

## ORIGINAL RESEARCH

# Physics Forceps vs Conventional Forceps in Extraction of Maxillary 1st Molar

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## ABSTRACT

In recent years, there has been an increased emphasis on the atraumatic removal of teeth. The Physics Forceps are the latest innovation in dental extraction technology and they provide an efficient means for atraumatic dental extractions. We compared the Physics Forceps with the conventional forceps for the removal of maxillary 1st molars in 30 patients under the following parameters time taken, postoperative pain on 3rd-5th-7th day, incidence of crown/root/buccal plate fracture during extraction. There was a significant difference pertaining to the time taken ( $p = 0.006$ ) and pain on the 3rd postoperative day ( $p = 0.031$ ). There were no other significant differences between the groups in any other variable studied. On comparing all of the aforementioned parameters, we have found that the utility of the instrument is better in comparison to the conventional forceps.

**Keywords:** Atraumatic extraction, Conventional forceps, Maxillary 1st molar, Physics forceps.

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**Conflict of interest:** None

## INTRODUCTION

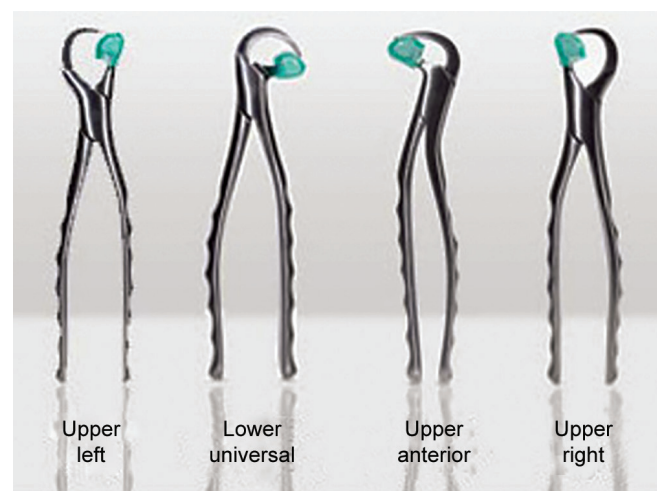
Tooth extraction is probably the oldest aspect of dentistry known to man and is the most primary procedure an oral surgeon has to perform. The history of dental extractions dates back to the days of Aristotle (384–322 BC) who described the mechanics of extraction forceps, including

the advantages of “two levers acting contrary...having a single fulcrum.” The traditional means of extracting teeth often involving creation of the mucoperiosteal flap, elevation and luxation with forceps often results in fracture or deformation of the dentoalveolar complex. This trauma could lead to ridge defects, making the placement of implants and other prosthesis very difficult and even impossible in some cases.<sup>1</sup> There have been several new exciting technological advances with an increased interest and need for atraumatic tooth extractions.<sup>2</sup> These advances have revolutionized the field of dentistry and oral and maxillofacial surgery. Among them is the development of Physics Forceps<sup>®</sup> by Golden | Misch in an attempt to change the face of dental extraction. The Physics Forceps implements a first-class lever, creep, and the type of force that provides a mechanical advantage that makes it more efficient.<sup>3</sup>

There is not enough literature describing its use and efficacy, hence we conducted a study to compare the efficacy of Physics Forceps *vs* conventional forceps for the extraction of the right and left maxillary 1st molars (Fig. 1).

## MATERIALS AND METHODS

Thirty healthy patients between the age group of 15 to 60 years reporting to our department, satisfying the inclusion criteria, were taken up for the study after getting approval of the Ethical Committee of the institution and



**Fig. 1:** Physics Forceps<sup>®</sup> (GMX 100L #12-15, GMX 200-Lower Universal #18-31, GMX 100A -#6-11, GMX 100R #2-5<sup>®</sup>)

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all the subjects gave informed consent to the study. All the subjects were healthy without any systemic illness. Following the standard surgical protocol, under local anesthesia (2% lignocaine with 1:80,000 adrenaline), all the extractions were performed by a single surgeon.

The patients were alternatively divided into two groups. Extractions in the test group were performed using Physics Forceps (GMX 100 series – UR #2-5 and UL #12-15®) and the control group were performed using conventional upper molar forceps (API Germany No. 17, 18). Postextraction instructions were given and patients were recalled for follow-up on 3rd, 5th, and 7th postoperative day. All the patients were prescribed Amoxicillin 500 mg as antibiotic and were asked to take Aceclofenac sodium 500 mg as analgesic if and when required.

