CHAPTER 3A

CYSTECTOMY, ROOT-END RESECTION AND RETROGRADE PREPARATION OF THE ROOT CANAL BY ASS. PROF. DRAGANA GABRIC

Aim of Treatment

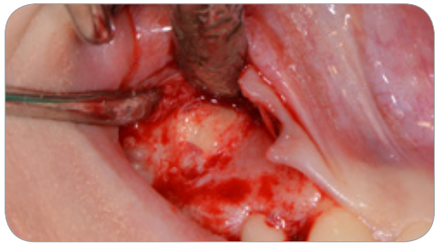
First of all endodontic surgery requires safe access to the periapical area, with minimal injury to the hard or soft tissues. During access the diseased periapical tissue should be preserved for histopathological examination. Resection of the root tip and preparation of the apical part of the canal is then accomplished with effective, but delicate instruments, which produce smooth surfaces, for a tight endodontic seal. Piezoelectric inserts for osteotomy and a specific assortment of instruments for endodontic retrosurgery fulfill all of these requirements.

Instruments for this case

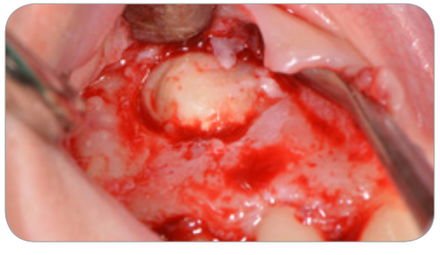
Clinical Case

In a 23-year-old female patient the root canal of tooth 15 had been treated orthogradally ' 5 months before surgery.

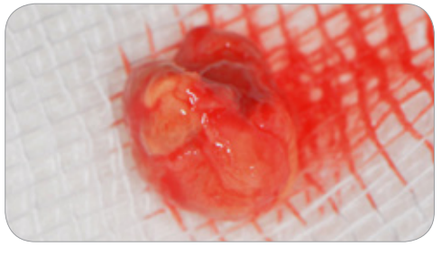
1 Due to pain and a persistent periapical translucency it was decided to retreat the tooth using retrograde microsurgery.



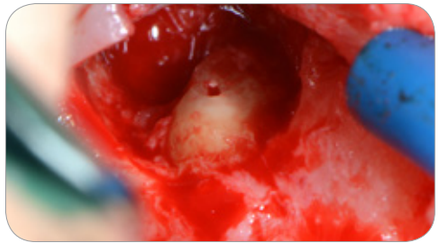
2 After preparation of a marginal full thickness flap with a vertical releasing incision the outline of the cystic lesion is clearly visible. The cortical bone was completely resorbed.



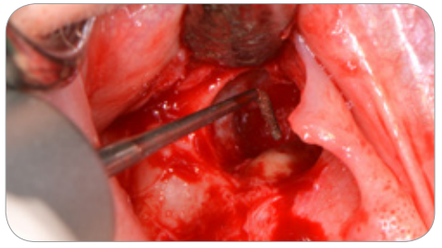
3 The outline of the cystic tissue has been prepared with a piezoelectric insert (Piezomed S2).



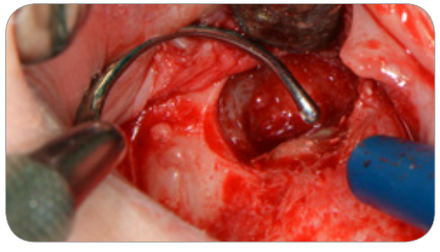
4 The diseased tissue specimen is intact and has been enucleated in toto, which makes histopathological examination easy.



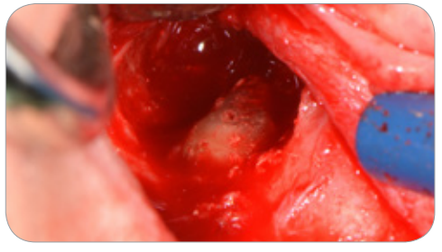
5 Periapical aspect of the diseased tooth, after near 90 degree beveling using a a straight diamond-coated piezoelectric instrument (R1D). The bony defect is big enough for the use of resection and retro-preparation instruments.



