

# Comparative Evaluation Of Accuracy Of Dental Operating Microscope With Conventional Vernier Caliper In Conservation Of Tooth Structure For Root Canal Treatment

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## **Abstract:**

**Background :** *The endodontic access cavity design directly relate to the identification and negotiation of the canals and allow straight line accessibility and visibility of the canals facilitating proper preparation. By introducing dental operating microscope and the accompanying capability of inspecting the root canals – ‘both orthograde and retrograde.’ This study is to determine the difference between the location and the difference in the access cavity for the conservation of the tooth structure.*

**Materials and methods:** *Thirty mandibular first molars were selected which were scheduled for the root canal treatment. The endodontic access cavity was prepared by using #4 carbide bur or #557 tapered bur. Three canals were located after the completion of the access opening. The samples were measured simultaneously with operating microscope and Vernier caliper. The inter orifice distance is measured and compared between the groups.*

**Results:** *Detection rate between the difference among the groups by operating microscope and Vernier caliper showed a non-significant difference between the groups only the mesiolingual orifice showed a significant difference. The microscopic method could more accurately detect orifices statistically than the other method.*

**Conclusion:** *Under the condition of this study access opening done under the microscope done shows more conservation of the tooth structure.*

**Keywords :** *Dental operating microscope, access opening, root canal treatment*

## **I. INTRODUCTION:**

The major cause of the persistence disease post treatment is due to the failure to identify the canals and its inadequate treatment. The endodontic access cavity design directly relate to the

identification and negotiation of the canals and allow straight line accessibility and visibility of the canals facilitating proper preparation.( 1 ) Advances in technology in dentistry have improved the quality of care that is provided to the general population.

Introducing dental operating microscope and the related skill in inspecting the root canals – both orthograde and retrograde have primarily changed our understanding towards ‘morphology and complexity of the canals.’ Until 1990s no wide spread acceptance of the operating microscope was found in spite the first publication of the paper. Prof. Syngcuk Kim and Prof. Gary Carr facilitated the wide spread use of the microscopic technique.(2) There is reduced stiffness and fracture resistance of the teeth that are endodontically treated due to increased volume of dentin removal while preparing access cavity.

In Endodontics, detecting a canal have relied on the doctors tactile skill and proper knowledge of the canal system, due to the capability to envision the canal orifice was imperfect. Using of ‘surgical headlamps and dental loupes’ has progressed into the use of the surgical operating microscope (SOM). The SOM offers the clinician with greater lighting and magnification and the capability in treating cases that formerly may have been thought non treatable or resulted in a compromised prognosis. (3)

The purpose of this study is to determine the difference between the location and the difference in the access cavity for the conservation of the tooth structure.

**Aim:** Comparative evaluation of inter canal orifice distance in mandibular 1<sup>st</sup> molar using microscope and CBCT in vivo.

**Objectives :** To evaluate and compare the accuracy of Dental Operating Microscope in conservation of tooth structure for root canal treatment using conventional Vernier caliper.

## II. MATERIALS AND METHODS:

### Material –

1. Pre-operative radiograph
2. Diagnostic set
3. High speed airtor
4. Round bur
5. Tapered fissure bur
6. Non-end cutting diamond bur
7. DG-16 endodontic explorer
8. Microscope

### Method

#### Selection of sample -

Study was performed in Department of Conservative Dentistry and Endodontics; Sharad Pawar Dental College .Thirty human mandibular 1<sup>st</sup> molars scheduled for root canal treatment were selected for the study. Informed written consents were obtained from each patient before treatment.

**Inclusion criteria :** General population with caries involving enamel, dentin and pulp requiring Root canal treatment in the single rooted teeth will be selected.

Teeth with completely developed roots will be included in the study.

**Exclusion criteria :** Teeth with evident periapical pathology, tooth mobility, root resorption will be excluded from the study.

Patients with medical conditions, pregnant, lactating women will be excluded from study.

