

Abstract Selection

Steroid treatment improves cochlear function in the MRL.MpJ-Fas(1pr) autoimmune mouse. Trune, D. R., Wobig, R. J., Kempton, J. B., Hefeneider, S. H. Oregon Hearing Research Center, Department of Otolaryngology–Head and Neck Surgery, Oregon Health Sciences University, NRCO4, 3181 SW Sam Jackson Park Road, Portland, OR 97201-3098, USA. truned@ohsu.edu. *Hearing Research* (1999) November, Vol: 137 (1–2), pp. 160–6.

Corticosteroid therapy is used to reverse autoimmune sensorineural hearing loss, although little is known of the mechanism by which this occurs. This has been due to the lack of a suitable animal model with spontaneous hearing loss that is steroid responsive. The present study examined the effects of prednisolone treatment on auditory thresholds in the MRL.MpJ-Fas(1pr) autoimmune mouse to determine its suitability as such a model. Autoimmune mice at 3.5–4.5 months of age were evaluated by pure-tone auditory brainstem response (ABR) to establish threshold elevations due to the disease. The steroid treatment group was then given prednisolone in their drinking water for 2.5 months, while untreated controls were given tap water. Significantly more steroid treated mice survived to the time of post-treatment ABR evaluation. Half of the steroid treated ears demonstrated either improvement or no change in cochlear function compared to only 25 per cent in the untreated controls. Overall, cochlear thresholds in the untreated controls increased by 14.7 dB, whereas no significant threshold increase was seen in the steroid treated group (4.3 dB) over the treatment period. No qualitative anatomical differences were seen in the ears of those mice surviving to the end of the study. These findings establish the autoimmune mouse as a model for studies of steroid responsive mechanisms within the ear. This could apply to autoimmune sensorineural hearing loss, as well as any hearing disorder for which steroid therapy is recommended.

Where are the receptors for *Streptococcus pyogenes* located on the tonsillar surface epithelium? Lilja, M., Silvola, J., Raisanen, S., Stenfors, L. E. Department of Otolaryngology, Faculty of Medicine, University of Tromsø, Norway. *International Journal of Pediatric Otorhinolaryngology* (1999) October 15, Vol. 50 (1), pp. 37–43.

Streptococcus pyogenes is the most frequent causative agent of acute pharyngotonsillitis (AT). The first events in the etiopathogenesis of an AT infection caused by these bacterial pathogens are their penetration through the mucus film covering the oropharyngeal mucosa, and their attachment to the surface epithelium. Adherence of *S. pyogenes* to tonsillar epithelial cells is a precondition for bacterial colonization, for triggering off cell activation, internalizing of bacteria into the epithelial cells and cytokine release from the epithelial cells with subsequent induction of an inflammatory reaction in underlying tissues. Scanning and transmission electron microscopic studies revealed that the surface epithelium of the human palatine tonsils consisted of a weakly keratinized, stratified squamous epithelium built up of pentagonal cells where the apical cell surface formed an irregular pattern of microridges. The distance between two adjacent microridges was roughly one-third of the diameter of a *S. pyogenes* bacterium. By using gold-labelled antiserum to *S. pyogenes*, we showed that the target region for these pathogens on the epithelial cells during an on-going AT infection was located on the crests of the microridges where bacterial pili made adhesin-receptor contact with the tonsillar surface epithelium.

How easily do topical antibiotics pass through tympanostomy tubes? An in vitro study. Saunders, M. W., Robinson, P. J. Department of Otorhinolaryngology, Southmead Hospital, Bristol, UK. *International Journal of Pediatric Otorhinolaryngology* (1999) October 15, Vol. 50 (1), pp. 45–50.

