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Medical Problems in Clinical Orthodontics

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ABSTRACT

Orthodontic therapy is based on interaction between mechanics and biology .Orthodontists are confronted with an increasing number of medically compromised patients who require proper alignment for esthetics and oral rehabilitation. An orthodontist needs to recognize various medical conditions and their impact on treatment procedures. Treatment should where appropriate be postponed until the medical problem is in remission or the side effects of the drug therapy are minimized. Comprehensive treatment may not always benefit the patient. Optimal oral health is essential for all patients and medically compromised require prior investigation before commencement of orthodontic treatment.

KEYWORDS : Medical problems, Clinical, Orthodontics

INTRODUCTION

Orthodontic treatment is performed in healthy young people. However ,more adults are now likely to seek orthodontic treatment. The practitioner should have a basic knowledge and understanding of the disease and its impact on the oral cavity as it is essential to recognize oral signs and symptoms of undiagnosed medical problems too. It is the aim of physicians to treat patients primarily from the standpoint of general health Emerging results from experiments in basic biology have shown information that enables the orthodontist to consider the patient's physiopathologic profile before addressing clinically the orthodontic problem. This information can be obtained from a routine medical examination and related tests.[1]

Medical conditions commonly encountered in orthodontic patients include-

Infective Endocarditis
Diabetes Mellitus
Hemophilia
Thalassemia
Thyroid
Parathyroid
Pregnancy
Hypertension
Cerebral Palsy
Asthma
Cancer
Osteoporosis
Renal Disorders

INFECTIVE ENDOCARDITIS

Infective endocarditis is defined as an infection of the endocardial surface of the heart, which may include one or more heart valves, the mural endocardium, or a septal defect. Its intracardiac effects include severe valvular insufficiency, which may lead to intractable congestive heart failure and myocardial abscesses . Endocarditis can be divided into a sub acute, Acute and Post-operative endocarditis. The causative organisms are usually the streptococci, staphylococci, Rickettsiae, Chlamydia or fungus. Endocarditis commonly affects heart valves, nonvalvular areas or mechanical devices that are implanted in the heart, such as artificial heart valves, pacemakers, or implantable defibrillators.[2] As an initial step the level of risk of endocarditis occurring must be established by a cardiologist.[3]

Orthodontic procedures including impression making, placement of separators, banding , surgical exposure of impacted teeth can produce bacteraemia and therefore a drug regime shortly before the procedure should be given in order to kill causative micro organisms and reduce the risk. As far as possible bonding should be preferred than banding . Patient must be encouraged to use antimicrobial mouthwash to control plaque and maintain a high standard of oral hygiene. It is desirable to prevent gingival bleeding before it occurs and it's best achieved by establishing and maintaining excellent oral hygiene. Chronic irritation from orthodontic appliance may cause bleeding and special effort should be made to avoid any form of gingival or mucosal irritation. Arch wire should be secured with elastomeric modules rather than wire ligatures and special care is required to avoid mucosal cuts when placing and removing the wire.[2]

DIABETES MELLITUS

When diabetes mellitus is part of the patient's history, the orthodontic practitioner should have a basic knowledge and understanding of this disease and its impact on the oral cavity, and should understand the consequences of diabetes mellitus in relation to dental treatment.

Diabetes mellitus is a metabolic disorder of diverse etiologic factors, characterized by hyperglycemia resulting from deficiencies in insulin secretion, insulin action, or both.

ORAL MANIFESTATIONS OF DIABETS MELLITUS

Approximately half of the people with diabets mellitus are undiagnosed, and a dental examination might give the first indication of the disease.

Important clues are

1. Dry mucous membranes (xerostomia)
2 . Oral candidiasis,
3. Burning mouth or tongue (glossopyrosis)
4. Impaired wound healing
5. Recurrent oral infections
6. Acetone breath.

ORTHODONTIC CONSIDERATIONS

Orthodontic treatment should not be performed in a patient with uncontrolled diabetes. If the patient is not in good metabolic control (HbA1c -9%), every effort should be made to improve blood glucose control. For diabetes mellitus patients with good medical control, all dental procedures can be performed without special precautions if there are no complications of diabetes mellitus.

