



## LESION SIZE EVALUATION AFTER INTENTIONAL REPLANTATION BY USING TWO DIFFERENT EXTRACTION METHODS

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### ABSTRACT

**Objective:** This study was directed to evaluate by CBCT the periapical lesion size after intentional replantation of permanent molars after extraction by two different extraction methods. **Patients and Methods:** A total of 28 failed root canal treated maxillary and mandibular molars were included in this study, the teeth were extracted either by conventional forceps or by periosteal assisted extraction, then apicectomy of apical 3mm and retrograde cavity were done by using carbide fissure bur, then filling the retrograde cavity with mineral trioxide aggregate were done, the tooth replanted back into its socket with slight apical pressure and socket compression and splinted for one week. The CBCT was done immediately post-operative, after one year and after 2 years. **Results:** Significant difference between group 1 and group 2 and also a difference between immediate and 1 and 2 years ( $p < 0.001$ ). **Conclusions:** Intentional replantation with atraumatic extraction is a valid option with high success rate.

### INTRODUCTION

Failure in endodontically treated teeth due to overextended root canal filling materials and file separation at the apical part of the canal may be impossible to treated non-surgically with necessity for surgical intervention. The periapical surgery is the procedures that performed when non-surgical approaches not effective, in involve the flap reflection, osteotomy to expose the affected root part and apicectomy then flap repositioning and suturing<sup>(1,2)</sup>. The healing complications, patient medical condition, acceptance to perform surgery and the close proximity to vital structures as maxillary sinus and inferior alveolar canal may limit the traditional periapical surgery<sup>(3-5)</sup>. In these situations the clinician should direct his sight to another option of the treatment before extraction

of the tooth which is intentional replantation (IR). Intentional replantation (IR) or "Controlled Avulsion" is a modality of treatment since 10<sup>th</sup> century by a well-known Arabic surgeon Abulkasim El-Zahrawy<sup>(6,7)</sup>. IR is the process of controlled extraction of the affected tooth and treating it extra orally by performing the apicectomy, retrograde cavity preparation and retrograde cavity filling by suitable material as mineral trioxide aggregate then re inserting it again to its socket with splinting the replanted molar with splinting the replanted tooth for the recommended time period<sup>(8,9)</sup>. The success of intentionally replantation mainly depend on a traumatic extraction, the main tool used for extraction is conventional forceps, but with the aiming to achieve atraumatic extraction, the physics forceps, periosteal assisted extraction or

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even orthodontic extrusion before extraction were developed<sup>(10)</sup>. The main complication after IR were mentioned as ankyloses and root resorption that cause the dentist and patient may disagree this line of treatment making it as the last treatment option for many decades<sup>(11)</sup>.

The radiographical examination side by side with clinical observation are the main tools used for follow-up evaluation, as it is the main prove for the success or failure of the procedures. the evaluation of healing of the IR cases mainly done by radiography<sup>(12)</sup>. One of the most widely used and accepted radiographs in evaluation of healing after periapical surgery is the CBCT<sup>(13,14)</sup>. Thus this study was directed to evaluate the periapical lesion size of intentionally replanted molars after extraction by periotome assisted extraction and conventional forceps extraction using CBCT scanning.

## SUBJECTS AND METHODS

**A. Study Design:** A randomized controlled study.

**B. Patient selection and assessment:** A total of 28 maxillary and mandibular molar teeth with the necessity to perform periapical surgery were included in this research. This number were determined after examination of 168 patients from the outpatient clinic of Faculty of Dentistry Al Azhar University, Assuit Branch.

### Inclusion Criteria:

1. Patient within the age range from 20 to 30 years.
2. Symptomatic failed root canal treated and/or retreated First and second mandibular and maxillary molars that need surgical intervention.

### Exclusion criteria:

1. Any molar with developmental anomalies, fractured root or with severe root curvature (by digital periapical radiography).
2. Molar with large furcal perforation (by digital periapical radiography).
3. Molar with grade IV mobility.
4. Patient with any existing medical conditions as diabetes, cardiac problems or pregnancy (after direct questions to the patient).

