

A Study On Orthodontics For Medically Compromised Patients

Mihin Muniya¹, Dinesh Kumar Bagga², Poonam Agrawal^{3,*}, Madhurima Nanda⁴,
Aartika Singh⁵, Kanak Priya⁶

¹Postgraduate student, Department of Orthodontics and Dentofacial Orthopaedics, School of Dental Sciences, Sharda University, gulatipujita@gmail.com

²Professor and Head, Department of Orthodontics and Dentofacial Orthopaedics, School of Dental Sciences, Sharda University, dineshkumar.bagga@sharda.ac.in

^{3,*}Professor, Department of Orthodontics and Dentofacial Orthopaedics, School of Dental Sciences, Sharda University, poonam.agrawal@sharda.ac.in

⁴Reader, Department of Orthodontics and Dentofacial Orthopaedics, School of Dental Sciences, Sharda University, madhurima.nanda@sharda.ac.in

^{5,6}Assistant professor, Department of Orthodontics and Dentofacial Orthopaedics, School of Dental Sciences, Sharda University, aartika.singh@sharda.ac.in, kanak.priya@sharda.ac.in,

Abstract

Advances and progress in medical care, higher level of well-being, increased life span with previously untreatable diseases led to high demand in elective dental and medical treatment. Dental practitioners are seeing more and more of these patients for routine care. A growing number of cases with serious medical disorder and medication regimen are seeking orthodontic treatment. An orthodontist should acknowledge numerous medical problems and their effect on treatment methods and modify the treatment protocol accordingly. In most of these conditions, Orthodontic treatment is not contraindicated unless it is uncontrolled. Consent prior to treatment, building good cooperation with the patient and regular monitoring of treatment progression are required to reduce physical impairment and enhance treatment results.

Guidelines for orthodontic evaluation and treatment of individuals with several different medical diagnoses should be provided. Dental care is an important part of health maintenance for these patients.

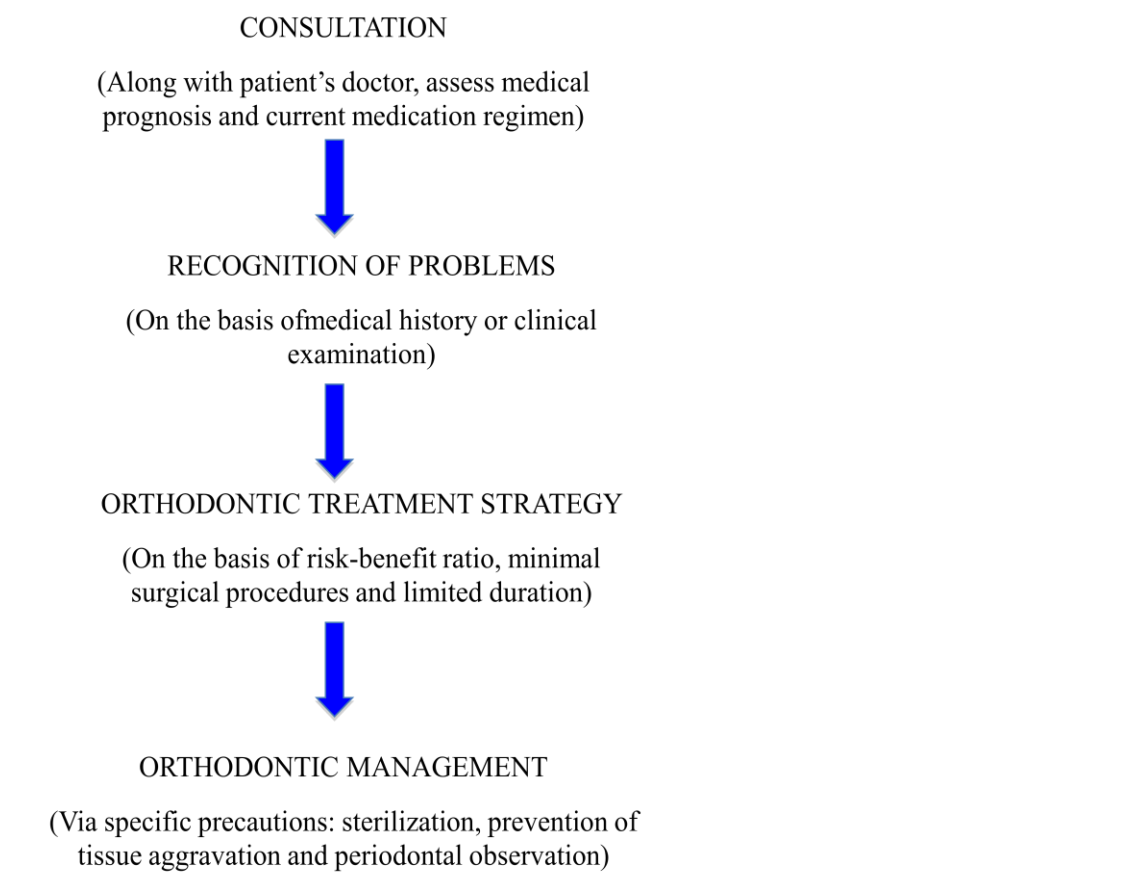
Keywords: Orthodontics, medically compromised patients, Orthodontic considerations, medical disorders.

