



the Child Dental Patient with

ASTHMA



ASTHMA - Definition

- A chronic inflammatory condition characterised by variable and reversible episodes of airflow obstruction and bronchospasm.
- History of **respiratory symptoms** often in response to an identifiable trigger.



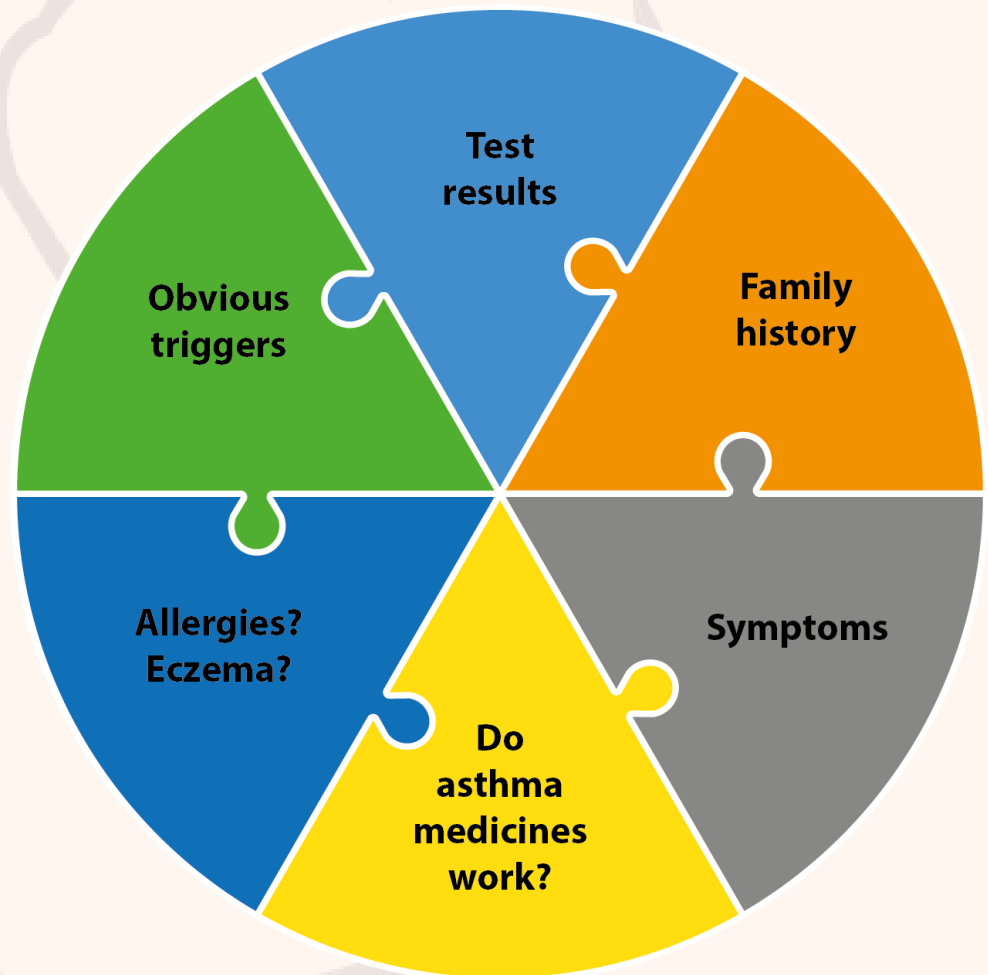
- Wheezing
- Shortness of breath
- Chest tightness
- Coughing
- Variable expiratory airflow limitation

Asthma and children

- A common chronic condition with wide-ranging implications for children's health, their families and the health care system
- The commonest chronic inflammatory disease in childhood
- Children <5 years old: variations of clinical symptoms → can be non-specific → symptoms-only approach that defines various wheezing phenotypes

Diagnosing asthma in children

There is no one specific test; diagnostic is made by corroborating pieces of evidence*



* <https://www.asthma.org.uk/advice/child/diagnosis/process-and-tests/>

General features

- Flared nostrils
- Blue or grey skin around mouth
- Skin on the neck pulled inward
- Skin between and under ribs pulled inward

Asthma classification

Global Initiative for Asthma (GINA) classification (2019) according to disease severity and adequacy of symptom control

Mild asthma	Moderate asthma	Severe asthma
Well-controlled with reliever medication alone/with low-intensity controller treatment - low dose inhaled corticosteroids (ICSs), leukotriene receptor antagonists/chromones	Well-controlled with low dose ICS/long-acting beta2-agonists (LABA)	Needs high-dose ICS/LABA to prevent uncontrolled asthma/ asthma that remains uncontrolled despite this treatment



