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OSAS in children

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Summary ***Background:*** Major risk factors for obstructive sleep apnea syndrome (OSAS) in children include adenotonsillar hypertrophy, neuromuscular disease and syndromes such as Down's or Pierre—Robin's syndrome; there is currently no consensus concerning diagnosis and therapy. ***Methods:*** The study analyses 40 children, aged 2 through 14 years, with macroscopic tonsillar hypertrophy (without recurrent tonsillitis but with OSAS) underwent adenotonsillectomy. Parents were invited to indicate the intensity of their children's symptomatology using a subjective evaluation scale, each patient underwent cephalometric analysis and polysomnography (PSG) before and after surgery. ***Results:*** The subjective scale of symptoms passed from 3.01 before treatment to 0.42 after treatment, rhinomanometry, passed from 3.456 to 0.896 p after 1 month the surgical operation ($P < 0.05$). The polysomnography showed a resolution of the number of obstructive events in 37 patients and a reduction in 3 patients and RDI index fell from a mean of 26.9—2.6 after therapy. The average of oxygen saturation changed from 79% before treatment to 95% after therapy. ***Conclusions:*** Adenotonsillectomy plays a major role in the treatment of OSAS.

1. Introduction

Obstructive sleep apnea syndrome (OSAS) is characterized by prolonged, generally partial, upper airway obstruction associated with hypoxemia, hypercapnia and the classic symptoms are snoring, apnea, and open mouth. The most common causes of obstructive sleep apnea (OSA) are: nasal obstruction, adenotonsillar hypertrophy, tongue collapse, body mass, cleft palatale, craniofacial disorders, and genetic mechanisms (a familial basis has been reported) [1—5]. The symptoms, signs and possible complications depend from the type and gravity of OSA: poor school performance, somnolence, growth retardation (because the IGF-I axis is affected in children with OSAS), facial and chest deformation and cardiovascular diseases [2,6]. The diagnosis is made on the basis of anamnesis (parents), ENT examination, rhinomanometry, oxymetry, and the gold standard polysomnography (PSG) [7,8].

The aim of our study was to evaluate the treatment of OSA, in selected children, by means of a surgical approach based on inferior turbinotomy involving radiofrequencies and adenotonsillectomy.

2. Material and methods

In our study, we selected 40 children (aged 2—14 years; 23 male and 17 female) with a diagnosis of OSA. Before and a month after treatment, the patients underwent ENT examination, rhinomanometry, polysomnography, and subjective assessment of symptoms on a scale from 0 to 4 (0: no symptoms; 1:

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mild symptoms; 2: moderate symptoms; 3: severe symptoms; 4: very severe symptoms). All the patients underwent inferior turbinotomy by radiofrequencies and adenotonsillectomy.

3. Results

We evaluated our surgical treatment of OSA in 40 children by means of Student's *t*-test. Clinical examination revealed a hypertrophy of the tonsils and inferior turbinates. Symptoms recorded on the subjective scale fell from 3.01 before treatment to 0.42 after treatment ($P < 0.05$). The total resistance to nasal airflow, as assessed by anterior rhinomanometry, decreased from 0.892 Pa s/cm^3 before surgery to 0.125 Pa s/cm^3 1 month after surgery ($P < 0.05$). Polysomnography revealed that obstructive events had been resolved in 37 patients and reduced in 3. The RDI index fell from a mean of 26.9 before therapy to 2.6 after therapy ($P < 0.05$). The average value of oxygen saturation rose from 79% before treatment to 95% after treatment.

4. Discussion

To treat OSA properly, a correct diagnosis must be made. The medical team has to recognize OSA, identify the correct procedure for diagnosis and the risks associated, and evaluate treatment options [7,8]. This can be achieved not only by means of ENT examination but also through instrumental studies such as rhinomanometry, polysomnography (polysomnography is recognized as the gold standard for diagnosing OSA, and there are currently no satisfactory alternatives) and oximetry, which appears to be specific but insensitive [7—9]. In our patients the clinic valuation showed a hypertrophy of adenotonsillar tissue and an increase of nasal total resistance caused from hypertrophy of inferior turbinates. Adenotonsillectomy and inferior turbinectomy by radiofrequency were therefore undertaken. Adenotonsillectomy is the first-line treatment for OSAS but requires careful postoperative monitoring for the high risk of respiratory complications. This surgical operation is curative in 75—100% of children with OSAS, including those who are obese or suffering from congenital central hypoventilation syndrome (CCHS) (sometimes enabled successful nasal mask ventilation). The risk of postoperative respiratory distress in such children is high [10]. It is important to rule out OSAS in children who are candidates for adenotonsillectomy so that such patients are not scheduled for ambulatory surgery, but rather given adequate postoperative monitoring and treatment [11]. Radiofrequency is effective in reducing the nasal resistance. We used radiofrequency in order to decrease the volume of the inferior turbinates. Radiofrequency can be applied to the nose, palate and tongue to treat sleep-disordered breathing [12—16]. We preferred to use this method as it has a bland effect on the nasal mucosa. Radiofrequency causes coagulation of the submucosal tissue, and a reduction in the volume of the inferior turbinates can be observed after 2—3 weeks, without bleeding or nasal package [12]. For selected patients, craniofacial surgery may be helpful. Some children require continuous positive airway pressure or the nasopharyngeal tube. Tracheotomy is rarely indicated [9]. Newer treatment modalities, such as skeletal expansion using distraction osteogenesis to correct facial deformities of the mandible and midface, have changed treatment of OSA during childhood. Although still the gold standard of care in selected cases, tracheostomy is not a benign procedure and the toll on both the patient and family can be devastating [17,18]. However children with OSA usually respond well to adenotonsillectomy. Occasionally, uvulopalatopharyngeal procedures may be necessary. Craniofacial anomalies and significant skeletal anomalies such as severe mandibular hypoplasia have historically been problematic. Tracheostomies were at one time the only way to secure the airway in these patients. New developments in distraction osteogenesis have enabled mandibular lengthening and airway improvement, leading to earlier decannulation of these patients [19]. In selected patients other authors confirm the efficacy of an aggressive surgical approach to the treatment of OSA in children, avoiding the necessity for tracheostomy or permitting decannulation of permanent T in the majority of cases [20]. Also the surgical management of obstructive sleep apnea in children with cerebral palsy were successfully managed without a tracheotomy. Tonsillectomy and/or adenoidectomy is recommended for initial surgical treatment of obstructive sleep apnea in children with cerebral palsy [21]. Also we have to remember therapy with nCPAP eliminated the signs of OSA. nCPAP is an effective and generally well-tolerated therapy for treatment of OSA in infants and children (sometimes children could not tolerate nCPAP) [22].

5. Conclusion

As there are various therapies for OSA in children, a correct clinical evaluation is very important. In our study, adenotonsillectomy proved to be an

efficacious first-line approach in many cases, though other types of treatment cannot be disregarded.

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