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MINIMALLY INVASIVE TOOTH EXTRACTIONS- THE NEWER ADVANCEMENTS TO THE CONVENTIONAL TECHNIQUES

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Abstract:

Dental extractions are considered to be one of the procedures that can make a patient quite anxious. However, newer advancements have come to the rescue. Most of the extractions that are being done involve some extent of soft tissue trauma. Due to the damage that occurs to the adjacent tissues while removing the tooth, the rehabilitation and restoration of the tooth has become quite difficult and time consuming. From the crux of the traditional techniques, surgeons realised the importance of preserving the soft tissue and dentofacial complex in the course of tooth implantation. This led to the evolution of the new idea, the Minimally invasive dentistry and the Minimally invasive extraction. Few minimally invasive atraumatic extractions, certain methodsdeveloped are already being used by the clinicians to extract the teeth such as Periotome, Piezotome, Benex vertical extractor, rubber band extraction, extraction using implant drills. Easy Xtrac system is one such procedure which is claimed to be based on cork screw principle is used in tooth extractions.

Keywords: Atraumatic Extraction, Preservation of alveolar bone, Absolute healing, Minimally invasive technique, Mucoperiosteal flap elevation.

INTRODUCTION:

The history of dental extraction begun in 7000 BC as in Indus valley civilisation.[1] From thirteenth century, several people studied on various ways to restore a tooth and ways to remove teeth.[1] However, over the decades the paradigm of a basic extraction has changed rapidly. Various procedures are explained so as to save the tooth rather than removing it. Nonetheless, in certain circumstances when an extraction is advised, the ultimate agenda now is to remove the tooth as atraumatically as possible and as easily as possible. The atraumatic dental extraction has exceeding benefits in terms of absolute healing, preservation of alveolar ridge, elimination of post traumatic swelling and in immediate implant placement.

The traumatic extractions might lead to loss of alveolar bone which in turn could compromise the aesthetic rehabilitation of the dental prostheses.[2] The conceptual use of dental luxators, forceps, and all

others related result in the widening of the dental socket.[2] Extraction of deeper root stumps, broken teeth could be more difficult and challenging. At times, there might be the need for mucoperiosteal flap elevation and trimming of the surrounding bone leading to the alveolar bone loss.[2-4] A system that works on how a wine bottle cap be opened using a cork screw is being implemented in the concept of Atraumatic extraction. There is no much documented literature available on this system. Hence this mini review is aimed to discuss the procedure of The Easy Xtrac System, its indications, its advantages and the disadvantages.

PROCEDURE:

Easy X-TRAC System is a procedure that works on a cork screw principle, that could be introduced in the daily lifestyle of an oral surgeon.[5] This approach has been introduced to make an extraction easier for both operator and patient. The Easy Xtrac System aims at an extraction which is minimally invasive, with minimal trauma to the surrounding tissues. This particular extraction mainly helps in minimizing the damage caused to gingiva and surrounding dentofacial structures. It can be used in extracting both single and double rooted teeth. The Easy X-TRAC System consists of drills and screws of three various sizes along with a custom made extractor and plates. Three drills are given along with three screws 30mm - 1.75mm diameter, 33mm - 1.75mm and one with 33mm - 2mm diameter and these help in engaging the tooth and easy removal using the vertical pull motion(Fig. 1&2) .[6-8]

Along with these, there is a ratchet used to give clockwise movements so as to tighten the screws placed into the tooth(Fig. 3). The set also provides right and left protector plate with a handle(Fig.4) .[6-8] The Easy X Tractor has a handle screw at the end and jaws at the front which engages the screw and protector plate (Fig. 5).

