Proceeding
<table>
<thead>
<tr>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of The Normal Mandibular Alveolar Resorption Pattern Based on Gander Using Panoramic Radiograph 416</td>
<td>351-362</td>
</tr>
<tr>
<td>Mohd Shuhaimi, M.H1, Ria N Firman2, F. Pramanik2, 426</td>
<td></td>
</tr>
<tr>
<td>Description of Corpus Length and Ramus Height of Mandible in Patients with Panoramic Radiograph 438</td>
<td>372-381</td>
</tr>
<tr>
<td>Siti Nur Aseerah1, Azhari2, Farina Pramanik2 438</td>
<td></td>
</tr>
<tr>
<td>Analysis of The Mandible Cortical Bone Height in Amlodipine user Patient Using Panoramic Radiograph 449</td>
<td>382-390</td>
</tr>
<tr>
<td>Farihah S, 2Epsilawati L, 2Suhardjo, 2AAG Dananjaya 449</td>
<td></td>
</tr>
<tr>
<td>Caries Description in Permanent Teeth Based on Mount and Hume Classification 457</td>
<td>391-397</td>
</tr>
<tr>
<td>Johana Yaputri 1, Rahmi Alma Farah2, Anna Muryani3 457</td>
<td></td>
</tr>
<tr>
<td>DIRECT COMPOSITE RESTORATION WITH STAMP TECHNIQUE 466</td>
<td>398-405</td>
</tr>
<tr>
<td>Yolanda1 ; Anna Muryani1 466</td>
<td></td>
</tr>
<tr>
<td>INTENTIONAL ENDODONTIC IN LEFT MAXILLARY CENTRAL INSISIVUS 474</td>
<td>406-412</td>
</tr>
<tr>
<td>W. Prabandari1, R. A. Farah2 474</td>
<td></td>
</tr>
<tr>
<td>DIRECT PULP CAPPING WITH MINERAL TRIOXIDEAGGREGATE</td>
<td>413-418</td>
</tr>
<tr>
<td>Wijoyo Sastro S1., Irmaelyn S2 481</td>
<td></td>
</tr>
<tr>
<td>ONE VISIT ENDODONTIC TREATMENT OF MAXILLARY CENTRAL INCISORS 489</td>
<td>419-425</td>
</tr>
<tr>
<td>Y. Dhamayanti 1, D. Arpin 2 489</td>
<td></td>
</tr>
<tr>
<td>NON-SURGERY TREATMENT FOR PERiapICAL LESION ON TOOTH 21 AND 22 WITH CONVENTIONAL ENDODONTIC TECHNIQUE 499</td>
<td>426-434</td>
</tr>
<tr>
<td>R. Indiwina1, D. Arpin2 499</td>
<td></td>
</tr>
<tr>
<td>CONVENTIONAL ENDODONTIC TREATMENT OF CHRONIC PERiapICAL LESION ASSOCIATED WITH TRAUMATIZED LEFT MAXILLARY INCISORS 507</td>
<td>435-442</td>
</tr>
<tr>
<td>S. Yumanta1, h. D. Adhita2 507</td>
<td></td>
</tr>
</tbody>
</table>
MANAGEMENT PULP NECROSIS WITH OPEN APEX USING APICAL PLUG MINERAL TRIOXIDE AGGREGATE 514
E. A. Sapuheni1, H. D. Adhita Dharsono2 514

HEALING OF PERIAPICAL LESION USING CALCIUM HYDROXIDE IN NONSURGICAL ENDODONTIC TREATMENT 522
Nuni. Maharani1, Anna. Muryani2 522

NONSURGICAL ENDODONTIC RETREATMENT ON LEFT MAXILLARY SECOND PREMOLAR WITH UNDERFILLED OBTURATION. 531
Ika Destina1, Diani Prisinda2 531

MANAGEMENT OF SEPARATED ENDODONTIC INSTRUMENT DURING ROOT CANAL TREATMENT WITH BYPASS TECHNIQUE 538
Nana Nurjanah1, H.D.A.Dharsono2 538

MANAGEMENT OF MAXILLARY FIRST PREMOLAR WITH THREE ROOT CANALS: A CASE REPORT 546
Zuleika1, H.D.A.Dharsono2 546

NON-SURGICAL ROOT CANAL RETREATMENT ON THE MAXILLARY LEFT SECOND PREMOLAR 557
Anna Muryani1, Irmaleny Satifti1 557

INTRA CORONAL BLEACHING ON UPPER LEFT CENTRAL INCISOR TOOTH (CASE REPORT) 565
Diani Prisinda 565

EFFECT OF FLUORIDE APPLICATION BEFORE OR AFTER BLEACHING OF CARBAMID PEROXIDE 35 % ON BLEACHED GUIDE SCORES, HARDNESS, AND ENAMEL BRIGHTNESS 573
Yendriwati1, Rehulina Ginting2, Fitri Yunita Batubara2 573

THE EFFECTIVENESS OF PARACHLOROPHENOL CAMPHOR MENTHOL AGAINST ORAL Candida albicans 585
Ayu Trisna Hayati, Emma Rachmawati, Ami Sucati 585

DENTAL MANAGEMENT IN CHILDREN WITH LOW BIRTH WEIGHT 591
Williayanti Soewondo1 591
Caries Description in Permanent Teeth Based on Mount and Hume Classification

Johana Yaputri¹, Rahmi Alma Farah², Anna Muryani³

¹ Faculty of Dentistry, Padjadjaran University Bandung 40132, Indonesia, Email: johanayaputri@gmail.com
² Faculty of Dentistry, Padjadjaran University, Bandung 40132, Indonesia. Email: rahmi farah@yahoo.com
³ Faculty of Dentistry, Padjadjaran University, Bandung 40132, Indonesia. Email: annamuryani1206@gmail.com