The total number of the teeth were determined by sample size calculation for the research performed in the same field<sup>(12, 15)</sup>, after approval by the ethical committee at Faculty of Dental Medicine Cairo, Boys, Al Azhar University (EC Ref No. : 593/2092). After full procedures explanation to the patient and verbal acceptance, a consent was signed by the patient. Furthermore, the teeth that included in this study were underwent for occlusal surface reduction to minimize the intervention in the next stage (figure1 A& B).



FIG (1) Showing preoperative x ray (A), preoperative occlusal reduction (B).

**C. Extraction procedures:** A carpule of articaine hydrochloride local anesthetic solution with epinephrine (Artinibsa 40/0.01mg/ml, laboratories inibsa, S.A., Spain) was administered to anaesthetize the tooth, the anesthetic technique used was outlined by Malamed<sup>(16)</sup>. Then the tooth extraction was achieved according to their group. In **group 1:** the extraction was done by using conventional forceps (Falcon Medical Polska sp z.o.o., Poland) by placing its peaks at the level of cervical lines without root cementum touching by the forceps peaks and without prior use of dental elevators. The extraction procedure was done according to the general guidelines for tooth extraction outlined by Hupp<sup>(17)</sup>. While in **group 2:** the extraction was assisted by using periotome (Medica, Titanium Blue Coated, pt3, BCI 3972, Pakistan). The periotome was inserted in the buccal, mesial, lingual and distal surfaces of the tooth at the bone level with apical pressure (figure 2, A), this was repeated until the periotome reached a minimum of 3

mm depth on each surface. After application of the periotome the tooth delivery from the socket was completed as mentioned in the group 1.

**D. Post extraction procedures:** Socket examination was done for any root fragment or filling residue then the patient was asked to bite on 2x2 piece of gauze. Then the tooth was held by a well moistened gauze from the crown without any touch to root surface. The apical 3mm from the root apex was resected by using fissure bur mounted in high-speed hand piece with coolant (figure2, B), then the retrograde cavity was done with depth of 3mm by using the same fissure bur. within the root canal which is filled after that by retrograde filling material (MTA) (figure 2,C). Then the tooth was re inserted back into its socket with gentle apical pressure and slight socket compression. The patient was asked to bite on 2x2 piece of gauze for 4 minutes. The whole procedures while the tooth out of socket shouldn't exceed 12 minutes.

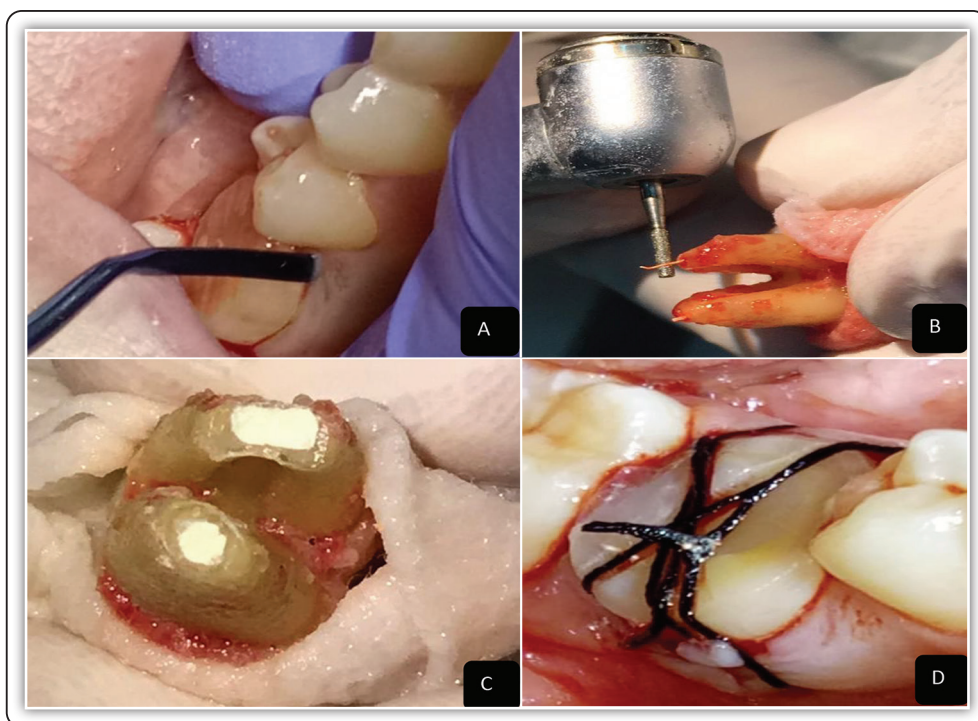


FIG (2) Showing periotome assisted extraction(A), root resection(B), retrograde filling (C), suture splinting(D).

