



Ain Shams University  
Faculty of Dentistry  
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# **ACCURACY OF TWO ELECTRONIC APEX LOCATORS IN DETERMINING SIMULATED ROOT PERFORATION (IN VIRTO STUDY)**

*Thesis submitted to Faculty of dentistry, Ain Shams  
University for Partial fulfillment of requirements for  
The Master Degree in Endodontics*

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**2020**

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# *Acknowledgment*

*I express my deepest gratitude to Dr Abeer ELGendy professor of Endodontics, Faculty of Dentistry, Ain Shams University for his constant guidance, support, motivation and untiring help during this work. Her depth knowledge has been extremely beneficial for me.*

*I express my profound sense of reverence to my supervisor Dr. Tarek Medhat Elsewefy lecturer of Endodontics, Faculty of Dentistry, Ain Shams University, for the time, support, motivation and guidance, he devoted to me. His high moral ethics was a model for me.*

*I would like to thank also Ain shams endodontics staff for offering me much support, effort throughout the whole work.*

*Mohamad Samir*

# *Dedication*

*I would like to dedicate this  
work to my parents and wife  
for their support.*

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## **List of abbreviation**

Electronic apex locator	EAL
Cone beam computed tomography	CBCT
Periapical Radiograph	PR
Digital periapical radiograph	DPR
Sodium hypochlorite	NaOCl
Chlorohexidine	CHX
Mineral trioxide aggregate	MTA
Periodontal ligament	PDL
Alternative current	AC
Direct current	DC
Actual length	AL
Electronic length	EL
Working length	WL
Vertical root fracture	VRF
Root perforation	RP
External root resorption	ERR

## INTRODUCTION

Root perforation is a non-anatomic mechanical or pathological communication between the root canal system and periodontal tissues. Although caries or resorptive processes may cause perforations, they are usually iatrogenically induced and they have a negative effect on the long-term prognosis of the tooth after root canal treatment<sup>(1)</sup>. Root canal treatment perforations may occur at access opening, canal orifice search, excessive dentin removal in danger zone, misdirected files during canal negotiation, unsuccessful attempts to bypass separated instruments and misaligned instruments during post-space preparation. So clinical diagnosis of location of perforation is mandatory in order to minimize the probability of extruding of various irritating materials used during root canal treatment procedure and prevent instrumentation beyond perforation site.

Diagnosis of perforation is done by direct observation of bleeding, indirect evaluation of bleeding by paper point, radiographic assessment, cone beam computed tomography (CBCT) and electronic apex locator (EAL). Radiographic examination is mandatory step in root canal treatment but it has a various limitation such as it is a two dimensional image of three dimensional object, superimposition of anatomical landmarks on area of interest, impossible to detect buccal or lingual perforations due to superimposition of root on area of perforation

and radiograph suffer from distortions such as elongation and shortening that prevent accurate measurement of position of perforation site<sup>(2)</sup>.

EALs is useful and reliable method of detecting root perforation as latest generation of EALs measure alternating current impedance at two or multiple different frequencies and they can work in the presence of various intracanal contents and irrigants. Root ZX mini and SIROEndo Pocket are two modern EALs.

Evaluation the accuracy of Root ZX mini and SIROEndo pocket devices in detecting simulated root perforations under different irrigation solutions seems to be of great interest