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## **Assessment of efficiency of arm force only versus arm force plus wrist movement during closed method extractions**

**Shivendra Choudhary**

MDS, Professor & Head Dept of Dentistry, Patna Medical College, Patna-4  
Email: [shivenmaxfax@yahoo.in](mailto:shivenmaxfax@yahoo.in)

**Abhishek Sinha**

MDS (Orthodontics), Assistant professor, Department of Dentistry, Patna Medical College.  
Corresponding author email: [drsinhaabhi@gmail.com](mailto:drsinhaabhi@gmail.com)

**Leena Priya**

(MDS)(Oral Medicine and Radiology), Senior Resident ( Department of Dentistry)PMCH, Patna

**Taruna**

(MDS), Senior Resident, Patna Medical College & Hospital

**Daya Shankar**

(MDS), Ex Assist prof., Department of Dentistry , PMCH, Patna

**Abstract**--Background: Atraumatic dental extraction preserves bone and maintains gingival architecture, thereby ensuring the option of replacement with implant supported prosthesis. The present study was conducted to compare the efficiency of arm force only versus arm force plus wrist movement during closed method extractions. Materials & Methods: 84 patients undergoing mandibular molar extraction of both genders were selected. Patients were divided into 2 groups. Each group comprised of 42 patients. In group I, interns used arm force only while in group II, interns used both arm force and wrist movement in extraction of mandibular molar. Parameters such as time taken for extraction, root fracture, bone plate fracture, and adherence of buccal plate to the root were assessed. Results: Group I had 22 males and 20 females and group II had 18 males and 24 females. The mean time taken for extraction was 10.2 minutes in group I and 5.4 minutes in group II. The difference was significant ( $P < 0.05$ ). In group I and group II, score 5 was seen in 6 and 14, score 4 in 5 and 12, score 3 in 14 and 8, score 2 in 12 and 6 and score 1 in 5

and 2. The difference was significant ( $P < 0.05$ ). Conclusion: The combined use of arm and wrist force found to be superior as compared to the use of arm force alone for a successful extraction.

**Keywords**---arm force, extraction, wrist force.

## **Introduction**

Extraction of teeth is the most common procedure carried out in oral surgery clinics. The final consequence of most dento-alveolar diseases is tooth loss, mostly through routine tooth extraction. Reasons for routine tooth extractions have been widely reported in medical literature. In addition, postoperative pain and discomfort, loss day at work as well as healing complications have been well reported in the immediate postoperative period following non-surgical (routine) tooth extraction.<sup>1</sup>

Tooth extraction with associated loss of surrounding alveolar bone and soft tissues could be attributed to improper technique.<sup>2</sup> As with any other surgical procedure, tooth extraction is also related with some postoperative sequelae, to name a few like pain, swelling, trismus, etc. These sequelae reflect inflammatory tissue reaction, which is more pronounced in some patients, increasing the postoperative recovery period and treatment cost. In recent years, there has been an increased emphasis on the atraumatic removal of teeth. Atraumatic dental extraction preserves bone and maintains gingival architecture, thereby ensuring the option of replacement with implant supported prosthesis.<sup>3</sup> The instrument selection and the technique used for extraction significantly affects the amount of para dental tissue loss. Marginal alveolar bone protection was influential in achieving optimal functional, esthetic and orthodontic treatment results.

Incorrect hand movements can increase the possibility of tooth apex fracture.<sup>4</sup> In most cases, the incidence of crown root fractures alone or along with buccal cortical plates increased when the wrong force was given.<sup>5,6</sup> The present study was conducted to compare the efficiency of arm force only versus arm force plus wrist movement during closed method extractions.

## **Materials and Methods**

The present study comprised of 84 patients undergoing mandibular molar extraction of both genders. The consent was obtained from all enrolled patients. Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Each group comprised of 42 patients. In group I, interns used arm force only while in group II, interns used both arm force and wrist movement in extraction of mandibular molar. Parameters such as time taken for extraction, root fracture, bone plate fracture, and adherence of buccal plate to the root were assessed. The assessment of extraction was based on the following criteria given by Choi et al. Score 5 indicate complete success, score 4 limited success with root tip fracture, score 3 limited success with root fracture, score 2 limited success with osteotomy and score 1 indicate failure. Data thus obtained were subjected to statistical analysis. P value  $< 0.05$  was considered significant.

## Results

Table I Distribution of patients

Groups	Group I (42)	Group II (42)
Method	Arm force only	Arm force and wrist movement
M:F	22:20	18:24

Table I shows that group I had 22 males and 20 females and group II had 18 males and 24 females.

