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Research Article

**EFFECTIVENESS OF HEMORRHAGE CONTROL IN  
PULPOTOMY OF SYMPTOMATIC MATURE PERMANENT  
TEETH WITH BIODENTINE****Dr. Seema Naz<sup>1</sup>, Dr. Chander Kumar<sup>2</sup>, Dr. Sheba Ramzan<sup>3</sup>, Dr. Kelash Kumar<sup>4</sup>**<sup>1</sup>BDS. MSc. Associate professor Oral Biology LUMHS, Jamshoro<sup>2</sup>BDS. MCPS. Associate Professor, Periodontology Dow Dental College (DUHS), Karachi,<sup>3</sup>BDS. FCPS. Dental surgeon LUH, Hyderabad<sup>4</sup>BDS.FCPS. Assistant Professor Operative Dentistry Baqai Dental College, Karachi**Abstract:**

**Objective:** effectiveness of hemorrhage control in pulpotomy of symptomatic mature permanent teeth with biodentine. **Design of study:** Cross sectional study. **Methodology:** Total 30 patients were included in the study. Preoperative vitality was checked with electric pulp tester (EPT). Local anesthesia was given and teeth were isolated with rubber dam. Access was made to the pulp chamber and inflamed pulp tissue was removed to the level of canal orifice. Hemostasis was achieved by application of small pieces of moist sterile cotton pellets and degree of bleeding was categorized as slight, profuse and over profuse. After control of bleeding material is mixed following manufacturer guidelines. An applicator was used to take the material at the site of placement and clot free pulp wound was covered with material. After placement of Biodentine rest of the cavity was restored with GIC. Patients were recalled after 24 hours and their pain level was recorded. **Results:** Among 30 patients, male and female were 37% and 63% respectively. Mean age of patients was  $30.93 \pm 7.320$  with minimum age 22 years and maximum age 46 years. Preoperative pain score was recorded as moderate pain in 37% cases and severe pain in 63% cases. Degree of bleeding assessed was 80% cases having slight bleeding and 20% having profuse bleeding. Postoperative pain recorded after 24 hours 77% no pain and 23% mild pain.

Association of preoperative pain and degree of bleeding was significant with slight and profuse bleeding in cases of severe pain as compared to moderate pain. Association of degree of bleeding and postoperative pain was significant after 24 hour ( $P= 0.04$ ), mild pain was present more in cases of profuse bleeding as compared to slight bleeding. **Conclusion:** Teeth with slight bleeding during pulpotomy procedure have more successful outcome in regard of less postoperative pain after 24 hours as compared to teeth with profuse bleeding.

**Corresponding author:****Dr. Kelash Kumar,**

BDS.FCPS

Assistant Professor

Operative Dentistry

Baqai Dental College, Karachi

Email: [drkelash25@gmail.com](mailto:drkelash25@gmail.com)

Cell# +923003091110

QR code



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**INTRODUCTION:**

Pulpotomy is a procedure, in which the coronal pulp is amputated, and the preserve the pulp's health.<sup>1</sup> The objective of removal partial or coronal pulp is to keep the remaining pulp healthy without adverse clinical signs or symptoms or radiographic evidence of internal or external root resorption. Pulpotomy techniques are categorized broadly into 3 groups: Devitalization, preservation and regeneration.<sup>2</sup> Devitalization techniques include FC, gluteraldehyde, electrosurgery and laser pulpotomy. Preservation techniques include ferric sulphate (FS), sodium hypochlorite (NaOCl) and Zinc oxide eugenol (ZOE) pulpotomy. Regenerative techniques include Ca(OH)<sub>2</sub> and MTA pulpotomy. Regardless of the pulpotomy technique, the radicular pulp should remain asymptomatic without signs or symptoms of pain or infection.<sup>3</sup>

Pulpotomy is classified into partial pulpotomy and full pulpotomy. Complete pulpotomy (also known as cervical pulpotomy) is the removal of coronal pulp tissue and the placement of a wound dressing on the canal orifice.<sup>4</sup> It is indicated when it is anticipated that pulp is inflamed to the deeper levels of the coronal pulp, traumatic exposure after more than 72 hours, or a carious exposure of young tooth with partially developed apex.<sup>5</sup>

Currently, several studies have reported successful outcome of vital pulp therapy in vital teeth with cariously exposed pulp with signs and symptoms of irreversible pulpitis with periapical lesions. A Panuroot and L Pairoj conducted a systemic review on vital pulp therapy in permanent teeth with carious exposed pulp, results of this systemic review shown that success rate of direct pulp capping, partial pulpotomy and full pulpotomy was in the range of 72.9%–99.4%. It provides evidence that vital permanent teeth with cariously exposed pulp might be managed successfully by vital pulp therapy.<sup>6</sup>

