rootEX®

The patent-protected instrument to extract root fragments safely - quickly - efficiently.

For the first time **rootEX®** instruments make it possible to remove root fragments safely, quickly and without additional surgical intervention.

The innovative technical solution has been internationally patented.

DIASWISS

PRECISION DENTAL INSTRUMENTS

European patent 3 251 627
US Patent 10,905,525
Russian patent 2018144660/14 (074516)
Japanese patent 6914324

The challenge today

Of the approximately 12.5 million* (source KZBV Yearbook 2017) root extractions performed annually in Germany, approx. 10 - 30 % result in roots or root fragments breaking off and remaining stuck in the alveola. Deeper fractured roots, whose fracture surfaces lie below the limbus alveolaris (edge of the bony root compartment), can only be removed if they are clearly exposed. A surgical procedure is then unavoidable:

- Incision - trapezoidal or triangular with the broad base in the vestibule (vestibule of the mouth, located towards the cheek or lip).
- Unfolding - mobilization of a mucosa periosteum flap (detachment of a mucosa periosteum flap from the bony support) with the help of a raspatory.
- Visualization of the vestibular alveolar wall (the wall of the dental compartment facing the oral vestibule).
- Osteotomy - removal of the thin layer of bone above the root(s) with a small ball bur. In favorable cases, a marginal bone bridge (at the edge of the root socket) can be preserved.
- Milling around the root fragments.
- Mobilization and removal by means of a probe, scaler, claw, lever.
- Wound closure by adaptation of the flap with sutures.

In addition to the disadvantages of the wound healing process and stress for the patient, prompt implantation is rendered impossible.

If root fragments remain in the jaw after an extraction or after a root destroyed by caries has broken off, remaining bacteria in the surrounding bone and / or soft tissue can lead to an infection (inflammation). In extreme cases, abscess can dissolve the jawbone in this area and a jaw fracture can occur. Additionnally, if the fragment is left in place, there is risk of neuralgiform complaints, and the patient must be informed about these possible complications.
If an extraction is necessary, removal of an intraoperatively caused root fragment is also necessary, unless:

- Important anatomical structures could be endangered.
- An extensive bone defect would have to be created to remove the root fragment.

The innovation

rootEX® instruments enable fast **and efficient extraction of root fragments without additional surgical intervention thus avoiding weakening of the jaw bone.**

Pre-drilling cleans and opens a hole enabling the retentive plug to be pressed into the root fragment. Unlike conventional tools, which are screwed into the root fragment, pre-drilling and subsequent pressing prevents the **rootEX®** root tip extractor from being overtightened and thus further breakage.

As soon as the plug is pressed deep enough into the fragment, the retentive elements of the **rootEX®** plugs connect with the root fragment. This allows for safe extraction of the fragmented root from the socket in one piece. For simple cases, a one-step system is also available in which the retentive elements are applied directly onto the drill.

rootEX®

Procedure

The first step is to select the appropriate instrument. For larger root diameters or reduced strength of the root fragment's structure, a correspondingly larger diameter of the **rootEX®** instrument should be selected. The selection of the length is determined by the anatomical conditions. A vertical canal is then drilled with the pilot drill at a minimum depth of the head length of the instrument (max. 800-1200 rpm).

The removal of the root fragment is usually performed in two steps:

Step 1

Perforating the root fragment using the **rootEX®** drill at the lowest possible speed (contra-angle handpiece). The **rootEX®** drills are sterilizable and can be used several times.

Step 2

The corresponding plug is pressed into the predrilled hole with a slight clockwise rotation. The laser-milled retentive barbs generate an extractive force of over 80 N, which exerts sufficient grip to remove the root fragment. The **rootEX®** plugs are suitable for single use only, as the retentive barbs do not develop sufficient extractive strength after inital use. The specially developed **rootEX®** forceps can be used if root fragments remain stuck.

For simple cases, a one-step **rootEX®** system is also available, in which the retentive barbs have already been laser-milled onto the drill so that the root fragment can be pulled directly after drilling. Slight tilting (pulling force slightly angled in relation to the drill hole) increases the adhesive force of the instrument. If the root fragment is firmly anchored, the extraction can be performed using the **rootEX®** forceps (to loosen the desmodontium, it is recommended to allow some time for this procedure).

Recommended speed for the drill:

- One-step system: max. 100-250 rpm.
- Two-step system/pilot drill: max. 800-1200 rpm.

Only moderate pressure should be applied to prevent piercing of the root fragment and/or lateral slippage.

The root fragment can be removed even in anatomically difficult situations by using the **rootEX®** forceps due to its multiple handling options.

As the two-step system exerts significantly higher extractive force (stronger retention), the use of the one-step system is only recommended if the following parameters are met:

- Reduced anchorage of the root fragment (reduced by, e.g. small dimension of the root fragment, periodontitis, accident, tumor, malnutrition, poorly fitted crowns and bridges, surgical intervention).
- Solid structure of the root fragment, (not weakened by caries for example).

Comparison to alternatives

Similar systems from competitors are usually more complicated to use, considerably more expensive or work with threaded screws to anchor in the root fragment. Using these can further damage the root by breaking them into yet smaller pieces.

The **rootEX®** system also features an instrument with a smaller diameter (0.8mm) working head, so that smaller fragments can also be removed.