Prevalence

- >339 million people globally suffer from asthma (The Global Asthma Report, 2018)
 - 417,918 deaths due to asthma globally in 2016
- France (2018) 6.4% general population
- Italy (2019)
 - 8% general population
 - 8.9% among young adults
 - 9.5% among children
 - 10.4% among adolescents
- Romania (2013)
 - 4.1% 15-39 years old
 - 7% among children
- Turkey (2018) 4.4% adult general population

Sources:

FR: https://erj.ersjournals.com/content/52/suppl_62/OA292

IT: [https://www.resmedjournal.com/article/S0954-6111\(18\)30360-3/pdf](https://www.resmedjournal.com/article/S0954-6111(18)30360-3/pdf)

RO: https://erj.ersjournals.com/content/42/Suppl_57/P964,

TR: <https://bmcpulmed.biomedcentral.com/articles/10.1186/s12890-018-0621-9#citeas>

ASTHMA Causes/pathogenesis:

- I. Environmental influences**
- II. Family history and genes**
- III. Exercise**

Causes/pathogenesis

I. Environment

- During pregnancy:
 - **allergic sensitization** before birth
 - **smoking mothers** → reduced lung function in newborn infants
- **Respiratory virus infections** → acute bronchiolitis in infancy, acute asthma attacks among older asthmatic children
- **Allergens:** house dust mites, animal dander
- **Poor air quality** from pollution

Causes/pathogenesis

II. Family history and genes

- Asthma and allergy → strong **hereditary traits** → influence the response to asthmatic drugs (β 2-receptor sensitivity and responsiveness to inhibitors of leukotriene synthesis)
- **Markers** with possible relationships to asthma and airway inflammation

III. Exercise

- Asthma exacerbations (exercise-induced asthma) during childhood and especially school age
- Restriction of physical activity for approximately 30% of all asthmatic children

Asthma triggers

- Anxiety
- Aerosols
- Tooth enamel dust
- Residue from dental materials
- Prolonged supine positioning
- NSAIDs
- Opioid drugs
- Products containing sulfites



Anxiety in the dental environment is a common trigger for acute asthma attacks

Medications

- Controlling treatments : **inhaled corticosteroids**
 - most children and adolescents live a normal life
 - can unbalance the ecology of oral bacterial flora → cariogenic species (S.mutans, L.acidophillus)
- Long-term use of **sugary medications** (antibiotics and analgesics) → negative impact on dental health
- Asthma treatment=**two steps**
 - ❖ **First:** control the symptoms of the acute phase (bronchospasm) → bronchodilator drugs
 - ❖ **Second:** treatment maintenance → prevent new acute events
→ inhaled/systemic steroids and bronchodilators of long duration

Prognosis

- Childhood asthma most often starts before school age.
- During puberty, many children – especially boys – experience improvement, but symptoms of asthma often recur later in life
- During early life, boys more frequently have asthma
- After 10 years of age, girls more frequently develop asthma, often with greater severity.
- Early childhood asthma and, in particular, severe childhood asthma increase the risk of chronic airway obstruction in adult life.

Oral Manifestations

1. increased prevalence of caries
2. enamel defects
3. malocclusion
4. erosion
5. oral candidiasis
6. changes in salivary composition and flow
7. periodontal disease

Dental Caries

- Double risk of dental caries in both primary and permanent dentitions
- Higher carious experience: dmft-t/DMFT-T indices especially in asthmatic children treated with long-term β_2 agonists
- Children with asthma >2 years → higher values of dmft-t/DMFT-T indexes
- Asthma medications may increase the risk of dental caries due to alterations in salivary parameters

Enamel Defects

- Prevalence of Developmental Defects of Enamel (DDE) → increased in asthmatic patients → risk of caries.
- The occurrence of dental enamel defects (enamel opacity) is correlated with greater asthma severity.
- Use of inhaled medications (β 2-agonists and corticoids) before age 3 → marked opacities and hypoplasia on permanent teeth.

Malocclusion

Asthma children under regular medication (inhalation of corticosteroids)→ higher frequency of malocclusions:

- Anterior open bite most frequent *
- Cross-bite
- Overbite
- Increased overjet
- Crowding
- High-arched palate

* frequent association with atypical swallowing/tongue thrusting

Dental Erosion

- Saliva = main buffer for daily dietary acids in the oral cavity
- Reduction in salivary flow → increased risk of dental erosion
- Increased incidence of gastro-oesophageal reflux disease (GORD) amongst asthma patients → increased risk of dental erosion
- Asthma medication: low pH of medications, prolonged periods in contact with the tooth surface and its side effects → dental erosion

