CASE REPORT

Management of a Case of Cusp Fracture due to HiddenCaries with Full Coverage Zirconia Crown and EMaxOnlay

Dhirja Goel[1], Seema Chowdhary[2], Gaurav Kumar Goel[3]

ABSTRACT

Dental caries is a widely prevalent disease worldwide.Even After numerous advancements in technology and understanding of dental caries, it still remains a matter of widespread concern. Tooth surfaces with pits and fissures are particularly vulnerable to cavities. It is hypothesized that occlusal lesions initiate on the fissure walls and can be obscured by sound superficial tissue. Such cavities are known as "Occult Caries" which are not easily detected and progress within dentin with minimal or no changes on enamel surfaces. This case presents the extensive effects of missed diagnosis of dental caries at the routine dental examination andthe importance of the need for early and accurate diagnosis of dental caries and its various preventive measures.

Keywords: Dental caries, Onlay, Zirconia crown.

Introduction:

Dental caries is a widely prevalent disease worldwide. According to the Global Oral Health Data Bank, prevalence varies from 49% to 83% across different countries[1]. Even After numerous advancements in technology and understanding of dental caries, it still remains a widespread concern.

Tooth Surfaces with pit and fissures are particularly vulnerable to cavities[2].It has been observed that although the occlusal surfaces represented only 12.5% of the total surfaces of the permanent dentition, they accounted for almost 50% of caries in school children.The probable cause of this is the morphological complexity of these surfaces which favours plaque accumulation. The fluoride also does not provide as much protection against caries in these surfaces as it does on smooth enamel surfaces[3].

1. *Reader*
Department of Pediatric and Preventive Dentistry
School of Dental Sciences, Sharda University, Greater Noida,
2. *Professor and Head*
Department of Pediatric and Preventive Dentistry
Kothiwal Dental College and Research Centre
Moradabad

3. *Prosthodontist, Private Practice, Noida,*

Correspondence Address
Dr. Dhirja Goel
A-1, Sector-41, Noida, UP, India
Email Id: drdhirja@gmail.com

The Most common method of clinical examination relies upon visual observation and tactile sense by probing with an explorer. It is hypothesized that occlusal lesions initiate on the fissure walls and can be obscured by sound superficial tissue. Additionally, regular use of fluoride leads to greater opacity of enamel, which may obscure underlying lesions. leading the so-called 'hidden lesions' which often go undetected[4].

Such cavities are known as "Occult Caries" which are not easily detected and progress within dentin with minimal or no changes on enamel surfaces.

This case presents the extensive effects of missed diagnosis of caries at routine examinations and the importance of the need for early and accurate diagnosis of caries and various preventive measures.

Case Report:

A seventeen year old female reported to the dental clinic with a chief complaint of breakage of a small tooth structure in the right lower back tooth. She was apparently well, with no history of pain earlier, when she broke her tooth accidentally while chewing about 2 days earlier. Since then, she had mild discomfort due to the movement of the fractured tooth portion. (Fig. 1)

Fig. 1: Initial Status

Apart from this, she was not aware of any dental problems in her mouth and had undergone a regular dental checkup at least once every year in recent years and no problems were ever diagnosed or suspected. The last checkup was about a year ago.She used to brush her teeth twice daily with a fluoridated toothpaste and had been using a Fluoride mouthwash regularly since years.

On examination, it was seen that the mesiolingual cusp of right lower first molar had fractured. The cusp had completely detached from the tooth and the fractured portion of the tooth was attached only with the gingiva. Caries were seen in the occlusal pit of the tooth. A careful complete examination of the mouth revealed small caries in occlusal pits of most molars.On removal of the fractured cusp, Soft dentine caries were seen which had completely undermined the enamel. A Digital Periapical Radiograph(RVG) was done which showed radiolucency in dentin extending close to the pulp in 46. Dentin radiolucency was also seen in 47. (Fig. 2, 3)

Fig. 3 Fractured Mesiolingual Cusp of 46.

Treatment Plan:

Right lower First Molar: Removal of caries followed by Root canal treatment. Core Build-Up with Dual Cured Composite material. A Full Coverage zirconia Crown as a final restoration.

Right lower Second Molar: Excavation of caries Followed by a direct restoration or a cuspal coverage indirect restoration depending upon the amount of remaining tooth structure.

Composite Resin Restorations were planned for other carious Teeth.

The fractured cusp was removed under local anaesthesia (Inferior Alveolar Nerve Block with lignocaine 2%). The soft decay was cleaned with a sharp spoon excavator and a preoperative buildup was done with Glass Ionomer Cement. Rubber Dam isolation was done for 46,47. A single visit root canal treatment was carried out in 46 using Dentsply Wave One Gold Reciprocating file system. Apex locator (Morita Root ZX II) was used to ascertain the correct working length. Obturation was done with warm vertical compaction method. An interim restoration with GIC was done.