1. Introduction

Advances and progress in medical care, higher level of well-being, increased life span with previously untreatable diseases led to high demand in elective dental and medical treatment. Dental practitioners are seeing more and more of these patients for routine care.¹

A growing number of cases with serious medical disorder and medication regimen are seeking orthodontic treatment.²Orthodontists need to be familiar with potential clinical implications of such diseases and conditions and modify the treatment protocol accordingly. In most of these conditions Orthodontic treatment is not contraindicated unless it is uncontrolled. Guidelines for orthodontic evaluation and treatment of individuals with several different medical diagnoses should be provided. Dental care is an important part of health maintenance for these patients.³

2. Protocol for Medically Compromised Orthodontic Patients



Various medical disorders routinely encounter in patients undergoing orthodontic treatment are:

- **Circulatory System**
 - Infective Endocarditis
 - Haemophilia
 - Sickle Cell Anaemia
 - Leukaemia
- **Ventilatory System**
- Asthma
- Cystic Fibrosis
- **Neurologic Disorders**
 - Multiple Sclerosis
 - Epilepsy
- **Liver Disease**

Hepatitis

• **Endocrine Conditions**

Diabetes Mellitus

• **Renal Disorders**

Chronic Renal Failure

• **Musculoskeletal System**

Juvenile Idiopathic Arthritis

Osteoporosis

3. Pregnancy Allergies Side Effects of Medications

a. Infective Endocarditis (IE)

Infective endocarditis is a potentially fatal condition characterized by inflammation of the endothelial surface of the heart involving the heart valves.⁵ Organism most commonly encountered – Alpha-haemolytic streptococci (e.g. *Streptococcus viridans*)

Orthodontic considerations

- Consultation with the patient's physician to recognize the possibility of IE.
- Rigorous oral health routine should be adopted during the course of treatment (Chlorhexidine 2%)
- Bands preferred over bonded brackets and modules or elastomeric ties over wire ligation.
- All sharp edges on molar bands including tubes and hooks should be smoothed and polished.
- Avoidance of fixed palatal acrylic appliances, such as Nance button and rapid maxillary expanders (RME). Excess adhesives need to be removed and cleaned.⁴

b. Haemophilia

Haemophilia is considered one of the most common congenital bleeding disorders.⁶ Haemophilia A; a sex-linked disease results from a deficit of clotting factor VIII. Haemophilia B/Christmas disease (Factor IX deficit) and von Willebrand's disease (von Willebrand's factor defect).

Orthodontic considerations

- Recommend rigorous oral hygiene. Patients are advised to maintain exemplary, non-traumatic oral health.
- Orthodontic appliances causing mucosal injury ought to be minimized. Smoothen and polish sharp edges and trim excess wires. To minimize trauma, impression making with a non-metal tray is preferred.
- Self-ligation is a better choice than the conventional brackets. Secure the archwires

with elastomeric modules instead of wire ligatures ties.

