The Dental Microscope: Modern Techniques in Periodontology Give the Patient a New Smile

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Optical magnification has broadened the horizons of dentistry in general, and periodontology in particular. It has established microsurgical techniques for periodontal procedures by magnifying even minute anatomical structures, leading to enhanced mucogingival aesthetic outcomes by minimizing scarring and decreasing healing time.

Fig. 1: Before Surgery

Fig. 2: After Surgery

Fifty years ago, the term mucogingival surgery was introduced and applied to surgical procedures that amended the relationship between gingiva and alveolar mucosa.[5] Nowadays, mucogingival surgery has evolved from traditional pocket therapy into a plastic surgery method that includes periodontal, peri-implant and mucosal concerns (e.g., buccal root recessions, volumetric defects, unaesthetic or asymmetric gingiva) whether they are caused by anatomic, developmental, or traumatic deformation. Successful mucogingival invasion depends upon the selection of an atraumatic surgical approach, which is limited by surgeon skill and cognition of the human eye.

In the field of periodontology, an increased demand for mucogingival aesthetics has required the optimization of periodontal procedures such as periodontal microsurgery. Generally speaking, the term microsurgery applies to surgical procedures performed with the aid of magnification systems like medical loupes or dental microscopes, adapted instruments and suture material.

The dental microscope, as a highly sophisticated system of lenses, allows binocular viewing at magnification of approximately 4x to 24x. The optical extension of the light beams, due to the system of lenses and prisms, effects accommodation of the eyes to virtual infinity so that no eye convergence is necessary and the demand on the eye muscle is minimal. The magnification recommended for surgeons ranges from 2.5x to 20x.[1,12] In periodontal surgery, magnification of 4x to 5x for medical loupes and 10x to 20x for the dental microscope appears to be ideal. The dental microscope guarantees an ergonomic working posture, optimal, coaxial lighting of the operation region and quite freely selectable magnification levels. Recent developments in dental microscopes have also enabled direct viewing of oral operation sites. In many surgical specialties, such as neurosurgery, urology, plastic and eye surgery, treatment outcomes were significantly improved by applying minimally invasive techniques.[7,11] Studies covering wound healing of extraoral operation sites have demonstrated that epithelization of a wound closed microsurgically was completed within 24 hours: minimal tissue trauma caused by a microsurgical incision and suture technique with primary wound closure results in reduced cell necrosis and, consequently, faster healing than with a macrosurgical approach.[17] The use and advantages of the dental microscope have been extensively discussed in endodontic literature.[3,18] The benefits of microsurgical approaches in periodontal therapy have also been described.[2,4,13,14,15,16] As they are relatively frequent therapies in periodontology, root coverage and soft tissue augmen-

tation are fundamental to daily practice. Root coverage with free connective tissue grafts has a high rate of clinical success,[8,9,10] whereas microsurgical techniques heal even more rapidly with minimal scarring, and therefore, enhance the aesthetic outcome. With proper lighting and visualization of the operation area, mucosal flaps can be prepared in equal thickness under a dental microscope without the risk of perforating the flap basis or the mucogingival junction. This is particularly important with double-split mucosal flaps, which traditionally place the highest demands on the surgeon. Closure of surgical wounds in a layer-by-layer fashion is indicated with all periodontal procedures where passive, tension-free wound closure is fundamental for wound healing and a successful functional and aesthetic outcome.[6] Everyday periodontal surgery shows that healing and regeneration results are seriously compromised when the flap cannot be kept completely closed. Moreover, abundant fat parts at the connective tissue graft can be removed under complete control beneath a dental microscope, and the connective tissue can be trimmed with ease and precision to the necessary size, which favors rapid vascularization.

Periodontal microsurgery not only improves the results of free-connective tissue grafts with the split-flap technique, it is similarly advantageous to periodontal diagnosis and therapy. Magnification of the structures and favorable lighting improve the recognition of subgingival elements. Judgment of pocket tissue facilitates optimal flap adaptation and enables passive primary wound closure to be achieved. These techniques, therefore, decrease the duration of the healing period, the time required for resorption of the connective tissue graft, scarring, as well as patient pain and discomfort.

Image courtesy: Practice of Dr. Wolfgang Bolz, Prof. Dr. Hannes Wachtel, Prof. Dr. Markus Hürzeler, Dr. Otto Zuhr, Dr. Wolf Richter, Munich, Germany

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