ABSTRACT

INTRODUCTION: A method of grouping caries lesions based on Mount and Hume classification, with the principle of minimal intervention, is expected to identify white spot lesions that cannot otherwise be identified using the G. V. Black classification system. The specific treatment plan for each caries lesion is also provided by Mount and Hume classification. Objective: This study aims to determine the caries prevalence in permanent teeth based on Mount and Hume classification. Materials and methods: This research was conducted by collecting descriptive data from patient observation. Data collection took place at Instalasi Rawat Jalan Integrasi Rumah Sakit Gigi dan Mulut Universitas Padjadjaran, between April 14th and May 14th 2015. All patients who fulfilled the inclusion criteria had given their informed consent prior to examination. Qualified patients underwent a visual and tactile clinical examination using the WHO probe. Carious lesions found during the examination were put into fifteen groups based on Mount and Hume classification, recorded, and processed in the form of a table. The prevalence of each group was then calculated by dividing the number of caries-affected teeth by the total number of teeth examined. Result: The results show that of 104 patients with 2990 teeth, prevalence of caries 1.0 is 11.71%; caries 1.1 is 18.13%; caries 1.2 is 4.88%; caries 1.3 is 0.54%; caries 1.4 is 0.97%; caries 2.0 is 2.58%; caries 2.1 is 1.00%; caries 2.2 is 1.04%; caries 2.3 is 0.27%; caries 2.4 is 0.07%; caries 3.0 is 1.97%; caries 3.1 is 0.64%; caries 3.2 is 0.17%; caries 3.3 and 3.4 is 0.00%. Conclusion: Caries prevalence found in this research is 43.95% and the highest rate of prevalence is found in caries 1.1 based on Mount and Hume classification (18.13%).

Keywords—dental caries; minimal intervention; mount and hume classification; white spot lesions
INTRODUCTION

Dental caries is the most common teeth and mouth disease in Indonesia [1], [2]. Based on the 2013 Riset Kesehatan Dasar (Riskesdas) report, Indonesia scores 4.6 on the DMF-T index. This score indicates high severity in dental caries, according to the categorization recognized by the World Health Organization (WHO). The prevalence of active caries in Indonesia based on the Riskesdas report in 2007 reached 43.4% [3], [4], [5].

Restoration approach in handling cases of dental caries is one of the causes of the current high prevalence of dental caries. G. V. Black classified carious lesions into six classes based on the location in 1908. The basic principle of "extension for prevention" in this classification requires extensive structural removal in order to form an ideal cavity, so the remaining tooth structure becomes brittle and causes "replacement dentistry". Non-cavitated lesions (white spots and brown spots), which are the earliest signs of dental caries, also cannot be identified by this classification [6], [7], [8].

Minimal intervention is a concept that aims to improve the treatment of preventive and early detection efforts, noting the symptoms and causes of a disease. Caries risk assessment and early detection of carious lesions are attempts at implementing the principle of minimal intervention in the handling of cases of dental caries. Early detection of carious lesions is expected to identify non-cavitated lesions so demineralization of tooth structure can be stopped and the teeth can be treated without surgical intervention [9], [10], [11].

Mount and Hume developed a new caries classification with the principle of "minimal intervention" in 1997. Carious lesions are classified more specifically based on their positions (site) and extensions (size). There are three site-based groups and five size-based groups. Thus, this system allows non-cavitated lesions to be identified prior to the formation of cavities [6], [7]. The specific treatment plan for each caries lesions is also provided by Mount and Hume classification [7], [12].

Rumah Sakit Gigi den Mulia Universitas Padjadjaran (RSGM Unpad) is a hospital that provides general and specialized dental services located in Jalan Sekeloa Selatan 1, Bandung. Instalasi Rawat Jalan Integrasi RSGM Unpad is a combined installation that consists of Operative Dentistry, Orthodontics, Prosthodontics, Periodontics, and Oral Medicine. Research on the prevalence of caries in permanent teeth based on Mount and Hume classification has never been done in this place so that relevant prior on-site data is unavailable.

The authors of this paper were interested in researching the prevalence of caries in permanent teeth based on Mount and Hume classification in RSGM Unpad based on the aforementioned issue. This research was conducted on patients at the Instalasi Rawat Jalan Integrasi RSGM Unpad. This study aims to determine the caries prevalence in permanent teeth based on Mount and Hume classification in Instalasi Rawat Jalan Integrasi RSGM Unpad.
MATERIALS AND METHODS

This is a descriptive observation-based research. Data collection took place at Instalasi Rawat Jalan Integrasi RSGM Unpad, between April 14th and May 14th 2015. The population included all patients in Instalasi Rawat Jalan Integrasi RSGM Unpad and samples were selected based on purposive sampling. The inclusion criteria for this research were new patients in Instalasi Rawat Jalan Integrasi Angkatan 2011 RSGM Unpad between April 14th and May 14th 2015; free from supra gingiva calculus; aged 13 years and over; and with a period of permanent teeth. The exclusion criteria for this research were patients who have been doing maintenance in the Instalasi Rawat Jalan Integrasi RSGM Unpad before April 14th 2015; patients with mixed dentition period; edentulous patients; patients using fixed orthodontics appliance; the caries which is located beneath or on the edge of existing restorations; and patients who are not willing to the subject of research. All patients who fulfilled the inclusion criteria had given their informed consent prior to examination. Qualified patients underwent a visual and tactile clinical examination using the WHO probe. Carious lesions found during the examination were put into fifteen groups based on Mount and Hume classification, recorded, and processed in the form of a table. The prevalence of each group was then calculated by dividing the number of caries-affected teeth by the total number of teeth examined.