There is no treatment preference with regard to fixed or removable appliances. It is important to stress good oral hygiene, especially when fixed appliances are used. These appliances might give rise to

increased plaque retention, which could more easily cause tooth decay and periodontal breakdown in these patients. Daily rinses with a fluoride-rich mouth rinse can provide further preventive benefits. Candida infections can occur, and then blood glucose levels should be monitored to rule out deterioration of the diabetes mellitus control. Diabetes-related micro angiopathy can occasionally occur in the periapical vascular supply, resulting in unexplained odontalgia, percussion sensitivity, pulpitis, or even loss of vitality in sound teeth. Especially with orthodontic treatment when forces are applied to move teeth over a significant distance, the practitioner should be alert to this phenomenon and regularly check the vitality of the teeth involved.

It is advisable to apply light forces and not to overload the teeth. Diabetic patients, and especially those who are uncontrolled or poorly controlled, have a higher tendency for periodontal breakdown, they must be considered in the orthodontic treatment plan as periodontal patients, and treatment considerations must accordingly be made. Especially in adults, it is important, before starting orthodontic treatment, to obtain a full-mouth periodontal examination including probing, plaque, and gingivitis scores, and to evaluate the need for periodontal treatment. The periodontal condition must be improved before beginning any orthodontic treatment. During orthodontic treatment, the orthodontist should monitor the periodontal condition and control inflammation. As with all orthodontic patients, maintaining strict oral hygiene is very important. If plaque control is difficult to achieve with mechanical aids such as toothbrush and interdental brush, then using a disinfectant mouth rinse of the chlorhexidine type as an adjuvant chemical plaque control can be considered. To minimize the neutralizing effect of the toothpaste on the chlorhexidine molecule, there should be at least a 30-minute interval between tooth brushing and the chlorhexidine rinse. Chlorhexidine is cationic and forms salts of low solubility with anions, resulting in a reduced antimicrobial effect. Such an anionic is sodium lauryl sulphate, which is widely used as a detergent in toothpaste. Because today there is no upper age limit for orthodontic treatment, the practitioner will see both type 1 and type 2 diabets mellitus patients. Type 2 patients can be considered more stable than type 1 patients, who can be presumed to be "brittle": strict compliance with the medical regimen is of the utmost importance to maintain control of blood glucose levels.

Deviations from appropriate diet and the schedule of insulin injections will result in distinct changes in the serum glucose level. Hypoglycemic reactions might occur more often in these patients. Type 1 diabetes mellitus is more often encountered in younger patients who frequently come for orthodontic treatment. Morning appointments are preferable. If a patient is scheduled for a long treatment session, eg, about 90 minutes, he or she should be advised to eat a usual meal and take the medication as usual. At each appointment, before the dental procedure starts, the dental team should determine whether the patient has fulfilled these recommendations, to avoid a hypoglycemic reaction in the office.

Diabetes mellitus and especially uncontrolled diabetes mellitus, is potentially life threatening as result of a hypoglycemic reaction Well-controlled diabetes mellitus is not a contraindication for orthodontic treatment. During treatment, special attention is required with regard to periodontal problems. Patients should be told about the greater propensity for gingival inflammation when fixed appliances are planned and the importance of maintaining good oral hygiene to prevent the progression of periodontal breakdown. Especially in type 1 diabets mellitus patients who are presumed to be more brittle, the oral cavity must be monitored regularly because they are more prone to gingvitis, periodontal breakdown, and candida infections.

When a type 1 patient frequently has hypoglycemic comas, one can assume that the diabetic state is not well controlled. The physician should try to obtain better glycemic control. If during orthodontic treatment signs of deterioration of the glycemic control are noticed, the orthodontist should advise the patient to consult his or her physician. Orthodontic treatment should be avoided in patients with uncontrolled or poorly controlled diabetes mellitus. Patients with good metabolic control, without local factors such as calculus, and with good oral hygiene, have a similar gingival status as healthy patients and thus can be treated orthodontically.[10]

HEMOPHILIA

Hemophilia is the most common congenital bleeding disorder. Hemophilia A is a sex-linked disorder due to a deficiency of clotting factor VIII. Other bleeding disorders include hemophilia B or Christmas disease (factor IX deficiency) and von Willebrand's disease (defects of von Willebrand's factor).

Orthodontic treatment is not contraindicated in patients with bleeding disorders.[5] Duration of treatment should be given careful consideration. Lengthier the treatment duration may increase potential complications.[6]Chronic irritation from orthodontic appliances should be avoided. Fixed appliances are preferable to removable appliances as the latter can cause gingival irritation.Selfligating brackets are preferable to conventional brackets. If conventional brackets are used, archwires should be secured with elastomeric modules instead of wire ligatures.

