Research Article

COMPARISON OF PHYSICS FORCEPS AND CONVENTIONAL EXTRACTION FORCEPS IN ORTHODONTIC EXTRACTION OF UPPER PREMOLARS

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ARTICLE INFO	ABSTRACT
	The purpose of atraumatic tooth extraction is for maintenance of the bone, thus there has been an increased interest for Physics forceps. The Physics forceps works on class 1 lever mechanism which is used in atraumatic extractions. **Aims:** To evaluate the efficacy of physics forceps over conventional Forceps in orthodontic extraction of upper premolars. **Methods and Material:** 12 Patients reporting to the Department, for extraction of bilateral upper premolars undergoing orthodontic treatment and who consented to participate for the prospective, split-mouth study were used. Physics forceps would be used in on quadrant and the conventional extraction forceps in the other quadrant randomly by using lottery system. The follow up was on post-operative 1st,3rd & 7th day. **Results:** The results showed that time required (sec) pre & post extraction difference of socket width, status of gingival laceration & status of cortical plate fracture and pain on and 3rd post operative day were far less in physics forceps group than in conventional extraction forceps group. For pain on postoperative 7th day does not showed significant difference. **Conclusions:** Thus we feel physics forceps are more efficient that conventional extraction forceps in atraumatic extraction of teeth.

INTRODUCTION

Extraction is a basic & primary procedure of oral surgery.

Normal extraction procedure was carried out using a traditional method of extraction using conventional extraction forceps required the separation of the periodontal ligament attachment and lifting or pulling of the tooth out of the socket with the two forceps beaks[1]. Extraction using conventional extraction forceps can actually be thought of as two class 1 lever connected with a hinge[2]. During a period of time there is an increased interest in atraumatic treatment and implant insertion. Recently, a revolutionary new technological advance in atraumatic tooth extraction is developed which primarily uses the biomechanical advantages of a class 1 lever, creep and stress distribution without the squeezing, grasping, twisting and pulling forces[3].

Hence, in this study we assess the efficacy of physics forceps over conventional forceps in orthodontics extraction of upper premolars.

Subjects and Methods

The study is a prospective, single-blind, split mouth, short clinical study with patients for extraction of bilateral upper premolar undergoing orthodontic treatment. The study was ethically approved by Research and Ethics Committee, KLE V.K. Institute of Dental Sciences, KLE University.-SI.No.1087.

12 Patients reporting to the Department of oral and maxillofacial Surgery, KLE.V.K. Institute of Dental Sciences, Belgaum for extraction of bilateral upper premolars undergoing orthodontic treatment from a period of October 2015 to April 2015.Who consented to participate for the prospective, split mouth study physics forceps was used in 12 surgical sites of one quadrant taken as study group and in other 12 sites of other respective quadrant conventional Forceps were used as control groups for orthodontic premolar extractions. Physics forceps would be used in on quadrant and the conventional extraction forceps in the other quadrant randomly by using lottery system

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to the follow up was on post-operative 1st day, 3rd day & 7th day.

Materials

1. Physics forceps
2. Conventional Forceps
3. 2% lignocaine with adrenaline 1:80,000

Study Group-12 premolar extraction using physics forceps.
Control Group-12 premolar extraction using conventional extraction forceps.

Patient between the age group of 15-30 years were included. Systemically healthy patients indicated for bilateral maxillary premolar extraction undergoing orthodontic treatment were included. Medically compromised patients, any tooth which is ankylosed or has a hypercementosis and for dilacerations of the roots, patients with oro-facial cancer or under chemotherapy or head & neck radiotherapy, tooth associated with periodontitis/periapical pathology and patient unwilling to participate in the study were excluded. Physics forceps was used in one quadrant and the conventional extraction forceps in the other quadrant randomly by using lottery system. All the patients were screened for inclusion and exclusion criteria.

