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Review Article

Atraumatic extractions-Indications and treatment modalities

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ABSTRACT

This paper seeks to enumerate and explain the instruments used commonly for atraumatic extractions, their method of usage and identify their indications. The methodology includes review of journal articles on approaches, benefits and procedures for atraumatic extraction and their compilation. The methodology also includes a review of websites of manufacturers of atraumatic extraction devices and instruments. These sources help to identify the common means for carrying out atraumatic extractions and also the indications for the same. Implants continue to be an exceedingly accepted means to replace an extracted tooth. This may be done immediately following an extraction or at a later date subsequent to satisfactory wound healing. In both situations the need for an atraumatic extraction seems all the more pertinent. Extractions for orthodontic purposes requiring minimal trauma to the surrounding structures of a tooth, particularly the bone, call for a far more atraumatic procedure than the conventional tooth extraction. With the advent of physics forceps, periotomes, luxators piezoelectric instruments and root traction devices atraumatic extractions by preservation of the alveolar bone, the socket, gingival architecture and without trauma to the periodontium has become a necessary skill in the repertoire of the general dental practitioner. This facilitates better implant outcomes or better orthodontic therapy. Newer methods such as Endoscopically Assisted Root Splitting can be used for extractions without causing trauma to the alveolar bone. This can be done using a Storz-Hopkins support endoscope and enlargement of the canals using Lindemann burs followed by longitudinal root splitting and removal using Bein forceps or fragment removal if an implosion technique is used. However, one needs to keep in mind the duration required for such procedure and the cost of instruments required. These methods prevent unnecessary mucoperiosteal flap elevations, incisions and osteotomies thereby minimizing inflammation. To make dental practitioners embrace these procedures, inadequate literature availability and time limitations remain the biggest constraints.

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1. Introduction

Atraumatic extractions comprise of those instruments and methods that use vertical rather than translational forces to extract teeth. These procedures primarily make use of devices like physics forceps, luxators and piezoelectric instruments. Newer techniques like endoscopically assisted root splitting are carried out to further enhance the outcome of the procedure. [1]

1.1. Indications

Use of atraumatic modalities for extractions include extractions for orthodontic treatment, extractions to be followed by implant placement, medically compromised patients, deciduous teeth with underlying permanent teeth and teeth which have undergone endodontic treatment. [2]

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1.2. Modalities for atraumatic extractions

1.2.1. Physics forceps [GoldenDent, USA] (Figure 1)

It is the most clinically effective and easy to use method which places a constant and steady load on the teeth. This results in build-up of creep followed by release of hyaluronic acid and breakdown of periodontal ligaments. The Physics Forceps operate as an elevator, rather than forceps, using first-class lever mechanics.[3] One handle is connected to a bumper, which acts as the fulcrum, which is placed deep in the vestibule. The other handle is connected to the beak, which is positioned most often on the lingual or palatal root of the tooth into the gingival sulcus. No aspect of the instrument grasps the crown and there is no advanced elevation needed. Once the instrument is properly placed, the handles are rotated a few degrees with only wrist movement in a slow, steady and controlled manner.

Fig. 1: Physics forceps [GoldenDent 27251 Gratiot avenue Roseville, Michigan 48066 USA.]

2. Luxators: [© Directa]

These instruments have an ergonomically designed handle to facilitate a better grip and thinner, sharper and stronger blades which help in inserting the instrument in the periodontal space with minimal trauma to alveolar bone.

They are categorised into 2 main types:

1. Luxator Periotomes
2. Luxator Elevators
3. Luxator Periotomes (Figure 2)

Luxator periotomes cause significantly less trauma and preserve the alveolar bone socket. They comprise of a fine tapering blade and an ergonomic handle. They act by wedging and severing periodontal ligament fibres and compression of alveolar bone.

