Review Article

Orthodontic Treatment Considerations for Medically Compromised Patients: A Review Article

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Abstract:

Modern orthodontic practice is increasingly incorporating the treatment of individuals with medical conditions. In most of these disorders, orthodontic treatment is not absolutely contraindicated, but it may still be necessary to modify the treatment strategy. 1. For patients who are medically compromised, early diagnosis and excellent medical management are now possible because of medical advancements. The quality of life is improved, and their life expectancy is increased. Therefore, these patients who have well-controlled medical issues can receive orthodontic therapy.2 It is essential to have complete medical histories. An orthodontist in practice should be well-equipped to handle the difficulties associated with diagnosing and treating patients who have medical problems. Depending on how a specific disease is affecting the oral environment, the treatment strategy should be modified. 3. The medical conditions that orthodontists may encounter are covered in this article. Additionally, the orthodontic treatment plan's suggestions and revisions will be thoroughly explored. This article's goal is to cover common medical disorders and the corresponding orthodontic management standards.

Keywords: Medically compromised patients, orthodontic consideration.

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INTRODUCTION

Number of people looking for orthodontic treatment has grown during the past few years. Some of them have health issues or take drugs. Orthodontists must be knowledgeable about these issues and understand how to adjust their treatment strategy accordingly. They are required to consult with the patients' doctors regarding certain orthodontic treatments and whether any treatment modifications will be required while the patient is undergoing treatment.1 Since the tissues' ability to respond to orthodontic therapy is compromised during the active or acute phase of an illness, orthodontic treatment is contraindicated during the acute or active phase of any disease process.2 However, most of these disorders are not contraindicated unless they are uncontrolled. The growth responses and the dento-alveolar changes are typically normal in patients who get proper medical care. 3 This article's goal is to cover common medical disorders and the corresponding orthodontic management standards.

The various medical conditions that could influence orthodontic therapy are covered in this article:

1. Diabetes mellitus (DM):

The hallmark of this illness is chronic hyperglycemia, which is an ongoing rise in blood sugar caused by

inadequate insulin. The two primary categories of DM are types 1 and 2. Lack of insulin secretion causes type 1 Diabetes mellitus and resistance to insulin and insufficient insulin production cause type 2 of diabetes mellitus.4

❖ **Orthodontic Considerations:**

Orthodontic therapy is not hazardous for people with well-controlled DM. In order to establish the patient's DM status both before and throughout treatment, discussion with the patient's doctor is necessary. Early morning appointments are preferred, and the patient is advised to take their regular medications and have a regular meal before the session.

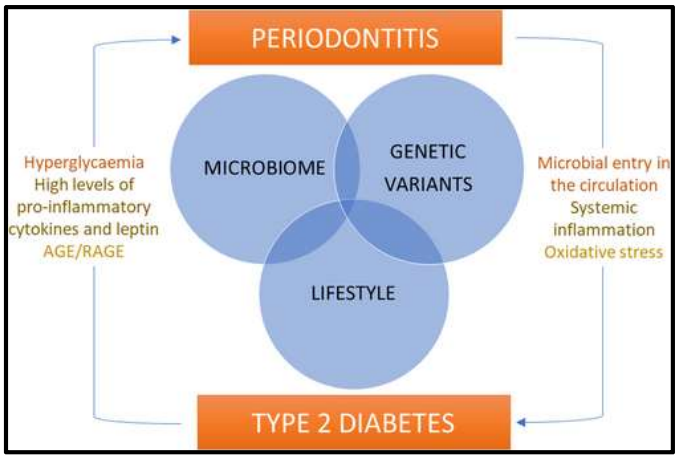

Figure 1: Relationships between type 2 diabetes and periodontitis.