Mount and Hume classification is a system that identifies carious lesions based on the site and size. Carious lesions were grouped into three based on location, site 1 (pits and fissures, occlusal surface), site 2 (interproximal), and site 3 (cervical third of the crown, root surface carries). Carious lesions were grouped into five based on size, size 0 (non-cavitated lesions, such as white spots or brown spots), size 1 (minimal lesions, limited to enamel, ball on the WHO probe drops into the surface of the enamel cavity/discontinuity), size 2 (moderate dentin involvement, ball on the WHO probe enters the opening of the cavity and in the opinion of the examiner the base is in dentin), size 3 (enlarge lesions, remaining tooth structure is weakened to the extent that cusp of the posterior teeth or incisal edges of the anterior teeth are split, or are likely to fail if left exposed to occlusal load), and size 4 (extensive lesions, bulk loss of tooth structure, loss of a complete cusp of the posterior teeth or incisal edges of anterior teeth) [12], [13], [7], [14].

Fig. 1. Three sites based on Mount and Hume classification: 1. occlusal fissures. 2. proximal contacts areas. 3. cervical regions around the full circumference of the tooth [12]
Fig. 2. Five sizes based on Mount and Hume classification: size 0 (no cavity), size 1 (minimal), size 2 (moderate), size 3 (enlarged), size 4 (extensive) [21]

Table 1. Mount and Hume classification. [2]

<table>
<thead>
<tr>
<th>Site</th>
<th>No Cavity (0)</th>
<th>Minimal (1)</th>
<th>Moderate (2)</th>
<th>Enlarged (3)</th>
<th>Extensive (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pri/ Fissure</td>
<td>1.0</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Contact Area</td>
<td>2.0</td>
<td>2.1</td>
<td>2.2</td>
<td>2.3</td>
<td>2.4</td>
</tr>
<tr>
<td>Cervical</td>
<td>3.0</td>
<td>3.1</td>
<td>3.2</td>
<td>3.3</td>
<td>3.4</td>
</tr>
</tbody>
</table>

RESULT

The result of research conducted on 104 patients with 2990 among them teeth shows that the prevalence of caries is 43.65%, as shown in Table II below:
Table 2. Caries prevalence based on Mount and Hume classification

<table>
<thead>
<tr>
<th>Mount and Hume Classification</th>
<th>Caries Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caries 1.0</td>
<td>11.71%</td>
</tr>
<tr>
<td>Caries 1.1</td>
<td>15.13%</td>
</tr>
<tr>
<td>Caries 1.2</td>
<td>4.06%</td>
</tr>
<tr>
<td>Caries 1.3</td>
<td>0.54%</td>
</tr>
<tr>
<td>Caries 1.4</td>
<td>9.71%</td>
</tr>
<tr>
<td>Caries 2.0</td>
<td>2.56%</td>
</tr>
<tr>
<td>Caries 2.1</td>
<td>1.00%</td>
</tr>
<tr>
<td>Caries 2.2</td>
<td>1.04%</td>
</tr>
<tr>
<td>Caries 2.3</td>
<td>0.27%</td>
</tr>
<tr>
<td>Caries 2.4</td>
<td>0.07%</td>
</tr>
<tr>
<td>Caries 3.0</td>
<td>1.97%</td>
</tr>
<tr>
<td>Caries 3.1</td>
<td>0.64%</td>
</tr>
<tr>
<td>Caries 3.2</td>
<td>0.17%</td>
</tr>
<tr>
<td>Caries 3.3</td>
<td>0.00%</td>
</tr>
<tr>
<td>Caries 3.4</td>
<td>0.00%</td>
</tr>
<tr>
<td>Total</td>
<td>43.95%</td>
</tr>
</tbody>
</table>

Table II shows that caries 1.1 is the type of caries with the highest prevalence with percentage 18.13%. Caries 3.3 and 3.4 are not found in this research.

DISCUSSION

The result shows that based on its location (site), carious lesions occur most commonly on site 1. This is consistent with the Mount and Hume theory that caries most often occurs in the pits and fissures of teeth (site 1). This is due to the anatomical shape of pits and fissures, causing cariogenic bacteria to often be trapped in this area and cannot be cleaned effectively with a toothbrush [12], [15]. The next discussion is based on the highest carious lesions at each classification site.

Site 1 includes the pits and fissures and occlusal surfaces of posterior teeth [12]. Order of prevalence of caries lesions at site 1 is as follows: 18.13% for caries 1.1; 11.71% for caries 1.0; 4.88% for caries 1.2; 0.97% for caries 1.4; and 0.54% for caries 1.3.

Caries 1.1 is superficial caries occurring in pits and fissures [12]. The result shows that caries 1.1 is the most common lesion. The high prevalence of this type of lesions is due to its confinement to the enamel, so it is often asymptomatic and the patient does not realize that his teeth have cavities [15]. The possibility of the presence of hidden caries also increases the prevalence of this lesion clinically. Hidden caries is an occlusal caries with dentin involvement and can be detected with radiographs (bitewing), but clinically this caries looks like a superficial caries [16], [17].
Caries 1.0, non-cavitated lesions (white spots or brown spots) on pits and fissures [12], is the second type of lesions more frequently found during this research. White spot lesions are asymptomatic and patients are often unaware of the existence of these lesions [15].

Caries 1.4 is caries in pits and fissures and occlusal surfaces of posterior teeth that have involved the pulp; usually there has been a loss of cusps of the posterior teeth or incisal edges of anterior teeth [12]. Caries 1.3 is caries in pits and fissures and occlusal surfaces of posterior teeth with large cavities which involve enamel and dentin [12]. Patients who have these carious lesions are usually already aware of them and feel a cavity in the tooth interfering with its functions, prompting them to get fillings. This leads to the infrequent findings of both lesions in this research, because restoration has usually been done on affected teeth.

Site 2 includes the interproximal surfaces below the contact point on the anterior and posterior teeth [12]. Order of prevalence on site 2 is as follows: 2.58% for caries 2.0; 1.04% for caries 2.2; 1.00% for caries 2.1; 0.27% for caries 2.3, and 0.07% for caries 2.4.

