

Importance of orthodontic considerations in medically compromised patients- part I

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ABSTRACT

This article will highlight some of the medical problems encountered when orthodontic treatment is provided for patients who have serious medical conditions. These conditions can impact orthodontic treatment, including infective endocarditis (IE), bleeding disorders, sickle cell anemia, leukemia, cystic fibrosis, asthma, epilepsy, multiple sclerosis, viral hepatitis, Type 1 and Type 2 diabetes, renal disorders, eating disorders, osteoporosis and allergies to materials used during orthodontic treatment. Effects of medications such as non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids and bisphosphonates. These various disease processes might influence treatment decisions and might require special considerations to avoid potential problems.

Introduction

Orthodontic therapy is no longer reserved for only healthy patients. With better management of serious medical problems, increased quality of life expectations, and greater ambulation, medically compromised individuals are now regular visitors to orthodontic practices. Orthodontists need to be aware of the possible clinical implications of many of these diseases and see their patients every 6 to 8 weeks to avoid rapidly developing medical problems which can manifest themselves at any age.[1]

This article examines some of the medical conditions that are relevant to orthodontic practice. A thorough medical history should be taken. This might involve seeking guidance from the patient's physician. Patients should be well informed of all the options and made aware that any orthodontic treatment has been planned with their best interests in mind. The importance of excellent oral hygiene should be emphasized to all patients.

Infective Endocarditis (IE)

Infective endocarditis (IE) is a rare condition, but it has high mortality and morbidity rates. The primary prevention of IE is very important. The National Institutes of Health and Clinical excellence (NICE) issued the most recent guidance for dental practitioners in the United Kingdom in March 2008.

Orthodontic considerations in patients with cardiovascular disorders

The orthodontist should communicate with the patient's physician to confirm the risk of IE. NICE has recommended that antibiotic prophylaxis should not be used in patients at risk of IE undergoing dental procedures bacteriaemia arises from everyday activities such as chewing and toothbrushing. The bacteriaemia experienced by the patient may be increased by plaque accumulation which can be

greater in the presence of orthodontic appliances. Various orthodontic procedures can produce a bacteriaemia including impressions, placement of a separator, fitting or removing bands and surgical exposure of teeth.

Bonded appliances are to be preferred to banded appliances where possible. Lucas and associates suggested risk of bacteriaemia induced by traction of unerupted, exposed and bonded teeth. NICE advised that chlorhexidine mouthwash should not be offered as a prophylaxis against IE in high-risk patients.

Bleeding Disorders

Bleeding disorders; like Coagulation defect, platelet deficiency, anticoagulants can produce bleeding problems that continue beyond 12 hours should return to their dental practitioner or seek medical treatment or emergency care.

Orthodontic treatment is not contraindicated but Consult with patient's haematologist before any surgical procedure is advised. If extractions or surgery cannot be avoided, increase / replace missing Factor VIII, avoid nerve blocks. Fixed appliances are preferable to removable appliances as the latter can cause gingival irritation. Self-ligating brackets are preferable to conventional brackets. If conventional brackets are used, arch wires should be secured with elastomeric modules instead of wire ligatures. The duration of orthodontic treatment should be kept to a minimum to reduce the potential for complication

Sickle cell anemia: is more common in people of African descent but also occurs in people with Asian or West Indian ancestors.

Orthodontic Considerations

Orthodontic treatment is not contra-indicated provided the patient has no or very mild complications and the oral hygiene is excellent. A multidisciplinary approach needed. Non-extraction treatment

approach is preferred. If extractions are necessary patient should be well ventilated and at an ambient temperature. orthodontic forces should be reduced and rest intervals between activations should be increased to restore the regional microcirculation.

Leukemia: has an acute and chronic form. Acute lymphoblastic leukemia is most common in children, whereas acute myeloblastic leukemia is more common in adults. Complications include, lymphadenopathy, spontaneous gingival bleeding caused by thrombocytopenia (reduction in platelets), labial and lingual ecchymoses and mucosal petechiae, ulceration, gingival swelling, and infections. Patients presenting with spontaneous bleeding in the presence of good oral hygiene needs an immediate care of a physician. Postpone orthodontic treatment if patient requires chemotherapy and BMT until at least 2 years. Light orthodontic forces needed to minimize root resorption complications. If there is evidence of apical root resorption, leave the appliance passive for 3 months. Non extraction approach will also reduce the risk of osteoradionecrosis (ORN). Topical fluoride application and artificial saliva may reduce dryness of mouth and caries. Mild irritation with appliances may cause severe ulceration of oral mucosa. Some malocclusions can be treated with vacuum formed aligners.