Table II Comparison of time taken for extraction

Groups	Time taken (mins)	P value
Group I	10.2	0.01
Group II	5.4	

Table II, graph I shows that mean time taken for extraction was 10.2 minutes in group I and 5.4 minutes in group II. The difference was significant ( $P < 0.05$ ).

Graph I Comparison of time taken for extraction

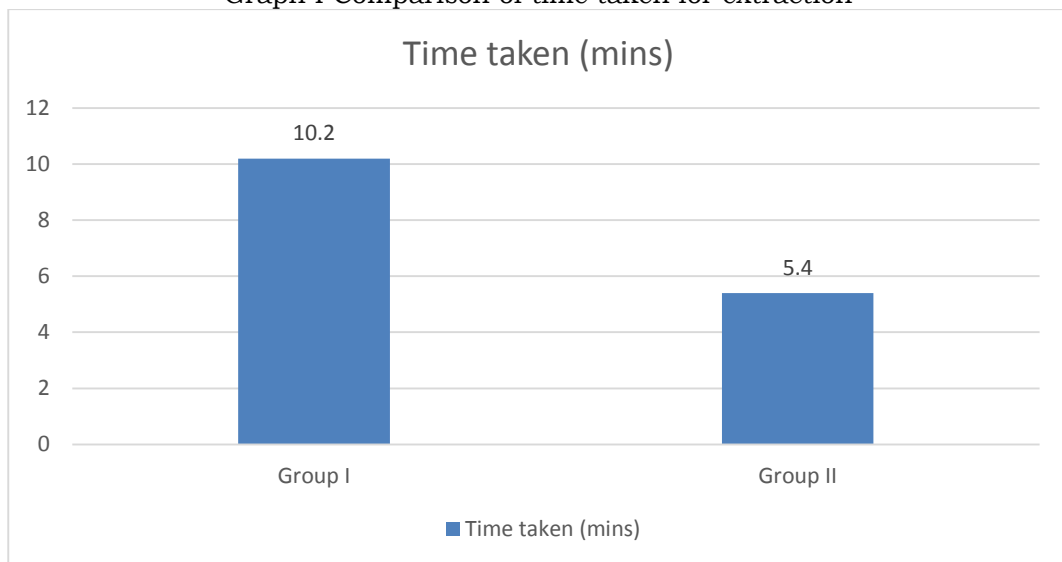
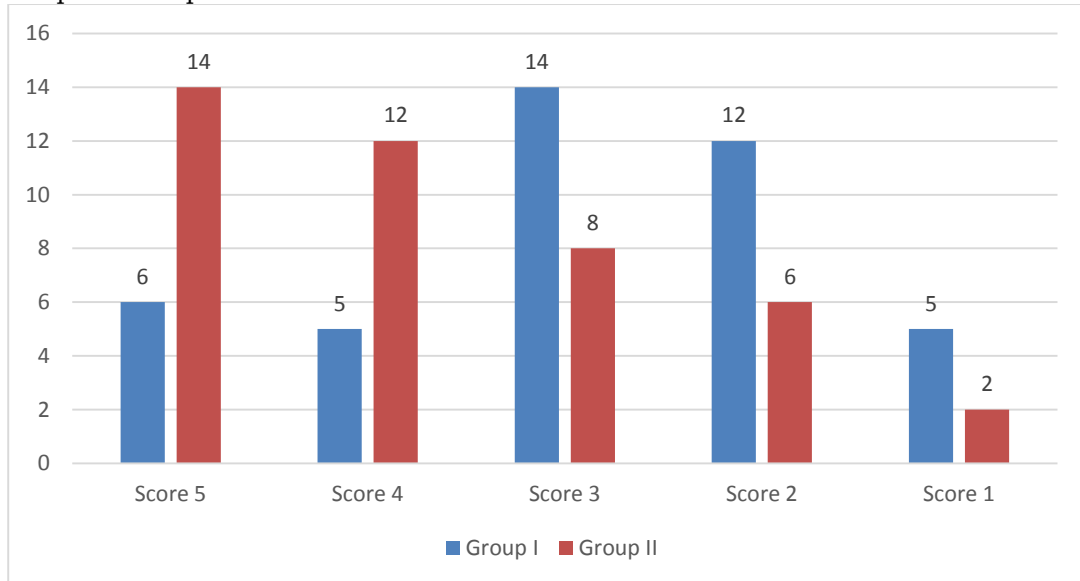


Table III Comparison of extraction score

Score	Group I	Group II	P value
Score 5	6	14	0.05
Score 4	5	12	0.01
Score 3	14	8	0.02
Score 2	12	6	0.01
Score 1	5	2	0.04

Table III, graph II shows that in group I and group II, score 5 was seen in 6 and 14, score 4 in 5 and 12, score 3 in 14 and 8, score 2 in 12 and 6 and score 1 in 5 and 2. The difference was significant ( $P < 0.05$ ).