Following parameters were assessed:

- Time taken for extraction (from the point of application of the beaks on the tooth to the delivery of tooth out of the socket).
- Pain evaluated using 100 mm visual analogue scale (VAS) at 3rd, 5th, and 7th postoperative day.
- Intraoperative evaluation—evaluation for root fracture, bone plate fracture, and adherence of buccal plate to the root.
- The success of extraction was based on the following criteria:
  - Complete success: Extraction without crown and root fracture
  - Limited success with osteotomy: Fracture-free extraction but associated with buccal or intradental fracture.
  - Limited success with root tip fracture: Extraction involving partial root tip fracture.
  - Failure: Failure to extract.
- The overall utility of the instrument as:
  - Score 1 – good
  - Score 2 – average
  - Score 3 – poor
- Complications (if any): Such as dry socket, hemorrhage, infection, oro-antral communication, damage to surrounding tissue.

### Statistical Analysis

Statistical analysis was done using software Statistical Package for the Social Sciences (SPSS) version 16.0. The mean scores of various variables were obtained and chi-square test and Mann-Whitney U test were performed. Grouping of the time taken and VAS score was done for, e.g., less than 5 minutes and more than 5 minutes for time taken and VAS score <50 and ≥50 mm. For intraoperative evaluation, data were dichotomized based on fracture of buccal plate, root, and adherence of the buccal plate. Score

1 = no fracture of buccal plate, root, and adherence of the buccal plate. Score 2 = fracture of buccal plate, root, and adherence of the buccal plate.

### RESULTS

The mean age in group A was 36.53 years (±12) and group B was 38.53 years (±10.7). Mean time taken for group A was 4.2 (±4.9) minutes, while for group B, was 8.5 (±2.8) minutes. After grouping, chi-square test was applied and statistically significant difference was observed when time was taken into consideration (p-value < 0.05). Mean score for pain in VAS for group A was 20.9 ± 22.5 and for group B it was 46.4 ± 19.26 on 3rd postoperative day; 14.66 ± 16.8 (group A) and 35.6 ± 18.8 (group B) on 5th postoperative day and 5.6 ± 8.17 (group A) and 14.3 ± 11.3 (group B) on 7th postoperative day. On applying chi-square test, statistically significant difference (p-value < 0.05) was noted on the 3rd day, while there was no difference seen on the 5th and 7th postoperative day (p-value > 0.05). Seven patients had fracture of either the root or buccal plate or adherence of buccal plate to tooth in group B, while four patients had the same problem in group A. There was no statistically significant difference observed (p-value > 0.05). Utility of Physics Forceps was found to be good in 80% cases, while that of conventional forceps was 40% (Figs 2 and 3).

### DISCUSSION

Atraumatic tooth extraction is a technique that specialists use to carefully remove a tooth and that dramatically reduces or eliminates the trauma to the tissues preserving the remaining bone around the tooth. The advantages of the atraumatic tooth removal are as follows:

- Preserves the tissue and bone around the teeth
- Improves the potential of the body to regenerate bone and “fill-in” the socket



Fig. 2: Left maxillary first molar gripped by GMX100 UL



**Fig. 3:** The tooth is successfully detached from its periodontal attachments and is luxated

- Reduces the risk of infection
- Reduces or eliminates the discomfort after the extraction
- Preserves the natural contour of the gums
- Enhances the esthetics of the final restoration.<sup>4</sup>

Various instruments and techniques have been developed to aid atraumatic tooth extraction. Techniques such as powered periostomes,<sup>2,4,5</sup> piezosurgery,<sup>6,7</sup> lasers,<sup>8</sup> Physics Forceps,<sup>2-4,9</sup> orthodontic extrusion of the third molar,<sup>10</sup> and the Benex vertical extraction system<sup>11</sup> are among a few tested and tried.

Dental forceps are two first-class levers, connected with a hinge. The forces applied to the handles are the long side of the lever, the beaks on the tooth are the short side of the lever, and the hinge acts as a fulcrum. Hence, the force on the handles is magnified to allow the forceps to grasp the tooth with great force. The handles of the forceps allow the doctor to grasp the tooth, but do not assist in the mechanical advantage to remove it. This is similar to attempting to pull a bottle cap off a bottle using a pair of pliers *vs* using the advantage of a lever to remove the cap, as with a standard bottle cap opener.