Caries 2.0 is a white spot lesions or brown spots on the interproximal surfaces of anterior and posterior teeth [12]. These lesions usually take the form of brown spots which extend to the facial and lingual. Therefore, they are easily identifiable and many were found in this research.

Caries 2.2 is caries with moderate cavities on the interproximal surfaces of anterior and posterior teeth involving enamel and dentin [12]. Interproximal caries are large on the outside (enamel) and form a cone towards DEJ so, clinically, the cavity will look spacious and easily identified [15], [18]. Consequentially, caries 2.2 was quite commonly found in this research.

Caries 2.3 and 2.4 have enlarged and extensive cavities [12]. As is the case in caries 1.3 and 1.4, these lesions are rarely found in this research because affected patients had undergone teeth restoration.

Site 3 is carious lesions that occur in the cervical one third of the crown or, following gingival recession, the exposed root [12]. Order of prevalence in site 3 is: 1.79% for caries 3.0; 0.64% for caries 3.1; 0.17% for caries 3.2; and 0.00% for caries 3.3 and 3.4.

Caries 3.0 is non-cavitated lesions (white spots or brown spots) in the cervical region [12]. Lesions found in this research were usually white spots in the cervical area forming a line parallel to the margin of the gingiva, easily identified when the tooth is dried. Many were found in this research.

Caries 3.3 and 3.4 are lesions with enlarged and extensive cavities on root surfaces. These lesions are very rarely found in this research because most of research subjects were about twenty years of age, while the root surface caries usually occurs in the elderly due to decreased protective factors, for example xerostomia [15], [19], [18].

Most lesions found on site 3 were non-carious lesions (e.g. abrasions and abrasions) that were not included in the results. Caries at site 3 are caused by various factors, such as the use of fixed orthodontic appliance, high sugar consumption, poor oral hygiene, and
xerostomia [20]. The carious lesions on site 3 were very infrequent in this research due to the good oral hygiene of most subjects.

CONCLUSION

Caries prevalence found in this research is 43.95% and the highest rate of prevalence is found in caries 1.1 based on Mount and Hume classification (18.13%). Mount and Hume classification should be used in clinical practice attempts at implementing the principle of minimal intervention in the handling of cases of dental caries, due to its early detection of caries lesions and specific treatment plan to each lesion.

ACKNOWLEDGMENT

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REFERENCES


Direct Composite Restoration With Stamp Technique

Yolanda¹; Anna Muryani¹

¹Staff of Department Conservative Dentistry, Padjadjaran University, Bandung, Indonesia

ABSTRACT

Creating functional and esthetic form on posterior teeth is very challenging. Efficiency and effectiveness are important to achieve a good restoration. There are many ways and techniques to restore posterior teeth, one of them is stamp technique. Typical indication of stamp technique are large single-tooth restoration, occlusal rehabilitation and direct fibre reinforced fixed partial denture. Describe a step by step of stamp technique to restore posterior teeth. A 21-year old female referred from the Department of Orthodontics, Faculty of Dentistry, Padjadjaran University for reshaping lower left tooth due to a dental anomaly. The clinical examination showed a free caries at mandibular left second premolar (tooth 35) and diastema 2 mm at mesial region. The vitality test was positive. The radiographic examination showed that root of 35 shorter than other. The treatment plan is reshaping and recounturing with direct composite restoration using stamp technique. The stamp technique can be an alternative technique to restore posterior teeth with direct composite in an effective and efficiency way.

Keywords : Stamp technique, restoration, reshaping, composite.

INTRODUCTION

Direct composite restoration is currently the standard technique for direct restoration. Direct composite restoration use to restore defects, repaint tooth structure invisibly and change tooth shape and alignment. Dental composite has advantages as a restorative material due to esthetics, conservation of tooth structure, adhesion to tooth structure, and low thermal conductivity. The conservative treatment approach is best collaborated with the use of composite due to their ability of bonding to many surfaces including natural teeth. With good case selection, proper adhesion and placement, posterior composite can provide successful and predictable restorations that may match the appearance of natural teeth.

Nevertheless, resin composite still has minor weakness. Placing successful posterior composites is difficult, tedious, and time consuming. The procedures includes achieving
the proper isolation, precise execution of the adhesive steps, incremental placement, adaptation, adjusting the occlusion, and finishing and polishing. For this reason, an alternative placement technique of composite restoration was introduced. The stamp technique is presented by three typical indications: large single-tooth restoration, occlusal rehabilitation of a compromised occlusal surface due to erosions and direct fibre-reinforced fixed partial denture.  

The stamp technique consists of fabricating an occlusal matrix to impress the occlusal anatomy of posterior teeth. The advantages of using an occlusal matrix are the reproduction of the original occlusal anatomy and occlusion, minimal requirement of finishing and polishing, minimal voids at the occlusal anatomy, and reproduction of optimally polymerized occlusal surface due to the exclusion of air during curing.

CASE REPORT

A 21-year old female referred from the Department of Orthodontics, Faculty of Dentistry, Padjadjaran University for reshaping of the lower left tooth because of anomaly. Clinical examination showed that tooth #35 no caries and intact occlusal surface. The vitality test using electric pulp test was positive. There is 2 mm diastema with tooth #34 (Fig. 1).

Fig. 1. Clinical feature of the tooth 35 before treatment
Radiographic examination showed 18, 28, and 38 are missing. Root of 35 shorter than other teeth (Fig. 2). The diagnosis of tooth 35 is vital tooth with microdontia. The treatment plan is direct composite restoration with stamp technique.

Subjective, objective, and radiographic examination was done on the first visit, then the patient signed the informed consent. Local scaling was done around tooth 35. Impression was made with double impression technique using materials polyvinylsiloxane (Exaflex, GC) followed by taking bite registration. The diagnostic mock up was made from working model to establish the shape of restoration using resin composite. A clear matrix was used to duplicate the mock up and used as template (Fig. 3).

