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Orthodontic Considerations in Medically Compromised Patients

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ABSTRACT

The orthodontic treatment of patients with medical disorders is becoming an increasing aspect of modern day practice. Although there is no absolute contraindication of orthodontic treatment in most of these conditions, they may require a slightly modified treatment approach. This article reviews the orthodontic treatment protocol for some medical conditions which are usually encountered.

Keywords :

Introduction

Progress in medicine, higher expectations of quality of life and increased life expectancy have resulted in a greater demand for elective dental and medical treatment.[1] It is estimated that 10 to 15 % of the children under the age of 16 years are affected by chronic long term medical disorders. Orthodontists need to be aware of the possible clinical implications of many of these diseases and management of such patients.[2]

Medical conditions that may be encountered in orthodontic patients include:

Infective endocarditis

Only a small number of patients with infective endocarditis have a connection with dentistry. It is extremely rare in adolescents and its incidence does not appear to be higher during orthodontic treatment. The prevalence and magnitude of bacteraemia of oral origin are directly proportional to the degree of oral inflammation present. The bacteraemia experienced by the patient may be increased by plaque accumulation which increases in the presence of orthodontic appliances. Various orthodontic procedures can produce bacteraemia including impression making, placing separators, fitting or removing bands and surgical exposure of teeth.[3]

Orthodontic considerations :

Any cardiac pathology should be evaluated in initial medical history. Patients at risk of endocarditis should be treated in consultation with their cardiologist and within the appropriate guidelines. Informed consent requires that a patient is aware of any significantly increased risk.

1. Patients must understand the need to maintain a high standard of oral hygiene.
2. Patients should use a daily antimicrobial mouthwash, e.g. chlorhexidine 2% to control plaque, especially for the two days leading up to fitting, removal or major adjustments of a fixed appliance.
3. Banding procedures can also be done under antibiotic prophylaxis.[4]
4. Bonded appliances are to be preferred to banded appliances where possible.
5. Bonding with closed eruption in impacted teeth should be avoided.[5]

Bleeding disorders

A through medical history is very important in these types of patients. The main inherited coagulation disorders include hemophilias A and B and von Willebrand's disease.

Hemophilia A is the most commonly occurring bleeding disorder. In addition, a number of congenital coagulation abnormalities caused by deficiency of other clotting factors have been recognized. In such cases the clinician should consult the patient's physician before dental treatment to determine the risk for bleeding and treatment modifications required. If extractions are required as a part of orthodontic treatment, most patients with moderate to severe hemophilia A are submitted to factor VIII concentrate infusion before extractions.

Genetically manufactured factor VIII products can be used if tooth extraction or other surgery like exposure of impacted canine is required in patients with severe bleeding disorders. They are usually hospitalized and given transfusion of the missing clotting factor in advance of the procedure. So wherever possible a nonsurgical approach should be adopted.

Orthodontic considerations :

1. Excellent oral hygiene is a must for these patients. Every effort should be made to avoid any chronic irritation from orthodontic appliance.
2. Archwires should be secured with elastomeric modules rather than wire ligatures, which carry the risk of cutting the mucosal surfaces. Special care is required when placing and removing archwires.
3. Orthopedic forces such as extraoral anchorage or maxillary distraction should be managed with more care.[6]
4. If extractions or surgery cannot be avoided, the management of patients with haemophilia relies on careful surgical technique, including an attempt at primary wound closure and the following regimen to:

a) increase Factor VIII production with 1-desamino-8-Dargi-nine vasopressin (DDAVP)
b) replace missing Factor VIII with cryoprecipitate, Factor VIII, fresh frozen plasma or purified forms of Factor VIII
c) antifibrinolytic therapy with transexamic acid or epsilon-amino caproic acid (EACA)[7]

Hematological malignancies

More than 40% of pediatric malignancies are haematological-leukemia or lymphoma.

Leukemias account for 30% of all childhood malignancies.

Orthodontic considerations:

1. Patient's physician should be consulted. If orthodontic treatment has not been started, it should be delayed until the patient has completed chemotherapy and is on long term remission.