The Physics Forceps was developed by Golden and Misch in 2004. Implementation of a first-class lever, creep, and the type of force provides the mechanical advantages necessary to make this dental extraction device more efficient. One handle of the device is connected to a "bumper," which acts as a fulcrum during the extraction. The beak of the extractor is positioned on the lingual or palatal root of the tooth and into the gingival sulcus. The bumper is placed on the facial aspect of the dental alveolus typically at the mucogingival junction. No squeezing pressure is applied to the handles or to the tooth. Instead, the handles (once in position) are rotated as one unit for a few degrees, and then the action is stopped for approximately 1 minute. The torque force generated on the tooth, periodontal ligament, and bone is related

to the length of the handle to the bumper (8 cm), divided by the distance from the bumper to the forceps beak (1 cm). As a result, a force on the handle connected to the bumper will increase the force on the tooth, periodontal ligament, and bone by 8 times. No force is required to be placed on the beak, which is only on the lingual aspect of the tooth root. Therefore, the tooth does not split, crush, or fracture.<sup>9</sup>

According to Dym and Weiss,<sup>12</sup> 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.

The extractions using the Physics Forceps are more predictable in time commitment, faster procedures, and most assuredly, less traumatic physically and psychologically to the patient.<sup>13</sup>

We chose this study on maxillary 1st molars because they are considered to be the most difficult to extract due to their variable crown bulk and multiple roots with variable anatomy. There was a significant difference pertaining to the time taken and pain on the 3rd postoperative day for extraction between the conventional and Physics Forceps ( $p < 0.05$ ). These differences could be attributed to the unique design of the Physics Forceps, which reduces the time frame as it allows building up internal force or creep within 60 to 90 seconds, allowing the bone to slowly expand and the periodontal ligament to release at the point at which the tooth will disengage from its socket. The working mechanism of Physics Forceps allows the tooth to be removed atraumatically unlike conventional forceps, thus reducing trauma at the surgical site and pain in the early postoperative period. There was no statistically significant difference found between pain on 5th and 7th postoperative days and intraoperative complications, such as buccal plate fracture, root fracture, or buccal bone adherence to the root. On comparing all of the above parameters, we have found out that the utility of the instrument is better in comparison to the conventional forceps. These findings are similar to those reported by various authors in the past.<sup>1-3,13,14</sup>

Hariharan et al<sup>15</sup> compared outcome variables (operative complications, inflammatory complications, and operating time) 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 first 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.

## REFERENCES

1. Scull P. Beak and bumper. *Dentist* 2010 Mar;56-61.
2. Weiss A, Stern A, Dym H. Technological advances in extraction techniques and outpatient oral surgery. *Dent Clin North Am* 2011 Jul;55:501-513.
3. Golden RM, inventor, GoldenMisch Inc, assignee. Dental plier design with offsetting jaw and pad elements for assisting in removing upper and lower teeth utilizing the dental plier design. US patent. 691, 089. 2005 Jun 28.
4. Patil SS, Rakhewar PS, Doiphode SS. Strategic extraction: an unexampled epitome altering our profession. *J Dent Implants* 2012 Jul-Dec;2(2):121-126.
5. Levitt D. Atraumatic extraction and root retrieval using the periosteum: a precursor to immediate placement of dental implants. *Dent Today* 2001 Nov;20(11):53-57.
6. Stübinger S, Kuttenger J, Filippi A, Sader R, Zeilhofer HF. Intraoral piezosurgery: preliminary results of a new technique. *J Oral Maxillofac Surg* 2005 Sep;63(9):1283-1287.
7. Vercellotti T. Technological characteristics and clinical indications of piezoelectric bone surgery. *Minerva Stomatol* 2004 May;53(5):207-214.
8. Stübinger S1, von Rechenberg VB, Zeilhofer HF, Sader R, Landes C. Er:YAG laserosteotomy for removal of impacted teeth: clinical comparison of two techniques. *Lasers Surg Med* 2007 Aug;39(7):583-588.
9. Misch C, Perez HM. Atraumatic extractions: biomechanical rationale. *Dent Today* 2008 Aug;27:100-101.
10. Choi YH, Bae JH. Clinical evaluation of a new extraction method for intentional replantation. *J Korean Acad Conserv Dent* 2011 May 31;36(3):211-218.
11. Muska E, Walter C, Knight A, Taneja P, Bulsara Y, Hahn M, Desai M, Dietrich T. Atraumatic vertical tooth extraction: a proof of principle clinical study of a novel system. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013 Nov;116(5):e303-e310.
12. Dym H, Weiss A. Exodontia: tips and techniques for better outcome. *Dent Clin N Am* 2012 Jan;56(1):245-266.
13. Feck A. Predictable, atraumatic dental extractions. *Dent Econ* 2010 Oct;100(10).
14. Kosinski T. Use of innovative physics forceps for extraction in preparation for dental implants. *Implant News Views* 2012 Mar/Apr;14(2):1-9.
15. 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.