CASE MANAGEMENT

On the second visit, bracket on teeth 34 and 36 was removed. A2 shade was determined using shade guide (Fig. 4).

Rubber dam was placed. Intra enamel preparation was done on surface of tooth 35 using aluminum oxide disc (Sof-Lex XT coarse, 3M). The surfaces of teeth 34 and 36 covered by Plumber’s teflon tape (PTFE) and then the surface of tooth 35 was treated with 37% phosphoric acid and adhesive (Fig. 5).
An enamel shade (A2) composite was placed in template matrix and then thin layer of flowable composite was applied on enamel shade. After that template matrix with the composite material was placed on tooth 35 from occlusal aspect and checked for correct fit (Fig. 6).

Rubber dam was removed, a #12 blade used to remove any excess material. Finishing and polishing were accomplished with finishing and polishing system (Fig. 7).

Postoperative evaluation was done one week later. There are no contact premature and any symptoms (Fig. 8).
Fig. 6. a. Resin Composite Application on Template Matrix. b. Insertion of template matrix, c. Light Cure Application, d. Post-Curing Composite.

Fig. 7. Postoperative view of tooth 35.

Fig. 8. One week evaluation direct composite restoration using stamp technique tooth 35.
DISCUSSION

The restoration of actual shape and topography of tooth surfaces very challenging. In this case, tooth 35 diagnosed with microdontia resulting diastema between tooth 34 and spaces between opposing teeth. When the shape and size of teeth do not require prosthetic reconstruction, and the occlusal ratio of the molars is normal, esthetic and functional teeth reconstruction with composite can be done. 7

Resin composites have been used increasingly as posterior restoratives. Nowadays, patients are attracted to a restoration that matches the color of natural teeth. In this case, resin composite used as a material for reshaping posterior tooth due to avoid the concerns over the use of mercury containing materials, thermally non-conductive, and bond to tooth structure with the use of adhesives. The advantages of resin composite as a posterior restorative material are esthetics, conservation of tooth structure, adhesion to tooth structure, low thermal conductivity, elimination of galvanic currents, and radiopacity. 8

Above all, reshaping posterior tooth can be a very time consuming. The stamp technique chosen in this case because it was minimal invasive, requires less time, and lowest cost solution. The diagnostic mock up has an important role in this case to achieve the best shape and occlusal topography of tooth. The clear matrix was used in this case because it is allows the polymerisation of light-curing. Slight infra-occlusion was made to prevent excessive occlusal load due to root length is shorter than the other teeth. 9

CONCLUSION

The stamp technique provides a simple and easy approach to reshape posterior tooth with accurate shape and occlusal topography, and less time consuming in finishing and polishing. The stamp technique can be an alternative technique to restore posterior teeth with direct composite in an effective and efficiency way.

REFERENCES

Healing Of Periapical Lesion Using Calcium Hydroxide In Nonsurgical Endodontic Treatment

Nuni, Maharani¹, Anna, Muryani²

¹Resident of Conservative Dentistry Department, Faculty of Dentistry, Padjadjaran University – Indonesia
²Lecturer of Conservative Dentistry Department, Faculty of Dentistry, Padjadjaran University – Indonesia

ABSTRACT

The periapical lesions are primarily caused by root canal infection. Therefore the treatment procedure should eliminate the etiological factors in the root canal system. Many of periapical lesions healed after this root canal treatment. A 21 years old female patient referred to Conservative Dentistry Clinic, Padjadjaran University Dental Hospital, with the chief complaint of pain on left mandibular premolar. There was a history of trauma around 7 years ago. Intra oral examination shows that the premolar tooth has no caries and restoration. Vitality test of 35 was negative, and positive on percussion. Periapical radiograph represent a radiolucence periapical lesion of 35 along one third of the root with undefined radiopaque border line. Nonsurgical endodontic treatment was performed by using Calcium hydroxide intra canal medicament. After 2,5 months treatment, there are significant reduction on the periapical lesion shown by periapical radiograph, without any clinical symptoms. Follow-up radiographic examination 3 months later shows that the healing still in process and there are no clinical symptoms. Nonsurgical endodontic treatment can be successful if the diagnosis and technical procedures are carefully performed.

Keywords. Healing; Periapical lesion; Nonsurgical endodontic treatment

INTRODUCTION

The diagnostic of periapical lesions is based on clinical and radiographic findings. Periapical lesions resulting from necrotic dental pulp are among the most frequently occurring pathologies found in alveolar bone. Exposure of the dental pulp to bacteria and their byproducts, may elicit nonspecific inflammatory response as well as specific immunological reactions in the periradicular tissues, and cause the periapical lesion.¹–²
The treatment of these infection consists of the elimination of the infectious agents by root canal treatment, allowing healing of the lesion. However, when the infection is not completely eliminated, the periapical lesion still remains. Periapical lesions of endodontic origin may develop asymptptomatically and become large. Proper biomechanical preparation followed by calcium hydroxide medication renewed periodically represents a nonsurgical approach to resolve extensive inflammatory periapical lesions. 

Necrotic pulps harbor pathogenic bacteria, necrotic pulp provide nutritional supply for these bacteria which leads to the development of periapical lesion. Conventional root canal treatment is primarily based on the removal of this microbial infection from the root canal system. Irrigants and intra-canal medicaments aid in reducing the microbial flora of infected root canals. In the present case reports, calcium hydroxide was used as the intra-canial medicament.