Procedure performed –

**Radiographs** -Pre-operative radiograph were taken from different angulation. CBCT of molars were done and accessed for inter canal orifice distance.

**Access opening** - Local anesthetic injection was administered to block the Inferior Alveolar nerve. A #4 carbide or round diamond or #557 tapered fissure bur was used. The bur chosen should enter the occlusal surface at the point determined by the pre-access factors (CEJ perimeter, tooth angulation, CPGD). The bur is then progressed towards the center of the mentally imagined CEJ until a drop is felt or the head of the handpiece touches the cusp. Though, a drop-off will only be felt when the pulp chamber is at least 2mm deep. All 3 canals orifices were located and enlarged with orifice enlarger.

**Measurement** – Customized grid was made and measurement between intercanal orifice were calculated under microscope under magnification of 12X and listed in table.

**Sample size :** Sample size calculation was done by the results from ‘OpenEpi, version 3, open source calculator – SS Mean’ and total of 32 samples were required with 16 samples in each group.

### III. RESULTS:

Table 1 shows that the difference between the orifices of the mandibular molar of each tooth group. Detection rate between the difference among the groups by operating microscope and venier caliper showed a non significant difference between the groups, only the mesiolingual orifice showed a significant difference. The microscopic method could more accurately detect orifices statistically than the other method.

Table 1:

Sr. No.	Group	Mean	Std. Deviation	Sig.
1.	MicroMBD	3.03	.44	.646 (NS)
	VerMBD	3.06	.42	
2.	MicroMLD	3.30	.45	.018*
	VerMLD	3.40	.42	
3.	MicroMBML	1.80	.25	.294 (NS)
	VerMBML	1.84	.27	

NS- Not significant

p<0.05- statistically significant

#### **IV. DISCUSSION:**

The study was conducted to evaluate the tooth conservation with the use of DOM and visual method during locating the distance between the orifice and measuring the difference.

In the mandibular molars all the orifices were noticed with human eye and with operating microscope. Using the operating microscope clear distinct picture of the calcified.

Technologic advancements in dentistry have greatly improved the quality of care provided to the general population.(4) Also the development of virtual microscopy has provided an substitute to the use of the microscope (5)

With instruction and frequent practice from testing, only the microscope group showed a noteworthy enhancement in access cavity preparation. It showed affirmative result of the DOM on preparing the access cavity, quality was better than that of the hands-on instruction, suggesting that the necessary skills was important for using the DOM. The study was showed, for the first time, the advantage of using the DOM for preparing access cavity by undergraduates.

It verified earlier studies assessing Endodontists' enhanced performance by using DOM.(6) Stropko stated that by using the DOM clinically, his skill to recognize MB2 canals in maxillary first molars amplified by 20%, to a total of 92%(7) . A multicenter study presented that the incidence of noticed and instrumented MB2 canals in maxillary first molars amplified, from 17% in not magnified, to 63% using loupes and 71% using the DOM.(3)

Baumann was the first that reported the benefit of using an DOM for conventional Endodontics. The nature of magnification in the endodontic treatment ranges from X3 to X30. The microscope shows tiny details into clear view and helps distinguish microstructures that are not visible to the naked eye. The operating microscope permits the dentist to appreciate the subtleness of pulp chamber anatomy visualizing the pulpal floor and locating root canal orifice.

Furthermore, the microscope improves the operator's skill to selectively remove dentine with great precision, reducing the procedural error. Studies have shown that the microscope increases the capability of the dentist to locate and negotiate the canal. (8)

#### **Conclusion –**

The art of dentistry is based on precision. Unaided eye can only see upto canal orifice Microscope may aid in various procedures of Endodontics and function as 3<sup>rd</sup> eye for Endodontist. As stated by Dr. Carr “You cannot treat what you cannot see” This study also conclude that microscope is an accurate armamentarium that should be incorporated for routine procedures in Endodontics.

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