2. If the patient is already undergoing treatment, the orthodontist should contact the patient's physician for prognosis. Intense chemotherapy weakens regenerative capacity of mucosa. Minor irritation can lead to opportunistic infection and subsequent severe complications. It is advisable to remove all orthodontic fixed appliances before starting chemotherapy as a safety procedure.
3. Apart from smooth appliances such as band and loops and fixed lower lingual arches, all fixed appliance parts should be removed. Removable appliances and retainers that fit well may be worn as long as tolerated by the patient who shows good oral care. If band removal is not possible vinyl mouth guards or orthodontic wax should be used to decrease tissue trauma.
4. To counter xerostomia during therapy use of sugar free chewing gum, candy, saliva substitutes, frequent sipping of water, and/or moisturizers is recommended.
5. Orthodontic treatment should start or resume after completion of all therapy and after at least 2-year event free survival when risk of relapse has been decreased and patient is not on immunosuppressive drugs. A thorough assessment of any dental developmental disturbances caused by cancer therapy must be done before initiating orthodontic treatment.[5]

Diabetes

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

Orthodontic considerations :

1. Orthodontic treatment should be avoided in patients with poorly controlled Insulin-dependent DM as these patients are particularly susceptible to periodontal breakdown.
2. It is important to stress good hygiene, especially when fixed appliances are used. Daily rinses with fluoride mouthwash are recommended.
3. Diabetes related microangiopathy can occasionally occur in the periapical vascular supply resulting in unexplained odontalgia, percussion sensitivity, pulpitis or even loss of vitality. Orthodontist should be aware of this phenomenon and regular vitality check- ups are advised.
4. The most common complication seen in diabetic patients is hypoglycemia. When planning dental treatment, it is best to schedule appointments before or after periods of peak insulin activity. This requires knowledge of the pharmacodynamics of the drugs being taken by the diabetic patient. Morning appointment is preferable. If a patient is scheduled for a long treatment session, he or she should be advised to eat a usual meal and take the medication as usual.
5. Children with diabetes are at nutritional risk and should undergo nutrition screening to identify those who require formal nutrition assessment with development of a nutrition care plan.[8]

Autoimmunedisorders - Juvenile rheumatoid arthritis

Juvenile rheumatoid arthritis (JRA) is an autoimmune inflammatory arthritis occurring before age 16 years. Juvenile rheumatoid arthritis is more severe than the adult disease and leads to gross deformity. One form of this disease which affects girls in late childhood may involve any joint and is associated with rheumatoid nodules, mild fever, anaemia and malaise. Temporomandibular joint can be damaged up to complete bony ankylosis. In 30 % of cases a severe skeletal class II jaw discrepancy occurs due to restricted growth of the mandible. Classic signs of rheumatic destruction of the TMJ include condylar flattening and a large joint space.

It has been suggested that orthodontic treatment for patients with JRA would prevent worsening of TMJ condition by reducing mechanical loads resulting from stabilization of occlusion. This contributes to long-term stability with a functional improvement.

Orthodontic considerations:

1. Proffit et al have suggested that orthodontic procedures that place stress on the TMJ, such as functional appliances and heavy class II elastics, should be avoided if TMJ is involved in rheumatoid arthritis. On the other hand, Kjellberg et al suggested that functional appliances may unload the affected condyle and act as a "joint protector".
2. If the wrist joints are affected, there is difficulty with tooth brushing. They require additional support from a hygienist during their orthodontic treatment and the use of an electric toothbrush should be considered. Sugar-free medicines should be preferred to minimize caries.
3. It has been suggested that in cases of severe mandibular deficiency, mandibular surgery should be avoided and a more conservative approach using maxillary surgery and genioplasty should be considered.[5]

Renal disorders

The most common renal condition to present to the orthodontist is chronic renal failure (CRF). CRF occurs after progressive renal damage. The symptoms and signs vary and can affect diverse body systems. Bone disease or renal osteodystrophy, compromised calcium metabolism, disruption in vitamin D metabolism resulting in secondary hyperparathyroidism, anaemia and marrow fibrosis leads to a reduced platelet count and poor platelet function. Haemostasis is impaired to varying degrees.

Initially treatment is conservative with dietary restriction of sodium, potassium and protein. As the disease progresses dialysis or transplantation are required. Many patients are prescribed steroids to either combat renal disease or to avoid transplant rejection. Immunosuppressant drugs such as cyclosporine and calcium channel antagonists such as nifedipine are also taken to prevent transplant rejection. Immunosuppressants predispose the patients to infections. These drugs can also cause drug induced gingival overgrowth. In children CRF leads to decreased growth and sometimes delayed eruption and enamel hypoplasia.