CASE REPORT

A 21 years old female patient referred to Conservative Dentistry Clinic, University Dental Hospital, with the chief complaint of pain on left mandibular premolar. There was a history of trauma around 7 years ago. Physical examination shows his blood pressure was 120 / 80 mmHg, with pulse 76 times per minute. The extra oral examination shows there are no abnormalities for his face symmetry, lips and temporomandibular joint. Intra oral examination shows that the oral hygiene was in good condition and the premolar tooth has no caries and restoration (Figure 1). Vitality test of 35 was negative and positive on percussion test. There are no mobility and no abnormality from the surrounding tissue. Periapical radiograph represent a radiolucence periapical lesion of 35 along one third of the root with undefined radiopaque border line (Figure 2). The diagnosis of this case was pulp necrose with apical periodontitis (AAE 2013). Root canal treatment was decided as a treatment plan of these case.

Figure 1. Clinical condition teeth of 35
CASE MANAGEMENT

After the patient signed the informed consent, the endodontic treatment started with isolating teeth by using rubber dam. Access opening was done by using open access bur. After the orifice was found, the pulp extirpated by using barbed broached needle, and then exploring the root canal by using K-File #8 and #10. The working length of the root canal determined by using apex locator and the result is 20 mm. The glide path was formed by using Path File #13, #16 and #19. The biomechanical preparation was done by using Protaper Next (Dentsply) with crown down technique until file X3, based on working length. The root canal was irrigated with combination of sodium hypochlorite 2.5%, root canal lubricant EDTA 15% (Glyde, Dentsply) and sterile saline solution. Irrigation also combined with agitation technique by using sonic instrument (Endoactivator, Dentsply). The canal was dried with sterile paper points. Calcium hydroxide paste was placed in canal until the paste seen at the canal orifice and after that the access cavity was sealed with intermediary restorative material. The patient instructed to get another visit on 2 weeks. On second visit, the objective examination shows negative on result, but the calcium hydroxide was still wet. So, the medicament was refreshed and after that the medicament was changed every 1 month. On 4th visit, the radiographic periapical photo was taken to see the lesion and the calcium hydroxide was refreshed and the patient was informed to get another visit 2 months later (Figure 3).

Figure 3. Periapical photo shows the lesion healing process of 35 after 2.5 months calcium hydroxide application
The next visit, subjective and objective examination still shows negative result and clinically there were no surrounding tissue abnormalities. The calcium hydroxide removed by using sodium hypochlorite 2.5% and saline, with final rinse using chlorhexidine 2% (OdontoHex, AM Australia). The trial radiographic photo was done after placing gutta-percha point X3 size with 20 mm length in the root canal (figure 4). Obturation was done by using the same gutta-percha, with single cone technique, using endomethasone sealer. The periapical radiograph was taken after that (figure 5). The patient asked to have another visit 1 week later.

The subjective and clinical examination was done one week later and there are no abnormalities and still shows negative results. After having another periapical photo as control photo (Figure 6), the treatment followed by endodontically treated teeth restoration
(porcelain fused to metal restoration with fiber post). The result after restored, shows that there are no clinical symptoms, no tissue abnormalities and the radiographic photo shows that the size of the lesion was getting smaller (Figure 7a & b).

**DISCUSSION**

Necrosis, death of the pulp, may occur immediately after a traumatic injury that disrupt the blood supply to the pulp. Within hours an inflamed pulp may degenerate to a necrotic state. Periapical lesions are classified according to the clinical picture and histologic appearance. The teeth with periapical lesions on this case are called apical periodontitis. The etiology of the case is the discharge of bacterial toxins from the necrose pulp due to trauma. In this condition, the symptoms that often appear were the presence of pain and discomfort from being up to the perceived weight when conducted tests on percussion. There were no response to the test of vitality due to the occurrence of pulp necrose. Pulpal necrosis is usually asymptomatic but may be associated with spontaneous pain and discomfort or pain (from the periapical tissues) on pressure. Tooth with necrotic pulp should be nonresponsive to vitality testing, because of the spread of inflammatory reactions to periapical tissues, often sensitive to percussion.1-3
Necrotic pulps harbor pathogenic bacteria, necrotic pulp provide nutritional supply for these bacteria which leads to the development of periapical lesion. Conventional root canal treatment is primarily based on the removal of this microbial infection from the root canal system. Irritants and intra-canal medicaments aid in reducing the microbial flora of infected root canals. Endodontic infection control is another crucial point to be addressed while planning the intervention. For elimination or maximum reduction of microorganisms in the root canal system, the professional should associate debridement using endodontic files with efficient irrigating solution and intracanal medication. Moreover, patency and enlargement of the canals in case of necrotic teeth with periapical lesions will help eliminating microorganisms from the apical foramen, thus preventing the inflammatory process to perpetuate. Root canals are performed in the setting of periapical lucency due to apical periodontitis. If treatment is successful, bone regeneration and healing of the periapical lesion will ensure and manifest as a gradual reduction in lesion size. Irrigation with sodium hypochlorite and adequate biomechanical preparation is recommended for effective neutralization and removal of infection from the root canal system, followed by calcium hydroxide intracanal medication. 7–8

Calcium hydroxide dressings were selected because they reportedly provide excellent clinical and laboratorial results. A success rate of 80.8 and 73.8% has been reported with calcium hydroxide, when used for endodontic treatment of teeth with periapical lesions. A high degree of success has been reported by using calcium hydroxide beyond the apex in cases with large periapical lesions. Calcium hydroxide was associated to an aqueous vehicle to allow rapid release of Ca++ and OH. Zinc oxide was added to the paste to allow better visualization of the medication within the canal. Calcium hydroxide is a widely used material in endodontic treatment because of its bactericidal effects. It is thought to create favorable conditions for perisapical repair and stimulate hard tissue formation. The action of calcium hydroxide beyond the apex may be four-fold: (a) anti-inflammatory activity, (b) neutralization of acid products, (c) activation of the alkaline phosphatase, and (d) antibacterial action. High frequency of periapical healing showing completed resorption of the periapical defect is observed with the treatment of calcium hydroxide. The exact mechanism of action of calcium hydroxide is still speculative. The efficacy of calcium hydroxide, owing to its antiseptic, anti-exudative, and mineralization inducing properties depends on the sustained release of calcium and hydroxyl ions to the root canal and periapical region. Regular renewal of the root canal dressing is fundamental in reducing the intensity of the periapical inflammatory process as they are progressively resorbed by the periapical fluids. 7,10,11