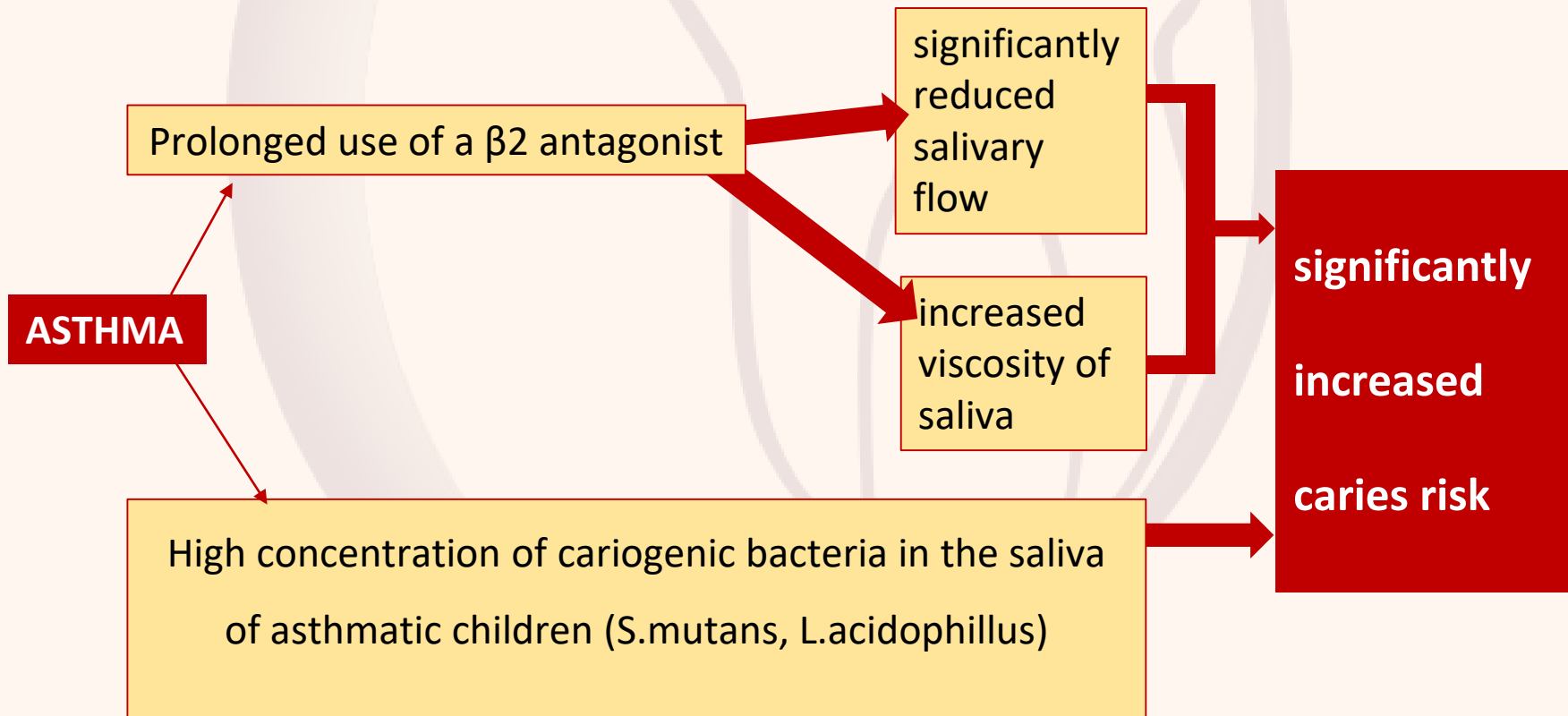
Candida

- Long-term use of inhaled corticoids (ICS) → increased incidence of oral candida infection especially pseudomembranous candidiasis.
- Elevated oral glucose levels → encouraging environment for candida adhesion and proliferation in the oral cavity → high risk of mucosal infection in the asthmatic patient.

Saliva

Normally, saliva contributes to caries reduction through four main actions:

1. physical cleansing
2. antibacterial effect
3. buffering capacity
4. super saturation with calcium phosphate



Periodontal Disease

- Long term use of asthma medication → decrease in salivary flow and secretory IgA and reduce its protective qualities → greater risk of developing periodontal disease
- Gingival tissues of asthmatic patients have markedly elevated IgE levels → responsible for periodontal destruction
- Increased levels of gingivitis and calculus levels in asthmatic patients → exacerbated by chronic mouth breathing secondary to sinupulmonary disease

Preventive measures

- Special attention for the prevention of caries
- Preventive programs are mandatory as part of their **interdisciplinary care**
- Use of spacers → reduce the permanence of drugs deposited in the mouth - drugs administered directly to the airway
- Rinse of the mouth with water after the use of medications, followed by tooth brushing

Preventive measures

- Educate patients/parents about the increased susceptibility to oral diseases
- Encourage regular dental check-ups
- Be aware of the increased risk of dental erosion, appropriate referrals if necessary (medical specialist, GP)
- Collaboration with the pneumologist/pediatricist → drugs with reduced adverse effects

