3. Nasal septal deformity:
Indiscriminate surgery of the nasal septum can interfere with mid facial growth and development. Judicious septoplasty in children is and can be safely performed but if you suspect that the main cause of nasal obstruction is nasal septal deformity, children should be referred to an experienced paediatric rhinologist.

4. Narrow highly arched palate:
Palate expansion by early orthodontic intervention.

**Sequence of events in altered facial growth and morphology associated with nasal obstruction.**

Long standing nasal obstruction of any cause leads to altered craniofacial growth which is more marked in children who are genetically susceptible to narrow highly arched palate. If the nasal resistance is increased two or three fold children adopt a chronic mouth open posture at rest. The altered position of the tongue and the lips causes the mandible to rotate downwards. This causes over eruption of the molars and a retrognathic open bite. A lower tongue also leads to altered tone in the buccinator muscle which leads to a constricted maxilla, a narrow palate, crossbite and the associated altered muscle pressure leads to retroclined teeth.

**Common orthodontic abnormalities associated with chronic nasal obstruction and mouth open posture:**

1. Openbite
2. Crossbite
3. Retrognathia
4. Overbite
5. Marginal Gingivitis

**KEY POINTS**

Chronic nasal obstruction causes chronic mouth open posture at rest.

Chronic mouth open posture at rest causes children to breath cold, non filtered, non humidified air. It alters the position of the lips and the tongue which inturn alters muscle tension which leads to an altered pattern of facial growth and morphology with dental abnormalities.

Early expert treatment of nasal obstruction coupled with early expert orthodontic intervention, preferably before the age of 6, leads to optimal functional and cosmetic results.

This treatment update should act as a guide to the various medical and surgical treatments of this extremely common condition.
For the last 100 years there has been extensive ENT and orthodontic literature detailing the relationship between longstanding nasal obstruction, altered patterns of facial growth and morphology and dentofacial deformity. The debate has been whether nasal obstruction causes impaired craniofacial growth and dental development, necessitating early intervention or if facial growth and morphology is purely genetic.

**Facial growth**

It is important to know that in terms of facial growth the lower jaw or the mandible, is 80% of adult size by the age of 6. Similarly the growth of the upper jaw, or the maxilla is 80% complete by the age of 6. Both upper and lower jaws are 90% of adult size by the age of 12 so if surgical intervention to correct nasal obstruction is to take place, ideally it should occur before the age of 6 and definitely the earlier the better thereafter.

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**Nasal Function**

The function of the nose is to warm, filter and humidify air and so there are obvious physiological advantages to adopting a mouth closed posture at rest.

**Major causes of nasal obstruction.**

The major causes of nasal obstruction in childhood are

1. **Allergic rhinitis:**

   This manifests by hypertrophy of the mucosa or the inferior turbinate and the mucosal changes associated with allergic rhinitis may or may not be reversible medically.

2. **Adenoid hypertrophy:**

   Causes blockage of the posterior nasal choanae and is a very common cause of sub total nasal obstruction and mouth open posture at rest. Confirmation of diagnosis is radiologically, usually by a standardised lateral airway x-ray or endoscopically using a telescope through the nose after topical vasoconstriction.

3. **Nasal septal deviation:**

   A common cause of unilateral nasal obstruction in children. Can be cartilaginous or bony or mixed.

4. **Narrow highly arched palate;**

   Decreases the vertical height of the nose. Correction of this palatal abnormality involves early orthodontic intervention.

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证据强烈地表明，鼻塞会导致嘴张开姿势及面部生长和形态的改变。

The end result of long standing nasal obstruction and altered facial growth and morphology is the classic adenoid facies with associated dentofacial abnormalities illustrated above. Adenoid facies is characterised by an open bite, cross bite and narrow highly arched palate, a long lower face, a gummy smile and significant malocclusion (class II or III).

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**The treatment of the common causes of nasal obstruction**

1. **Allergic rhinitis:**

   Optimal medical management involves topical treatment with low dose water based surface acting non absorbed steroid spray occasionally supplemented by oral medications such as low dose Singulair.

   A predictive index for the efficacy of medical management can be obtained by putting a topical sympathomimetic amine into the nose, waiting 5 minutes for the lining to constrict. This is the amount of nasal decongestion that optimal medical management can achieve. Where the lining of the nose has lost its elasticity or reversibility or when compliance with medication is poor the newer surgical treatments, particularly **ENDOSCOPIC POWERED INFERIOR TURBINOPLASTY** are very effective at permanently treating nasal obstruction due to allergic rhinitis.

2. **Adenoid hypertrophy:**

   Treatment is by Adenoidectomy bearing in mind that up to one third of children have intranasal extension of adenoid tissue which is appropriately treated not only by curettage but by transnasal powered resection.

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continued overleaf