Biodentine is a new version of calcium silicate-based inorganic cement. Biodentine is bioactive cement with dentin-like mechanical properties, which can be used as a dentine substitute on crowns and roots. It has a positive effect on vital pulp cells and stimulates tertiary dentin formation. In direct contact with vital pulp tissue it also promotes the formation of reparative dentin.<sup>7,8</sup> It consists of powder and liquid system where the powder is composed of tri calcium silicate (main component), calcium carbonate (filler material), zirconium oxide (radiopacifier), di calcium silicate (traces), calcium oxide (traces), iron oxide (traces) and

the liquid is an aqueous solution of a hydro-soluble polymer (water reducing agent) with calcium chloride (decreases the setting time).<sup>8</sup> The mixing of Biodentine powder and liquid results in a gel structure, allowing ionic exchange and polymerization over time to form a solid network. The reaction product consists of a cementitious phase containing tri calcium silicate, a radiopacifier phase comprising of zirconium oxide, and the authors claim that calcium carbonate acts as a nucleation site which allows the formation of reaction rims around it, thereby enhancing the hydration and producing a denser microstructure.<sup>9</sup>

The purpose of this study was to assess the effect of hemorrhage control and degree of bleeding during the pulpotomy procedure on postoperative pain in pulpotomy of cariously exposed symptomatic vital permanent teeth.

**MATERIAL AND METHODS:**

The study was conducted in Department of operative dentistry, Liaquat University of medical and health sciences Jamshoro from April 2018 to September 2018. Total 30 patients were included in the study with inclusion criteria set as cariously exposed vital permanent teeth with pain (VAS  $\geq$  1), Age 18 years to 50 years of either gender, all permanent teeth with percussion negative. Cases excluded from the study were pregnant patients, having history of significant medical disease (like CABG), allergy to any known material, teeth with necrosed pulp, permanent immature teeth, any pathology on radiograph (periapical and lateral radiolucency). Written informed consent was obtained from all patients before starting the treatment.

Preoperative vitality was checked with electric pulp tester (EPT). Local anesthesia was given with lidocaine 2% with adrenaline 1:80,000 teeth were isolated with rubber dam. Access was made to the pulp chamber and inflamed pulp tissue was removed to the level of canal orifice using a large round bur in a slow speed air motor or spoon excavator with copious irrigation with normal saline. Hemostasis was achieved by application of small pieces of moist sterile cotton pellets and degree of bleeding was categorized as slight if controlled within 1 minute by placing moist cotton pellet, profuse if controlled within 5 minutes and over profuse if bleeding is not controlled. After control of bleeding material is mixed following manufacturer guidelines. An applicator was used to take the material at the site of placement and clot free pulp wound was covered with material. After placement of Biodentine rest of the cavity was restored

with GIC. Patients were recalled after 24 hours and their pain level was recorded on VAS scale as mild moderate and severe.

#### RESULTS:

Total 30 patients were included in the study. Among which Male and female were as shown in figure 1.

Mean age of patients was  $30.93 \pm 7.320$  with minimum age 22 years and maximum age 46 years As Shown in Table-1

Preoperative pain score was recorded as shown in Table-2

Degree of bleeding assessed during the pulpotomy procedure as shown in Table-3.

Postoperative pain after 24 hours, as shown in Table-4.

Association of preoperative pain and degree of bleeding as shown in Table-5

Association of degree of bleeding and postoperative pain as shown in Table-6.

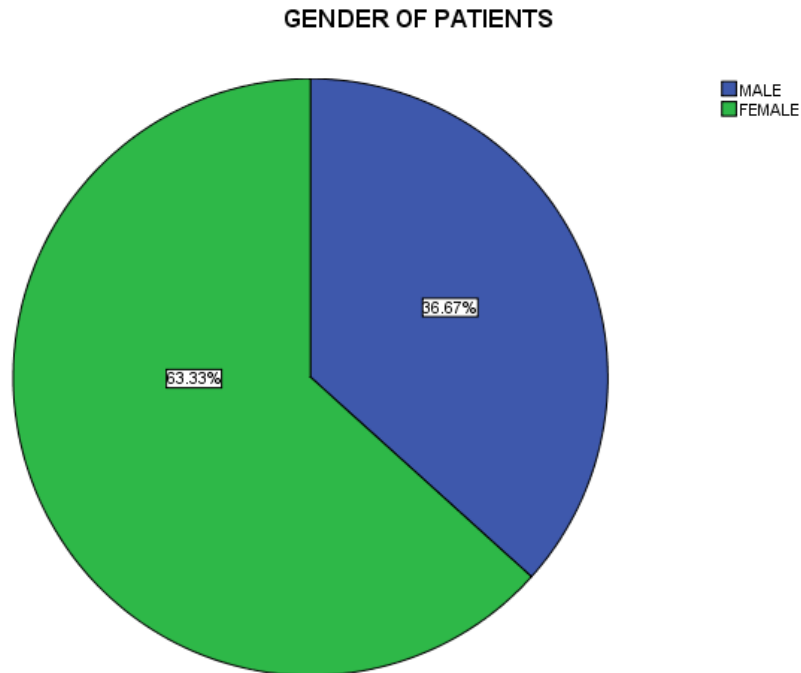


Figure-1: Gender of patients

**TABLE- 1. AGE OF PATIENTS**

	Patients	Minimum	Maximum	Mean	Std. Deviation
AGE OF PATIENTS	30	22	46	30.93	7.320