Surgical Protocol

Assigned patients were undergone surgical procedure in the oral surgery unit by an experienced Surgeon. After the procedure was explained to the patient, the teeth were anesthetized using 2% lignocaine with adrenaline 1:80,000. Both the upper premolars were extracted as atraumatically as possible uses the physics forceps in the one quadrant and the conventional extraction forceps in the other quadrant randomly using lottery system. Extraction was done with the physics forceps in one quadrant and then after 1 week in the other quadrant with the conventional extraction Forceps. Both the teeth were extracted by the same operator. Operating time was noted from the beginning of the extraction i.e., after the injection of local anaesthetic until the tooth is completely removed from its socket. Pressure pack was then placed and post extraction instructions were given to the patient. The operated site was evaluated by a staff member, unaware of the type of extraction forceps used on each quadrant. Post extraction instructions were given after adequate haemostasis was achieved. A simple present / absent format was used for the assessment.

The Analgesics prescribed for both study and control group was same for all patients if needed. Previous experience of the patient during extraction was noted.

Evaluation Criteria

Evaluation Criteria: The pre-extraction and post-extraction socket width using digital calliper, with physics Forceps and conventional extraction technique was evaluated clinically. Pain scores was recorded on the 1st, 3rd & 7th post operative days using visual analog scale (VAS) with 0 being no pain and 10 indicating the worst possible pain. Patient was provided with a standard visual analog scale (VAS) data with a score of 0-10. Operating time was recorded with a stop watch from the beginning of extraction after the local anaesthetic injected to the completion of the extraction[5].

RESULTS

The data was collected & was evaluated using Mann-Whitney u test, unpaired 't' test paired t- test, chi- square with Yates correction of wilcoxon matched paired test.

Table (1). Represents the comparison of two groups (physics forceps & convention forceps) with time required (sec) by mann-whitney u test which comes to be mean time as 131.75 sec with physics forceps with a standard deviation of 18.83 sec whereas with conventional forceps mean time came to be 295.17 sec with a standard deviation of 42.31 sec. Thus physics Forceps require less time for extraction than conventional forceps with significant difference of (p=0.0001).

Table 1 Comparison of two groups (Physics forceps and Conventional forceps) with time required (sec) by Mann-Whitney U test

Group	Mean	SD	Sum of ranks	U-value	Z-value	p-value
Physics forceps	131.75	18.83	78.00			
Conventional forceps	295.17	42.31	222.00	0.00	-4.1569	0.0001*

*p<0.05

Table (2). represents the comparison of two 2 groups (Physics forceps & Convention Forceps) with pre & post extraction difference of socket width unpaired t test, which shows means difference between pre & post extraction socket width in physics forceps group is 0.35 mm with standard deviation of 0.11 mm and that in conventional forceps group means of 1.38 with standard deviation of 0.42mm thus in physics forceps group the socket expansion is less compared to conventional forceps group with significant difference of (p=0.0001).

Table 2 Comparison of two groups (Physics forceps and Conventional forceps) with pre and post extraction socket width by unpaired t test

Time	Group	Mean	SD	SE	t-value	p-value
Pre extraction	Physics forceps	8.88	0.28	0.08	0.3312	0.7436
	Conventional forceps	8.83	0.34	0.10		
Post extraction	Physics forceps	9.22	0.31	0.09	-5.7142	0.0001*
	Conventional forceps	10.22	0.52	0.15		
Difference	Physics forceps	0.35	0.11	0.03	-8.3683	0.0001*
	Conventional forceps	1.38	0.42	0.12		

*p<0.05

Table (3). Represents comparison of two groups (Physics Forceps & conventional Forceps) with status of gingival laceration & cortical plate fracture.

Table 3 Comparison of two groups (Physics forceps and Conventional forceps) with status of gingival laceration and cortical plate fracture

Variables	Physics forceps	%	Conventional forceps	%	Total
Gingival laceration					
Present	1	8.33	11	91.67	12
Absent	11	91.67	1	8.33	12
Chi-square with Yates's correction = 13.5001 P = 0.0001*					
Cortical plate fracture					
Present	0	0.00	5	41.67	5
Absent	12	100.00	7	58.33	19
Chi-square with Yates's correction = 4.0422 P = 0.0441*					
Total	12	100.00	12	100.00	24

*p<0.05

Which show presence of gingival laceration in 1 patient in physics forceps group & in all patients in conventional forceps group. Thus physics forceps group shows that there is less gingival laceration with significant difference of (p=0.0001). And in the physics Forceps group cortical plate fracture was absent and in conventional forceps group cortical plate fracture was observed in 5 patients which shows significant difference of p=0.0441.