FAQ

1. Is there a possibility of drill breakage in difficult situations?
   *The **rootEX®** instruments are made of stainless steel, therefore damages to the instrument are unlikely if handled correctly.*

2. What is the cost-benefit ratio in terms of time?
   *The **rootEX®** system allows for faster, and thus more cost-effective extraction of root fragments, as well as requiring only a minimally invasive procedure.*

3. Can **rootEX®** instruments be used several times?
   *To ensure safe functioning of the **rootEX®** plugs, a new tool must be used for each application whereas the drill can be used several times.*

4. Will the patient experience pain in the course of this treatment method?
   Due to the minimally invasive procedure, the patient can expect significantly less pain as well as a better wound healing process as opposed to conventional procedures.

5. Is the **rootEX®** system easy to use?
   *The **rootEX®** system is easy and convenient to handle.*

Literature

- Gabka J, Harnisch H: Surgery course for dentists. Georg Thieme Publishers 1973
- Schwenzer N, Ehrenfeld M: Dental Surgery Vol. 3. Georg Thieme Verlag 2009: 6 et seqq.
- Horch HH (ed.): Praxis der Zahnheilkunde Volume 9: Dental Surgery. Publisher Urban & Schwarzenberg 1989: 181 ff.

- (Source, Patient Information University Hospital Jena "Soft Tissue Inflammation")
- (http://www.zahngesundheit-online.com/Zahnchirurgie-Oralchirurgie-/Entfernung-von-Wurzelresten) (DocMedicus)

Standard	Diameter	Drill Cat. 161	PU	Diameter	Plug Cat. 160	PU	SET Cat. 159
rootEX® 0.8	ø 0,8 mm	REF 935L.008med	6 pcs	ø 1,0 mm	REF 936L.010med	6 pcs	1x Drill ø 0,8 mm 5x Plugs ø 1,0 mm REF 935L.Set.008
rootEX® 1.1	ø 1,1 mm	REF 935L.011med	6 pcs	ø 1,3 mm	REF 936L.013med	6 pcs	1x Drill ø 1,1 mm 5x Plugs ø 1,3 mm REF 935L.Set.011
rootEX® 1.3	ø 1,3 mm	REF 935L.013med	6 pcs	ø 1,5 mm	REF 936L.015med	6 pcs	1x Drill ø 1,3 mm 5x Plugs ø 1,5 mm REF 935L.Set.013
rootEX® 1.6	ø 1,6 mm	REF 935L.016med	6 pcs	ø 1,8 mm	REF 936L.018med	6 pcs	1x Drill ø 1,6 mm 5x Plugs ø 1,8 mm REF 935L.Set.016
rootEX® 1.8	ø 1,8 mm	REF 935L.018med	6 pcs	ø 2,0 mm	REF 936L.020med	6 pcs	1x Drill ø 1,8 mm 5x Plugs ø 2,0 mm REF 935L.Set.018

Short	Diameter	Drill Cat. 161	PU	Diameter	Plug Cat. 160	PU	SET Cat. 159
rootEX® 0.8 short	ø 0,8 mm	REF 935K.008med	6 pcs	ø 1,0 mm	REF 936K.010med	6 pcs	1x Drill ø 0,8 mm 5x Plugs ø 1,0 mm REF 935K.Set.008
rootEX® 1.1 short	ø 1,1 mm	REF 935K.011med	6 pcs	ø 1,3 mm	REF 936K.013med	6 pcs	1x Drill ø 1,1 mm 5x Plugs ø 1,3 mm REF 935K.Set.011
rootEX® 1.3 short	ø 1,3 mm	REF 935K.013med	6 pcs	ø 1,5 mm	REF 936K.015med	6 pcs	1x Drill ø 1,3 mm 5x Plugs ø 1,5 mm REF 935K.Set.013
rootEX® 1.6 short	ø 1,6 mm	REF 935K.016med	6 pcs	ø 1,8 mm	REF 936K.018med	6 pcs	1x Drill ø 1,6 mm 5x Plugs ø 1,8 mm REF 935K.Set.016
rootEX® 1.8 short	ø 1,8 mm	REF 935K.018med	6 pcs	ø 2,0 mm	REF 936K.020med	6 pcs	1x Drill ø 1,8 mm 5x Plugs ø 2,0 mm REF 935K.Set.018

in one	Diameter	Standard Cat. 160	PU	Diameter	Short Cat. 160	PU
rootEX® 0.8 in one	ø 0,8 mm	REF 937L.008	6 pcs	ø 0,8 mm	REF 937K.008	6 pcs
rootEX® 1.3 in one	ø 1,3 mm	REF 937L.013	6 pcs	ø 1,3 mm	REF 937K.013	6 pcs
rootEX® 1.8 in one	ø 1,8 mm	REF 937L.018	6 pcs	ø 1,8 mm	REF 937K.018	6 pcs
rootEX® SET in one	2x ø 0,8 mm 2x ø 1,3 mm 2x ø 1,8 mm	REF 937L.Set	6 pcs	2x ø 0,8 mm 2x ø 1,3 mm 2x ø 1,8 mm	REF 937K.Set	6 pcs

Forceps Cat. 159

REF 02-2521-00

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