THALASSEMIA

Thalassemia is an inherited disorder of hemoglobin synthesis. It can be can be classified as α-thalassemia, β-thalassemia, γ-thalassemia and δ-thalassemia indicating which blood hemoglobin chains are affected. Based on their clinical and genetic orders they are classified into major (homozygous) and minor (heterozygous) types.[7]

Patient who have undergo splenectomy are at massive risk of infection followed by bacteremia. Antibiotic prophylaxis must be given during invasive procedures. Functional and extraoral appliances can be used however, the "skeletal forces" in thalassemia patients must be less than what is used with normal patients because of the thin cortical plates in thalassemic patients[9].Radiographs at 3 months intervals can be indispensable because the thin cortical plates can complicate orthodontic treatment. Regular prophylaxis and fluoride applications are recommended in these patients. Extraction should be carried out at the time of admission for blood transfusion, i.e. when hemoglobin level is at its highest, with the administration of antibiotics[8]. Thalassemic patients are at an increased risk of viral hepatitis and AIDS due to repeated blood transfusion and therefore screening test for the same should be carried out at regular intervals.[4]

THYROID HORMONE

The thyroid is the major regulator of metabolism and affects all of the bodily functions. Thyroid dysfunction is the second most common glandular disorder of the endocrine system which may rear its head in any system in the body including the mouth. Patients who have hyperthyroidism have increased levels of anxiety, and stress or surgery can trigger a thyrotoxic crisis. fluoride on their thyroid can utilize fluoride free toothpaste, an oral neutralizer gel.[11]

Orthodontic therapy requires minimal alterations in the patient with adequately managed thyroid disease. In hyperthyroidism enlarged tongue may pose problem during treatment. The bone turnover can influence orthodontic treatment. High bone turnover (i.e., hyperthyroidism) can increase the amount of tooth movement compared with the normal or low bone turnover state in adult patients. Low bone turnover (i.e., hypothyroidism) can result more root resorption, suggesting that in subjects where a decreased bone turnover rate is expected, the risk of root resorption could be increased.[15]

PARATHYROID HORMONE

Since orthodontic tooth movement is achieved through alveolar bone remodeling, medicines stimulating bone metabolism might promote tooth movement. As an important regulator of bone metabolism, parathyroid hormone could be a potentially valuable agent for facilitating tooth movement. Parathyroid hormone, as a major regulator of calcium and phosphate homeostasis, has gained particular attention for its paradoxical effects on bone metabolism.

PREGNANCY

There is no health reason why a pregnant woman cannot wear braces. Having braces doesn't really involve a dramatically changed diet, expect for maybe a soft food diet in the initial days of braces treatment. Gingivitis During puberty and pregnancy, hyperplasia of the gingival tissues, also known as puberty or pregnancy epulides, may be due to poor oral hygiene, inadequate nutrition, or systemic hormonal stimulation.

Light and continous force should be used as we know that periodontium is susceptible to breakdown with heavy forces and its advisable to limit the visits to shorter appointments to avoid the patient being in extreme supine position especially during the later stages of the pregnancy. However, there are some factors that could make orthodontic treatment uncomfortable. For instance, the first trimester of pregnancy can manifest itself in the form of morning sickness. Several women actually suffer through morning sickness throughout their pregnancy. Morning sickness can have you feeling fatigued and dehydrated.

It is advisable to coordinate the orthodontic treatment plan with the obstetric care provider to establish guidelines that will benefit maternal oral health and perinatal outcomes. Orthodontic treatment could include the necessity to have one of the teeth extracted. Tooth extraction by itself may not be dangerous for a pregnant woman.[12]

HYPERTENSION

Hypertension is defined as systemic blood pressure systolic values >140mmHg and/or diastolic >90mmHg.Hypertension is a highly prevalent cardiovascular disease, which affects over 1 billion people worldwide .Table 1 shows different types of hypertension

Table 1

Category	Diastolic mmHg	Systolic mmHg
Optimal	<80	<120
Normal	80–84	120–129
High normal	85–89	130–139
Grade 1 hypertension	90–99	140–159
Grade 2 hypertension	100–109	160–179
Grade 3 hypertension	≥110	≥180
Isolated systolic hypertension	<90	≥140

ORAL MANIFESTATIONS CAUSED BY THE ADVERSE EFFECTS OF ANTIHYPERTENSIVE DRUGS

1. Xerostomia
2. Gingival hyperplasia.
3. Lichenoid reaction.

Reducing stress in these patients are important.Appointments should be less than one hour. Maintaining periodontal health and good oral hygiene is very important during orthodontic treatment. calcium channel blockers can cause gingival hyperplasia in addition to irritation caused by fixed appliance**.**

CEREBRAL PALSY

Cerebral palsy is an umbrella term for a group of conditions characterized essentially by motor dysfunctions that might be associated with sensory or cognitive impairment stemming from a nonprogressive brain lesion during development. Its prevalence is about 2 of every 1000 live birth.

