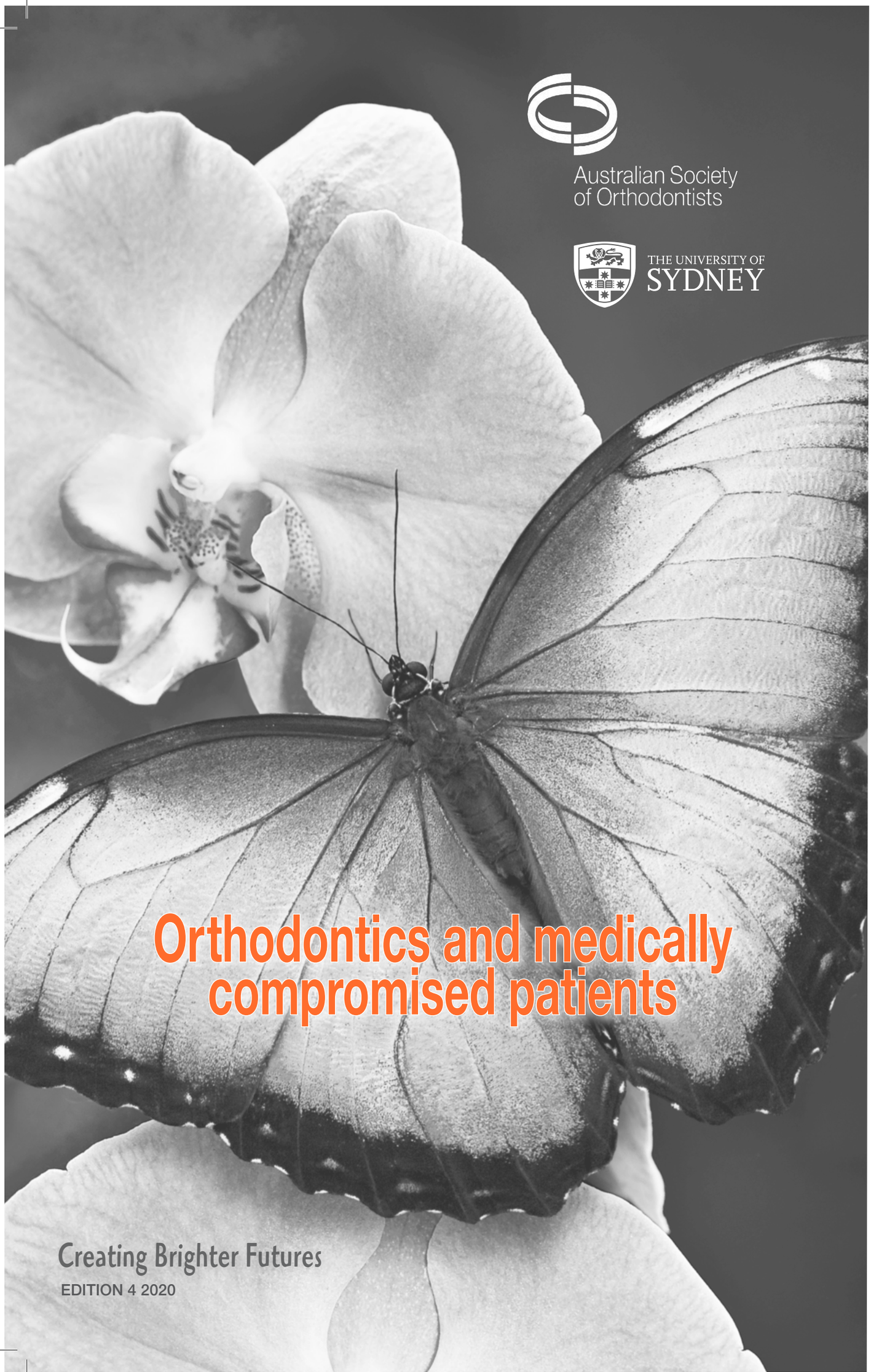

Australian Society of Orthodontists

THE UNIVERSITY OF SYDNEY

Orthodontics and medically compromised patients

Creating Brighter Futures

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Orthodontics and medically compromised patients

With the increasing trend of people seeking orthodontic therapy we are more likely to see patients with chronic and systemic health problems. At the same time, advances in medical science have also produced greater long-term survivability of medically compromised patients, further increasing the prevalence of patients with underlying medical conditions. This issue of Brighter Futures will discuss some medical conditions more commonly seen in orthodontic practice and their management considerations.

