

# Powerptome® Assisted Atraumatic Tooth Extraction

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## Abstract



**Background:** While traditional dental extraction techniques encourage minimal trauma, luxated elevation and forceps removal often results in fracture or deformation of the dentoalveolar housing. This trauma typically results in post extraction ridge defects that may preclude treatment with dental implants or result in sub-pontic food traps when traditional fixed partial dentures are used. These problems may be avoided with “atraumatic” extraction techniques. This paper introduces an automated periosteal elevator that combines bone preservation with expedient extraction times.

**Methods:** Seven cases are presented in which atraumatic extractions were performed with

the Powerptome® automated periosteal elevator (West-Port Medical, Inc., Salem, Oregon, USA).

**Results:** In all seven cases, dental extractions were performed flaplessly without damaging the dentoalveolar housing. Most cases were performed in a matter of minutes.

**Conclusion:** The automated periosteal elevator introduced in this paper is an effective device for expedient atraumatic dental extractions. By avoiding mucoperiosteal flap reflection and damage to adjacent bone, delicate gingival papillae are preserved and the opportunity for future or immediate dental implant treatment is maintained.

**KEY WORDS:** Atraumatic dental extraction, periosteal elevator, dental implant

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## INTRODUCTION

Treatment modalities are in a constant state of flux to meet the ever changing needs of the dental profession. This is readily apparent in the field of implant dentistry, especially where dental extractions are concerned. Traditional extraction techniques have one ultimate goal: removal of the tooth from its dentoalveolar housing. In certain circumstances, achieving this goal involves fracturing or surgical removal of surrounding bone. Basic exodontia texts often advocate as much, and while all mention that trauma should be kept to a minimum, bone preservation is typically a secondary concern. For example, many texts note the thin nature of maxillary buccal bone and advocate “rolling” teeth out buccally during extractions as this is the path of least resistance.<sup>1,2</sup> Extracting teeth in this manner often leads to fracture of the buccal plate or deformation of the residual socket. As such, it has been recommended to apply inward circumferential pressure at the socket crest to compress and reposition bone that was traumatized during tooth extraction.<sup>3</sup>

Traumatic damage to the dentoalveolar housing during extraction can result in significant ridge deformities upon healing. In addition to compromising esthetics, such deformities may preclude dental implant placement or result in sub-pontic food traps beneath traditional fixed partial dentures. To avoid these complications, “atraumatic” dental extraction techniques have gained prominence and may ultimately become the standard of care for removal of teeth.

Atraumatic extraction preserves bone, gingival architecture, and allows for the option of future or immediate dental implant placement. A number of tools and techniques have been proposed for minimally invasive tooth removal includ-

ing the Easy X-Trac System<sup>4</sup> (Titan Instrument, Hamburg, New York, USA), Physics Forceps<sup>5</sup> (Surgical Solutions USA, Carlsbad, California, USA), #15 scalpel blades, and periotomes.<sup>6</sup> This article introduces a new addition to the armamentarium for atraumatic tooth extraction: the Powertome<sup>®</sup> (WestPort Medical, Inc., Salem, Oregon, USA). The following series of cases demonstrates utilization of the Powertome<sup>®</sup> for atraumatic tooth removal and rationale for its use.

## DISCUSSION

The basic tenements of atraumatic dental extractions include removal of teeth with preservation of adjacent bone and gingival architecture. In order to achieve this, conventional extraction techniques must be abandoned. Conventional dental extractions typically involve reflection of a mucoperiosteal flap and significant leverage elevation of the tooth against adjacent bone to facilitate removal with forceps. In addition to surgically traumatizing delicate gingival papillae, such techniques have great potential to create residual ridge deficiencies secondary to bone deformation and/or fracture induced by luxation.

One way to reduce trauma to adjacent bone during tooth extraction is via use of the periotome. Periotomes are extraction instruments that employ the mechanisms of “wedging” and “severing” to facilitate tooth removal.<sup>5</sup> Periotomes are composed of very thin metallic blades that are gently wedged down the periodontal ligament (PDL) space in a repetitive circumferential fashion.<sup>7</sup> In addition to minimally invasive luxation, the periotome blade severs Sharpey’s fibers that secure the tooth within the socket. Once a majority of Sharpey’s fibers have been separated from the root surface,