1. It is best to apply mild orthodontic forces.
2. The patient's dental hygiene should be maintained in excellent condition and reinforced each time they visit the office.
3. Any changes in oral hygiene should also be checked on at each appointment.
4. To assess periodontal health prior to and through orthodontic treatment, a periodontist needs to be included, especially for adult patients.5
5. Orthodontists and their staff should be prepared to handle any diabetic situations, particularly those with hypoglycemia.
6. Using an adjuvant mouthwash every day, ideally right before bed, will help to prevent subsequent problems.1

Before beginning orthodontic treatment, it is important to get a full mouth periodontal test which includes probing, plaque scoring and gingival scoring, and to determine whether periodontal therapy is necessary or not, especially in adults. Before receiving orthodontic care, the periodontal problem must be eliminated first. When a patient with diabetes is receiving orthodontic care, the orthodontist should keep an eye on their periodontal health and manage any sign of inflammation.6

2. Thyroid Disorders:

Uncontrolled thyroid hormone synthesis results in hyperthyroidism. Hypothyroidism, on the other hand, is caused by a decrease in the thyroid gland's activity and hormone production. Orthodontic issues that includes hyperthyroidism are, rapid teeth eruption and significant bone turnover. Anterior open bite, macroglossia, delayed tooth emergence, mandibular second molars impaction, and reduced bone turnover are all orthodontic issues associated with hypothyroidism.7

❖ **Orthodontic Considerations:**

1. Stress management techniques should be used with hyperthyroidism.
2. Careful consideration should be given while choosing painkillers for hyperthyroidism.
3. It is not advised to take NSAIDs or aspirin, and other pain relievers like vasopressor amines, epinephrine can be administered under strict supervision.
4. Patients with hyperthyroidism frequently exhibit more tooth movement.
5. Root resorption is more likely to occur in hypothyroid people.8,9

3. Asthma:

This condition is episodic and is caused by airway constriction. These symptoms are typically transitory, this causes breathing difficulties and wheezing. Asthma patients frequently get xerostomia as a result of using steroid-containing inhalers for an extended period of time. Decalcification and periodontal issues are therefore more likely to affect them.10

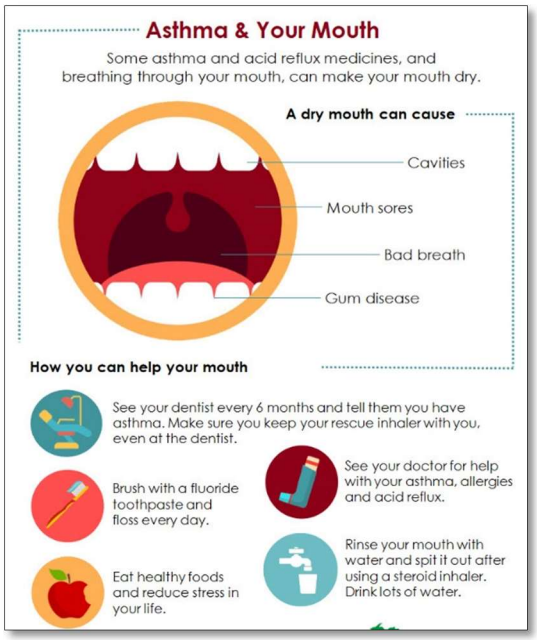

Figure 2: Schematic representation of asthma and oral manifestation

❖ **Orthodontic Considerations:**

1. Anxiety and stress levels should be kept to a minimum because they may trigger an asthma attack.
2. Avoid having the patient lie down during appointments, and schedule brief visits with the patient.
3. If at all feasible, the patient should take their regular medicine prior to the consultation, and if necessary, they should have an inhaler with them.1
4. External root resorption is more likely to occur in people with asthma.11
5. Due to xerostomia, extensive oral hygiene is advised.
6. Because of a potential drug allergy, aspirin and NSAID painkillers should not be used. Patients with asthma are encouraged to take acetaminophen.12

4. Seizure Disorder:

These diseases are brought on by aberrant electrical signals produced by cerebral neurons, which cause rapid, transient, and involuntary abnormalities in neurologic function. They may manifest as sensational, behavioural, or altered states of consciousness. Two or more seizures that are neither induced by, nor related to, acute brain malfunction result in epilepsy.13 Dysfunction in the brain is the cause. Orthodontic issues can include potential face fractures, oral damage, gingival hyperplasia brought on by anticonvulsants, asymmetry of the face, and temporomandibular joint dislocation.14

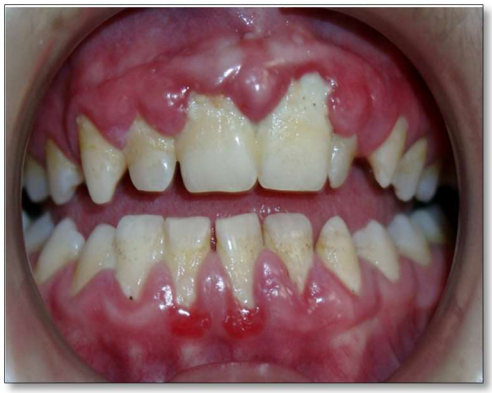

Figure 3: Gingival enlargement in a patient with seizures.