Fig 1: Easy Xtrac Drills

Fig 2: Easy Xtrac Screws (30mm x 1.75mm)

Fig 3: Easy Xtrac Ratchet

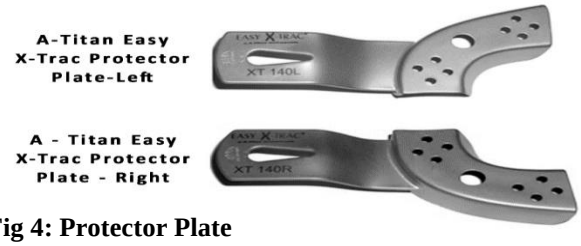

Fig 4: Protector Plate

Source: Picture (1-5): AvtecDental. Available from: avtecdental.com. https://www.avtecdental.com/products/a-titan-easy-x-tractor-device. Latest accessed on July 24 2023

Fig 5: Easy X Tractor

Source: Picture (1-5): AvtecDental. Available from: avtecdental.com. https://www.avtecdental.com/products/a-titan-easy-x-tractor-device. Latest accessed on July 24 2023

It mainly outweighs the conventional techniques over:

1. A wholesome atraumatic tooth,[6,8]
2. Minimally invasive tooth extraction,[6-8]
3. No need for bone restoration,[6]
4. For Both Single and Double rooted teeth,[8]
5. Pressure less extraction,
6. No post traumatic complications,
7. Avoids unnecessary widening alveolus and minimizes damage to adjacent bone structures,
8. All rotary movements to pull the teeth were eliminated,[7,8]
9. Immediate implants can be placed,
10. Reduced risk of fractures,
11. No necessity for mucoperiosteal elevation,[8]
12. Operator comfort,[8]

DISADVANTAGE:

1. Severely curved roots,
2. Teeth with extensive ankylosis,
3. Teeth with narrow roots,[8]

4. Teeth with vertical fractures,[8]
5. Molars need a prior section,
6. A strategically learning curve for clinicians,
7. Equipment,

Patient is explained about the procedure. A re-operative radiograph prior the procedure. The surgical area is made clean and dry. A dry gauze is used to clean the area and a topical anaesthetic is applied using dry swab. Local anaesthesia is administered at the target side of tooth to be extracted. The crown structure of the tooth can be sectioned horizontally. Or in case of removal of the root stumps or broken tooth, can be used readily. A pre-operative radiograph is helpful in assessing the length of the tooth. This step is also useful in selecting the appropriate drill and screw. The drills are used to widen the pulp chamber (Fig. 6). The previously selected drill is stabilized in the tooth (Fig. 7). The ratchet from the Easy Xtrac Kit is used to tighten the engaged drill into tooth giving clockwise motion (Fig. 8).

Once the screw is secured, the left or right protector plates are selected. An Impression material is placed over the tray except in the circumscribed area of the tooth indicated to be extracted and is kept in oral cavity (Fig. 9). The Easy X Tractor jaws are engaged to the drill and the handle screw is turned and opens up the jaws to create a vertical pull to the tooth (Fig. 9). Once the tooth luxates, the protector plate, X Tractor are removed from the oral cavity and the tooth is ready to be pulled out (Fig. 10). The tooth can be extracted either by the protector plate itself or the drill is used to pull the tooth vertically (Fig.11).[6]

Fig 6: Preparation of Root Canal with Root Drill

Fig 7: Self Cutting Screw is placed into the Prepared Canal

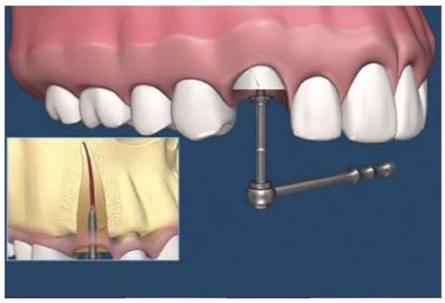

Fig 8: Placing the screw using a Ratchet

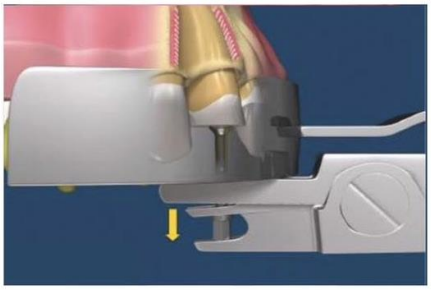

Fig 9: Protector plate is placed. Turning handle screw will open the jaws and pulls the tooth using vertical force only