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CASE 1



**Figure 1a:** Presurgical radiograph of Case 1.



**Figure 1b:** Preclinical presentation of Case 1.



**Figure 1c:** Powertome® blade advanced in a "sweeping" fashion.



**Figure 1d:** Powertome® blade advanced down PDL.



**Figure 1e:** Rotational movement of root with forceps.



**Figure 1f:** Atraumatic removal of the tooth.

CASE 2



**Figure 2a:** Fractured coronal tooth segment.



**Figure 2b:** Presurgical clinical presentation of Case 2.



**Figure 2c:** Powertome® blade advanced down PDL.



**Figure 2d:** Residual root removed with simple suction.



**Figure 2e:** Dental implant fixture delivery.

CASE 3



**Figure 3a:** Powertome® blade advanced down PDL of small mandibular incisor.



**Figure 3b:** Powertome® blade advanced in a “sweeping” fashion.



**Figure 3c:** Mandibular incisor removed with rotational movement.



**Figure 3d:** Immediate dental implant fixture delivery.



**Figure 3e:** Postsurgical radiograph of Case 3.

CASE 4



**Figure 4a:** Presurgical clinical presentation of Case 4.



**Figure 4b:** Powertome® blade advanced down PDL.



**Figure 4c:** Atraumatic extraction of brittle maxillary canine.



**Figure 4d:** Extracted segments of maxillary canine from Case 4.



**Figure 4e:** Immediate dental implant fixture delivery (facial view).



**Figure 4f:** Immediate dental implant fixture delivery (occlusal view).

CASE 5



**Figure 5a:** Presurgical radiograph of Case 5.



**Figure 5b:** Presurgical clinical presentation of Case 5.



**Figure 5c:** Powertome® blade advanced down PDL.



**Figure 5d:** Powertome® blade advanced further down PDL.



**Figure 5e:** Extracted roots and tooth fragments from Case 5.



**Figure 5f:** Note the preservation of gingival and osseous structures.

CASE 6



**Figure 6a:** Presurgical clinical presentation of Case 6.



**Figure 6b:** Powertome® blade advanced down PDL.



**Figure 6c:** Powertome® blade advanced further down PDL.



**Figure 6d:** Removal of maxillary molar with forceps.



**Figure 6e:** Extracted roots and tooth fragments from Case 6.



**Figure 6f:** Note the preservation of gingival and osseous structures.



CASE 7



**Figure 7a:** Presurgical clinical presentation of Case 7.



**Figure 7b:** Powertome® blade advanced down PDL.



**Figure 7c:** Powertome® blade advanced down PDL of additional teeth.



**Figure 7d:** Rotational movement allows for simple extraction of single rooted tooth.



**Figure 7e:** Additional rotational extractions.



**Figure 7f:** Note the preservation of gingival and osseous structures.

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rotational movements allow for extraction of the tooth with minimal lateral pressure.<sup>8</sup> This reduces potential trauma to adjacent bone and associated gingival structures. Disadvantages of the periotome include provider fatigue and adding a significant amount of time to the extraction procedure.

The Powertome<sup>®</sup> combines the atraumatic extraction advantages of the periotome with mechanized speed. The Powertome<sup>®</sup> is an electric unit that has a handpiece with a periotome blade that is controlled by a foot switch (figure 8). The automated periotome blade is controlled by a solenoid within the handpiece. Power output to the handpiece is regulated by the controller box and may be adjusted to 10 different power settings. The Powertome<sup>®</sup> is operated by selecting a power setting on the controller unit and inserting the blade into the PDL space. User experience indicates that it is often easiest to begin interproximally. After inserting the blade into the PDL space, the Powertome<sup>®</sup> is activated via the foot switch. 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 millimeter increments. During activation of the unit, the Powertome<sup>®</sup> blade advances easily with minimal hand pressure yielding much faster and less fatiguing results than traditional periotomes. Following use of the Powertome<sup>®</sup> the tooth in question should be gently removed with forceps in a rotational fashion. In some instances, the authors have found that simple suction is all that is required to remove smaller single rooted teeth. Multi-rooted teeth, on the other hand, may require surgical sectioning to convert the tooth into multiple "single rooted" teeth. Prior to sectioning multi-

rooted teeth, it is recommended to use the Powertome<sup>®</sup> in the same fashion as applied to single rooted teeth. In some instances, especially in the cases of fused or convergent roots, multi-rooted teeth may be removed without the need for sectioning. If the roots are flared, however, sectioning the tooth into multiple single rooted teeth will reduce potential for damage to adjacent bone.

## CONCLUSION

Following the recommended protocol for Powertome<sup>®</sup> assisted atraumatic tooth extraction as presented in this article, maximum preservation of the alveolar housing and related gingival structures may be achieved. The multiple cases presented in this article demonstrate the effectiveness of the Powertome<sup>®</sup> for achieving such. ●

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### Disclosure

The authors report no conflicts of interest with anything mentioned in this article.

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