BACKGROUND: Despite potential ototoxicity, eardrops contain-

ing aminoglycosides remain in widespread use in the presence of indwelling tympanostomy tubes (grommets). It is unclear how readily they pass into the middle ear during administration, nor whether this is affected by middle ear secretions. MATERIALS AND METHODS: The trans-tympanic pressure required to force antibiotic solutions through a tympanostomy tube in an artificial middle ear model was investigated with six ototopical preparations and two sizes of tube. To assess the effect of middle ear secretions, tympanostomy tubes removed from patients ears were investigated in addition to new tubes. The intra-canal pressure generated during tragal massage was also measured. RESULTS: Pressures required for leakage of solutions differed significantly between solutions ($p = 0.001$) and tube sizes, smaller lumen tubes requiring higher trans-tympanic pressure for leakage to occur. The presence of middle ear secretions reduced the pressure required for leakage of solution. Tragal massage generated pressures of over 20 cm of H₂O which would be enough to force solution into the middle ear in all tube/solution combinations. DISCUSSION: Some antibiotic solution is likely to leak into the middle ear during most applications of antibiotic solution. Although the risk is small, this suggests the possibility of ototoxicity, previously demonstrated in animal experiments. The relatively low incidence of this occurrence in clinical practice is thought to be related to inter-species anatomical variations.

Single-or-two-stage laryngotracheal reconstruction; comparison of outcomes. Saunders, M. W., Thirlwall, A., Jacob, A., Albert, D. M. Department of Otolaryngology, Southmead Hospital, University of Bristol, UK. mike.saunders@bris.ac.uk. *International Journal of Pediatric Otorhinolaryngology* (1999) October 15, Vol. 50 (1), pp. 51–4.

To compare single-stage laryngotracheal reconstruction (SSLTR) and reconstruction with tracheostomy and indwelling stent (two-stage LTR), a retrospective review was made of 69 patients undergoing laryngotracheal reconstruction for subglottic stenosis at Great Ormond Street Hospital for Sick Children. Pre-operative details recorded included grade and aetiology of subglottic stenosis, history of previous laryngeal surgery, sex of patient and age at reconstruction. As a measure of outcome, the total number of procedures including all endoscopy and further reconstruction was recorded as well as de-cannulation rate, and the need for more than one reconstruction. The patients undergoing two-stage reconstruction tended to have more severe stenosis (mean grade = 2.56) compared to the SSLTR group (mean grade = 2.14) and were more likely to have had previous laryngeal surgery. Inevitably, the outcome after reconstruction in the two-stage patients is therefore less favourable, and direct comparison of the two groups is not statistically valid. However, multiple regression analysis reveals that single-stage reconstruction does confer a significant independent advantage over the two-stage procedure in terms of average number of post reconstruction procedures ($p = 0.006$), and a significant advantage in de-cannulation rate ($p = 0.03$). No difference was noted in the requirement for further reconstruction between the two groups. Although a two-stage procedure is still required in certain cases such as those with very severe stenosis or respiratory insufficiency, the single-stage reconstruction is the procedure of choice for uncomplicated paediatric subglottic stenosis.

Unilateral sensorineural hearing loss and its aetiology in childhood: the contribution of computerised tomography in aetiological diagnosis and management. Bamiou, D. E., Savy, L., O'Mahoney, C., Phelps, P., Sirimanna, T. Audiology Department, Great Ormond Street Hospital for Sick Children, London, UK. doriseva@indirect.co.uk *International Journal of Pediatric Otorhinolaryngology* (1999) December 5, Vol. 51 (2), pp. 91–9.

OBJECTIVES: The objective of this study was to identify factors correlated with the CT outcome and to examine the contribution of the CT scan in the aetiological diagnosis and management of unilateral sensorineural hearing loss in childhood. **METHODS:** The records of 35 consecutively investigated patients by the Audiology Department of Great Ormond Street Hospital between January 1996 and June 1998 were reviewed. The CT results, population sample characteristics, initiation of further investigations after the CT results and management decisions based on the CT results were tabulated and analysed. **RESULTS:** In a series of 35 consecutively investigated children with unilateral sensorineural hearing loss, 11 CT scans were identified as abnormal. The CT findings were: labyrinthitis ossificans (3), unilaterally dilated vestibular aqueduct (2), bilaterally dilated vestibular aqueduct (2), unilateral deformity of the cochlea ('Mondini') (1), unilateral severe labyrinthine dysplasia (1), unilateral markedly narrow internal acoustic meatus (1), bilaterally dilated lateral semicircular canals (1). The presence of progressive hearing loss was a significant predictor of abnormal CT outcome, while the severity of hearing loss was not. The CT scans offered valuable information regarding the aetiological diagnosis in all cases and, in addition, prompted the appropriate vestibular rehabilitation in three cases, further investigations in four (with dilated vestibular aqueduct) and hearing preservation counselling in two (bilateral DVA) (seven out of 35 = 20 per cent). **CONCLUSION:** All children with unilateral sensorineural hearing loss should have a CT scan of the petrous pyramids/IAMs performed at some stage, as not only aetiology but also prognosis and management of these cases may be significantly influenced by the CT outcome.

