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Abstract

Extraction is a oral surgical procedure performed for the therapeutic removal of teeth from the oral cavity. Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycaemia due to defect in insulin secretion or action or both. Mucormycosis nothing but an opportunistic fungal infection which mainly infects the immunocompromised patients. Consent is the legal issue that protects every patient’s right not to be touched or in any way treated without the patient’s authorization.Aim of this article is to review and overcome the increased chances of fungal infection in uncontrolled diabetes patients after dental extractions and how to manage such scenario and to avoid further legal issues. Since mucormycosis may occur secondary to tooth extraction, dentist must be familiar with the signs and symptoms of mucormycosis and about its serious complications to overcome any unfavorable outcome. Valid consent plays an important role in our dental practice and this is the only evidence that protects the dental surgeons from illegal issues.

Keywords

Extraction, Diabetes mellitus, Mucormycosis, Informed consent

Introduction

Minor oral surgical procedure performed for the therapeutic removal of teeth from the oral cavity, using proven techniques and specialized instruments causing minimal trauma to the attaching apparatus, least injury to the surrounding tissues in a pattern conducive to uneventful healing inorder to achieve best possible prosthetic rehabilitation. Diabetes Mellitus is a group of
metabolic diseases characterized by chronic hyperglycaemia due to defect in Insulin secretion or action or both. It produces symptoms of polyurea, polyphagia, polydipsia. If left untreated, cause Acute complications such as diabetic ketoacidosis, nonketotic hyperosmolar coma etc., and Chronic complications such as heart disease, stroke, kidney failure, foot ulcers etc. (1) Criteria for the diagnosis of diabetes according to American Diabetic Association 2010 was

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Diagnostic Values for Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycosylated Hemoglobin (HbA1c)</td>
<td>≥6.5%</td>
</tr>
<tr>
<td>Fasting plasma glucose level</td>
<td>≥126mg / dl (7.0 mmol/l)</td>
</tr>
<tr>
<td>Post prandial glucose level (2 hours after calorie intake)</td>
<td>≥200 mg/dl (11.1 mmol/l)</td>
</tr>
<tr>
<td>Random plasma glucose</td>
<td>≥200 mg/dl (11.1 mmol/l)</td>
</tr>
</tbody>
</table>

Mucormycosis is an opportunistic fulminant fungal infection, which mainly infects the immunocompromised patients. Organism that causes mucormycosis is a saprophytic fungus, rhizopus/ mucor (2). The most common site of entry of organism is through the nose and paranasal air sinuses due to inhalation of fungal spores (3). Steps to be followed to prevent illegal issues as we analysed

This fungus enters the artery and form thrombi and cause necrosis of hard and soft tissues (4).

This study was to review and overcome the increased chances of fungal infection in uncontrolled diabetes patients after dental extractions and how to manage such scenario and to avoid further legal issues

**Interrelation of Diabetes Mellitus And Mucormycosis**

Predisposing factors for fungal infection are uncontrolled diabetes, lymphoma, leukemia, renal failure, organ transplant transplant, long term immunosuppressive therapy, AIDS, protein energy malnutrition, burns, cirrhosis. Uncontrolled diabetes mellitus alters the normal immunologic response of patients to infections. Those patients have decreased granulocyte phagocytic ability. And there will be altered PMN response. Ability of serum of immunocompromised patients to inhibit rhizopus invitro is reduced, which makes them suitable hosts to opportunistic fungal infection (5). Disseminated involvement of mucormycosis is observed in diabetics with ketoacidosis which favours rapid proliferation of fungus and its invasion into orbit and cerebrum (6). Mucormycosis is aggressive and potentially fatal in diabetic patients due to impaired host defence mechanism and increased presence of iron (7).

Steps to be followed to prevent illegal issues as we analyzed...
Need For Proper Consent Form

Consent means voluntary agreement, compliance and permission. This concept comes from the ethical issue of respect for autonomy, individual integrity, self determination (8). Section 13 of the Indian Contract Act lays that two or more persons are said to consent when they agree upon the same thing in the same sense (meeting of the minds ) (9).

Consent is the legal issue that protects every patient’s right not to be touched or in any way treated without the patient’s authorization. Surgeon who performs operation with outpatient’s consent commits assault for which the surgeon is liable in damages (10). It is important for the dental surgeon to be well informed of fundamental process of consent which exist under the law so that dental care can be provided within the legal framework (11).
current scenario, medical and dental professions are facing high rate of malpractice suits.

**Twin purposes of consent:** (12)
Clinical purpose
Legal purpose

**Consent form should consist of**
Nature of the diagnosis
Nature of the treatment plan
Risks associated with the treatment
Risks when if no treatment undertaken
Alternative therapies. (7,13)

**Pitfalls of consent:** (14)
Failure to maintain an adequate record of consent process and as a result, incomplete details of what were discussed with the patient.
Poor communication skills.
Failure to involve the patient

Informed refusal: (15)
It is the patient’s right to refuse all or part of the proposed treatment, other alternate therapies, and likely consequences of declining treatment have been explained in the patient’s own language.

**Two areas of the law are relevant** (16)
Trespass to person and negligence and any procedures that is invasive or irreversible require informed consent.