6 With R1D the root canal is prepared in a retrograde direction.



7 The canal is filled with mineral trioxide aggregate (MTA).



8 Situation after retrograde filling.

9 The flaps are finally repositioned and sutured.

8 The radiograph 2 months post-surgery shows significant ongoing ossification, indicating successful treatment of the cystic lesion.

Description of technique

Microsurgical techniques have become the standard of care for the surgical management of endodontic complications (1, 2). When anamnesis and diagnostics have confirmed that a surgical (retro-)endodontic treatment is indicated the equipment of choice includes a microscope for optimal visualization of the surgical area. Moreover there is an array of specific hand and mechanical instruments suitable for soft tissue access, osteotomy, periapical soft tissue removal, root end preparation and obturation, and suturing (3, 4).

Access to the periapical site and cystectomy

In order to reduce bleeding a vertical releasing incision is prepared, in combination with a marginal or submarginal horizontal incision. The periapical area is identified (Fig. 2) and existing bone over the diseased tissue is cut (Fig. 3) with suitable instruments, e.g. with piezoelectric saws or with piezoelectric diamond-coated round or spatula-shaped inserts. As there may occur pathologies other than granulomae or cysts the periapical tissue should routinely be examined with histopathological methods. It is therefore important to preserve the tissue in toto during access to the apical area (5). The procedure can be compared with the management of the Schneiderian membrane in maxillary sinus grafting. For the same reason piezoelectric osteotomy has proven more successful than rotary preparation concerning epithelial perforation of the cystic tissue, bleeding (better visibility of surgical field), postoperative complications and recurrence of the cystic process (6–8). After piezoelectric access the cystic tissue can be carefully enucleated with hand instruments (Fig. 4).

Root-end resection and retrograde preparation

Using optimal magnification and, if necessary, methylene blue solution for detection of all details the most apical infected part (approximately 3 mm) of the root tip is ablated. This can be performed with rotary carbide burs in specially angulated micro-handpieces, or with dedicated ultrasonic diamond-coated inserts. In comparison with lasers, both options have proven less invasive and to produce more suitable surfaces for cellular attachment during tissue repair (9). Diamond-coated instruments for use in piezoelectric surgery devices are a third and relatively new option for the procedure (10).
Finally, retrograde cavity preparation can be successfully performed with specific assortments of ultrasonic inserts. There is a number of different shapes and angulations available, which allow delicate enlargement of the apical canal. In comparison with rotary burs ultrasonic technology has proven safer in preservation of the canal shape.

It also allows a more precise and better controlled preparation in the long axis of the canal, resulting in less perforations (11). Analogous to ultrasonic inserts assortments of piezoelectric surgery inserts can be used for retrograde preparation (Fig. 6) (12).

Challenge of the procedure and benefits of the Piezomed

In endodontic microsurgery it is important to preserve a maximum amount of hard and soft tissues, depending on the specific indication:

1. After soft tissue access bone should be prepared with minimum heat production to avoid tissue damage. This is ideally accomplished with piezoelectric devices which allow effective irrigation. With Piezomed inserts the coolant exits near the tip, close to the surgical area.
2. The size of the defect produced by access osteotomy is critical for successful healing. Delicate piezoelectric inserts, e.g. the Piezomed B6/B7, S1 or S2, allow precise and minimal-invasive cutting of the bone overlying the periapical lesion. The cavitation effect permits better control of bleeding and therefore enhanced visibility in comparison with rotary instruments.
3. The selective cutting action of piezoelectric devices helps to preserve the integrity of the soft periapical cystic or granulation tissue, which is important for pathohistologic examination (5).
4. Root-end resection was carried out with a piezoelectric insert which is routinely used for retrograde root canal preparation. Depending on the defect size the B3 would also be suitable.
5. The retrograde endodontic assortment of the Piezomed is shaped similar to ultrasonic inserts available for the same indication. The diamond-coated instruments R1D, R2RD/R2LD, R3D and R4RD/R4LD allow precise and minimal-invasive retrograde preparation of the root canal, with high efficiency due to the powerful action of the device.

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