- Treatment duration should be shortened and minimized.
- Avoidance of orthodontic appliances causing chronic irritation. Fixed appliances are better choice than the removable appliances as they have a tendency for increased gingival inflammation.
- If possible, bonding over banding and a non-extraction treatment plan are advisable.⁷
- Acetaminophen; a better and safer choice than NSAIDs for pain management.

c. Asthma

Asthma is a chronic lower airway disease resulting from airway constriction that occurs periodically. Signs and symptoms comprise episodic wheezing, coughing, dyspnea, and tightness of chest. Oral manifestations: candidiasis, reduced salivary flow, increased accumulation of calculus, gingivitis, and exacerbated periodontal disease.

Orthodontics considerations

- Anxiety and stress should be eased as it might provoke an attack.
- Morning appointments and waiting time should be shortened and supine position need to be avoided, if possible are favored to lessen the danger of an asthmatic attack.
- Before the appointment patient's routine medication should be consumed and Corticosteroid inhaler (most widely used) also need to be accessible to the patient during the appointment if required;
- In 10% patients with asthma, allergic to Aspirin and NSAIDs, Acetaminophen is preferable for pain management.
- Careful usage of rubber dams as they reduce breathing efficiency. Caution while positioning the suction nozzle as they may provoke a cough reflex.¹
- Usage of local anaesthesia (LA) with/without relative analgesia (RA) except for GA should be ideally advocated for orthodontic extractions.

d. Epilepsy

It is a chronic neurological disorder characterized by frequently recurrent seizures.⁹ Injuries to buccal mucosa, tongue, avulsion, facial fractures, luxation or fractures of teeth and TMJ subluxation can occur during seizures.⁸

Orthodontic considerations

- Patients contraindicated to receive orthodontic treatment are those with improperly controlled [SEP] seizures plus episodes of collapse or unrestrained body movements. Not contraindicated in a well-controlled seizure.
- Cautious use of removable orthodontic appliances as they allow dislodgement during a seizure. So, should be designed for maximum retention and comprised of high impact acrylic. Orthodontic fixed mechanotherapy are suggested.
- Proper trimming of Invisible aligners around the gingival margins.
- Avoidance of fixed bonded retainers due to the risk of drug-induced gingival enlargement. Anti-convulsant (Phenytoin) can exacerbate if the retainer is around or impinging the gingiva.
- Well-trained orthodontic team to deal with seizures. Emergency medication attention is required for Status epilepticus. So, benzodiazepine should be given to control the seizure.¹⁰

e. Diabetes Mellitus

It is the most commonly encountered endocrine disorder presenting persistently raised blood sugar levels (hyperglycemia), that results from defects in insulin secretion, insulin action, or both.¹¹

Type 1 (insulin dependent IDDM or juvenile-onset diabetes) results from defects in insulin secretion

Type 2 (non-insulin dependent NIDDM or mature-onset diabetes) develops as a result of defects in insulin resistance and inadequate insulin production.

Orthodontic considerations

- Avoidance of orthodontic treatment in those with poorly controlled Diabetes Mellitus as they are most likely to undergo periodontal breakdown. Orthodontic treatment is not contraindicated in well-controlled DM.²
- Strict preventative routine should be followed. Draw patient's attention to the implication of poor oral health and high risk of periodontal problems.²
- Patient's diabetes control regimes are least likely to interfere by early morning appointments. Prior to longer appointments, advise patients to take regular meals and medications.
- In all diabetic patients, mild physiological forces should be applied to avoid overloading the teeth.

- Well-trained and qualified team of Orthodontists and staff should be prepared to deal with any diabetic emergencies, particularly sudden hypoglycaemia.
- Treatment at the time of orthodontic surgery^{12,13}
 - If conscious: Deliver 50 gram of glucose in the form of drink, tablet or gel.
 - If unconscious: Administer 20 ml of 50% Dextrose IV or 1 mg of glucagon intramuscularly.
 - Administer oral glucose once the patient is cooperative to prevent recurrent hypoglycaemia. Summoned emergency services in delayed recovery cases.

f. Hepatitis

An absolute interest to the orthodontist is the viral hepatitis. It has been estimated that among all the patients reporting to the dental health centre, 1.53% are hepatitis B virus (HBV) carriers.¹³