❖ **Orthodontic Considerations:**

Regarding the level of stability of one's condition, the kind of medication taken, and the patient's medical history, a doctor should be consulted. To define the scope of the orthodontic intervention, it is necessary to first evaluate the type of seizure disorder:

1. It is essential to discuss the chances for lacerations of oral tissues and dental injuries which can develop during orthodontic treatments if seizure episodes take place.
2. Seizures that are well-controlled are not viewed as a barrier to orthodontic treatment.
3. Orthodontic therapy is not recommended for people with uncontrolled seizures who experience episodes of uncontrollable movement of body parts.14
4. These devices should be used carefully, reinforced with additional retention devices, and manufactured of high-impact acrylic resin due to the possibility of removable appliances becoming dislodged during seizure episodes. Fixed orthodontic appliances are therefore advised.
5. Trim the edges of clear aligners carefully near the gingival margins.15
6. Due to the potential for drug-induced gingival expansion, bonded retainers need to be avoided. This

risk can be increased if the retainer is in close proximity to or impinges on the gum.
7. If required, the patient's doctor may ask for a magnetic resonance imaging (MRI). But fixed orthodontic appliances made of metal can cause the MRI to be distorted. In order to obtain a suitable image, it is advised to remove all removable components, especially wires and ligatures.
8. Sometimes it is necessary to remove all appliances and then reinstall them following the MRI. As a result, individuals with these conditions are advised to use titanium, ceramic, or plastic brackets.
9. The orthodontic team should take the following actions if an epileptic episode happens while the patient is there:
Avoid restraint, lay the patient down or to the side, remove any equipment, note the time the seizure began, speak softly, and be next to the patient till he or she is awake. If the seizure lasts longer than ten minutes, or if it is accompanied by apnea, or if more than three episodes take place shortly, call for immediate medical help.14

5. Hemophilia:
A lack of any of the blood's clotting factors causes this illness. A lack of factor VIII and IX is the root cause of hemophilia A and B, respectively. A defect in the Von Willebrand's factor is what leads to Von Willebrand's disease.10

- Orthodontic Consideration:

1. These patients are not prohibited from receiving orthodontic treatment
2. Strict dental hygiene must be practised.
3. Mucosal damage brought on by an orthodontist or orthodontic devices needs to be kept to a minimum.
4. Extra wires should be removed and sharp edges should be softened.16
5. Self-ligating braces are better than conventional ones.
6. Elastomeric ligatures should be used to bind arch wires instead of wire ligatures.
7. The course of treatment should be kept as minimal as possible.10
8. Gingival irritability is more common with removable appliances. Fixed appliances are therefore preferred.
9. If possible, treatment with a non-extraction approach and bonding rather than banding is advised.
10. Non-steroidal anti-inflammatory medicines (NSAIDs) should not be used to treat pain since they are capable of making people more likely to bleed. A safer option is acetaminophen.
11. When taking an impression, a non-metal tray is preferred to a metal one to reduce trauma to soft tissue.
12. A saliva ejector should be positioned on a piece of gauze set on the floor of the mouth during bonding.17

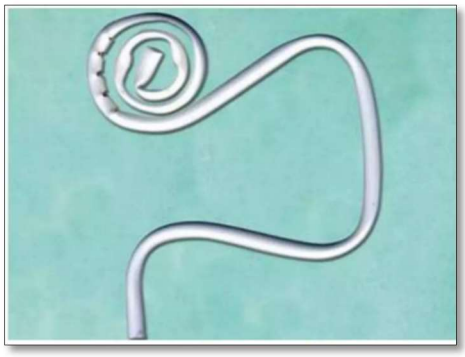

Figure 4: Suction tip for minimizing trauma to floor of mouth

6. Sickel cell anemia:
This genetic disorder is caused by haemoglobin gene mutation, resulting in abnormality of red blood cells. Their capacity and ability to move through the microcirculation is reduced. This causes the blood to become more viscous, clogs capillaries, restricts blood flow to organs, and finally causes discomfort, tissue damage and ischemia.18 Delay in tooth emergence, class II malocclusion, increased overjet, increased overbite, retrognathic mandible, prognathic midface, prognathic maxilla, increased vertical dimension, and convex profile are some common orthodontic features.19