Diabetes Mellitus:

Diabetes Mellitus is a common endocrine disorder that is frequently encountered. Based on data from the Australian Bureau of Statistics 2017-2018 National Health Survey, an estimated 6% of Australians over 18 years of age have diabetes (type 1 and 2 diabetes but excluding gestational diabetes).

The key to any orthodontic treatment for a diabetic patient is good medical control. Orthodontic treatment should not be started in patients with uncontrolled diabetes (HbA1c >9%) as they have an increased tendency for periodontal breakdown. Even in well-controlled diabetics there is likely to be more gingival inflammation, probably due to impaired neutrophil function (Bensch 2004). Prior to commencing treatment a full mouth periodontal examination is recommended, with regular periodontal observation and maintenance during treatment.

Orthodontic forces can sometimes produce retardation in osseous regeneration, weakening of the periodontal ligament and microangiopathies in the gingival area. This is more pronounced in diabetic patients (Holtgrave 1989). Similarly, a study in diabetic rats showed a significant decrease in bone formation in the dental alveolar cortex (Villarino 2011). Lighter forces should therefore be used wherever possible.

Because diabetic patients are susceptible to periodontitis the importance of maintaining good oral hygiene must be stressed. In addition to mechanical plaque control, the use of 2% chlorhexidine mouth rinse as an adjuvant chemical plaque control is beneficial. To minimise the neutralizing effect of toothpaste on chlorhexidine, there should be at least a 30 minute interval between tooth brushing and the chlorhexidine rinse (Owens 1997).

Early morning appointments are preferable with the patient being encouraged to eat a regular meal and take their usual medication before the visit. Clinicians and staff should be trained and ready to deal with any diabetic emergencies, especially sudden hypoglycaemia.

Thyroid Disorders:

After Diabetes Mellitus, thyroid disorder is the most common endocrine problem. Thyroid disease occurs more frequently in women, especially those over 50 years old, and will affect bone turnover.

In hyperthyroidism, an increased rate of tooth movement with higher bone turnover and accelerated dental eruption may pose issues. Conversely, in hypothyroidism problems include low bone turnover, increased risk of root resorption, delayed eruption of teeth, impaction of mandibular second molars and macroglossia (Maheshwari 2012).

A stress reduction protocol should be implemented as much as possible. NSAIDs and aspirin are not recommended, and alternative pain medication should be prescribed.

Asthma:

Asthma, a common condition particularly in children, is characterised by recurrent and reduced airflow due to inflammation in the lungs. Inhaled corticosteroids are widely used and can result in oral manifestations including xerostomia, candidiasis, increased calculus and increased gingivitis.

Summary of Orthodontic Considerations in Diabetic Patients

Considerations before orthodontic treatment	Good medical history. Check for HbA1c level and/or contact the patient's physician to verify the control of the disease. Type 1 Diabetes patients are presumed to be less stable: check the frequency of hypoglycaemic reactions. Type 2 Diabetes patients are presumed to be more stable.
Considerations during orthodontic treatment	Evaluate the oral cavity for signs of deterioration of glycaemic control, at each appointment. Advise the maintenance of good oral hygiene. Monitor the periodontal condition and maintain control over the inflammation. Apply light physiological forces. Check on a regular basis the vitality of the teeth involved.
Summary	Patients with well-controlled diabetes are not contraindicated for orthodontic treatment. Avoid orthodontic treatment in uncontrolled or poorly controlled diabetes patients.

(Adapted from Bensch 2004 & Almadih 2017)

Studies have found asthmatic patients to be at increased risk of orthodontically-induced external root resorption. The upper first molars were most susceptible to external apical root resorption in both medicated and non-medicated asthmatic patients. Although the incidence of external apical root resorption is higher in asthmatics, the severity of the root resorption is the same between asthmatics and non-asthmatics. This higher incidence may be due its proximity to the maxillary sinus and may result from local sinus inflammation (NcNab 1999). Corticosteroids can also increase root resorption so orthodontic force levels should be reduced and patients monitored more frequently (Kalia 2004). In animal studies, corticosteroid therapy has also been shown to affect orthodontic tooth movement and tissue response. In a rat model, an increased rate of tooth movement was observed after long-term corticosteroid therapy.

Stress and anxiety should be minimised. Short morning appointments, short waiting times, and avoidance of the supine position, if possible, are recommended. The patient's usual medication should be used before the appointment if needed. Acetaminophen is recommended over Aspirin and NSAID for pain management.