Orthodontic considerations:

1. Orthodontic treatment is not contraindicated if the disease is well controlled.
2. Treatment could be deferred if the renal failure is advanced and dialysis is imminent. If possible treatment could be carried out prior to transplantation to avoid the risks associated with immunosuppressant drugs.
3. Appointments should be scheduled on non-dialysis days. The day after dialysis is the optimum time for treatment for surgical procedures as platelet function will be optimal and the effect of heparin will have worn off.
4. Surgical procedures are best carried out under local anaesthetics as anaemia and the potential electrolyte disturbances that can predispose the patient to cardiac arrhythmias can complicate general anaesthesia.
5. The value of prophylactic antibiotics in renal transplant patients on prevention of post-operative complications is questionable or unproven, with the British Society for Antimicrobial Chemotherapy (BSAC) stating that there is no need for antibiotic prophylaxis for dental treatment; however the decision to give prophylaxis should be made on an individual basis, in conjunction with the patient's renal physician.
6. It has been suggested that orthodontic treatment forces should be reduced and the forces re-adjusted at shorter intervals.[9]

Bronchial Asthma

Asthma is a diffuse chronic inflammatory obstructive lung disease with episodes of chest tightness that causes breathlessness, coughing, and wheezing all of which are related to bronchiole inflammation. It is associated with hyper-reactivity of the airways to a variety of stimuli and a high degree of reversibility of the obstructive process. Symptoms can last for a few moments or for as long as a day leading to inflammation and subsequent fibrosis.

Asthma is a leading cause of chronic illness in childhood. The etiology is poorly understood but it is a complex disorder in-

volving immunological, infectious, biochemical, genetic, and psychological factors. The strongest identified risk factor for the development of asthma is atopy, an inherited tendency to exhibit allergic reactions. Acute episodes of coughing and wheezing are often precipitated by exposure to allergens and irritants, such as cold air or noxious fumes and emotional stress. Drug therapy is now the mainstay of treatment both prophylactically and during acute exacerbations. Usually it involves bronchodilators, inhaled corticosteroids, theophylline and anticholinergetics.

Orthodontic considerations:

1. When an asthmatic dental patient seeks care, the clinician must assess risk level by taking an oral history of the illness: ascertaining the frequency and severity of acute episodes, reviewing the patient's medications thoroughly (as they provide an indication of disease severity) and determining the patient's specific triggering agents. Preventing a sudden episode of airway obstruction is essential when treating an asthmatic patient.
2. As a general rule, elective orthodontics should be performed only on asthmatic patients who are asymptomatic or whose symptoms are well controlled to minimize the risk of an attack, the patient's appointment should be in the late morning or the late afternoon.
3. Orthodontist needs to be aware of the potential for dental materials and products to exacerbate asthma. These items include dentifrices, fissure sealants, tooth enamel dust (during interproximal slicing) and methyl methacrylate. Therefore fixed appliances and bonded retainers without acrylic are preferable.
4. Anxiety is a known 'asthma trigger'. For most patients, asking for a simple confirmation that they have taken their most recent scheduled dose of medication can prevent stress. Oxygen and bronchodilator should be available during treatment.
5. Before sending patient to any invasive work to another specialist, he should be informed about the medical history. Dental local anesthetics with vasoconstrictors should be used with caution in asthmatic patients, as many vasoconstrictors contain sodium metabisulfite, a preservative that is highly allergenic.[6]

Allergies

Latex allergy is a common allergy in dental office.

Latex can cause:

1. Irritant contact dermatitis
2. Delayed cutaneous reaction which can extend beyond the area of latex contact.
3. Immediate hypersensitivity reaction. e.g. angioedema

Orthodontic considerations

1. If latex allergy is suspected refer to dermatologist.
2. If latex allergy is confirmed, use latex-free products and mark in patient notes.[10]

Nickel Allergy

Nickel allergy as detected by skin testing is common. Intra-oral reactions to nickel are extremely rare and cannot usefully be predicted from skin tests. Contact hypersensitivity may occur on the skin of the cheeks or neck in response to the outer headgear bow or studs of the headgear in patients with nickel allergy.[10]

Orthodontic considerations:

1. A dermatologist should confirm a true nickel allergy.
2. Patients with a defined history of atopic dermatitis to nickel containing metals should be treated with caution and closely monitored during orthodontic treatment.
3. In patients with diagnosed nickel hypersensitivity and where intra-oral signs and symptoms are present the orthodontist should replace Ni-Ti archwires with one of the following:

a) Stainless steel archwires with a low nickel content;
b) Titanium molybdenum alloy (TMA) which is nickel free;
c) Fibre reinforced composite wires;
d) Pure titanium or gold plated wires. If the allergic reaction continues, all SS archwires and brackets should be removed.

