Applications of Piezosurgery in Oral and Maxillofacial Surgery

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Abstract
Piezoelectric bone surgery is a relatively novel alternative to routine bone cutting tools to overcome limitations of hard tissue surgery in maxillofacial surgery practice. Clinical applications of piezosurgery in oral and maxillofacial surgery are varied and range from dentoalveolar and maxillary sinus procedures to implant and temporomandibular joint surgeries. Its advantages over other methods make piezoelectric surgery a technique of choice for osseous surgeries today.

Introduction
Piezoelectric bone surgery is a relatively novel alternative to traditional bone cutting tools to overcome limitations in oral hard tissue surgery. It is a promising and improved technology for bone cutting that is meticulous and soft tissue-sparing, based on ultrasonic micro-vibrations [1].

Clinical applications of piezosurgery in oral and maxillofacial surgery are:

Dento-alveolar procedures
a) Root resection,
b) Hemi-section, root amputation,
c) Periodontal surgery (osseous bone contouring),
d) Apical resection and endodontic treatments,
e) Alveolar decortication and corticotomy,
f) Alveolar distraction,
g) Dental extractions,
h) Removal of impacted teeth (in and around the mandibular canal or maxillary sinus, piezosurgery helps prevent nerve damage, even in case of accidental contact with the working insert tips) [2].

Maxillary sinus surgeries
a) Preparation of bone window with lateral approach [3],
b) Sinus floor elevation,
c) Atraumatic sinus mucosa dissection [4].

The risk of perforating Schneiderian membrane is reduced from 30% to 7% during the osteotomy procedure for bone window confection or during membrane lifting [5].

Bone grafting
a) Harvest of intra-oral autogenous bone chips with a good number of viable osteocytes [6].
b) Mandibular ramus block bone graft as an onlay graft for increasing bone thickness [7].
c) Harvesting iliac block bone graft for jaw reconstruction.
d) Piezosurgery provides high precision and operating sensitivity and easy differentiation between cortical and cancellous bone while removing blocks of monocortical cancellous bone [8].

Dental Implantology
a) Implant socket preparation called ‘differential ultrasonic socket preparation’ is performed with selective enlargement of one socket wall [3].
b) Alveolar ridge splitting and expansion without the risk of thermo-necrosis of bone with reduced risk for adjacent soft tissues damage [9].
c) Re-contouring of alveolar crest with enhanced vibratory efficiency.
Disadvantages are
a) Contraindicated in patients with pacemakers,
b) Not cost effective,