The character and consequences of disturbing sound sensations in retraction type middle ear disease. Bunne, M., Falk, B., Hellstrom, S., Magnuson, B. Department of Otorhinolaryngology, Hospital of Boden, Sweden. marie.bunne@nll.se. *International Journal of Pediatric Otorhinolaryngology* (1999) November 15, Vol. 51 (1), pp. 11–21.

OBJECTIVE: Transient sound disturbances are common but neglected symptoms in retraction type middle ear disease (R-MED). The aim of this study was to explore and describe their character, their individual consequences, and their role in the development of tympanic membrane retractions. **METHODS:** Fifty-three subjects with manifest retractions and experiences of disturbing sound and ear analysis of the transcribed interviews. **RESULTS:** Two different patterns emerged from the interviews. 1. Too weak sound was the least common and most tolerable disturbance. It occurred in 45 per cent and was eliminated by Valsalva's inflation. 2. Sudden and transient sensations of too loud and piercing sound, and intermittent autophony frequently caused intense and intolerable discomfort, which might in turn cause loss of control of speech and conversation. These types occurred in 74 per cent and 60 per cent, respectively, and were eliminated by evacuating the middle ear, for example by sniffing. Subjects who described too loud sound or intermittent autophony commonly preferred a retracted tympanic membrane position. This may explain why pressure equalization by swallowing, and inflation by Valsalva's manoeuvre often elicited discomfort. **CONCLUSIONS:** Transient experience of too loud sound or intermittent autophony may indicate a shift of sound preference towards the sound experienced at negative middle ear pressure, and an unreliable tubal function in the sense that it fails to stay closed to protect the ear from sounds and pressure variations in the nasopharynx. Such experiences of altered sound may trigger evacuation of the middle ear, which eliminates the sound disturbance. It is crucial to identify, interpret, and explain the disturbances correctly in the therapy and prevention of retractions, since habitual evacuation exposes the tympanic membrane to strong negative pressure loads and a subsequent risk of developing retraction.

Audiological findings in large vestibular aqueduct syndrome. Govaerts, P. J., Casselman, J., Daemers, K., De Ceulaer, G., Somers, T., Offeciers, F. E. University Department of Otolaryngology, St Augustinus Hospital (University of Antwerp), Antwerp-Wilrijk, Belgium. govaerts@uia.ua.ac.be. *International Journal of Pediatric Otorhinolaryngology* (1999) December 15, Vol. 15 (3), pp. 158–64.

An enlarged vestibular aqueduct is a congenital disorder causing early onset and progressive hearing loss in children. This paper presents the audiological findings at first presentation and the

audiological evolution in 10 consecutive cases presenting with hearing loss and showing a large vestibular aqueduct on imaging. The reported onset of the hearing loss is within the first few years of life. Most of the cases (80 per cent) showed bilateral involvement. The sex ratio was one. Patients presented on average at age five with a median hearing loss of 62 dB at the speech frequencies. The hearing loss was essentially asymmetrical with an interaural difference, of 33 dB and it was a mixed type of hearing loss in 90 per cent of the cases. The authors claim that the conductive component of this hearing loss is a pure cochlear conductive loss which may be pathognomonic for the disease. The presence of a conductive component in a child is easily misinterpreted as a middle ear ventilation problem or in case of good ventilation as an ossicular problem (type otosclerosis). In addition and in contrast to most literature data, the authors did not find evidence for stabilization of the hearing loss but the found a steady decrease of the hearing at an average rate of four dB/year.

Large vestibular aqueduct syndrome treated by hyperbaric oxygen. Nakashima, T., Ueda, H., Furuhashi, A., Yasue, M., Beppu, R., Ogawa, K., Takahashi, H. Department of Otorhinolaryngology, Nagoya University School of Medicine, Japan. *International Journal of Pediatric Otorhinolaryngology* (1999) December 15, Vol. 51 (3), pp. 207–10.