Ca(OH)₂ is often used to effect periapical healing by combination of its antimicrobial activity and its ability to promote hard tissue formation and periodontal healing. In this particular non-surgical technique, calcium hydroxide paste was considered and used as the intracanal dressing material of choice because of its reputed healing of periapical inflammation and formation of an apical hard tissue barrier. The influence of calcium hydroxides on periapical healing could be attributed to both its bactericidal effects and mineralising effects. Microorganisms coming in direct contact with calcium hydroxide are possibly destroyed by its
high alkalinity (usually pH 12 to 13). Once the bacteria are destroyed and their substrate neutralised, the calcium hydroxide in contact with vital connective tissue in the apical area exerts basically the same effect as when it is placed on the coronal pulp. Tissue layers similar to those formed after pulpotomy and pulp capping with calcium hydroxide have been noted in the apical barrier. But instead of reparative dentine, a collagenous cementum-like tissue is formed, probably because different cells are involved. 12,13

Radiographic evaluation was done using the PAI scoring system given by Ørstavik in 1986. This is a 5-point scale radiographic interpretation designed to determine the absence, presence, or transformation of a diseased state. The reference is made up of a set of five radiographs with corresponding line drawings and their associated score on a photographic print (Table 1). Healing of the periapical lesion usually occurs with hard tissue regeneration that is characterised by reduction of the radiolucency on follow-up radiographs. This case shows that the healing still on process, and there are small changes in bone structures that define the PAI score is 2 whilst the initial condition of PAI score was 4.14,15

CONCLUSION

Nonsurgical endodontic treatment of periapical lesions have shown a high success rate. This treatment with calcium hydroxide is an initial treatment option of choice in patients with large periapical lesions, affording complete periapical healing. Periodic follow-up examinations are essential and various assessment tools can be used to monitor the healing of periapical lesions.

REFERENCES

Non-Surgical Root Canal Retreatment On The Maxillary Left Second Premolar

Anna Muryani¹, Irmaely Satifili¹

¹Endodontic And Operative Dentistry Department Universitas Padjadjaran

ABSTRACT

Root canal treatment failure is usually caused by recurrent infection in the root canal. The case of teeth requiring root canal treatment is generally caused by the presence of persistent infection in the root canal. The microorganisms that are in recurrent infections of the root canal originate from microorganisms capable of surviving the previous treatment or microorganism entering into a root canal after the treatment is completed as a result of leakage or loss of restorations (crowns). This case report will discuss the non surgical root canal retreatment on the maxillary left second premolar. Female patients aged 26 years old came to UNPAD Dental and Oral Hospital complaining the lost of the filling on the upper left tooth, and food often got trapped in the tooth. Approximately 3 months earlier, the patient had been treated with root canal treatment at the dentist before. The patient wanted the tooth to be refilled due to appearance disturbance. Intra oral examination test resulted: vitality (-), percussion (+), palpation (-), and tooth mobility (-). Management of root canal treatment failure cases is the non-surgical treatment. The main purpose of non-surgical root canal treatment is to regain access to the apical foramen, by disposing of root canal filling completely, resulting in good cleaning and shaping thereof filling can be done perfectly. Treatment in this case is managed well by showing absence of patient complaints, no swelling, no pain, widening and thinning of periodontal membrane radigraphically, lamina dura resumed to normal.

Key words: non-surgical root canal retreatment.

INTRODUCTION

The potential for an optimal outcome of endodontic treatment reaches up to 90%-95% of the cases when teeth are treated under controlled clinical condition.¹ After a root canal procedure, a tooth may require re-treatment because of a persistent infection or reinfecction of the root canal. Re-treatment requires complete removal of the root canal filling material, followed by further shaping, cleaning and reobturation.²,⁶
However cross sectional studies have demonstrated that the reality for the overall population might be somewhat different with only 35%-60% of the root canal treated exhibiting no disease. The great majority of these studies revealed a strong correlation between the quality of endodontic treatment and periradicular status. Root canal treatment failure is usually caused by recurrent infection of the root canal. The microorganisms that are in the root canal that causes recurrent infection can be derived from microorganisms that can survive on previous treatment or microorganisms that enter into a root canal after the treatment is completed as a result of leakage or loss of restorations (crowns).

CASE REPORT

Female patients aged 26 years old came to UNPAD Dental and Oral Hospital complaining the lost of the filling on the upper left tooth, and food often got trapped in the tooth. Approximately 3 months earlier, the patient had been treated with root canal treatment at the dentist before. The patient wanted the tooth to be refilled due to appearance disturbance. Intra oral examination test resulted: vitality (-), percussion (+), palpation (-), and tooth mobility (-).

Radiographic examination resulted in radiopaque image in the half of root canal. Widening of the periodontal membrane and discontinued lamina dura are seen in the apical portion. The walls of root canal diminish in the coronal third (Figure 1).

The clinical diagnosis is previously treated (AAE) of maxillary left second premolar with chronic apical periodontitis. The prognosis is good since the re-treatment can be performed through coronal, oral hygiene is good, the patient is cooperative and no systemic disorders are found. Non-surgical root canal re-treatment is chosen for treatment planning. Final restoration is designed as fiber post and porcelain zirconia crowns.

