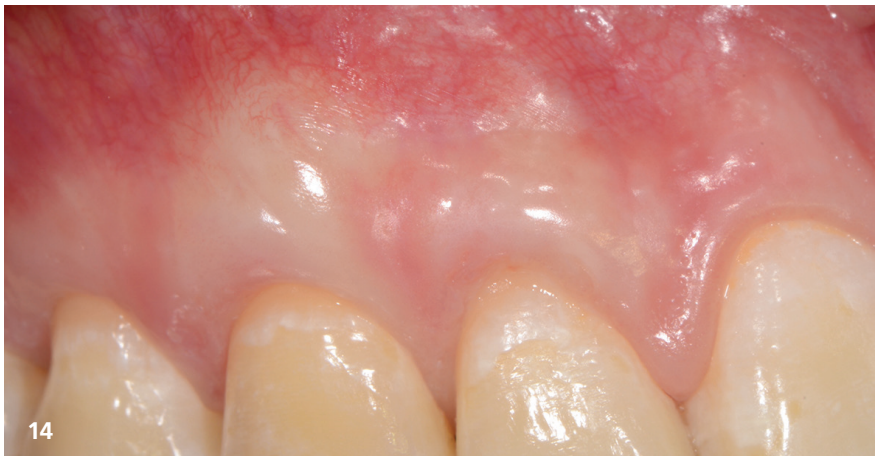


Fig. 13: One year after treatment. The recession is almost completely covered. The gain of attached gingiva makes oral hygiene significantly more effective. **Fig. 14:** One year after treatment. Complete coverage of the maxillary recessions and improved aesthetic appearance.

connective-tissue graft (SBGT) in the context of different variants of the tunnelling technique seems to provide results that had been difficult to achieve until quite recently.[2,3]

Since more severe bleeding can occur in these clinical situations due to the more extensive preparation of the tunnel, the application of hyaluronic acid stabilises the blood clot and exerts a positive influence on wound healing (Figs. 2–14). Two recently published case studies have demonstrated that the combination of hyaluronic acid and an SBGT with different variants of the tunnel technique resulted in complication-free healing and excellent coverage of single and multiple recessions in the maxilla and mandible (Figs. 13 & 14).[2,3]

Conclusion

Existing scientific and clinical evidence shows that the use of cross-linked hyaluronic acid promotes periodontal wound healing and regeneration, opening new possibilities in reconstructive periodontal surgery.

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