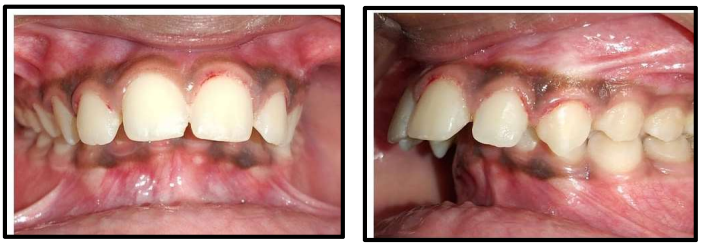

Figure 5: Class II malocclusion with increased overjet and overbite
(Feature of sickle cell anemia)

❖ **Orthodontic Consideration:**

1. Orthodontic therapy is not contraindicated
2. Consultations should be planned in the early hours of the morning, and the patient need to be in a chronic stage of the illness.
3. It is important to reduce mental stress.19
4. If at all possible, treatment with a non-extraction method is preferred.
5. If it is possible, use mild orthodontic forces.
6. Teeth movements with clear aligners should be minimized.
7. Rest intervals during activations should be incorporated into the treatment strategy to allow for the reestablishment of local microcirculation.20
8. During orthodontic procedures, bleeding should be prevented.
9. If additional anchorage is required, extra-oral anchorage is recommended above TADs, and the forces that are applied should be controlled carefully.21

7. Infective Endocarditis:

The endothelium of heart or vessels in the body becomes infected, resulting in this disease. Although this disorder can damage all endothelial-lined surfaces in the ventricles, the atrial chambers and pulmonary arteries, heart valves are particularly susceptible. It has not yet been fully determined how IE and orthodontics are related.22 No significant risk of bacteremia was discovered by the American Heart Association committee when orthodontic appliances were adjusted.23

❖ **Orthodontic Consideration:**

1. Prophylaxis is not advised in routine adjusting of fixed or removable appliances or bracket placement.
2. Any orthodontic operation that can damage the oral mucosa or interfere with the gingival tissues is advised to use prophylaxis. These include the use of temporary anchorage devices, interproximal reduction, and the placement and removal of bands.23
3. The single dose of the prophylactic antibiotic should be administered prior to the treatment or up to two hours later.
4. It should be given to patients with high-risk for six months following the treatment, including those with previous IE, prosthetic valves, disease of the valves, unrepaired or partially corrected cyanotic congenital heart disorder (CHD), and CHD repaired with prosthetic material.
5. The patient's cardiologist should be consulted to establish the risk level and to arrange for a suitable antibiotic prescription based on the proposed orthodontic procedure: amoxicillin is the first choice. In the event of a penicillin allergy, clindamycin may be used.24
6. During treatment, a thorough oral hygiene routine should be observed.
7. Bonded brackets rather than bands are advised.
8. To keep arch wires in place, elastomeric ties are preferred to ligature ties.
9. Sharp edges, such as those on tubes and hooks, should be polished and rounded off.
10. Extra adhesives need to be cleaned and removed.
11. It is best to stay away from fixed acrylic equipment.22, 23

8. Pediatric Cancer Patient:

One in 900 youngsters between the ages of 16 and 44 is now thought to have survived childhood cancer. All forms of juvenile cancer now have a survival rate that is close to 80%. A delayed second round of therapy will be experienced by about 50% of all survivors. Chemotherapy and radiation therapy administered to a developing person will have an impact on their developmental milestones, dental and craniofacial development. Salivary dysfunction may potentially raise the risk of caries. It has been demonstrated that orthodontic therapy has no negative side effects, despite the fact that perfect treatment outcomes are not always obtained.25