The splinting was done by using 000 silk non-resorbable suture crossing over the occlusal surface of the tooth in figure 8 shape from buccal to lingual side (figure2, D), the sutures removed after 1 week. The patient was instructed to avoid brushing and chewing in the side of splinting till splint removal, with ibuprofen 600mg prescribed 4 days.

**E. Post-operative Assessment:** The patients were sent for CBCT imaging immediately post-surgery then scheduled for re imaging after 1 year and 2 year (figure 3).

**CBCT Evaluation:** A narrow beam CBCT (Planmeca ProMax 3d mid, Planmeca Oy, Helsinki, Finland) was used with the following settings: voxel size = 75 μm with 90 kV and 12 mA. The scans were evaluated using Planmeca Romixes viewer 3.8.1 R. measuring the of the apical lesion size immediate post-operative, after 1 year and after 2 years and comparing it as a volume of the lesion size.

Data were explored for normality using Kolmogorov-Smirnov and Shapiro-Wilk tests, data showed non-parametric (not-normal) distribution. Mann Whitney and Wilcoxon tests were used to compare the quantitative outcomes in this study. The significance level was set at  $P \leq 0.05$ . Statistical analysis was performed with IBM® SPSS® Statistics Version 20.

**RESULTS**

There was a statistically significant difference between Group1 and Group2 at immediate post-operative, 1 and 2 year where ( $p < 0.001$ ) and ( $p = 0.015$ ) at 2 years (figure 2). Furthermore, in both groups: there was a statistically significant difference between (Immediate), (1 year) and (2 years) groups where ( $p < 0.001$ ). with a significant difference between (Immediate) and each of (1 year) and (2 years) groups where ( $p = 0.001$ ) and ( $p < 0.001$ ). Also, a significant difference was found between (1 year) and (2 years) groups where ( $p < 0.001$ ).

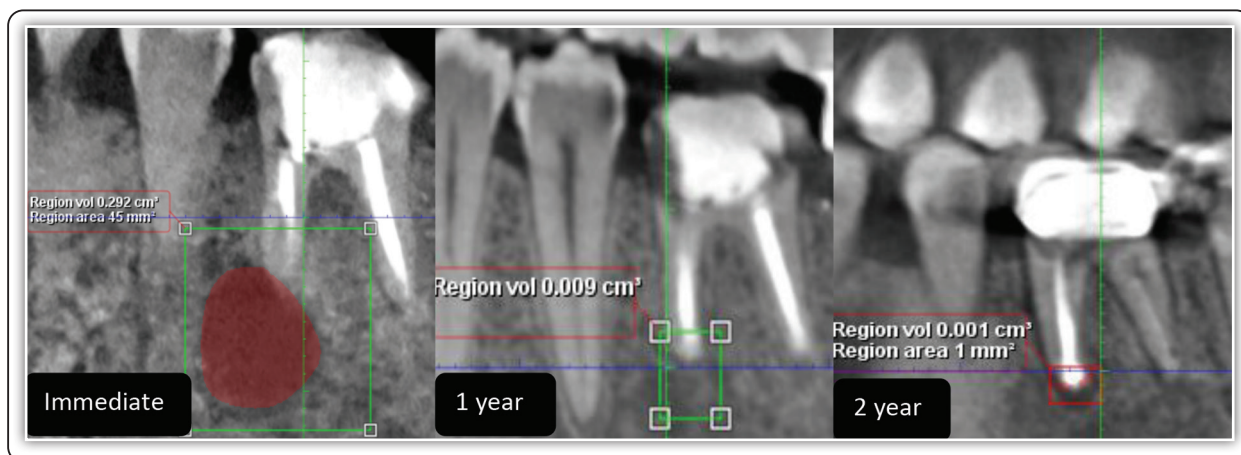


FIG (3) Showing A CBCT scans at immediate ,1 year and after 2 year.

