Pediatric otolaryngology–head and neck surgery in China: Present situation and future prospects

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Evolution

Pediatric otolaryngology–head and neck surgery (OHNS) is a young discipline in the 21st century. During its development, the discipline and its sub-areas were increasingly enriched and refined, and its name evolved from “ear, nose and throat” to “otorhinolaryngology” and then to “otolaryngology–head and neck surgery”. In the United States, the American Laryngological Association was established in 1878, and the American Academy of Ophthalmology and Otolaryngology was founded in 1903. However, no doctors specialized in pediatric OHNS until the 1940s. Later, several children’s hospitals in the United States began to recruit or train pediatric otolaryngologists. At the 1971 American Academy of Ophthalmology and Otolaryngology annual meeting, Dr. Sylvan Stool invited about 20 doctors who were interested in pediatric otolaryngology to establish an organization of pediatric otolaryngologists. In 1973, the Society for Ear, Nose, and Throat Advances in Children was founded. However, it was not until 1985 that the American Society of Pediatric Otolaryngology, a professional organization in parallel with the American Otological Society and the American Laryngological Association, was finally established.¹,²

The development of pediatric OHNS in China can be divided into three stages. The first stage was marked by the publication of Pediatric Otolaryngology, a monograph edited by Professor Chengxian Yan in 1986.³ In 1994, the first National Conference on Pediatric Otolaryngology was held in Nanjing. Later, pediatric otolaryngology was gradually adopted throughout the country. The second stage started with the establishment of the Pediatrics Group of the Chinese Society of Otolaryngology (hereafter referred to as “the Pediatrics Group”) in 2003. In particular, the publication of Practical Pediatric Otolaryngology⁴ in 2011 played a key role in leading and regulating the advancement of this discipline. With the support and promotion of the Chinese government, large numbers of children’s hospitals and woman and child health care centers were founded across China, providing professional platforms for the development of pediatric Otorhinolaryngology. The Pediatrics Group, as a scholarly organization of physicians and scientists who are engaged in pediatric otolaryngology, greatly promotes the development and specialization of this discipline.⁵ The third stage is a milestone in the development of its connotation. Starting in 2013, Xin Ni, a leader in this field, has expanded the connotation of pediatric otolaryngology and promoted the overall development of pediatric otology, rhinology, laryngology, and head and neck surgery. This has made the diagnosis and treatment of specific ear, nose, and throat (ENT) diseases more professional and refined, changing pediatric OHNS into a more independent discipline.

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The past several decades have also witnessed advances in basic and clinical research on pediatric OHNS, especially in cutting-edge fields such as interdisciplinary studies, genetics, and rare diseases.

**Advances in clinical practice**

Traditionally, ENT diseases in children were referred to as “three kinds of inflammations and deafness” (namely rhinitis, otitis media, tonsillitis, and deafness), and the four main surgeries were tonsillectomy and adenoidectomy, excision of the preauricular fistula, tympanic membrane catheterization, and tracheal and esophageal foreign body removal. In recent years, the diagnosis and treatment of ENT diseases have been further refined and improved with the rapid advances in pediatric OHNS. Pediatric otology, rhinology, laryngology, and head and neck surgery as well as studies on pediatric vertigo, voice, sleep disorders, and hearing problems have gradually resulted in the establishment of specific disciplines with characteristics corresponding to children. More surgical procedures with higher levels of difficulty are available thanks to emerging new techniques and auxiliary equipment.

**Pediatric otology**

The anatomy, physiology, pathology, and disease manifestations of the ears are quite different in children than that in adults. For example, early diagnosis and treatment of hearing impairment is critically important for speech development in children. Because of the high plasticity of the auditory cortex in children, cochlear implantation can be highly effective in improving the speech development of hearing-impaired children. In addition, new advances in deafness gene research have led to the diagnosis of various causes of deafness at the molecular level, shedding new light on future gene therapy. The Universal newborn hearing screening (UNHS) is beginning in 2003. It has allowed for early detection, intervention, and treatment of hearing impairment in children. This has effectively reduced the incidence of deafness and dramatically improved the recovery rate, contributing greatly to children’s hearing health. The diagnosis and treatment of middle ear diseases are another priority. Otitis media is one of the most common diseases in childhood. Because of the special anatomical and physiological features of their middle ears, children often develop otitis media, the incidence of which declines with age. The recent advances in otology have contributed to the optimized management of otitis media, especially the etiology-based diagnosis and treatment of this disease. With the introduction of techniques such as eustachian tube function tests, advances in diagnosis, and the introduction of minimally invasive endoscopic treatment, the specialty of pediatric ear surgery has quickly been established. In 2008, the Pediatrics Group launched the *Guidelines for the Diagnosis and Treatment of Children with Otitis Media (Draft)* to standardize the clinical practice.

**Pediatric rhinology**

Allergic rhinitis and rhinosinusitis are also remarkably different between children and adults. The Pediatrics Group steered the *Guidelines for Diagnosis and Treatment of Pediatric Allergic Rhinitis* in 2011 and the *Recommendations on the Diagnosis and Treatment of Pediatric Rhinosinusitis* in 2013, paving the way for more standardized diagnosis and treatment of children with allergic rhinitis and rhinosinusitis. The clinical value of these documents has also been recognized by international peers. Pediatric nasal diseases such as malignant nasal/sinus tumors, nasal/ophthalmologic diseases (e.g., congenital lacrimal cysts and sinusitis-induced intraorbital complications), nasal/skull-related diseases (e.g., meningeal herniation, nasal glial heterotopia, and median nasal dermoid fistula), and nasal/cranial communicated injuries are diverse and complex and require standard management. More standardized diagnosis and treatment protocols that are suitable for pediatric patients are expected on the basis of case analyses, multidisciplinary cooperation, and introduction of more sophisticated technology.