4. If the allergic reaction is severe the patient should be referred to a physician. Alternative nickel free bracket materials include ceramic, polycarbonate, titanium and gold. Fixed appliances may be substituted with plastic aligners in selected cases.[9]

Thyroid and Parathyroid Disorders

Orthodontic therapy requires minimal alterations in the patient with adequately managed thyroid disease. Patients with histories of hyperthyroidism should be carefully evaluated to determine the level of medical management, and they should be treated in a way that limits stress and infection. Medications such as epinephrine and other vasopressor amines should be given with caution in patients with treated hyperthyroidism, although the small amounts used in dental anesthetics. Patients with hypothyroidism require careful consideration due to the potential for excessive sedation.

Routine orthodontic therapy may be provided to patients with parathyroid disease once the disorder has been identified and the proper medical treatment given. However, patients who have not received medical care may have significant renal disease, uremia, and hypertension.[5]

Neurological disorders

Epilepsy

Epilepsy is a common symptom of an underlying neurological disorder. The seizures can take a variety of forms and epilepsy is considered to be active if a person has had a seizure within the last 2 years or is taking anti-epileptic medication.[11]

Brain damage due to injury, infection, birth trauma or a cerebrovascular accident accounts for 25% of cases. The other 75% of cases have no identifiable cause but there is a familial trend. Epilepsy can develop in some genetic syndromes such as Down's or in Sturge-Weber syndrome. The prevalence of active epilepsy is between 5 and 10 people per 1000 of the population. The condition is more common in men and the incidence is high in the first two decades of life.

Hyperventilation, fever, photic stimulation, withdrawal or poor lack of compliance with anticonvulsants, lack of sleep, oversedation, emotional upset and some medications such as antihistamines can stimulate attacks. Both the condition and the medical management can affect oral health. Phenytoin was once the first choice in managing epilepsy in younger people but this has fallen out of favour because of its many side effects. These include nausea, mental confusion, acne, hirsutism, hepatitis, erythema multiforme and gingival overgrowth. However, the orthodontist may still encounter patients taking phenytoin. Alternatives such as carbamazepine also have oral side effects including oral ulceration, xerostomia, glossitis and stomatitis.[9]

Orthodontic considerations in patients with epilepsy

1. The orthodontist should ensure the patient has taken their normal anti-epileptic medication, is not too tired and has eaten normally before each appointment.
2. The orthodontist should ensure the patient is receiving regular and rigorous preventative dental care to avoid/ minimize dental disease.
3. Gingival overgrowth associated with phenytoin is the most widely known complication of anti-epileptic medication, with 50% of individuals being affected within 3 months of starting the drug. Gingivectomy is recommended to remove any hyperplastic tissue that interferes with appearance or function. For patients with recurrent hyperplasia, the patient's physician should be contacted to discuss alternative medication. Gingival hyperplasia resolves spontaneously within 1–6 months of phenytoin withdrawal.
4. Removable appliances need to be used with caution, wherever possible removable appliances should be de-

signed for maximum retention and made of high impact acrylic.
5. If an individual with a Class II division 1 incisor relationship experiences an aura before a seizure, he or she should carry a soft mouth guard with palatal coverage and extending into the buccal sulci, to use at such times.
6. The orthodontic team should be well trained in seizure management.[9]

Multiple sclerosis (MS)

MS is a complex neurological condition that occurs as a result of damage to the myelin sheaths within the central nervous system. The damaged areas result in inflammation and interference in both sensory and motor nerve transmission. It is more common in women than men with a ratio of 3: 2.65. The prognosis depends on the subtype of the disease. The life expectancy of patients is nearly the same as that of the unaffected population, and in some cases a near-normal life is possible.

The main symptoms relevant to oral care include pain and numbness of varying severity in the facial and oral tissues. The arms and hands can also be affected challenging the patient's ability to carry out effective oral hygiene. Trigeminal neuralgia is atypical in that patients are younger, the pain may be bilateral and unstimulated. Indeed trigeminal neuralgia in people under 40 can be indicative of MS. Orthodontists should be aware of this and refer affected individuals for a neurological assessment.

Orthodontic considerations in patients with MS

1. Preventive regimes should be based on the nature of the individual's MS. Custom made toothbrush handles to improve grip and the use of electric toothbrushes to compensate for the loss of manual dexterity and coordination have been recommended.
2. Appointments should be at their convenience, the environment kept at a comfortable temperature. Patients with spasms should be allowed to get out of the dental chair and move around to relieve them. Individuals with dysphagia should be treated in a semi-reclined position.
3. Treatment objectives should be tailored to the patient's condition. Patients with severe MS may be best treated to a compromised result. Removable appliances may not be tolerated well. In patients with poor coordination the use of intermaxillary traction may be contraindicated.[9]

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