Renal disorders

Patients with kidney disorders are presenting more frequently in orthodontic practice due to improvements in medical care resulting in reduced morbidity and mortality. The most common renal condition to present to the orthodontist is chronic renal failure (CRF).

Orthodontic treatment is not contraindicated in patients if the disease is well controlled.

Treatment can be postponed if the renal failure is advanced and dialysis is imminent. If necessary treatment can be carried out prior to transplantation to avoid the risks associated with immunosuppressant drugs.

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.

Surgical procedures are best carried out under local anaesthetic. The anaemia and the potential electrolyte disturbances that can predispose the patient to cardiac arrhythmias can complicate general anaesthesia.

Musculoskeletal System

Juvenile idiopathic arthritis

Juvenile idiopathic arthritis (JIA) is a severe disease of childhood. The temporomandibular joint (TMJ) is affected in 45% of cases with JIA. The diagnosis of TMJ involvement is more difficult than the other joints as the signs and symptoms are missing or weak. Hence patients are most often seen when extensive changes have occurred. This can lead to the development of condylar hypoplasia, restricting

mandibular growth resulting in mandibular retrognathism.

JIA patients commonly present with skeletal Class II and open bite malocclusions. Mandibular asymmetry is seen in cases with unilateral TMJ involvement. Early orthodontic intervention facilitates both the skeletal and the occlusal rehabilitation.

Orthodontic considerations in patients with JIA

The main aim is to allow the child to live as normal life as possible. The functional ability of the TMJ in JIA children should be monitored closely in order to start medical treatment as soon as inflammation begins in the joint.² There is remission of the disease in adolescence for 70% of patients.^[3]

Oral hygiene aids including modified toothbrush handles and electrical toothbrushes can be recommended to patients with JIA.^[4]

A bite splint can be provided to unload the joint during any acute periods of inflammation. A distracted splint has also been suggested to modify mandibular growth in the same way as conventional functional appliances. The use of functional appliances in patients is a controversial area. It has been argued that functional appliances and class II elastics put increased stress on the TMJs and should be avoided;^[5] however, it has also been suggested that functional appliances protect the joints by relieving the affected TMJ, the aim being to move the mandible into the normal anterior growth rotational pattern thus correcting the skeletal Class II relationship.^[6] Surgery can be considered if the problem cannot be treated orthodontically; however, it has been suggested that mandibular surgery should be avoided and instead a patient with severe mandibular deficiency should have maxillary surgery and genioplasty.

Osteoporosis

Osteoporosis is a common progressive metabolic bone disease that decreases bone density and deterioration of bone structure.

Bisphosphonates (BPs)

These drugs are commonly prescribed to manage osteopenia and osteoporosis or to treat hypercalcaemia caused by bone metastasis in cancer patients.

BPs inhibits the resorption of trabecular bone by osteoclasts and hence preserves bone density. Although their medical benefits have been proven, there are increasing numbers of side effects that can affect orthodontic treatment including delayed tooth eruption, inhibited tooth movement,^[7] impaired bone healing, and BP-induced osteoradionecrosis (ONJ) of the jaws.

Orthodontic considerations in patients taking BPs

Take detailed medical history to identify patients who are taking BPs.^[8]

Orthodontic treatment can only be considered after discussion with the patient's physician and other medical specialists. Ascertain why the patient is on BPs.

Assess the risk of osteoradionecrosis via the route of administration, duration of treatment, dose and frequency of use.^[9] If possible treatment should be carried out prior to BP treatment.

In patients at high risk of ONJ, it may be better to accept the malocclusion and consider the benefits of cosmetic dentistry.

Patients on oral BPs are at a lower risk of ONJ or osteoclastic inhibition. Patients should be counselled about inhibited tooth movement, ONJ and impaired bone healing with elective surgery procedures.

If orthodontic treatment is indicated, it should be planned to minimize risks including a non-extraction protocol favouring interproximal stripping to limit the treatment time and the degree of tooth movement and so treatment can be discontinued early if needed. Informed consent should outline all the risks associated with orthodontics and BPs.

The clinician should look for signs of ONJ and the patient should be advised to have regular dental check-ups. Some clinicians suggest that one should try to avoid invasive laser therapy or temporary anchorage devices in treatment plans; however a recent study of implants placed in 61 female patients taking oral BPs for longer than 3 years, revealed no untoward postoperative sequelae. This suggests that patients who take oral BPs are no more at risk of implant or temporary anchorage device failure than other patients

Drug induced gingival overgrowth (DIGO)

DIGO affects a proportion of patients on medication for hypertension, epilepsy and the prevention of organ transplant rejection.