**Dental considerations in diabetic patients:** (17)
Patients should be asked about recent blood glucose levels, antidiabetic medications, dosages, frequency of administration. Dentists should get physician’s opinion if necessary.

Following is the review of previously reported cases of Mucormycosis after tooth extraction in diabetes patients:

<table>
<thead>
<tr>
<th>Author(s) &amp; Year</th>
<th>Country</th>
<th>Age</th>
<th>Underlying Disease</th>
<th>History Of Extraction</th>
<th>Clinical Presentation</th>
<th>Management</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tale F 2000.</td>
<td>USA</td>
<td>77 M</td>
<td>Diabetes Mellitus</td>
<td>Multiple right anterior teeth extraction</td>
<td>Cellulitis, Pulmonary edema, Sepsis, Cerebral, Multi organ dysfunction</td>
<td>Surgical debridement, IVAB</td>
<td>TA</td>
</tr>
<tr>
<td>Bechara A 2005</td>
<td>Oman</td>
<td>65 M</td>
<td>Diabetes Mellitus</td>
<td>Mandible right second molar</td>
<td>Pain and numbness at the extraction site and lower lip paresthesia</td>
<td>Surgical debridement, IVAB</td>
<td>NA</td>
</tr>
<tr>
<td>Alphandar 2007</td>
<td>Iraq</td>
<td>50 M</td>
<td>Diabetes Mellitus</td>
<td>Mandible right maxillary teeth</td>
<td>Painful non healing extraction socket and mastication headache</td>
<td>Tenzin of narcotic</td>
<td>TA</td>
</tr>
<tr>
<td>Nohad N. Georges 2019</td>
<td>India</td>
<td>50 M</td>
<td>Diabetes Mellitus</td>
<td>Mandible right posterior teeth</td>
<td>Pain, edema, numbness, dentoalveolar abscess</td>
<td>Antibiotic, surgical debridement, IVAB and hospitalisation</td>
<td>NA</td>
</tr>
<tr>
<td>Gopal K 2004</td>
<td>India</td>
<td>45 M</td>
<td>Diabetes Mellitus</td>
<td>Multiple maxillary teeth</td>
<td>Pain and difficulty in opening mouth, symptoms of abscess in maxillary sinus</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Mohab M 2013</td>
<td>Egypt</td>
<td>77 F</td>
<td>Diabetes Mellitus</td>
<td>Mandible right posterior teeth</td>
<td>Subcutaneous swelling of right face, Cerebral, periorbital</td>
<td>Surgical debridement, IVAB</td>
<td>TA</td>
</tr>
<tr>
<td>Kumar N 2017</td>
<td>India</td>
<td>87 M</td>
<td>Diabetes Mellitus</td>
<td>Mandible anterior teeth</td>
<td>Pain in upper jaw, numbness, swelling of ear, maxillary sinus</td>
<td>Surgical debridement, IVAB</td>
<td>NA</td>
</tr>
<tr>
<td>Key K 2017</td>
<td>India</td>
<td>70 M</td>
<td>Diabetes Mellitus</td>
<td>Mandible right posterior teeth</td>
<td>Inability to have mastication, fluid discharge through nose, photophobia, edema of ear</td>
<td>Surgical debridement with maxillary decompression, IVAB</td>
<td>NA</td>
</tr>
<tr>
<td>Sivaraman M 2015</td>
<td>India</td>
<td>55 M</td>
<td>Diabetes Mellitus</td>
<td>Mandible right maxillary teeth</td>
<td>Painful swelling of right face and lower lip, discharge through nose</td>
<td>Surgical debridement with maxillary decompression, IVAB</td>
<td>NA</td>
</tr>
</tbody>
</table>
DM – Diabetes mellitus, M – Male, F - Female, NA – Not Applicable, Sh – Satisfactory healing, IVAB - Amphotericin B.

The most common form of this disease in maxillofacial region is rhinocerebral mucormycosis that spreads to oral cavity, maxilla, palate, nose, paranasal sinuses, orbits and CNS. Early symptoms include facial cellulitis, nasal inflammation, Periorbital edema, tissue necrosis (4). According to literature, nearly 40-50% of patients with mucormycosis have diabetes mellitus as a predisposing factor. In this review article, only 85% of cases who underwent extraction of maxillary posterior teeth was most commonly associated with this disease. Extraction of maxillary anterior teeth contributed for one case and mandibular molars for one case. Increased association of mucormycosis with maxillary posterior teeth extraction can be due to their close proximity to maxillary sinus, which often get involved when fungal spores are inhaled.

Management of mucormycosis: (4)

Includes immediate hospitalisation.

Systemic antifungal therapy. Amphotericin B is the drug of choice.

Supportive therapy includes fluid balance, nutritional supplements, correction of underlying immune deficiency, surgical debridement to remove the necrosed tissue.

Conclusion

When mucormycosis occurs secondary to tooth extraction, may cause significant morbidity and mortality. Therefore dentists should be familiar with the signs and symptoms of mucormycosis and be aware of its serious and fatal complications to avoid unfavorable outcome in dental practice. At present valid consent is an important ingredient of our dental practice. A signed, fully explained written informed consent may be the soulful evidence that the mishap that occurred was a risk acknowledged by dentist and accepted by the patient. And this protects the dental practitioners from illegal issues.

References


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