![Figure 1. Initial Diagnosis Photo](image)

CASE MANAGEMENT

On the first visit, the patient’s root canal is cleaned to dispose leftover food and debris, followed by improving the access. Working length measurement is done by the radiographic method, obtaining temporary working length of 11.5 mm. Gutta percha removal
is performed by softening the gutta percha with xylene liquid dripped on cotton and placed in the root canal for a few seconds. After gutta percha becomes soft, removal is done using a needle file retrieval headstrom # 20, # 25 (Figure 2).

After gutta percha is removed, it is confirmed by takinroot canal using a file-K # 10.

Cleaning and smoothing of the root canal walls is performed with circumferential movement with K-file # 15, # 20, # 25, # 30, # 35, # 40, # 45. After each turn of the needle, irrigation is done using 2.5% NaOCl and 17% EDTA. Root canals are dried with paper points and given medicaments, in this case calcium hydroxide, and filled with temporary restoration. On the second visit, the patient has no complaints, examinations result in: percussion +, pressure +, mobility –, and calcium hydroxide is dry but still dirty. Calcium hydroxide is the removed with file. The canal is irrigated with 2.5% sodium hypochlorite and 17% EDTA. Calcium hydroxide is reapplied and the tooth is filled with temporary filling.

![Figure 2. Gutta percha removal with needle (File Headstrom #20,#25)]

Figure 3. The root canal is free from gutta percha

![Figure 4. Filling trial radiograph.]

490 PROCEEDINC
On the third visit, it reveals complaints (-), percussion (-), palpation (-) and calcium hydroxide looks clean and dry. Calcium hydroxide is cleaned by irrigating the canal with NaOCl 2.5% solution and EDTA 17%, then dried with paper points. Prior to root canal filling, gutta percha trial radiograph is taken according to the appropriate MAF No. 35 (Figure 4).

Root canal is filled with gutta percha and sealed with endometason by performing lateral condensation technique. Radiograph picture is then taken and it reveals the filling is in accordance with working length. Gutta percha is cut with a heated excavator, 1 mm phosphate cement is applied to the orifice area and then covered with glass ionomer (Figure 5).

On control visit the following week, the patient has no complain about pain, shows negative results on palpation, percussion, and pressure tests and radiographic picture reveals reduction in radiolucency at the apical portion (Figure 6). The follow upon this cse is fiber post and porcelain zirconia crown.

**DISCUSSION**

Root canal treatment failure is clinically characterized by swelling, pain, sinus track, while radiographically characterized by decreased radiographic density due to the occurrence of bone loss, the radiolucent lesions in the periradical, widening of periodontal membrane, and discontinuing of lamina dura. The causes of root canal treatment failure are fault diagnosis or errors in planning a treatment.21,22
Other causes are errors during treatment procedure, inappropriate restoration, improper root canal cleaning, coronal restoration leakage, non-hermetic root canal filling, and vertical root fracture which can cause unsuccessful root canal treatment due to reinfection in the root canal. Root canal re-treatment in this case is due to the detached crown restoration, therefore causing radiolucency lesion at the periapical, widening of periodontal membrane and discontinuing of lamina dura. Thus re-treatment is required to eliminate reinfection.

The root canal treatment can be done in two ways, which are non-surgical (conventional) and surgical treatment. Non-surgical root canal re-treatment is root canal re-treatment by entering through the crown, aiming to clean the root canal from irritants which largely consist of microorganisms remaining from previous treatment or the ones which entered the canal after completion of treatment. Surgery is the second choice if the non-surgical treatment cannot be done.

In this case report, the non-surgical root canal re-treatment on the maxillary left second premolar is performed since the access preparation to the canal can be gained through coronal. The canal entrance can be reached without obstruction. This tooth has undergone root canal treatment and restored with post and crown made of porcelain fused to metal a few years ago, but got detached since five months ago. Root canal treatment failure is caused by the detached post and porcelain fused to metal crown which leave the canal open and contaminated. Thus the root canal treatment results in failure. The treatment failure requires non-surgical endodontic re-treatment.

The main purpose of non-surgical root canal re-treatment is to re-gain access to the apical foramen, by disposing the root canal filling completely, resulting in good cleaning and shaping therefore filling can be done perfectly. The root canal treatment will be successful if the disposal of the filler can be done perfectly to allow cleaning of the root canal up to apical foramen.

The root canal treatment may be less successful in difficult cases, such as root canal treatment on the tooth with curved root. Surgical root canal treatment is performed on the canals which cannot receive re-treatment through root canal system because the bacteria and other irritants cannot be removed coronally and apical portion cannot be cleaned.

Indications of endodontic surgical re-treatments are repeated failure with non-surgical treatment, in cases of non-surgical re-treatment that can not be done, and is not expected to provide a better result. General contraindications of endodontic surgical re-treatment are influenced by several things, such as anatomical factor of close approximation to maxillary sinus which can risk maxillary sinus perforation that leads to sinusitis.

This non-surgical root canal re-treatment applies calcium hydroxide medicament, and after 1 month, abnormalities in the periapical region is reduced. Periapical lesion healing abilities depend on many factors, such as diagnosis, good access, and identification of all the orifices of the root canal system.

Treatment in this case is managed well by showing absence of patient complaints, no swelling, no pain, widening and thinning of periodontal membrane radiographically, lamina dura resumed to normal. The existed complaints have been eliminated during the fourth.
visit. The final restoration in the form of fiber post and porcelain crowns zirconia performed 2 weeks after charging for setting time sealer endometaison 72 hours. Final restoration of fiber post and porcelain zirconia crown will be inserted 2 weeks after root canal filling since the setting time of endometaison takes up to 72 hours.

Non-surgical root canal re-treatment in this case gives good results due to proper cleaning and access preparation to the root canal can be gained directly without obstructions. Root canal re-treatment on the maxillary left second premolar resulted well by using non-surgical techniques. It can be concluded that the proper case and selection should be considered in non-surgical root canal re-treatment.

REFERENCES