Infective Endocarditis:

Patients with cardiac disorders may undertake orthodontic treatment. The prevalence of congenital cardiac defects ranges from 2.4-13.7 per 1000 live births.

There is some disagreement in the medical profession about the need for antibiotic prophylaxis for orthodontic treatment and it is recommended that the patient's doctor or cardiologist be contacted regarding this before orthodontic treatment is commenced. The table below highlights the relatively low risk routine orthodontics appears to produce.

Orthodontic procedures resulting in bleeding may increase the risk of endocarditis. The initial placement of bands is the only orthodontic procedure for which the American Heart Association defined as having a significant risk of bleeding (Dajani 1997). Antibiotic prophylaxis is not recommended for routine adjustment of fixed and removable orthodontic appliances. Antibiotic prophylaxis however is recommended for any orthodontic procedures that may elicit gingival bleeding, including band removal, interproximal reduction, placement of temporary anchorage devices and for soft tissue trauma caused by loose or detached orthodontic appliances (Wilson 2007).

The use of antimicrobial mouth rinses such as chlorhexidine gluconate may be beneficial to reduce the oral bacterial load before the placement and removal of orthodontic bands. Where viable, orthodontic treatment should avoid using orthodontic bands and use bonded attachments instead. Also, elastomeric ties rather than metal ties should be used. All sharp edges should be smoothed and polished, and excess adhesives should be removed and cleaned. Fixed acrylic appliances, like Nance and acrylic rapid maxillary expanders should be avoided.

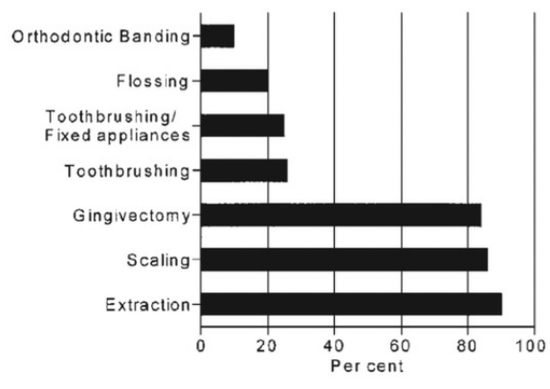


Figure 1: The maximum reported prevalence of bacteraemia for a variety of dental procedures.

The current American Heart Association recommendation for endocarditis prophylaxis is a single dose of amoxicillin (2g in adults or 50mg/kg in children) administered 1 hour before the procedure. For penicillin allergic patients, clindamycin 600mg for adults and 20mg/kg for children). If unanticipated bleeding occurs, then antibiotics should be given at the time of treatment or up to 2 hours after.

Psychiatric Issues:

Based on the Australian Child and Adolescent Survey of Mental Health and Wellbeing ('Young Minds Matter' survey), conducted in 2013-2014, 1 in 7 (13.9%) children and adolescents aged 4-17 years of age had a mental health disorder in the previous 12 months (Lawrence 2015). Attention Deficit Hyperactivity Disorder (ADHD) was the most common mental disorder affecting 7.4% of all children and adolescents, followed by Anxiety disorder (6.9%) and major depressive disorder (2.8%).

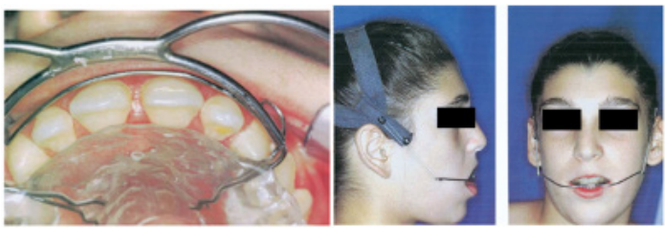
Autism Spectrum Disorder (ASD) is a neuro-developmental syndrome which starts before three years of age and continues for life. The spectrum includes Asperger Disorder (AD), Autism, Pervasive Developmental Disorder and Childhood Disintegrative Disorder (CDD). These patients have a higher prevalence of Class II malocclusion, increased overjet, high and narrow palate, posterior crossbite, open bite and severe maxillary crowding. These dental manifestations may be attributed to persistent parafunctional habits, including bruxism, lip biting, dummy use and tongue thrusting. For these patients the presence of parents, giving short clear sentences, voice control, Tell-Show-Do techniques, behaviour modification, and positive reinforcement can be utilized to improve communication and acceptance. These procedures may need to be undertaken over several visits before starting the orthodontic treatment. Desensitization techniques can be used by gradually introducing the patient to the items used in the orthodontic office. Some procedures can be conducted using behaviour management and protective stabilization (restrain). Others might need sedation, or even general anaesthesia. Removable orthodontic appliances are frequently recommended for autistic patients and they should be as small as possible and be reinforced by wires. (Hamad 2019)

