Pathogenesis of obstructive sleep apnea (OSA) and the prevalence of residual excessive sleepiness in patients treated with CPAP

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Obstructive sleep apnea (OSA) is characterised by repetitive episodes of upper airway occlusion during sleep.The pathogenesis of obstructive sleep apnea (OSA) has been under investigation for over 29 years, during which a number of factors that contribute to upper airway (UA) collapse during sleep have been identified. In patients with sleep apnea hypopnea (OSAH) volumetric MRI studies and computer-based analysis techniques permited the objective quantification of the volume of the tongue, soft palate, parapharyngeal fat pads, and lateral pharyngeal walls.

It has been demonstrated that the upper airway calibre reduction during sleep due to enlargement of the total soft tissue (tongue, uvula, tonsilar pillars, adenoids, soft palate, blood vessels, lymphoid tissue, pharyngeal fat pads, muscles and pharyngeal mucosa) [1] is crucial to the development of OSA in many patients. Enlargement of the soft tissues through hypertrophy, inflammation, or edema may reduce the diameter of the UA. Soft tissue edema is considered as largely responsible for this thickening [6], possibly resulting from inflammation. OSA has been shown to be associated with a variable degree of nasal inflammation, uvula mucosal congestion and airway hyperreactivity.

The upper airway inflammation, whose clinical importance is uncertain, is characterised by leukocytes infiltration and interstitial oedema. In addition, recent data has shown the presence of neutrophilic inflammation in the lower airways. The current opinion is that airway inflammation is caused by the local, repeated mechanical trauma related to the intermittent airway occlusion typical of the disease. Another potential mechanism involves the intermittent nocturnal hypoxemia that through the phenomenon of the ischemia-reperfusion injury may induce the production of oxygen free radicals and therefore cause local and systemic inflammation.

Finally, a state of low-grade systemic inflammation may be related to obesity per se with the pro-inflammatory mediators synthesised in the visceral adipose cells. Several authors stress the role of circulating and local inflammatory mediators, such as pro-inflammatory cytokines, exhaled nitric oxide, pentane and 8-isoprostane as the determinants of inflammation in OSA [7]. MRI studies have demonstrated increased soft tissue mass surrounding the UA and, hence, reduced UA size in the retropalatal and, to a lesser extent, the retroglossal area of OSA patients compared with control subjects [2, 3, 4]. The larger the volumes of the lateral pharyngeal walls, tongue, and total soft tissue, the greater are the odds of OSA [4].

Thickening of the lateral pharyngeal walls appears to be the predominant factor in OSA patients [5]. The impairment of upper airway (UA) mechanoreceptor sensitivity and reflexes that maintain pharyngeal patency and respiratory control system instability, have also been identified as possible mechanisms facilitating UA instability. This suggests that OSA may be a heterogeneous disorder, rather than a single disease entity. Therefore, the extent to which various pathogenic factors contribute to the phenomenon of repetitive collapse of the UA during sleep probably varies from patient to patient.

Further elucidation of specific pathogenic mechanisms in individuals with OSA may facilitate the development of new therapies that can be tailored to individual patient needs according to the underlying mechanism(s) of their disease [6]. More easily and rapidly than MRI [8], acoustic pharyngometry can be used to assess the UA caliber [9] and its change in OSAH patients [10].

Obstructive sleep apnea (OSA) is characterized by repetitive pharyngeal collapse during sleep. Increased intrinsic UA collapsibility that is generally observed in OSAH patients [11] is due to decreased transmural pressure and increased pharyngeal wall compli-ance.

Continuous positive airway pressure (CPAP) provides a pneumatic splint for the nasopharyngeal airway and is a safe, simple treatment for the obstructive sleep apnoea syndrome [12].. CPAP eliminates respiratory events and reduces sleepiness in OSAH patients. The relative risk of having residual excessive sleepiness (RES) has been found to be 5.3 (95% CI 1.6-22.1), when Epworth Sleepiness Scale (ESS) score before treatment was >or=11. As 230,000 obstructive sleep apnoea patients are currently treated in France by continuous positive airway pressure, more than 13,800 of them might suffer from residual excessive sleepiness[13].

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