We report the case of a 14-year-old girl with a large vestibular aqueduct (LVA) in whom hyperbaric oxygen (HBO) therapy was effective for the treatment of sensorineural hearing loss. The patient was referred to Nagoya University Hospital for the treatment of hearing loss on 14 September, 1998, because her right hearing level had declined abruptly on 22 August, 1998, and had not changed for three weeks since then in spite of steroid and prostaglandin therapy. Her audiogram revealed bilateral profound deafness of more than 110 dB. She had had profound hearing loss on the left side since she was nine years old. HBO therapy was performed on 22 occasions from 17 September until 19 October, 1998. During the HBO therapy, her right hearing ability returned almost to the level determined prior to the abrupt loss, 60 dB. We therefore recommend HBO therapy for the treatment of sensorineural hearing loss associated with large vestibular aqueduct syndrome if the hearing ability does not recover following conventional treatment.

Evaluation of markers of deep vein thrombosis in patients undergoing surgery for maxillofacial malignancies. Wendel, H. P., Scholpp, J., Schulze, H. J., Heller, W., Schwenzer, N. Department of Thoracic, Cardiac and Vascular Surgery, Eberhard-Karls-University, Tuebingen, Germany. hp.wendel@uni-tuebingen.de. *Journal of Cranio-Maxillo-Facial Surgery* (1999) August, Vol. 27 (4), pp. 266–70.

During and following significant surgical intervention, deep venous thrombosis prophylaxis by application of anticoagulants is routinely used. However, patients with malignant disorders are subject to an especially high risk of deep venous thrombosis progressing in severe cases to subsequent pulmonary embolism. The present study focuses on appraising modern markers of deep vein thrombosis in 34 patients undergoing major maxillofacial surgery, with some malignant disorders. No significant differences between the two patient groups were noted using the markers of the kallikrein-kinin-system. From the first postoperative day plasma levels of the coagulation indicator thrombin-antithrombin-III complexes were significantly higher in the group of tumour patients. Markers of fibrinolysis indicated corresponding results: on the first postoperative day tissue-plasminogen activator values rose to 18.9 ± 3.2 micrograms/l in the group of malignant patients, but only to 7.4 ± 1.1 micrograms/l ($p < 0.05$) in the control group. Also postoperative D-dimer concentrations in the malignancy group were significantly above those of the control group. In the present study it could be demonstrated that patients with malignant neoplasia undergoing major maxillofacial surgery are exposed postoperatively to a particularly high risk of developing thromboembolic complications. All in all, the status of anti-thrombotic therapy requires reappraisal with respect to the current treatment approach adopted in tumour patients.

Microanatomical variations in the cerebellopontine angle associated with vestibular schwannomas (acoustic neuromas): a retrospective study of 1006 consecutive cases. Sampath, P., Rini, D., Long, D. M. Department of Neurological Surgery, Johns

Hopkins School of Medicine, Baltimore, Maryland, USA. prakash_sampath@brown.edu. *Journal of Neurosurgery* (2000) January, Vol. 92 (1), pp. 70–8.