❖ **Orthodontic Consideration:**

1. Making use of devices that reduce the possibility of root resorption.
2. Light application of force
3. Accepting a therapeutic outcome compromised by oversimplified mechanics.
4. Finishing the course of treatment earlier than usual
5. Bypassing care for the lower jaw.
6. It is advisable to wait at least two years following the end of cancer treatments before beginning orthodontic treatment. After a mean of 14.1 years, Remington and colleagues reviewed 100 patients who displayed resorption of the roots during appliance therapy. After active therapy was stopped, there was resorption of root, but there was an increasing remodelling of the root.
7. For patients who are at risk for root resorption, it is typically indicated to obtain an apical film after 6 months into ongoing orthodontic therapy.
8. The treatment must be stopped for a period of three months if the film reveals that the bone resorption is advancing.2,25

9. HIV/ AIDS:

The acquired immunodeficiency syndrome (AIDS) is caused by the human immunodeficiency virus (HIV), which is a bloodborne retrovirus affecting the immune system cells, notably the T-helper lymphocytes (CD4+ cells) and macrophages. In these patients, oral lesions are typically the first to be found. These lesions, which have a high viral concentration and a low CD4+ cell count, contain oral candidiasis and hairy leukoplakia. HIV/AIDS patients may develop medical problems and need special care depending on the severity and stage of their infection.26

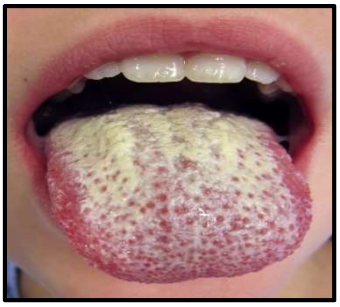

Figure 6: Oral candidiasis

❖ **Orthodontic Consideration:**

1. HIV individuals who have no symptoms should get standard medical care. Once the potential of a condition known as or thrombocytopenia has been ruled out, these patients can have routine orthodontic therapy. A suitable referral is advised if an oral lesion is found during treatment.
2. People with HIV can take some drugs for a very long time. Some drug interactions should be known to orthodontists.
3. Use cautious when using aspirin and acetaminophen. Acetaminophen actually has the potential to exacerbate anaemia and granulocytopenia brought on by taking zidovudine (Retrovir) medications. Aspirin and NSAIDs must not be taken when there is thrombocytopenia.27,28

10. MOOD Disorders:

These illnesses include major depressive disorder (MDD) and bipolar disorder. MMD is characterised by a number of symptoms, including hopelessness, severe sadness and lack of interest, appetite loss, guilt, suicide thoughts, gloom, and trouble sleeping. Long-lasting episodes of mania and depression alternate with each other in bipolar disorder (manic-depressive disorder).29 Racing thoughts, reduced sleep, irritability, and hunger abnormalities, bipolar illness can present with symptoms of MMD. Orthodontically speaking, these patients frequently skip visits, behave badly when they do, show little compliance, become disinterested in their care, and neglect their oral hygiene. Because orthodontists can spot early signs of various psychiatric problems, they should be concerned about their patients' psychological health.30

❖ **Orthodontic Consideration:**

In order to closely monitor the patient's condition during orthodontic treatment, a tight working connection with the individual's psychiatrist is necessary.

1. Xerostomia, which raises the risk of caries, can be brought on by some drugs used to treat psychiatric disorders. The orthodontic process may be hampered by gingival hyperplasia induced on by other drugs.
2. It is preferable to get these issues under control prior to starting orthodontic treatment.

3. If a mood condition manifests while receiving orthodontic treatment, a psychologist should be referred to right once.30
4. In addition, the orthodontist must determine whether to carry on with orthodontic therapy until the psychological issues have been brought under control.
5. Orthodontic therapy should last a minimum amount of time.30,31

CONCLUSION

Modern orthodontic practice is increasingly incorporating the treatment of individuals with medical conditions. Trend is most likely to persist. When compared to more intrusive dental treatments, orthodontic treatment is normally thought to be low risk; yet, certain orthodontic maneuvers used in fixed therapy may be hazardous to some patient populations. The more crucial part of risk management is prevention. In the patient group with medical complications, a thorough medical history, open contact with the patient's doctor, and clinical attentiveness are essential. If their illnesses are under control, medically compromised individuals can be evaluated and treated in an orthodontic clinic. Before starting orthodontic treatment, it is crucial to communicate with their doctors. It is advised that orthodontists and employees must have a basic understanding of these disorders and be equipped to handle any crises that may arise during orthodontic sessions.

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