Preventive measures

- Patients should understand the implications of frequent intake of sugary drinks; advise the consumption of water



- Use of toothpaste with high fluoride content (1450ppm) from very young ages
 - spit excess toothpaste after brushing; do NOT rinse ☐ prolonged effect of fluoride
- Fluoride mouth rinse, if age appropriate
- Use of sugar-free chewing gum, especially after meals → increase salivary flow and buffer the acidic effects of medication

Preventive measures for the management of asthma-related oral conditions in children

In office	At home
Collaboration with pneumologist/pediatricist and family for an accurate assess of child's reaction to dental treatment	
Establish the health status, assess the medications that are taken and oral health risk levels	Space appliance with inhaler
Reduce anxiety, avoid triggers that could initiate asthma attacks	Rinse with water/neutral or high pH mouthrinse, drink milk, eat cheese or plain yogurt after inhalation Avoid toothbrushing immediately
Train the dental staff in case of an asthma attack→ emergency treatment	
Use of dental sealants	Soft toothbrush, fluoride toothpaste
Topical fluoride treatments	Sugar-free chewing gum when gastroesophageal problems appear/after using an inhaler for salivary flow stimulation
Early orthodontic referral/intervention	

1.Leung JS, Johnson DW, Sperou AJ, et al. A systematic review of adverse drug events associated with administration of common asthma medications in children. *PLoS One*. 2017;12:e0182738.

2.Arafa A, Aldahlawi S, Fathi A. Assessment of the oral health status of asthmatic children. *Eur J Dent*. 2017;10:357.

3.Thomas M, Parolia A, Kundabala M, Vikram M. Asthma and oral health: a review. *Aust Dent J*. 2010;55:128–133.

Important for the paediatric dentist

Before dental treatment

- Appointments late in the morning or afternoon
- Establish the severity of the asthmatic condition
- Antibioprophylaxis for immunosuppressed patients
- Corticosteroid replacement for adrenally suppressed patients

Important for the paediatric dentist

During dental treatment

- Caution when using rubber dam
- Minimize patient's stress:
 - No prolonged horizontal position
 - No nitrous oxide in patients with severe asthma
 - No barbiturates
- Avoid local anesthetics with sodium metabisulfide or other sulfites
- Use vasoconstrictors with caution

Important for the paediatric dentist

Protocol for an asthma attack

- Stop the dental treatment, clear the mouth from instruments and dental materials
- Emergency management by dental staff
- Position the patient comfortably
- Evaluation of respiratory symptoms, oxygen administration by full-face mask
- If symptoms get worse/do not respond to the treatment → call emergency number (112, 911 etc)

Important for the paediatric dentist

Oral hygiene

- Control of dental plaque → may improve the quality of respiration of the asthmatic children (occurrence and exacerbation of bronchic asthma) and control periodontal disease
- Improvement of the following variables when control of oral hygiene is applied:
 - Clinical symptomatology
 - Lung function
 - FEV1 reversibility
 - Immunological markers
 - Decrease of seric IgE concentration
 - Reduced number of eosinophylls
 - Modification of the microbial profile
- Ultrasonic scaling and professional brushing
- Correct technique of toothbrushing, rinse with a mouthwash solution ≥ 2 x/day

Local anesthetics

Antioxidants (sodium **bisulfite**, **metabisulfite**) are added to **local anesthetic** products that contain vasoconstrictors (epinephrine, levonordefrin) to prevent biodegradation by oxygen.

- Sulfites may induce allergic reactions, BUT the reaction is not a common one, even in sulfite-sensitive patients → dental anesthetics only contain a small amount of metabisulfite.
- ~ 96% of asthmatics are not actually sensitive to sulfites; and those who are, are usually severe, steroid-dependent asthmatics
- Although it is recommended to avoid sulfite-containing solutions, the use of local anaesthetics with vasoconstrictors has been used safely in asthmatic patients.
- History of previous sensitivity → caution → use of a local anaesthetic without a vasoconstrictor

Important for the paediatric dentist

Sedation

- May be indicated → case selection is recommended
- Nitrous oxide (N₂O) inhalation sedation in patients with mild-to-moderate asthma → prevents acute symptoms
- Medical consultation in patients with severe asthma → N₂O may cause airway irritation → may exacerbate an asthma attack
- Midazolam (sedative drug) → may cause respiratory depression → caution when sedating the asthmatic patient.

Conclusions

- Asthmatic patients are at a greater risk of developing dental diseases and the dental setting contains a multitude of common triggers for asthma attacks.
- Dental practitioners should be vigilant and recognise the correlation between asthma and its associated oral health problems.
- Early diagnosis, correct intervention and prevention can minimise the risks of developing dental diseases and reduce the occurrence of acute exacerbations