OBJECT: Great advances in neuroimaging, intraoperative cranial nerve monitoring, and microsurgical technique have shifted the focus of acoustic neuroma surgery from prolonging life to preserving cranial nerve function in patients. An appreciation of the vascular and cranial nerve microanatomy and the intimate relationship between neurovascular structures and the tumour is essential to achieve optimum results. In this paper the authors analyse the microanatomical variations in location of the facial and cochlear nerves in the cerebellopontine angle (CPA) associated with acoustic neuromas and, additionally, describe the frequency of involvement of surrounding neural and vascular structures with acoustic tumours of varying size. The authors base these findings on their experience with 1006 consecutive patients who underwent surgery via a retrosigmoid or translabyrinthine approach. **METHODS:** Between July 1969 and January 1998, the senior author (D.M.L.) performed surgery in 1022 patients for acoustic neuroma: 705 (69 per cent) via the retrosigmoid (suboccipital); 301 (29 per cent) via the translabyrinthine; and 16 (two per cent) via the middle fossa approach. Patients undergoing the middle fossa approach were excluded from the study. The remaining 1006 patients were subdivided into three groups based on tumour size; Group I tumours (609 patients (61 per cent)) were smaller than 2.5 cm; Group II tumours (244 patients (24 per cent)) were between 2.5 cm and 4 cm; and Group III tumours (153 patients (15 per cent)) were larger than 4 cm. The senior author's operative notes were analysed for each patient. Relevant cranial nerve and vascular 'involvement' as well as anatomical location with respect to the tumour in the CPA were noted. 'Involvement' was defined as adherent between neurovascular structure and tumour (or capsule), for which surgical dissection was required to free the structure. Seventh and eighth cranial nerve involvement was divided into anterior, posterior, and polar (around the upper or lower pole) locations. Anterior and posterior locations were further subdivided into upper, middle, or lower thirds of the tumour. The most common location of the seventh cranial nerve (facial) was the anterior middle third of the tumour for all groups, although a significant number were found on the anterior superior portion. The posterior location was exceedingly rare (< one per cent). Interestingly, patients with smaller tumours (Group I) had an incidence (3.4 per cent) of the seventh cranial nerve passing through the tumour itself, equal to that of patients with larger tumours. The anterior inferior portion of the tumour. Not surprisingly, larger tumours (Group III) had a higher incidence of involvement of fourth cranial nerve (41 per cent), fifth cranial nerve (100 per cent), ninth–11th cranial nerve complex (41 per cent), fifth cranial nerve (100 per cent), ninth–11th cranial nerve complex (99 per cent), and 12th cranial nerve (31 per cent), as well as superior cerebellar artery (79 per cent), anterior inferior cerebellar artery (AICA) trunk (91.5 per cent), AICA branches (100 per cent), posterior inferior cerebellar artery (PICA) trunk (59.5 per cent), PICA branches (79 per cent) and the vertebral artery (VA) (93.5 per cent). A small number of patients in Group III also had AICA (3.3 per cent), PICA (3.3 per cent), or VA (1.3 per cent) vessels within the tumour itself. **CONCLUSIONS:** In this study, the authors show the great variation in anatomical location and involvement of neurovascular structures in the CPA. With this knowledge, they present certain technical lessons that may be useful in preserving nerve function during surgery and, in doing so, hope to provide neurosurgeons and neurootologists with valuable information that may help to achieve optimum outcomes in patients.

Patients with head and neck tumours excrete a chondroitin sulfate with a low degree of sulfation: a new tool for diagnosis and follow-up of cancer therapy. Martins, J. R., Gadelha, M. E., Fonseca, S. M., Sampaio, L. O., De L Pontes, P. A., Dietrich, C. P., Nader, H. B. Departamento de Bioquímica-Biologia Molecular, Universidade Federal de Sao Paulo, Escola Paulista de Medicina, Brazil. *Otolaryngology – Head & Neck Surgery* (2000) January, Vol. 122 (1), pp. 115–8.

The chondroitin sulfate excreted in the urine of 10 patients with cancer of the head and neck and 27 healthy subjects was analysed. The disaccharide products formed from chondroitin sulfate excreted by these 10 patients by action of chondroitinase ABC show a significant ($p < 0.0001$) relative increase of nonsulfated

disaccharide (35.6 per cent \pm 5.7 per cent) when compared with the nonsulfated disaccharide (10.0 per cent \pm 0.9 per cent) present in the chondroitin sulfate of 27 healthy subjects. In six patients the structure of the excreted compound was analysed up to four months after surgery. After removal of the cancer, the percent amounts of the nonsulfated disaccharide tend to approach the values found for the chondroitin sulfate of healthy subjects. A significant ($p < 0.0001$) change in the ratio of urinary chondroitin sulfate and heparan sulfate and a decrease in the electrophoretic migration of chondroitin sulfate were also observed. All of the patients with head and neck cancer analysed so far have shown this structural anomaly of urinary chondroitin sulfate. This assay may be useful in the diagnosis and follow-up of cancer therapy.