Orthodontic considerations in patients with DIGO

Patients at risk of DIGO require a team approach with the patient, his or her physician, GDP, periodontist, hygienist and the orthodontist. Early liaison with the patient's physician is recommended to investigate whether an alternative drug can be prescribed.

The recurring message is to ensure patients have excellent oral hygiene in order to reduce the risk of DIGO.[10] A rigorous oral hygiene programme should be instigated from the outset and reinforced during treatment.

A non-extraction approach is preferred in case treatment has to be terminated due to medical problems or exacerbation of the DIGO. Additionally, space closing mechanics including nickel titanium closing springs, elastomeric power chain or active ties can impinge on the hyperplastic gingival tissue.

Archwire loops could have a similar affect and be displaced buccally, altering the direction of force. Small low profile brackets is recommended and the excess composite around the margins should be removed. Bands should be avoided if possible as they have been associated with significantly more gingival inflammation than bonded molars.

Essix based retainers should be relieved around the gingival margins to maintain alignment. Bonded retainers should be avoided in patients with DIGO.

Allergies

Two key allergic reactions have been described in the literature.

Type I hypersensitivity reactions are an immediate antibody mediated allergic response, occurring within minutes or hours after

direct skin or mucosal contact with the allergen.

A delayed hypersensitivity reaction (Type IV) usually presents with localized allergic contact dermatitis.

Nickel

Orthodontists are sometimes required to treat patients with an allergy to nickel and nickel is present in a number of orthodontic materials, notably nickel titanium (Ni-Ti) arch wires.

Orthodontic considerations in patients with a nickel allergy

A dermatologist should confirm a true nickel allergy. Patients with a defined history of atopic dermatitis to nickel containing metals should be treated with caution and closely monitored during orthodontic treatment.

In patients with diagnosed nickel hypersensitivity and where intra-oral signs and symptoms are present the orthodontist should replace Ni-Ti arch wires with one of the following:

- Stainless steel archwires with a low nickel content;
- Titanium molybdenum alloy (TMA) which is nickel free;
- Fibre reinforced composite wires;
- Pure titanium or gold plated wires.

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.[11] Fixed appliances may be substituted with plastic aligners in selected areas.

Latex allergy

The increase in allergic reactions to natural rubber latex over the past two decades has been accredited to the increased use of latex based gloves and universal precautions. Orthodontic elastics used to apply intermaxillary forces are another potential source of the latex protein.

Orthodontic considerations in patients with latex allergy

The goal is to significantly reduce exposure to patients routinely. This can be done by cleaning the surgery more frequently with a protein wash, cleaning or changing the air filter more regularly.

Latex free goods should be stored in a 'latex-screened' area to avoid prior contamination with latex products. Patients with a diagnosed allergy can be offered early morning appointments to reduce the exposure to airborne latex particle.

The diagnosed patient should be monitored for signs of adverse reactions. The team should be capable of instigating prompt emergency care.

The emergency drugs and resuscitation equipment should be free from latex.

Latex free orthodontic materials

There are a number of latex free alternatives to commonly used orthodontic materials. Natural rubber latex is found in gloves, elastics, separators, elastomeric modules, elastomeric power chain, polishing rubber cups, band removers and masks with latex ties. Synthetic non-latex gloves made from nitrile, polychloroprene,

elastoyren and vinyl, are readily available for clinical use. Both latex free and latex gloves have to meet the European standard for single use medical examination gloves. Elastomeric separators can be replaced with self-locking

Separating springs. Manufacturers can provide alternatives such as latex free power chain, ligature chain, rotation wedges, headgear components, and masks.

Pre-diagnosis

If a reaction to latex is suspected, patients should be referred to an allergist, clinical immunologist or dermatologist for testing.

Post-diagnosis

The orthodontic team including radiographers should be aware of the implication of treating latex allergy patients.

Eating disorders

The most common eating disorders are anorexia nervosa (AN) and bulimia nervosa (BN).

Orthodontic considerations in patients with eating disorders

The orthodontist is likely to notice these features and should be suspicious of these illnesses and deal with them sensitively. The first referral should be to the patient's physician. However, it is important to maintain confidentiality and gain consent.

Diet advice is vital as this cohort of patients may drink an excessive quantity of acidic or carbonated drinks to as an alternative to normal food.[12]

Patients should be counseled not to brush their teeth immediately after vomiting. They should be given advice on how to increase the intra-oral pH by chewing gum, or rinsing the mouth with water or milk.

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