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The Use of Physics Forceps in Different Locations (Case Reports)

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Abstract:*Atraumatic extraction is an issue of interest for both dentists and patients, as it preserves the alveolar ridge in a sound state where immediate dental implants are indicated or when rapid healingis needed, or even for successful prosthetic rehabilitation. In this study we are using the new technique of extraction where the extraction is performed atraumatically using the physics forceps , by using a single first class lever, creep,stressdistribution,rather than squeezing and pulling the alveolus. Two patients indicated for extraction of their badly decayed teeth, using atraumatic extraction technique were included in this study as case studies, the time taken for extraction was recorded for each case.Postoperative clinical evaluation was performed on the 3rd and 7th day to check the healing, pain intensity, and presence of any complication . In conclusion:physics forceps may be of a help in certain cases to improve the quality of dental extraction.*

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I. Introduction

Tooth extraction is a traumatic procedure resulting in immediate destruction and loss of alveolar bone and surrounding soft tissue. The clinical presentation of alveolar defects seen immediately following tooth removal varies from simple to complex. This evaluation can only be accurately made immediately following extraction, since damage often occurs during the process of tooth removal (1,2,3). An extraction device physics forceps has been developed to apply a biomechanical rational to the extraction process of a tooth using a class 1 lever, creep and shear component of force. The physics forceps is really a dental extractor than a forceps and uses first-class lever mechanics. Creep is a phenomenon whereby a material continues to change shape over time under a constant load(1,3.4). In tooth extraction, creep may occur in bone and periodontal ligament. Under a constant load of 60 Mega pascals, the bone over time changes shape in three different stages. This action contributes to the creep rupture of the ligament and usually elevates the tooth few millimeters from socket (4,5) At this point the tooth is loose and ready to be removed from the socket using conventional extraction forceps. When a rotating force is applied to the physics forceps on the tooth, the stress to the tooth and periodontal complex is a shear component of force. The force applied to the gum and bone by the bumper is over a greater surface area and is a compressive force, thus bracing the buccal bone.

This permits the lingual plate to expand more and protects the facial plate from fracture (2,4,5,6). During the extraction of a tooth, the alveolar bone surrounding the socket expands and the periodontal ligament is severed. While these physical changes undoubtedly occur, biochemical changes also occur that are arguably more important. When the periodontal ligament istraumatized with forceps or elevators, hyaluronidase enzymeis released. This enzyme catalyzes the hydrolysis of hyaluronic acid, which comprises a substantial portion of the extracellular matrix of all human tissue, including the periodontal ligament (3,7).

Once the chemical breakdown of the periodontal ligament by hyaluronidase is sufficient, the tooth is released from its attachment to the alveolus and can be easily removed. The more hyaluronidase released per unit time, the more efficient the release of the tooth, and the less trauma to the alveolar bone. This explains why the Physics Forceps (Golden-Misch), with its steady, unrelenting pressure on the periodontal ligament, quantitatively creates a greater release of hyaluronidase in a shorter period of time than traditional forceps or elevator extractions, because the trauma from those techniques is intermittent (3,8).This study was conducted in the outpatient dental clinics of Taif University female branch.Informed consent forms were signed by the patients participating in this case study, and agreement to publish in a dental journal.

Physics forceps and bumpers.

Case I:

Female patient aged 26 years presenting in the outpatient dental clinic of the medical directorate of Taif University, with gingival level remaining root trunk of mandibular left first molar with chronic abscess discharging pus through pulpal opening .

The Lower Universal (LU) physics forceps was used to remove this fractured molar. The bumper was placed on the bucccal plate of bone perpendicular to the long axis of the tooth and at the level of the mucogingival junction, and the lingual beak of the forceps was placed as deep as possible in the lingual sulcus . Steady force was appliedfrom the wrist towards the buccal side, time was measured from the start of forceps application till the complete removal of the tooth was achieved. The time consumed to extract the tooth atraumatically was 2 minutes 52 seconds.Case II:Female patient aged 38 years old complaining of presence of remaining roots of maxillary left first molar , causing irritation and she needed to extract them before implantation.So the Upper Left(UL) physics forceps was used to remove those root stumps.The time elapsed from the start of application of forceps till the full dislodgement of the roots from their sockets was 3 minutes 23 secondsFollow –up:Both patients were asked to return back on the 3rd and the 7th postoperative days to evaluate their pan intensity through a VAS (visual analogue scale designed spesifically for this study) and to recordthe healing pattern, for presence of any gingival lacerations, or any abnormal consequences.Regarding the pain on the 3rd postoperative day,in case I it was mild, while in case II it was moderate . On the 7th postoperative day: case I had no pain, while case II had still mild pain.