**Management of upper airway diseases**

Obstructive sleep apnea syndrome (OSAS) is one of the most common airway diseases in children. In 2008 and 2018, respectively, the Pediatrics Group issued the *Guidelines for the Diagnosis and Treatment of Obstructive Sleep Apnea Hypopnea Syndrome in Children* and the *Expert Consensus on Diagnosis and Treatment of Tracheobronchial Foreign Bodies in Chinese Children*. Meanwhile, the Beijing Children’s Hospital successfully organized a nationwide multicenter study on pediatric OSAS, in which the epidemiology, pathogenesis, assessment, and treatment of pediatric OSAS in China were systematically analyzed. With advances in research on the etiologies and pathological mechanisms of pediatric respiratory sleep diseases, the danger of these conditions has been fully recognized and the corresponding treatments standardized. The introduction of these strategies has allowed for pre-emptive management of pediatric patients with chronic disease. Notable achievements have also been made in the standard and multidisciplinary treatment of pediatric upper airway diseases including laryngomalacia, laryngotracheal malformation, childhood recurrent respiratory papillomatosis, and laryngopharyngeal reflux.

**Pediatric head and neck surgery**

With the hard work of the head and neck surgeons from Beijing Children’s Hospital, surgical treatment protocols have been established for a variety of diseases in children, including thyroglossal cysts, high tracheoesophageal...
fistula, head and neck vascular malformations, and thyroid cancer. Meanwhile, many innovative techniques have enabled the standard diagnosis and treatment of pediatric head and neck diseases and paved the way for the development of pediatric head and neck surgery as a specialty; such techniques include the endoscopic diagnosis and minimally invasive treatment of piriform sinus fistula, ultrasound-guided intervention of vascular malformation, esophageal repair and reconstruction, intraoperative recurrent laryngeal nerve monitoring, small-incision endoscopic surgery of thyroid tumors, and nanocarbon negative parathyroid imaging and protection. The multidisciplinary team approach to the management of head and neck diseases in children has also been advocated in an attempt to maximize patient benefits with minimum costs. In July 2019, the National Children’s Medical Center and the Head and Neck Cancer Professional Committee of China Anti-Cancer Association, together with many top experts in pediatric OHNS, translated and published two important books: *Pediatric Head and Neck Tumors and Rhoton’s Atlas of Head, Neck, and Brain*, offering informative references and marking the rise of pediatric head and neck surgery in China.

**Construction of the discipline**

Since the 1950s, older generations including those of Sichang Jiang and Yinxiang Xu have made great contributions to the construction of the discipline of pediatric OHNS. In 1994, the first National Conference on Pediatric Otolaryngology of the Chinese Medical Association was successfully held in Nanjing. Ten years later, in 2004, the Second Annual Meeting of Pediatric Otorhinolaryngology was held in Xiamen; this was also the first academic annual meeting after the establishment of the Pediatrics Group. The biannual meeting has been held continuously since 2008, serving as a robust platform for pediatric otorhinolaryngologists. From clinical practice to basic mechanisms and new technology promotion, construction of the discipline of pediatric otorhinolaryngology has been increasingly optimized.

*Pediatric Otorhinolaryngology*, edited by Chengxian Yan, was published in 1986. This was among the first batch of Chinese textbooks in this field. Later, Yude Guo, Jingru Qin, Yuxiu Liu, and many other authors also authored influential monographs on pediatric otorhinolaryngology. In 2011, the publication of *Practical Pediatric Otolaryngology* marked the further development of this field.

The Chinese Medical Association officially approved the establishment of the Pediatric Group of the Chinese Society of OHNS in early 2003. More than 228 children’s hospitals and maternal and child health centers staffed by more than 500 otorhinolaryngologists now exist nationwide. Doctors specialized in the management of ENT diseases are also available in the otorhinolaryngology departments of some general hospitals. The professional organizations in this field include the Chinese Society of OHNS, Chinese Society of Pediatrics, Chinese Association of Otorhinolaryngologists, and Chinese Association of Pediatricians. More medical staff have been engaged in pediatric otorhinolaryngology with the establishment of the Professional Committee on Pediatric OHNS in the National Center for Children’s Health and Futang Research Center of Pediatric Development.

**Professional training**

Professional training in pediatric OHNS has been increasingly standardized. In the standardized training for resident doctors, the rotation of pediatric OHNS has been gradually integrated into the ENT discipline because of the differences in disease types and medical algorithms and because more residents choose to receive training in pediatric OHNS in children’s hospitals. In addition, pediatric OHNS has been added to the courses for college students specializing in pediatrics or otorhinolaryngology, laying a solid foundation for the training of young doctors in this discipline. Thus, reasonable professional-training modes have been adopted for pediatric OHNS, and new generations of doctors and scientists are constantly emerging.

**Promising future**

Pediatric OHNS has entered a new developmental period. Because diseases in this field are often congenital and hereditary, their genetic features and the functions of related genes will be hot research topics in future, and precise intervention and treatment at the molecular level will further change the diagnostic protocols and treatment techniques. Meanwhile, the extensive application and further development of artificial intelligence technology in this field has led to dramatic changes in the diagnosis and treatment modalities. Otorhinolaryngologists must be alert to new theories and technologies and pay close attention to breakthroughs in basic medical technology and their influences. The future priorities of pediatric OHNS may include disease prevention, individualized diagnosis, precise treatment, and standardized management, which will surely benefit more pediatric patients and their families.

**CONFLICT OF INTEREST**

No conflict of interest exists with this manuscript.

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