2.1. Luxator elevators (Figure 3)

Luxator elevators are used in a semi-circular rocking and cutting motion while applying apical pressure. A deeply wedged luxator can also be used to push against a tooth root

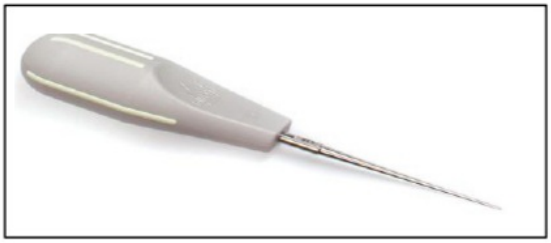

Fig. 2: Luxator periotome [© Directa AB]

to assist in tearing the periodontal ligament and luxating the tooth. Luxators should not be used in a prying motion or to apply significant rotational torque. Incorrect use results in damage to the tip. They are not robust instructments, and they chip and break when used in an inappropriate manner.

Fig. 3: Luxator elevator [© Directa AB]

2.2. Endoscopically assisted root splitting

It is employed primarily in the anterior aesthetic zone. The surgeon operates at the 9 o'clock position while watching the operating site on a video screen via Storz -Hopkins support endoscope [KARL STORZ SE & Co. KG] (Figure 4). The crown of the tooth removed using transversal separation at the level of gingiva. This is followed by identification of root canal, enlargement of the canals using Gates' and Lindemann's burs and splitting the roots using straight or curved elevators. Implosion technique is utilised in this case by moving bone fragments towards the centre of the alveolus. The root pieces can be removed under endoscopic guidance with root forceps.

2.3. Piezoelectric instruments (Figure 5)

These instruments work at a modulated frequency of 24 to 29 Hz and amplitude of 60 to 200 mm/s. The prominent advantage is that they produce a clean and neat cut with no damage to nerves or other soft tissue on accidental contact.[4] There is no requirement of stabilising force to compensate for rotary or translational motion as in the case of burs or

Fig. 6: Powertome© Copyright 2022 surgical solution USA

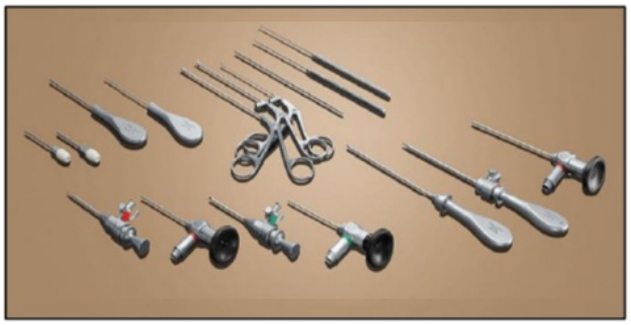

Fig. 4: Storz-Hopkin's endoscope [KARL STORZ SE & Co. KG Dr. Karl-Storz-StarBe]

saws, and they reduce postoperative swelling and trismus.

Fig. 5: Piezotome extraction UnitSATELECR® (FRANCE) distributed by COMEG

2.4. Powertome (Figure 5)

The Powertome combines the atraumatic extraction advantages of the periotome with mechanized speed. It comprises of a handpiece with a periotome blade that is controlled by a foot switch. The procedure started by placing the blade of periotome in the PDL space interproximally. Keeping the blade parallel to the long axis of the tooth, the blade should follow the contours of the tooth in a sweeping motion, advancing apically in 2-4 millimetre increments.[4] It advances easily with minimal hand pressure yielding much faster and less fatiguing results than traditional periotomes. Following use of the Powertome the tooth in question should be gently removed with forceps in a rotational fashion. In some instances, simple suction is all that is required to remove smaller single rooted teeth. Multirooted teeth, on the other hand, may require surgical sectioning to convert the tooth into multiple "single rooted" teeth.

3. Conclusion

Extractions for orthodontic purposes requiring minimal trauma to the surrounding structures of a tooth, particularly the bone, call for a far more atraumatic procedure than the conventional tooth extraction. With the advent of physics forceps, periotomes, luxators, piezoelectric instruments and root traction devices atraumatic extractions by preservation of the alveolar bone, the socket, gingival architecture and without trauma to the periodontium has become a necessary skill in the repertoire of the general dental practitioner. This facilitates better implant outcomes or better orthodontic therapy. However, one needs to keep in mind the duration required for such procedure and the cost of instruments required. To make dental practitioners embrace these procedures, inadequate literature availability and time limitations remain the biggest constraints.

4. Conflict of Interest

The authors declare no conflict of interest.

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