Attention-Deficit Hyperactivity Disorder (ADHD) is a diagnosis characterised by inattention, impulsivity, inappropriate hyperactivity and an inability to follow directions. Children with ADHD might have their growth disturbed by the disorder or medications used for its treatment. Dental manifestations include a high prevalence of caries, molar-incisor hypoplasia and being more prone to dental trauma. Due to poor compliance, some orthodontic tasks, including activation of appliances and placement of elastics, need more follow-up and the involvement of parents and other family members. Strict oral hygiene is mandatory. Short appointments scheduled early in the morning are recommended. Frequent breaks during the appointment are beneficial to gain compliance and attention. Instructions should be simple and clear. The Tell-Show-Do method has a great impact on behaviour modification in these patients. Orthodontic treatment plans that require high compliance should be avoided (Hamad 2019).

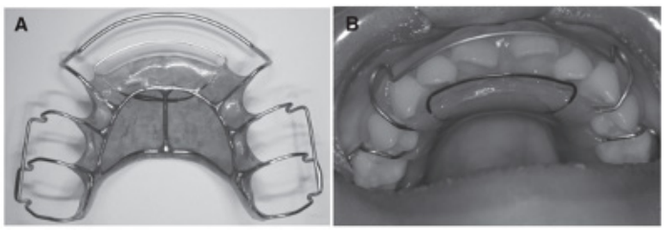
It is essential to adapt orthodontic management to the Special Needs Child by simplifying treatment and setting realistic treatment goals. For these patients, problems with fixed appliances can be more severe so using removable appliances may be at times more appropriate (Becker 2004).

It is also often advisable to formulate treatment plans,

whether fixed or removable, that shorten treatment durations. This may mean selecting compromise extraction (or non-extraction) plans, choosing treatments less reliant on patient co-operation, and using appliances such as Tip Edge or smaller brackets that allow the insertion of heavier arch wires in the early stages of treatment (Becker 2004).



Example of an innovative maxillary orthopaedic appliance to treat a Class II patient (Becker 2004)



Example of a removable appliance with a shape-memory wire to treat an autistic child with lateral incisor crossbites, proclined central incisors and malalignment. The appliance exerts light and continuous orthodontic force and is relatively durable. (Kan Saito 2013)

Summary of Psychiatric Conditions, Medications and Orthodontic Behavioural Considerations

DIAGNOSIS	MEDICATIONS	IMPACT ON ORTHODONTIC
Attention deficit hyperactivity disorder (ADHD)	Stimulants: methylphenidate, Dexedrine, atomoxetine, buprorion, clonidine, guanfacine	Immediate impact on office visits, problems with compliance or organization with home care due to impulsive, active disorganized behaviour.
Depression	Antidepressants: SSRIs, mood stabilizers: lithium, valproic acid, other antiepileptic meds	Compliance problems, overly concerned about appearance due to poor self-image.
Anxiety disorder	SSRIs, benzodiazepines	Undue worries, concerns about side effects or outcomes
Developmental disorder (eg autism)	Second generation neuroleptics (eg olanzpines), SSRIs	Relationships with staff, challenging unreasonable worries, odd behaviours due to lack of social skills and problems with personal space and routine changes.

Summary and Conclusion

With the increasing prevalence of medically compromised patients seeking orthodontic treatment, knowledge of these medical conditions and their impact on orthodontic management is critical. Good communication with their primary physician or psychiatrist is also essential for successful orthodontic care. While orthodontics is generally regarded as an elective procedure for most patients, correction of malocclusions may be considered medically necessary when the treated condition improves breathing, mastication, speech, and reduction in pain symptoms as well as enhancing social and psychological well-being (Ghafari 2016). The delivery of orthodontic treatment should not be denied to medically compromised patients as it improves their quality of life, however, comprehensive treatment may not be practical and therefore treatment procedures should be modified according to individual needs.

References available on request

Past issues of Brighter Futures can be accessed at:
www.aso.org.au/resources/brighter-futures-newsletters

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