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Modern methods of tooth extraction

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Abstract
The purpose of this article is to compare different methods of tooth extraction. Atraumatic tooth extraction is essential for a wide range of technologies on bone level repair.
It provides the best healing condition for the socket. The past years have seen the rapid development of atraumatic tooth extraction technologies: (physics forceps; bene extraction, piezo surgery).
This paper gives a brief overview of thies methods,their characteristics, advantages and disadvantages,as well as suggests the best method based on this analyses.

Keywords: The bene extractor, atraumatic safe extraction, tooth extraction, piezo surgery, physics forceps)

1. Introduction

The purpose of this research is to find atraumatic ways of tooth extraction. With the development of science and invention in the area of technical boost, it is essencial to provide the safest and the most painless treatment in dentistry as well. In the framework of this article we are comparing the methods of autramatic tooth extraction in order to find the best and the most effective one. In this article we are focusing on three modern methods: physics forceps, piezo surgery. The bene extractor.
At the end of the article the most effective and safest method is chosen, based on the research. Further we will present these methods and compare them.

Piezosurgery

The first method we would like to present is piezosurgery. In the course of our research we have come across to many articles dedicated to the analyze and development of this method and nowadays it is considered to be one of the most modern and painless methods of tooth removal. Technically, the piezo surgery system tips resemble the conventional piezoelectric ultrasound tip, consisting of the axis, insertion, and a generator of periodic intermediate frequency. Inside the central axis, the piezoelectric ceramic particles are stacked to generate intermediate-frequency vibrations. Active tips can be connected to the conventional piezo surgery system and may even serve as conventional tools for bacterial calculus removal. However, the ultrasonic piezosurgery system tips differ from conventional tools on four parameters: generator frequency, generator weight, hardness, and tip shape [1].
The system built by Mectron piezosurgery [2]. It consisted of an intermediate-frequency generator and a bomb that allowed for irrigation during the operation. To get the desired cutting effect, changes were made in tips whose ultrasonic vibrations come into resonance with the piezoelectric ceramic particles of the axis, thereby allowing increased energy production and making the active tip action more efficient. The hardness of the tip is increased by a titanium nitrite surface layer, sometimes diamond, allowing the tips to act on harder tissues without breaking. Finally, different forms of tips provide a better cutting effect when the tip turns into an electric micrometer saw under the influence of ultrasonic vibrations [1, 2].
A recent systematic review by Troedhan has revealed that piezotomes exerts minimal thermal damage on bone, enhanced bone healing, least destruction of bone due superior depth-control and accurate osteotomy cuts as well as protection to the soft tissue [3]. However, they still have some
disadvantages including longer surgical time and high cost of the armamentarium.
Concerning the piezotome, Tsai have investigated the outcome of piezoelectric instruments on healing of alveolar sockets after extraction of mandibular third molars. The extractions with the use of piezoelectric instruments was compared to the ones with conventional instruments. In the result, it was found that, one month after extraction,
the attachment level at the distal side of the mandibular second molar was more enhanced if piezoelectric instruments were used [4].

Mechanism of action

This system utilizes piezoelectric principle: certain ceramics and crystals deform when an electric current is passed across them, resulting in oscillations of ultrasonic frequency. Microstreaming and cavitation phenomenon are the peculiar features of piezosurgery [5]. The microstreaming is generated by a continuous whirling movement of a fluid generated by a little vibrating insert that favours a mechanical action of debris removal. The cavitiation phenomenon, caused by implosion of gas bullae into blood vessels during osteotomy, produces an important hemostatic effect to optimize intraoperative visibility.

As a conclusion we can add that piezosurgery is an advanced method of performing dentistry surgical procedures, such as tooth extraction, bone grafting and dental implantation. Tissues are cut using ultrasound, so that the surrounding gums, blood vessels and nerves are not damaged. As for the incision itself, it is made as precisely and accurately as possible [6].

The incisions of hard and soft tissues in the oral cavity are made with the help of ultrasound, which allows you to make a hole, cut off a piece of hard tissue of bone or teeth. The ultrasonic device does not adjoin to fabrics, acts on distance [6].

Physics Forceps

In dentistry, the basis of tooth extraction is the physical change of expanding the dental alveolar bone (socket) along with the severing of the periodontal ligament. No matter that this happens, it is more important to understand what is happening in biochemical terms with the tooth and the socket of the tooth. When the periodontal ligament is damaged with forceps or elevators, hyaluronidase is released. The physics forceps technique eliminates the necessity to harsh treatment, such as firmly grasp, push, twist, rock, and pull with arm. The tooth is released to the alveolus and can be pulled out,when chemical breakdown of the periodontal ligament by hyaluronidase takes place. This technique applies a steady rotational trauma to the periodontal ligament quantitatively creating a release of hyaluronidase in a shorter period of time than traditional forceps or elevator extractions because the trauma from these conventional techniques is intermittent (not a steady constant force). As a result, the physics forceps technique is much more efficient, time saving, and not as traumatic to the alveolar bone as conventional methods.

Over the last decade there has been an increased interest in atraumatic tooth extraction in order to maintain bone for implant insertion [7]. Recently, a fundamentally new concept and equipment in exodontia, the physics forceps from GOLDEN/MISCH, has been developed. It mostly applies biomechanical advantages of a first -class lever, creep, and stress distribution [8].

Some of the numerous advantages of applying this technique and the technic of physics forceps include but are not limited to logical and successful extractions with very short time period: usually in less than 4 minutes:

Preserving the buccal bone and cortical plate, preventing having to lay aps and removing bone to access roots, virtually eliminating root tip fractures, assisting with efficient full-mouth reconstructive extractions, supporting immediate implant placement.