Tonsillectomy in diagnosis of the unknown primary tumour of the head and neck. Randall, D. A., Johnstone, P. A., Foss, R. D., Martin, P. J. Department of Otorhinolaryngology, Naval Medical Center San Diego, CA, USA. *Otolaryngology – Head & Neck Surgery* (2000) January, Vol. 122 (1), pp. 52–5.

OBJECTIVES: The purpose of this study was to discuss the experience of one tumour registry with performing tonsillectomy in the diagnostic approach to unknown head and neck primary tumours. It also describes the importance of including tonsillectomy in this evaluation algorithm. **STUDY DESIGN:** A retrospective chart review was done of 68 patients with either tonsillar or unknown primary squamous cell carcinoma culled from 829 patients seen from 1956 to 1996 at the head and neck tumour registry at the Naval Medical Center San Diego. **METHODS:** Records from the head and neck tumour registry, radiation oncology service, and pathology department were reviewed with attention to presenting symptom, initial examination, diagnostic studies performed, and type and result of biopsies performed. **RESULTS:** thirty-four patients sought treatment for a neck lymph node metastasis of squamous cell carcinoma without an identifiable primary tumour site. Six of these (18 per cent) had the primary site diagnosed by performing tonsillectomy ipsilateral to the presenting neck mass. Six of 14 T1 tonsillar carcinomas in this series had the primary site identified by tonsillectomy. **CONCLUSIONS:** Despite a diligent search, a primary tumour site may not be found in the head and neck cancer patient. The tonsil may harbor an occult squamous cell carcinoma. The patient benefits from identification of the initial tumour site because postoperative irradiation ports may be reduced and because surveillance for recurrence may be improved. For these reasons, tonsillectomy should be performed ipsilateral to the presenting cervical metastasis if no other primary tumour site is identified.

Effect of verapamil on cholesteatoma migration in vitro. Kountakis, S. E., Chang, C. Y., Minotti, A. M., Cabral, F. R. Department of Otolaryngology, University of Texas-Houston Medical School, Houston, USA. *Otolaryngology – Head & Neck Surgery* (2000) January, Vol. 122 (1), pp. 91–5.

OBJECTIVES: It was previously shown that cholesteatoma migration in vitro is influenced by the calcium concentration of the culture medium. This study was designed to determine whether the calcium channel blocker verapamil affects cholesteatoma migration in vitro. **METHODS:** Cholesteatoma cells harvested from patients with chronic ear disease were grown in culture and were exposed to culture medium containing verapamil. The migration rate of the verapamil-exposed cells was compared with control rates. **RESULTS:** Verapamil at 300 microgram/l caused marked reduction in the rate of migration compared with control values. The migration rate returned to normal within 48 hours after verapamil was removed from the culture medium. Higher verapamil concentrations (500 micrograms/l) caused complete detachment of the epithelial cells from the substrate within 24 hours. **CONCLUSION:** Our findings suggest that cholesteatoma migration in vitro is calcium channel dependent and can be reduced with calcium channel blockers such as verapamil.

Pharyngeal acid reflux in patients with single and multiple otolaryngologic disorders. Ulualp, S. O., Toohill, R. J., Shaker, R. MCW Dysphagia Institute, Department of Otolaryngology and Human Communication Disorders, Division of Gastroenterology and Hepatology, Medical College of Wisconsin, Milwaukee, USA. *Otolaryngology – Head & Neck Surgery* (1999) December, Vol. 121 (6), pp. 725–30.

OBJECTIVE: This study was designed to determine the prevalence and characteristics of pharyngeal acid reflux (PAR) events in single and multiple otolaryngologic disorders. **METHODS:** Sixty-seven patients with otolaryngologic symptoms and objective findings and 34 healthy control subjects were studied with an ambulatory 24-hour, three-site pharyngoesophageal pH monitoring technique. Otolaryngologic diagnosis included isolated posterior laryngitis (PL) in 28 patients, isolated chronic rhinosinusitis (SIN) in 12, combined PL and SIN (PL+SIN) in six, PL plus laryngotracheal stenosis (PL+LTS) in 12, and PL plus vocal cord nodules (PL+VCN) in nine. **RESULTS:** PAR events were documented in 68 per cent of patients with PL, 34 per cent of patients with SIN, 67 per cent of patients with PL+SIN, 67 per cent of patients with PL+LTS, 78 per cent of patients with PL+VCN, and 21 per cent of controls. The prevalence of PAR events in patients with isolated PL as well as those with PL combined with other disorders was significantly higher than that in patients without PL and that in controls. As a group, patients with PL had a greater number of PAR events and acid exposure time than other patients and controls. Distal and proximal esophageal reflux parameters were not significantly different among groups. **CONCLUSIONS:** The prevalence of PAR is significantly higher in patients with isolated PL compared to patients with other isolated otolaryngologic disorders and in controls. The prevalence of PAR in isolated otolaryngologic disorders other than PL is similar to that in healthy controls. The prevalence of PAR is significantly higher in patients with both PL and other otolaryngologic disorders than in controls and in patients with isolated otolaryngologic disorders.