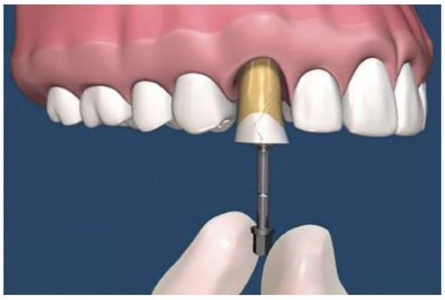

Fig 10: The Protector plate is removed tooth is pulled out

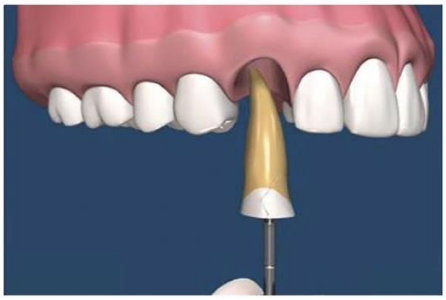

Fig 11: Removal the Tooth

[Source: Picture 6-11: Easy XTrac System. Available from: atitan.com https://www.atitan.com/subcategories/7-easy-x-trac-system.]

DISCUSSION:

The minimal invasive technique described mainly focuses on vertical forces rather than translational forces.[9] It is beneficial in orthodontic extractions, immediate implant placement.[9] In case of placing an immediate implant is mainly focused at reducing tissue and bone resorption soon after the extractions[10-12]. This itself reduces the duration of the treatment.[11,12] The maintenance and preservation of local soft and hard tissues is mainly indicated in anterior extractions as the prosthetic rehabilitation need to restore both functional and aesthetic features. This explains the necessity to maintain gingival contour and the interproximal papillae of anterior dentition.[12] The maintenance of adequate bone height and thickness result in success of the future treatment plan.[12-15] Instruments like periotome are purposely designed so as to engage the vertical axis of the tooth into the periodontal ligament to assist in luxation. The usage of periotome benefits in preventing over elevation of flap in any case. It is useful in removing endodontically extracted teeth also.[13] It potentially reduces the damage to gingiva and surrounding structures.[13,14]

However, any conventional technique could have one or the other disadvantages. It led to the development of automated periotome.[13] It works on wedging principle while extracting the tooth.[13] It is an electrical instrument with a hand piece whose angulation can be adjusted according to the tooth to be removed. James et al. in October 2019 did a study on the powertome periotome which is used in extraction of fourteen teeth, eight posterior and six anterior.[13] It took 4.8 minutes and hence is time saving[13] the periotome[4,5,13], piezotome, benex vertical extractor, rubber band extraction, extraction using implant drills[5] are some other. Easy Xtrac system is one method where extraction can be done with very minimal invasion.

The Benex Extractor System is very similar to the principle used in Easy Xtrac system. It almost depends on same cork screw principle where the canal is drilled and a calibrated burr is fixed into the toot. A post is placed and a metal traction string is placed. a hand screw is used by the clinician to give certain clockwise movements to severe the periodontal ligament fibres. However, can mostly be useful in single rooted or straight rooted teeth.[16] Muska E et al studied 111 patients and concluded that it is successful in atraumatic extractions. However, according to him, it is more successful with Single rooted teeth than multi-rooted teeth. [17] the usage of Benex extractor is indicated in certain anterior teeth immediate implant

cases without raising the necessary mucoperiosteal flap. A study done by Shu-Xin Ren on twenty-five patients, where anterior teeth are indicated to be extracted are selected and removed. Followed by immediate placement of healing abutments and permanent restorations are placed after three months. The result concluded that this procedure is a convenient method in flapless immediate implant placement in anterior teeth.[18]

Sapian root remover system is another similar procedural approach where the roots can be removed atraumatically. The procedure involves usage of anterior driver, latch, extraction screws, fulcrum tray and so on to engage the remained root. This procedure is mainly helpful in immediate implant cases. The procedure is invented by Dr. Schubert Sapian and is described by Ajay et al.[19]

CONCLUSION:

The Easy Xtrac System helps the dental surgeon to remove the teeth as minimally invasive an atraumatically as possible. The Crux of Minimally invasive dentistry is to preserve natural structures as much as possible. The preservation of gingiva, its contour, height, preservation of buccal and lingual cortical plate, other bony structures could be helpful in functional and aesthetic rehabilitation dentition. Whenever possible and required, the dentist can use the mentioned procedure.

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