

## Age-Related Outcomes of Sleep Apnea Surgery in Infants and Children

Janek S. Januskiewicz, FRACS\*†

Steven R. Cohen, MD\*

Fernando D. Burstein, MD\*

Cathy Simms, RN\*

This study was designed to determine whether age at the time of surgery is an important influencing factor on outcomes following surgical correction of severe refractory obstructive sleep apnea (OSA) in infants and children. Data were collected prospectively on 55 children, all with severe OSA refractory to conservative medical and surgical measures, who underwent combinations of soft-tissue and skeletal procedures aimed at relieving their airway obstruction. The study population was subdivided for analysis into three groups based on age at the time of surgery (>36 months, >12 to <36 months, and ≤12 months). Each child was assessed for clinical outcomes, polysomnography results, and complications. Children in the >36 months group demonstrated a significant improvement in respiratory disturbance index (RDI), apnea index, and lowest overnight oxygen saturation postoperatively. Only RDI improved significantly in the >12 to <36 months group. Although there was a trend toward improvement in the respiratory indices for the children ≤12 months of age, they had a significantly longer intensive care and hospital stay, a greater mean number of extubation attempts, and the highest surgical failure rate (29%). Other complications such as infection, atelectasis, or temporary postoperative nasopharyngeal tube dependence occurred most frequently in the >36 months group. Surgical management of severe refractory OSA in children age ≤12 months is more difficult and less likely to succeed. The reasons for this are discussed and recommendations for management are given.

Januskiewicz JS, Cohen SR, Burstein FD, Simms C. Age-related outcomes of sleep apnea surgery in infants and children. *Ann Plast Surg* 1997;38:465-477

From the \*Center for Craniofacial Disorders, Scottish Rite Children's Medical Center and the †Section of Plastic and Reconstructive Surgery, Emory University, Atlanta, GA.

Received Jun 25, 1996, and in revised form Nov 15, 1996. Accepted for publication Nov 16, 1996.

Address correspondence to Dr Cohen, Center for Craniofacial Disorders, Scottish Rite Children's Medical Center, 5455 Meridian Mark Road, Suite 200, Atlanta, GA 30342.

The sequelae of untreated upper airway obstruction in children are protean, including failure to thrive, pulmonary disease, neurological impairment and intellectual delay, cardiac failure, and death [1, 2]. Hitherto failure of conservative ther-

apies has often necessitated tracheostomy placement with the attendant risks of tube dislodgment or obstruction leading to death, or late complications and decannulation difficulties relating to chronic infection or granulation tissue formation [3, 4]. Tracheostomy may have a profound negative impact on the child's social and psychological development, and in the long term imposes a financial burden on the parents. A variety of other surgical maneuvers have been employed to treat obstructive sleep apnea (OSA) with mixed results [5-8]. These have included soft-tissue procedures such as choanal dilatation and stenting, tonsillectomy, adenoidectomy, uvulopalatopharyngoplasty (UPP), palatal split, tongue-lip adhesion, and tongue reduction; or skeletal surgeries such as maxillary and monobloc advancements, all aimed at improving airway patency.

The senior authors have developed a treatment philosophy for refractory sleep apnea and for tracheostomy-dependent children with craniofacial deformities that has been reported elsewhere [9]. The approach is based on a multidisciplinary team evaluation to define the problem in terms of the anatomic and functional airway zones affected. From these data a rational, sequential, and case-directed surgical strategy is applied with the aims of improving the respiratory index, avoiding tracheostomy, and preventing the long-term sequelae. This protocol has been applied across all age groups for a variety of underlying conditions. It has been our clinical impression that in the younger children (<12 months) it has been more difficult to achieve our aims. This study was undertaken to determine whether the age at time of surgery is an important influencing factor on outcomes of sleep apnea surgery in children and, if so, the reasons for any observed differences.