According to the article a technique for atraumatic tooth removal immediately before the implant placement is neccessary. Further we will present the research sased on the analyses of the researches of Yalcin S1: In this prospective split-mouth study, outcomes of the 2 groups (n = 42 premolars) requiring extraction of premolars for orthodontic treatment purpose using physics forceps and Conventional forceps were compared. Clinical outcomes in form of time taken, loss of buccal soft tissue and buccal cortical plate based on extraction defect classification system, postoperative pain and other complication associated with extraction were recorded and compared. And in this article we can saw their results: Statistically significant reduction in the operating time was noted in physics forceps group. Marginal bone loss and soft tissue loss was also significantly lesser in physics forceps group when compared to conventional forceps group. However, there was no statistically significant difference in severity of postoperative pain between both groups.

Besides, we studied the article by El-Kenawy MH1, which draws parralals between physics and Conventional forceps in Simple Dental Extraction. Moreover, we gathered essential information about physics forceps and further we will bring cases from their research. The researches asked about experiment: 200 adult patients seeking simple dental extraction were selected from the Outpatient Clinic in the Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Mansoura University, Egypt. The selected patients were randomly allocated into two groups: group I: included 100 patients, in this group extraction was done using physics forceps, and group II: included 100 patients, in this group extraction was done using conventional forceps. And their result: In physics forceps group: crown fracture occurred in three cases (3 %), buccal bone fracture occurred in three cases (3 %), and root fracture occurred in 14 roots (8.5 %), while in conventional forceps group: crown fracture occurred in 10 cases (10 %), buccal bone fracture occurred in seven cases (7 %), and root fracture occurred in 27 roots (16.6 %).

Mechanism of physics forceps

The physics forceps [10, 11] applies first-class mechanics to ensure atraumatic extraction of a tooth from its socket. One handle of the device is connected to a “bumper”. This bumper is normally placed on the frontal aspect of the dental alveolus, usually at the mucogingival junction. It is critical that the bumper side of the forceps always be seated higher than the mouth side before beginning the removal. The beak of the extractor is placed most often on the palatal root of the tooth and into the gingival sulcus [12].

"Hariharan et compared outcomes in patients undergoing orthodontic extraction of upper premolars with the physics forceps or the universal extraction forceps. A split-mouth clinical trial was conducted to compare the outcomes of the two groups (n = 54 premolars). The physics forceps group had lower mean (SD) VAS for pain (0.59 (0.57)) on the rest postoperative day than the other group (1.04 (0.85)) (p = 0.03). There were no other significant differences between the groups in any other variable studied."- Hariharan S, Narayanan V, Soh CL. Split-mouth comparison of physics forceps and extraction forceps in orthodontic extraction of upper premolars. Br J Oral Maxillofac Surg 2014 Dec; 52(10):e137-e140.

Benex Extraction

What the Benex extraction system does, is giving the opportunity to remove the root of the tooth. Benex extractor system was developed by Hager & Meisinger GmbH, Neuss, and includes benex extractor, which is a pull string, an impression tray, self-tapping screws and burs for matching diamond in 2 different diameters (1.6 mm and 1.8 mm) [14]. It works in the following way; the tooth is removed only by pulling along its long axis in a vertical way out of its socket. Systems, which are similar to benex extractor, include easy X-TRAC and Apex control. It can be used to remove single rooted teeth, as well as multi rooted teeth with non-divergent roots. Another advantage of the new Benex Extractor can be found in germectomy: in the framework of this

method, germs of the teeth are also removed in a gentle and time saving way [13].

The plus sides of Benex are the following: If it happens that a root of a tooth breaks off during an extraction and it is not possible to reach with forceps, the Benex will offer a sollution. It's a perfect alternative to extracting the root by surgical manner; a small lug is screwed into the root, a cable is attached to the lug and the other end of the cable is connected to the Benex. The tool is supported by the teeth on both sides of the root. As soon as everything is attached, a small handle is rotated to increase pressure. Within the period of few seconds, the root comes out straight away. The Bene system is very expensive.

A minimally invasive extraction technique using Benex Extraction System in flapless immediate implant placement in anterior teeth.

Ren SX, Shanghai Kou Qiang Yi Xue. 2016:"Twenty-five patients with single hopeless anterior maxillary teeth were enrolled in the study. The involved teeth were extracted using Benex Extraction System and implants were immediately placed in a flapless way. Healing abutments were connected immediately. After 4-6 months of healing, screw-retained implant temporary crowns were used to reshape the peri-implant gingiva. Permanent restorations were delivered 3 months later. Extraction time was recorded and the technique feasibility was evaluated using visual analogue scale (VAS). Peri-implant marginal bone resorption was measured in X- ray films after loading for 1 year later. Pink esthetic score (PES) was checked to evaluate the gingival esthetics. Questionnaire was delivered and collected to assess patients' satisfaction on surgical experience and esthetic outcomes. SPSS 13.0 software package was used for statistical analysis" [14].

2. Conclusion

We have studied and reviewed various articles. On the basis of the data of this articles it can be concluded that, from our point of view, the most atraumatic method of removal is physics forseps, because we known that this method is the most modern in dentistry. In 70% of the articles we find information that physics forseps is the most authrometic method is physics forseps.

"Unlike conventional forceps, only one point of contact is made of the tooth being extracted" [15]

"The Physics Forceps are effective in most cases, including badly decayed or broken down teeth, endodontically treated teeth, fractured or fragile teeth, curved or long rooted molars and cuspids, or any tooth that would historically be challenging with conventional instrumentation. The Physics Forceps are ideal for implantologist that wants to preserve the surrounding bone and tissue in preparation for dental implants [16].

In this way the Physics forceps are innovative extraction instruments. Using physics forceps help us to carry out a high-quality manipulation. We think that this method really can help in a dentists work.

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