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ADVANTAGES OF PERIODONTAL LIGAMENT DETACHMENT USING A PERIOTOME DURING ATRAUMATIC TOOTH EXTRACTION

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Abstract: atraumatic tooth extraction minimizes damage to surrounding tissues. Pre-detachment of periodontal ligaments using a periotome greatly facilitates extraction and reduces complications. According to clinical studies, the use of a periotome reduces postoperative pain by 52.8%, reduces soft tissue damage and preserves the alveolar bone. The paper provides a comparative analysis of traditional techniques without pre-detachment and atraumatic techniques with the use of a periotome.

Keywords: atraumatic tooth extraction, periotomy, periodontal ligament, luxation, surgical ironing.

Tooth extraction is one of the most frequently performed procedures in dentistry. The traditional technique uses elevators without pre-detachment of the periodontal ligaments, which often leads to tissue injury. In my practice, I observe damage to the alveolar bone, soft tissue tears, and severe pain during traditional removal. With the development of implantology, the concept of atraumatic removal has acquired a new meaning. In the practice of our colleagues, the preservation of the alveolar bone is critically important for subsequent implantation. In our studies, the use of a periotome for pre-detachment of the periodontal ligament significantly improves the extraction results. The periodontal ligament (PDS) connects the tooth root to the alveolar bone. According to research, PDS contains 13 groups of collagen fibers, of which six groups - Sharpei fibers - are embedded in the cement of the tooth and the alveolar bone. In my practice, understanding the anatomy of PDS is crucial for choosing the right technique. Forcible tearing of Sharpei fibers during traditional removal leads to damage to bone and soft tissues. Traditional removal uses elevators in a rocking motion to cross the PDS and expand the alveoli. In the practice of our colleagues, risks include: unintentional pressure on an adjacent tooth, fracture of the alveolar bone, rupture of soft tissues, severe postoperative pain. According to the PMC, luxation forces on the alveolar bone potentially cause fracture or compression necrosis of bone cells. In my practice, the main problem is that most elevators are too thick to penetrate into the space of the PDS without damaging the supporting bone. Atraumatic extraction is a technique for protecting the alveolar bone and adjacent teeth. According to research, using periotomes and luxators, the force is directed apically, and the PDS intersects rather than breaks. The basic principles in my practice are the complete intersection of connective tissue fibers with a circular incision, the use of specialized tools to cross the ligament, the direction of force apically along the root axis, and the use of forceps only after achieving tooth mobility. Periotomes are specialized tools with thin, sharp blades (2-5 mm) for penetrating into the narrow space of the PDS. According to PMC, periotomes were developed more than 30 years ago to complement grain elevators. Advantages: thin, sharp blades, the ability to cross Sharpei fibers, minimal pressure on bone, work without peeling off soft tissues. Luxators are tools that combine the functions of periotomes and elevators. In my practice, luxators are useful when a combination of ligament intersection and moderate luxation is required. According to research, luxators are thinner and sharper than traditional elevators, and they fit better in narrow apical

spaces. According to the PMC randomized trial, the periotome is held by a modified pen grip and inserted at an angle of 20 degrees to the long axis of the tooth into the gingival sulcus. Technique in my practice:

Step 1: Circular incision. The blade is inserted into the gingival groove at an angle of 20 degrees to cross the cervical gingival fibers.

Step 2: Moving into the PDS space. The periotome moves a few millimeters into the ligament space, tilting mesially, then distally, tangentially to the root surface. According to the PMC, it gradually moves up to two thirds of the distance to the apex of the root.

Step 3: Circular processing. The periotome works circularly around the root in a slow process to detach the ligament.

Step 4: Biomechanical creep. After the insertion of the instrument, a period of 10-20 seconds is maintained, allowing creep of the bone and ligament to occur.

Step 5: Apply forceps. Only after achieving significant mobility are forceps used, which grasp the tooth deeply at the root and gently rock it until it is easily removed. According to a PMC randomized double-blind study of 100 patients, all parameters were statistically significantly better in the periotomy group. An intergroup comparison showed a 52.8% decrease in pain in the experimental group, while pain increased in the control group. Reduction of postoperative pain. According to the PMC, the use of a periotome resulted in a 52.8% reduction in pain. In my practice, patients report significantly less discomfort. The mechanism is associated with minimal tissue injury, absence of fiber rupture, bone preservation, and absence of compression necrosis. In the practice of our colleagues, patients require lower doses of analgesics. Minimization of soft tissue damage. According to the PMC, there was significantly less gum damage in the periotomy group. In my practice, with the traditional technique, tears of the gums are often observed, especially the interdental papillae. Crossing the fibers with a scalpel or periotome prevents their violent rupture, which reduces bleeding, delayed healing, and postoperative discomfort. Preservation of the alveolar bone. In my practice, bone preservation is a priority when planning implantation. When using a periotome, the force is directed apically along the root axis, rather than laterally onto the bone. In our research, atraumatic removal preserves bone quantity and quality, as well as gingival architecture, resulting in more predictable implant positioning. Protection of adjacent teeth. With traditional machinery, the elevator often uses an adjacent tooth as a fulcrum. In my practice, I have observed cases of damage to neighboring teeth during aggressive luxation. When using a periotome, the force is directed into the PDS space, which protects neighboring structures. Better healing for implantation. According to research, atraumatic technique is a critical component of the comb preservation process. In the practice of our colleagues, atraumatic removal provides optimal conditions for osseointegration when planning implantation. Maintaining the viability of the PDS and the surrounding blood supply leads to more predictable healing. In my practice, I identify the following disadvantages of removal without prior detachment: violent rupture of Sharpei fibers, compression necrosis of bone cells, high risk of fracture of the alveolar bone, damage to neighboring teeth, severe postoperative pain, prolonged healing, unpredictable resorption of the alveolar ridge, high risk of fracture of the tooth root. Our studies have identified situations where pre-detachment is particularly important: planning immediate or delayed implantation, tooth extraction in an aesthetically significant area, thin soft tissue biotype and thin buccal bone plate, multi-root teeth, teeth with curved or hypercemented roots, patients at high risk of osteonecrosis (bisphosphonates, radiation therapy), the need to preserve alveolar a comb for prosthetics.

Conclusions:

Pre-detachment of periodontal ligaments using a periotomy is a key component of an atraumatic tooth extraction technique. According to clinical studies, this approach provides a statistically significant reduction in postoperative pain by 52.8%, minimizes soft tissue damage and preserves the alveolar bone. In our research, the advantages of PDS detachment include crossing rather than tearing connective tissue fibers, directing force apically instead of laterally pressing on the bone, preventing compression necrosis, protecting neighboring teeth, and creating optimal conditions for implantation. The traditional technique without prior detachment leads to violent rupture of fibers, tissue injury, severe pain syndrome and unpredictable ridge resorption. In my practice, the use of a periotome for pre-detachment has become the standard of quality for tooth extraction. In the practice of our colleagues, an atraumatic technique using a periotome is especially important when planning implantation, removal in an aesthetically significant area and in patients with a thin tissue biotype. Compliance with the principles of atraumatic removal with mandatory pre-detachment of the periodontal ligament ensures the best clinical results, patient satisfaction and predictability of subsequent treatment.

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