Transmission of Hepatitis B, C and D occurs via contact with infected person's blood. Also spread through contaminated drug needles and other body fluids. Infection of oral mucous membrane, skin, respiratory tract or eyes of patients and dental personnel arises from aerosols generated by dental handpieces (in cases of prophylaxis, enamel removal during interproximal reduction and residual cement removal after debonding).²

Orthodontic considerations

- Universal cross-infection control precautionary measures should be provided.
- All the team members should be immunized against Hepatitis B. Barrier technique such as gloves, eyeglasses, and mouth mask should be worn. Those with anti-HBs level below 100, a booster is required.¹⁵
- Impressions can be one of the links in transmitting the HBV to orthodontics. The impressions must be disinfected by dipping them in glutaldehyde or by spraying sodium hypochlorite and leaving it for 10 min.¹⁴
- Caution while prescribing medications to liver disease patients. Hepatic impairment cause metabolic malfunction of certain drugs leading to toxicity.¹⁶ Caution while prescribing drugs that metabolize in the liver, like NSAIDs, Acetaminophen.¹⁷

4. Allergies

a. Nickel Allergy

The most common metal to cause contact dermatitis in orthodontics is Nickel. Widely used

Nickel-containing metal alloys are: Nickel titanium and stainless steel.

Oral clinical signs and symptoms: gingival hyperplasia, burning sensation, periodontitis, angular stomatitis, gingival desquamation, oral mucositis with mild to severe erythema, erythema multiforme, numbness, sore tongue, unpleasant metallic taste or loss of taste sensation.¹⁸

Nickel allergic patients show contact hypersensitivity on the neck or cheek in reaction to outer bow of headgear or studs of headgear.

Orthodontic considerations

- Ni-Ti archwires should be substituted with stainless steel archwires having low nickel content, titanium molybdenum alloy (TMA), fibre reinforced composite wires, pure titanium or gold plated wires.
- Ceramic, polycarbonate, titanium and gold are some alternative nickel free bracket materials.¹⁹ Replace fixed orthodontic appliances with clear aligners in certain cases.
- Plastic-coated headgear studs are better alternative than metal studs.

b. Latex Allergy

The main reservoir of latex allergens are: Disposable surgical gloves, especially powdered gloves. Orthodontic elastics used for intermaxillary force application are other potent reservoir of the latex protein.

Orthodontic considerations

- If a latex allergy is suspected – Refer the patient to a dermatologist, an allergist or clinical immunologist for testing.
- If reaction to latex is confirmed – Recommendation of latex free products like non-latex synthetic gloves composed of nitrile, vinyl, neoprene and elastyren.
- Substitute elastomeric separators with self-locking separating springs.²⁰

c. Pregnancy

Pregnancy may decrease the pace of tooth movement and hence extend treatment duration. As the duration of orthodontic therapy is usually more than the pregnancy phase, patients should avoid concerns regarding pregnancy problems and orthodontic treatment.²¹ Certain conditions taken into account before advancing with braces in pregnant women are:²¹

- Pregnancy associated gingivitis and periodontitis.

- Tooth movement affected by hormonal changes.
- Influence of particular drugs during pregnancy and tooth movement.
- Pregnancy craving and eating habit and its impact on orthodontic treatment.

Orthodontic considerations

- Strict oral hygiene regimen should be followed to maintain excellent oral health.
- Caution to minimize exaggerated inflammatory reaction in response to pregnancy-induced hormonal variations.
- Steel ligature is preferred over elastic modules as the latter are considered less hygienic.²²
- First trimester: Avoid x-rays, drug therapy, extraction
- Second trimester: Safest time to undergo treatment.
- Late pregnancy: Avoid supine position
- Appointments should be short and allowed to change position frequently
- Light continuous forces should be applied since the periodontium is prone to breakdown with the application of heavy forces.

5. Conclusion

An orthodontist should acknowledge numerous medical problems and their effect on treatment methods. Delay the treatment that is considered suitable until the exemption of the medical problems or the adverse effects of the drug therapy is diminished. Treatment procedure should be modified in accordance with the requirement of the patient. Consent prior to treatment, building good cooperation with the patient and regular monitoring of treatment progression are required to reduce physical impairment and increase treatment result.