Table (4). Represents comparison of 1st day, 3rd day & 7th day, with respect to VAS Sore For pain in two group (Physics forceps & Conventional forceps) using Mann-Whitney U test shows. Physics forceps group had significantly less pain on 1st post-operative day than the other group with (p=0.0005) on 3rd day & (p=0.003). The VAS for pain on postoperative 7th day does not show significant difference of (p=0.1659).

Table 4 Comparison of two groups (Physics forceps and Conventional forceps) with respect to VAS scores at 1st day, 3rd day and 7th day by Mann-Whitney U test

Variable	Group	Mean	SD	Sum of ranks	U-value	Z-value	p-value
1st day	Physics forceps	1.25	0.45	90.00			
	Conventional forceps	2.33	0.49	210.00	12.00	-3.4641	0.0005*
3rd day	Physics forceps	0.17	0.39	87.00			
	Conventional forceps	1.25	0.45	213.00	9.00	-3.6373	0.0003*
7th day	Physics forceps	0.00	0.00	126.00			
	Conventional forceps	0.33	0.49	174.00	48.00	-1.3856	0.1659
1st day -3rd day	Physics forceps	1.08	0.29	149.50			
	Conventional forceps	1.08	0.51	150.50	71.50	-0.0289	0.9770
1st day -7th day	Physics forceps	1.25	0.45	109.50			
	Conventional forceps	2.00	0.74	190.50	31.50	-2.3383	0.0194*
3rd day -7th day	Physics forceps	0.17	0.39	101.00			
	Conventional forceps	0.92	0.51	199.00	23.00	-2.8290	0.0047*

*p<0.05

Fig 1 Conventional forceps - gingival laceration

DISCUSSION

There have been several exciting technological advances in extraction techniques in oral and maxillofacial surgery within last few years, such as powered periotome, piezosurgery, orthodontic extrusion and lasers[2].

Fig 2 Physics forceps - extraction

The Physics forceps uses classes 1 lever mechanics to atraumatically extract a tooth from its socket. In physics forceps one handle of the device is connected to a "bumper", which acts as a fulcrum during the extraction[3]. This bumper is usually placed on the facial or buccal aspect of the dental alveolus, at the mucogingival junction the beak of the forceps is positioned most often on the lingual or palatal root of the tooth and into the gingival sulcus. The handles are the rotated using a firm & steady yet gentle rotational force & then held in position under moderate tension for approximately 60 sec. Because there is no squeezing applied to the beak, the tooth does not split, crush or fracture. This process allows the tooth socket to expand and permits the tooth to exit the socket, when a rotating force is applied 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 gingiva & the buccal cortical plate 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 [3]. Thus the expansion of the socket is less in physics forceps than in the conventional extraction forceps.

Physics Forceps with its steady unrelenting of trauma to the periodontal ligament quantitatively creates a greater release of hyaluronidase in a shorter period of time than traditional forceps or elevator extraction because the trauma from those techniques is intermittent. Hence, the use of physics forceps is more efficient, faster, & less traumatic to the alveolar bone. This pilot study aimed to compare the efficacy of physics and conventional forceps regarding the time period required for extraction, presence or absence of gingival laceration cortical plate fracture, expansion of the socket & pain.

According to Dym and Weiss there is no need to raise a mucoperiosteal flap or use an elevator before attempting extraction with the physics Forceps. Thus there is less time required as there is no gingival retraction required which take about 40-60 sec and prevents gingival laceration. Our study was split-mouth study design to reduce the chances of bias and there was no operator bias as the same operator extract the tooth on both sides of each patient[4]. However the limitation of the study was, there were lacerations seen on the buccal mucosa where the bumper of the physics forceps was placed

for extraction of teeth in the upper arch. Future prospective Studies should be performed for extraction of root stumps and grossly decayed teeth, with larger sample size.

CONCLUSION

Thus we conclude that efficacy of physics Forceps is higher than that of the conventional extraction forceps in atraumatic extraction of maxillary premolars. A study is being performed in our department on a larger sample size.

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