Caries were excavated in 47 with a spoon excavator and slow speed carbide bur. Care was taken not to expose the Pulp Horn. Since the cavity floor was very close to the pulp, an MTA based dressing was given and an interim restoration was done with Glass Ionomer Cement. Since the remaining mesial and buccal walls were very thin, an indirect cusp coverage restoration was planned. (Fig. 4)

Fig. 4: Root Canal Treatment and Crown Preparation in 46, Pulp Capping and Onlay Preparation in 47

In the next visit, both the first and second molars were restored with dual cured composite core build-up material (Paracore, ColteneWhaledent). 46 was prepared for a full-contour zirconia crown. A thin chamfer margin was prepared. The gingival retraction was achieved with Retraction cord size

00 (Ultrapak). 47 Was prepared for a Lithium Disilicate Onlay(Emax, Ivoclar) as it was more conservative as compared to a full-coverage crown. No retraction cord was used for 47 as all the margins were supragingival. (Fig. 5,6)

Fig. 5: Preparation for Crown and Onlay

Fig. 6: Final Zirconia Crown and EmaxOnlay on Models.

Impressions were made with Polyvinylsiloxane impression material using a single step putty wash technique and sent to the lab after disinfection.

The Crown was cemented using Resin modified Glass Ionomer Cement (FugiCem, GC) and the Exam Onlay as bonded using Dual cure resin cement (Variolink N, Ivoclar). A radiograph was taken to verify the accuracy of margins of the restorations. (Fig. 7,8)

Fig. 7: Crown on 46 and EMaxOnlay on 47

Fig. 8: Final Radiograph of 46,47

The cavities in other teeth were also restored with Light cure composite resin. (Fig. 9)

Fig. 9: Restorations for 36,37.

Discussion:

Small cavities can be easily restored and the restorations often last longer, whereas, once the caries progress, the restoration often becomes more and more extensive and expensive.Thus the importance of prevention and early caries detection can never be overemphasized. Although No caries detection methods are foolproof, additional diagnostic methods should be employed in addition to visual-tactile methods to identify the lesions which could otherwise be missed.

Bitewing Radiographs are an invaluable tool for the identification of caries and should be taken at an interval of 3 years in a low-risk population[5]. Using bitewing radiography raises the sensitivity of the diagnosis if obvious dentin caries activity is to be detected, but can be inaccurate if diagnosing enamel occlusal caries activity.
According to epidemiological data, Following Key ages have been specifically recommended for bitewing radiographs[6]:

- **Age 5**, when it gives a considerable diagnostic yield of otherwise undetected approximal lesions in primary molars.

- **Age 8–9**, when the first permanent molar has been in contact with the second primary molar for about 2 years, and these surfaces are, therefore, at risk of approximal caries.
- **Age 12–14**, when even in low caries-prevalence populations, one in five children has at least one approximal lesion that has been overlooked without bitewing radiography.
- **Age 15–16**, when it is the first 3 to 4 years after tooth eruption and the establishment of approximal contacts create the risk of new approximal lesions.

Other newer methods of caries detection arecaries detecting Dyes, Digital Imaging, Fiber Optic Transillumination, Digital Fiber Optic Transillumination Imaging, Xeroradiography, Subtraction Radiography, Mini-D, Fluorescence, DIAGNOdent, Quantitative Light-Induced Fluorescence, Carbon Dioxide Laser, Electrical Conductivity Measurements, Ultrasonics (Ultrasound Caries Detector), Endoscope/Videoscope, Micro Air Abrasion, Tuned Aperture Computed Tomography, Cone Beam Computed Tomography, Optic Coherence Tomography, Terahertz Imaging, Multiphoton Imaging, Infrared Thermography, Infrared Fluorescence[7].

A systematic review published in the early 1990s found that the preventive fraction (PF), that is the proportion of occlusal decay prevented, among children receiving a one-time application of auto polymerizing sealant was 71%[8].

For advanced carious lesions, restorations must be done as secondary prevention to control the further progression of the disease.

If the remaining walls are thinner than 2 mm, an indirect restoration is indicated to provide better longevity to the tooth. An Onlay is preferred over a Crown to preserve tooth structure and to keep the margins in easily cleansable areas.

Where one or more wall is missing, a full-coverage restoration becomes a necessity. A full-contour zirconia crown provides excellent strength with a more conservative preparation as compared to a PFM restoration.

Conclusion:

Dental caries areoften difficult to diagnose by simple visual and tactile means.Missed caries can be often devastating and need extensive treatment at later stages. It is thus imperative to try to diagnose dental caries at early stages. Additional means such as X-rays, etc must be routinely used in persons considered to be at risk.

Patients must be encouraged for preventive measures for caries prevention and arrest at initial stages. Pit and fissure sealants are a very effective means to prevent dentalcaries in teeth with deep pits and fissuresand must be utilized more often.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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