6. References

1. Maheshwari S, KV Sanjeev, A Juhi, KC Prabhat. Orthodontic care of medically compromised patients. Indian Journal of Oral Sciences, Vol.3, Issue 3, Sep-Dec 2012.
2. Patel A, J B Donald, S Jonathan. Medical disorders and orthodontics. Journal of Orthodontics, Vol. 36, 2009, 1–21.
3. R VV John, RP William. Orthodontic care for medically compromised patients: possibilities and limitations. JADA, Vol.III, August 1985.
4. Jena AK, Duggal R, Mathur VP, Parkash H. Orthodontic care for medically compromised

- patients. *J Indian Orthod Soc* 2004;38:160.
5. Taubert KA, Dajani AS. Preventing bacterial endocarditis: American heart association guidelines. *Am Fam Physician* 1998;57:457-68.
 6. Jover-Cerveró A, PovedaRoda R, Bagán JV, Jiménez Soriano Y. Dental treatment of patients with coagulation factor alterations: An update. *Med Oral Patol Oral Cir Bucal* 2007;12:308-7.
 7. Grossman RC. Orthodontics and dentistry for the hemophilic patient. *Am J Orthod* 1975; 68: 391–403.
 8. Johnstone SC, Barnard KM, Harrison VE. Recognizing and caring for the medically compromised child: 4. Children with other chronic medical conditions. *Dent Update* 1999;26:21-6.
 9. Jacobsen PL, Eden O. Epilepsy and the dental management of the epileptic patient. *J Contemp Dent Pract* 2008;9:54-62.
 10. Fiske J, Boyle C. Epilepsy and oral care. *Dent Update* 2002; 29: 180–87.
 11. Little JW. In: *Dental Management of the Medically Compromised Patient*. 7th ed. Canada An Imprint of Elsevier, Mosby; 2007. p. 60-84, 680-90.
 12. Bensch L, Braem M, van Acker K, Willems G. Orthodontic treatment considerations in patients with diabetes mellitus. *Am J Orthod Dentofacial Orthop* ,2003; 123: 74–78.
 13. Chandler-Gutiérrez L, Martínez-Sahuquillo A, Bullón-Fernández P. Evaluation of medical risk in dental practice through using the EMRRH questionnaire. *Med Oral* 2004;9:309-20.
 14. Matyas J, Dao N, Caputo AA, Lucatorto FM. Effects of disinfectants on dimensional accuracy of impression materials. *J Prosthet Dent* 1990;64:25-31.
 15. Greenwood M, Meechan JG. General medicine and surgery for dental practitioners. Part 5: liver disease. *Br Dent J* 2003; 195: 71–73.
 16. Al-Khalidi JA, Czaja AJ. Current concepts in the diagnosis, pathogenesis, and treatment of autoimmune hepatitis. *Mayo Clin Proc* 2001;76:1237-52.
 17. Dunlap CL, Vincent SK, Barker BF. Allergic reaction to orthodontic wire: report of a case. *J Am Dent Assoc* 1989; 118: 449–450.
 18. Noble J, Ahing SI, Karaiskos NE, Wiltshire WA. Nickel allergy and orthodontics, a review and report of two cases. *Br Dent J* 2008; 204: 297–300. [SEP]Leite LP, Bell RA. Adverse hypersensitivity reactions in orthodontics. *Semin Orthod* 2004; 10:240–43.
 19. Hain MA, Longman LP, Field E, Harrison J. Natural rubber latex allergy: implications for the orthodontist. *J Orthod* 2007; 34: 6–11.
 20. N S Uday, J .B Mayuresh, G.T Nandlal, R. J Ashwini. Pregnancy and Orthodontics: The Interrelation. *IJADS* 2015; 1(3): 15-19.

Nat. Volatiles & Essent. Oils, 2021; 8(4): 5818-5827

21. Michalowicz BS, DiAngelis AJ, Novak MJ et al. Examining the safety of dental treatment in pregnant women. J Am Dent Assoc 2008; 139:685-695.