Patients with epilepsy and a malocclusion should have a comprehensive orthodontic evaluation. Adverse side effects of AEDs and past dental trauma should be researched by the orthodontist and reviewed as part of patient informed consent. Mechanical challenges such as closing interdental spaces in the presence of gingival hypertrophy should be considered when estimating treatment time. As part of the informed consent process, the possibility of soft-tissue injury during a breakthrough seizure is to be stressed. The metal in a fixed orthodontic appliance may distort images obtained by magnetic resonance imaging (MRI). When cranial MR scans are conducted at , stainless steel brackets cause significantly more distortion in cranial MR images than plastic, ceramic, or titanium brackets . Patients with poorly controlled seizure disorders that manifest with falling and/or uncontrolled body movements are not candidates for any type of orthodontic appliance.

ASTHMA

Asthma is a disease of the airways characterized by hypersensibility of the tracheobronchial tree to several stimuli. This condition is evidenced by generalized narrowing of airways and can be alleviated spontaneously or with medication. Clinically, asthma manifests itself through dyspnea, coughing, and wheezing. Asthma is an episodic disease in which acute exacerbations are intercalated with asymptomatic periods.

Inhaled corticosteroids are the most widely used and most effective asthma antiinflammatory agents.[13] Oral manifestations include candidiasis, decreased salivary flow, increased calculus, increased gingivitis, and increased periodontal disease.[38]Schedule these patients' appointments for late morning or later in the day, to minimize the risk of an asthmatic attack. Judicious use of rubber dams should be avoided as they reduced breathing capability. Care should be used in the positioning of suction tips as they may elicit a cough reflex. Up to 10% of adult asthmatic patients have an allergy to aspirin and other non steroidal antiinflammatory agents.[14] A careful history concerning the use of these types of drugs needs to be elicited. The orthodontist should ensure the patient has their inhaler nearby.**[4]**

CANCER

Cancer patients undergo intense chemotherapy which weakens regenerative capacity of mucosa. Minor irritation can lead to opportunistic infection and subsequent severe complications.

Orthodontic treatment may start or resume after completion of all medical therapy and after at least 2year event free survival when risk of relapse has been decreased.

Use of appliances that minimize the risk of root resorption should be preferred , lighter forces should be used, terminate the treatment earlier than normal, choose the simplest method for the treatment needs and do not treat the lower jaw. The lower jaw is at risk of osteoradionecrosis because of its limited blood supply.

OSTEOPOROSIS

Osteoporosis is chronic, systemic, degenerative disease characterized by decreased bone mass, a micro architectural deterioration of the bone and consequent increase in bone fragility.[16]

Orthodontic treatment therefore, must include the consideration of problems such as bone loss, retention instability, and temporomandibular dysfunction.[17] Problem associated with medication must also be given consideration. Estrogen decreases the rate of tooth movement.[18] Extraction protocol and use of temporary anchorage devices should be avoided. BP inhibits osteoclasts, decreases microcirculation and thus impedes tooth movement.[4]

RENAL DISORDERS

The most common renal condition to present to the orthodontist is chronic renal failure. Chronic renal failure is a progressive and irreversible decline in renal function.

Extraction should be done cautiously in such patients. Abnormal bone healing after extraction can result due to alterations in calcium and phosphors metabolism and secondary hyperparathyroidism which result in bone demineralization.[19]Due to the increase in circulating parathyroid hormone. It has been suggested that orthodontic treatment forces intervals. Gingival overgrowth secondary to the immunosuppressive therapy is the most studied oral manifestation. Gingivectomy should be considered in such patients.

CONCLUSION

An orthodontist needs to recognize various medical conditions and their impact on treatment procedures. Treatment should where appropriate be postponed until the medical problem is in remission or the side effects of the drug therapy are minimized. Comprehensive treatment may not always benefit the patient. Treatment procedure should be modified according to need. Consent before treatment, Good patient cooperation and constant monitoring of the progress of the treatment are necessary to minimize physical damage and to maximize treatment outcome.[4]

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