Table- 2 Preoperative pain

Pain level	Frequency	Percent	Cumulative Percent
MODERAET PAIN	11	37	37
SEVERE PAIN	19	63	63
Total Patients	30	100	100

Table-3 Degree of Bleeding

Degree Of Bleeding	Frequency	Percent	Cumulative Percent
SLIGHT BLEEDING (+)	24	80	80
PROFUSE BLEEDING(++)	6	20	100
Total	30	100	

Table- 4: Postoperative Pain

	Frequency	Percent	Cumulative Percent
NO PAIN	23	77	76.7
MILD PAIN	7	23	100.0
Total	30	100.0	

Table 5. ASSOCIATION OF PREOPERATIVE PAIN SCORE \* DEGREE OF BLEEDING

PREOPERATIVE PAIN SCORE	DEGREE OF BLEEDING		Total	P value
	SLIGHT BLEEDING (+)	ROFUSE BLEEDING(++)		
MODERAET PAIN	13	0	13	0.037
SEVERE PAIN	11	6	17	
Total	24	6	30	

Table 6. ASSOCIATION OF DEGREE OF BLEEDING \* POSTOPERATIVE PAIN AFTER 24 HOURS

DEGREE OF BLEEDING	POSTOPERATIVE PAIN AFTER 24 HOURS		Total	P VALUE
	NO PAIN	MILD PAIN		
SLIGHT BLEEDING (+)	19	5	24	0.04
ROFUSE BLEEDING(++)	1	5	6	
TOTAL	20	10	30	

**DISCUSSION:**

Treatment of symptomatic vital permanent teeth is generally performed with root canal therapy. However, even with advanced techniques and materials root canal procedures still continue to be a challenge to clinician due to complex root canal system and procedures associated with it. Addition to the time consumption it leads to the removal of excessive tooth structure and make tooth non-vital, thus leading to the frequent fracture of such teeth.<sup>10</sup> In deep carious lesions, pulp inflammation is restricted to the coronal tissue of the pulp, leaving the pulp tissue uninfected in the deeper portion of the pulp. Therefore pulpotomy is a vital pulp therapy procedure in which coronal pulp tissue is removed and the radicular pulp is preserved by placing a suitable biocompatible material to protect the pulp from further insult and initiating healing and repair.

Total 30 patients were part of study. Mean age of the patients in this study was  $30.93 \pm 7.321$ , the present study results are in agreement with the studies conducted by Fong CD and Bokhari S S et al have shown that dental pulp of aged patient has a reduced ability to overcome the inflammatory insult because it typically becomes more fibrous with reduced vascular supply as compared to dental pulp of young patients which has larger pulp space and abundant blood supply with increased cellular content and rapid inflammatory response.<sup>11</sup>

A total of 30 patients were part of the study. Pain assessment after 24 hours of treatment was recorded. Pain was absent in majority of cases 77% and 23% of patients reported mild pain This lies in agreement with the study conducted by Soni H K,<sup>12</sup> in which patient have shown no postoperative discomfort after pulpotomy.

During clinical procedure the degree of bleeding was assessed as slight bleeding in 80% of cases. In previous studies<sup>13, 14, 15</sup> It has been reported that optimum hemorrhage control is essential for successful outcome of vital pulp therapy procedures. An over profuse bleeding upon exposure that is unable to stop is likely to indicate a more inflammatory involvement of pulpal tissue and should not be considered a case for vital pulp therapy i.e. pulp capping or pulpotomy.<sup>16</sup> In this present study none of the patient was noticed with over profuse bleeding upon exposure in both groups, while majority of cases with slight bleeding were covered with Biodentine When preoperative pain was compared with degree of bleeding, shown as significant ( $P=0.037$ ).

When association of postoperative pain was compared with degree of bleeding, in cases slight bleeding cases there was no pain in 19 cases and 5 cases reported mild pain. Cases with profuse bleeding have postoperative pain as compared to slight bleeding this could be due to more pulp inflammation occurred in profuse bleeding cases. More pain mediators and edema occurs in highly inflamed pulp and compared to less inflamed pulp. The association showed significant (0.04).<sup>16</sup>

In this present study biodentine was chosen, because it is new calcium silicate based biomaterial resembling Mineral Trioxide Aggregate (MTA), as both have same mechanism of action on pulpal healing. Biodentine had similar efficacy in clinical setting and may be considered as alternative to MTA in vital pulp therapy procedures, i.e. pulpotomy or pulp capping. Fast setting time, easy handling and single stage approach simplifies and improves the clinical use of Biodentine.

**CONCLUSION:**

It was concluded that pulpotomy have been introduced as another treatment modality for management of cariously exposed symptomatic vital permanent teeth. But hemorrhage control may affect treatment outcome depending upon the severity of inflammation. In this study the teeth with slight bleeding have more successful outcome in regard of less postoperative pain after 24 hours as compared to teeth with profuse bleeding. This need to be validated with larger number of cases and other materials selected for pulpotomy.

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