Gingival lacerations were not found in both cases, and the healing continued in a normal pattern.

II.Discussion

Tooth extraction in order to be performed efficiently and least traumatically should be accomplished with controlled force and steadiness [5,9]. Various instruments and techniques have been utilized to fulfill atraumatic tooth extraction(7,9,10). The advantage of physics forceps over conventional forceps and all other extraction techniques is related to their unique design which is able to deliver a powerful mechanical force by employing an efficient first-class lever(10.11). The extraction technique, in physics forceps, unlike the conventional one, thebuccal portion of the beak is covered with a plastic bumper which is placed apically in the vestibule and work by rotation of the wrist rather than a squeezing movement [8,12]. The force applied by the bumper onto the gingiva and bone is distributed over a larger surface area and is a compressive force, so the tooth and alveolus do not fracture.

Once the tooth is luxated it can be delivered using conventional forceps or a rongeur [6, 13,14]. Conventional dental forceps are class 2 levers that are connected with hinge. Forces are applied on the long side of the lever i.e. the handles, the beaks act as the load arm of the lever, hinge act as fulcrum and tooth to be extracted act as load. Hence the force applied on the handle is magnified to allow the forceps to grasp the tooth and does not provide mechanical advantage to extract the tooth. According to Dym and Weiss(5), there is no need to raise a mucoperiosteal flap or use an elevator before attempting extraction with the Physics forceps. This is a major advantage, particularly in cases that require atraumatic extraction [15].Time taken to extract the teeth can be considered as a time period from engaging the tooth by forceps to completely removing the tooth out of socket. Physics forceps require constant traction force involving only unidirectional force for extraction of any tooth while conventional forceps involve buccal and lingual directing force to luxate the tooth followed by twisting or rotating force depending on the tooth to be removed which can increase the intra operative time. In the present study it was found that the time required to extract using physics forceps was significantly lesser as compared to that of conventional forceps which is in accordance with the results of the previously reported studies (10,11,12,13).Mandalet al.(10), in their comparative study also reported the same results with mean extraction time of 139.8 sec using physics forceps and 236 sec using conventional forceps [10,16]. Whereas Hariharan et al.(9), in their study did not find significant difference in time taken, with mean extraction time using physics or conventional forceps.

Conservation of marginal bone following tooth extraction is very important in recent era of Implantology. Physics forceps is believed to prevent the marginal bone loss by its developer Golden/ Misch[8,17]. Previously it wasfoundthatless gingival laceration using the physics forceps compared totheconventional forceps and it was concluded that,physics forceps can perform extractions less traumatically thus supporting our findings where gingival laceration was not found in both cases.Postoperative pain in extractions done by physics forceps using Visual Analogue Scale (VAS) was also measured in the present study, where mild to no pain was found in both patients in both postoperative follow up periods.The results are in accordance with the conclusions of Madathanapalli et al (18) and Patel et al(19), who found significantly lesser postoperative pain in physics forceps group on first postoperative day when compared to conventional forceps. In the present study no complications occurred whether during extraction or postoperatively. Choi et al.(7), in their study found high success rates with physics forceps which is in agreement with our study . In the present study we didn't find any swelling on 3st postoperative day in both cases of extraction. Buccal cortical fracture was not seen in both cases as well, which was in accordance to previous studies [10,17,18,19]. No other complications were noted in any of the studied cases.

III. Conclusion

Atraumatic extraction techniques are being more desired nowadays. With adopting such technology exodontia will be no more a dreadful procedure for anxious patients. On the contrary it will be very simple and more comfortable, thus benefitting both patients and dentists. Therefore, dental practitioners must utilizethese methods, to provide high quality of treatment for their patients in a short duration. Further studies should be made in different extraction locations for more evaluation of benefits of this new biomechanical technique of extraction.

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