Graph II Comparison of extraction score



## Discussion

Teeth extraction is one of the most common oral surgical procedures practiced since the early days of dentistry. It was the only procedure performed by dentists in the previous centuries and various instruments used for extraction have evolved over time.<sup>8</sup> In the 14th century, Guy de Chauliac invented dental pelican, which was in use till the late 18th century.<sup>9</sup> Tooth extraction is a surgical act and several complications might arise directly related to the operator's actions.<sup>10</sup> Fracture of the alveolar bone is the most frequent complication during tooth extraction which is related to either too much force being transferred onto the tooth through the instrument or wrong placement of forceps.<sup>11</sup> The present study was conducted to compare the efficiency of arm force only versus arm force plus wrist movement during closed method extractions.

We found that group I had 22 males and 20 females and group II had 18 males and 24 females. Sundaram et al<sup>12</sup> compared the efficiency of arm force only versus arm force plus wrist movement during closed extractions. The patients who underwent extractions of right upper molars ( $n = 50$ ) in the Oral and Maxillofacial Surgery Department were selected for the study. It was observed that 30% of the trainees used arm only force during dental extraction and were unaware about it. The time taken for tooth removal in the group which used arm and wrist force was significantly lesser ( $P < 0.001$ ). It was also observed that the breakage of tooth and alveolar bone fracture was more common with the group who used only arm force

We observed that mean time taken for extraction was 10.2 minutes in group I and 5.4 minutes in group II. Stubinger et al<sup>13</sup> examined the benefits to laser osteotomy in oral surgery using two different short-pulsed Er:YAG laser systems. Er:YAG lasers, using either a fiber-optic delivery system and an articulated arm delivery system, were used to remove impacted teeth in 30 patients. In 15 patients an Er:YAG laser utilizing a fiber-optic delivery system was applied for cutting bone, with a pulse energy of 500 mJ, a pulse duration of 250 microseconds and frequency of 12 Hz (energy density 177 J/cm<sup>2</sup>). The other 15 patients were treated with an Er:YAG laser utilizing an articulated arm delivery system, with a pulse energy of 1,000 mJ, a pulse duration of 300 microseconds and a frequency of 12 Hz (energy density 157 J/cm<sup>2</sup>). In all cases the lasers allowed precise bone ablation without any visible, negative, thermal side-effects. Since the laser tip was used in a non-contact mode and could be positioned freely, unrestricted cut geometries were feasible. Adjacent soft tissue structures could be preserved and were not harmed by the laser beam. However, osteotomies were time consuming, especially if teeth had to be separated. The level of water irrigation limited the use of the laser. In 20% of the cases in which the articulated arm delivery laser was used to section teeth, it was necessary to use a conventional dental drill to finish the procedure.

We observed that in group I and group II, score 5 was seen in 6 and 14, score 4 in 5 and 12, score 3 in 14 and 8, score 2 in 12 and 6 and score 1 in 5 and 2. Cicciu et al<sup>14</sup> analysed all the applied movements when extracting healthy upper and lower jaw premolars for orthodontic purposes. They demonstrated that the different bone densities of the mandible and maxilla are not a significant parameter when related to the extraction force applied. The buccal and palatal rocking movements, plus the twisting movements were also measured in this in-vivo study during premolar extraction for orthodontic purposes. The physical strains or forces transferred onto the teeth during extraction are the following three movements: gripping, twisting, and traction. A strain measurement gauge was attached onto an ordinary dentistry plier. The strain measurement gauge was constituted with an extensimetric washer with three 45° grids. The system operation was correlated to the variation of electrical resistance. The variations of resistance ( $\Delta R$ ) and all the different forces applied to the teeth ( $\Delta V$ ) were recorded by a computerized system. The results underlined the stress distribution on the extracted teeth during gripping, twisting and flexion.

## **Conclusion**

Authors found that the combined use of arm and wrist force found to be superior as compared to the use of arm force alone for a successful extraction.

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