TABLE (1) Mean and SD values of lesion size of different groups.

Variables	Lesion size				p-value
	Group1		Group2		
	Mean	SD	Mean	SD	
Immediate	.1532	.14629	.3300	.12238	<0.001*
1 year	.0327	.01117	.0192	.00878	<0.001*
2 years	.0020	.00158	.0009	.00124	0.015*
p-value	<0.001*		<0.001*		

\*: significant ( $p < 0.05$ ) ns: non-significant ( $p > 0.05$ )

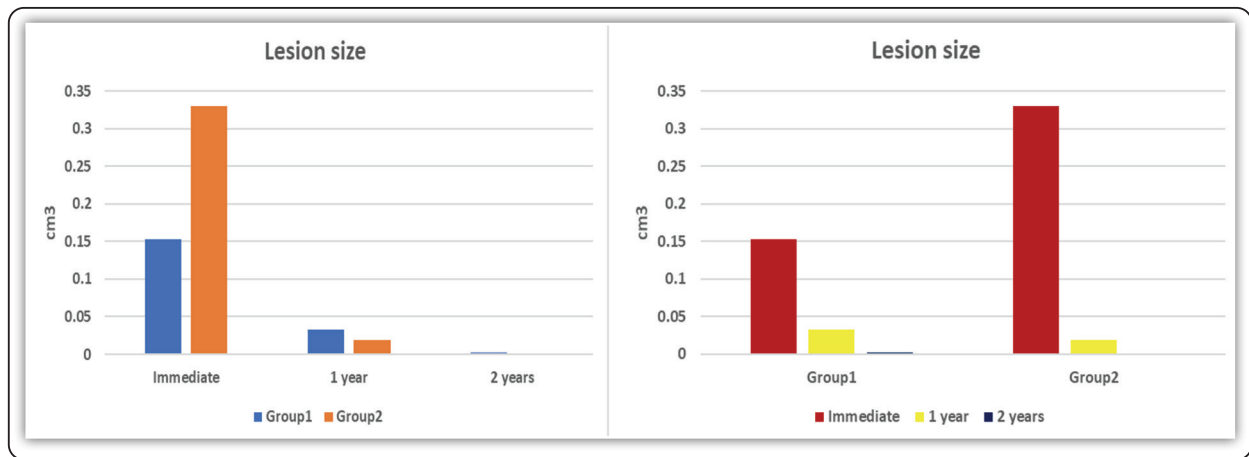


FIG (4) Bar chart representing lesion size different groups and at different follow up periods.

## DISCUSSION

The difficulty in surgical management of the periapical lesion in the maxillary and mandibular molars was the main cause behind the selection of this teeth in the current study. Moreover, the fear from injuries to the maxillary sinus and inferior alveolar canal during periapical surgery were the major causes for using intentional replantation in such cases<sup>(2, 18, 19)</sup>

It is well known that the key factor for success of IR cases is atraumatic extraction. Hence the use of periotome assisted extraction in comparison with the most commonly used tool for extraction conventional forceps were designed for this research<sup>(10, 20, 21)</sup>.

In apicectomy stage the fissure bur was used due to a non-clogging property and leaving smooth surface behind it. Moreover, incidence of fracture and cracking after ultrasonic root end preparation in extracted teeth<sup>(6, 22)</sup>. Moreover, non-resorbable suture was used for splinting in this study as it is simple way and a 7 days to avoid the tooth ankylosis<sup>(23, 24)</sup>.

In the current study the use of periotome assisted extraction provide a significant increase in healing of the apical lesion which may advocated to a traumatic PDL severing that lead to maximum healing capacity and excellent reattachment.

This was in agreement with another research that conclude that the safe extraction and PDL saving is the main factor for re attachment of the previously severed PDL<sup>(10, 20, 25, 26)</sup>.

Moreover, the lesion size decreased in size significantly after 1 year and also after 2 year this may be a sign of accepted healing after periapical surgery and this may coordinate with other research<sup>(12)</sup>.

## CONCLUSION

Periotome is a valuable tool for a traumatic extraction in IR cases.

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