Hearing preservation in solitary vestibular schwannoma surgery using the retrosigmoid approach. Moffat, D. A., da Cruz, M. J., Baguley, D. M., Beynon, G. J., Hardy, D. G. Department of Otoneurosurgical and Skull Base Surgery, Addenbrooke's Hospital, Cambridge, United Kingdom. *Otolaryngology – Head & Neck Surgery* (1999) December, Vol. 121 (6), pp. 781–8.

The results of 50 cases of vestibular schwannoma surgery with hearing preservation performed by the retrosigmoid approach at Addenbrooke's Hospital, Cambridge, during a 10 year period are presented. The hearing-preservation rate, using audiometric criteria set by others as 'serviceable hearing' (Wade, P. J., House, W., *Otolaryngology Head and Neck Surgery* 1984;**92**:1184–93; Silverstein, H., *et al.*, *Otolaryngol Head Neck Surg* 1986;**95**:285–91; Cohen, N. L., *et al.*, *Am J Otol* 1993;**14**:423–33) was eight per cent (four of 50 cases). When the more stringent selection criteria of near-normal hearing and reporting criteria of socially useful hearing preservation (pure-tone average < 30 dB/ speech discrimination score > 70 per cent) is used, the hearing-preservation rate is 4.8 per cent (one of 21 cases). The only preoperative factor that may predict a favourable hearing-preservation outcome is normal auditory brain stem response morphology (Fisher's exact two-tailed test, $p < 0.001$). The number of suitable candidates for hearing-preservation surgery are few. Reasonable indications for attempted vestibular schwannoma surgery with hearing preservation are discussed.

Pediatric type I thyroplasty: an evolving procedure. Link, D. T., Rutter, M. J., Liu, J. H., Willging, J. P., Myer, C. M., Cotton, R. T. Department of Pediatric Otolaryngology–Head and Neck Surgery and the Aerodigestive and Sleep Center, Children's Hospital Medical Center, University of Cincinnati College of Medicine, Ohio, USA. *The Annals of Otolaryngology, Rhinology and Laryngology* (1999) December, Vol. 108 (12), pp. 1105–10.

The treatment of vocal fold paralysis of type I thyroplasty in the pediatric age group has not been reported. From 1990 to 1998, 12 type I thyroplasty procedures were performed on eight patients between two and 17 years of age. The most common cause of vocal fold paralysis was neurologic, followed by vagal injury from a cardiac procedure. The most common indications for the procedure were aspiration and dysphonia. In our early thyroplasty experience, adult techniques and measurements adapted after Isshiki or Netterville were used. Postoperative laryngoscopy showed that in most cases, the placement of the implant was too high. There were variable outcomes in aspiration and dysphonia with this technique. These findings appear to be independent of thyroplasty approach or of implant design type. We conclude that the standard approach for vocal fold medialization in the adult cannot be applied accurately in the pediatric population. In

performing pediatric thyroplasty, the anatomically lower position of the vocal fold must be taken into consideration. We have since modified our technique to adjust for accurate identification of the vocal fold line and medialization. The modified approach for vocal fold medialization in the pediatric population is discussed.

Motor innervation of the human cricopharyngeus muscle. Sasaki, C. T., Kim, Y. H., Sims, H. S., Czibulka, A. Section of Otolaryngology, Yale School of Medicine, New Haven, Connecticut, USA. *The Annals of Otolaryngology, Rhinology and Laryngology* (1999) December, Vol. 108 (12), pp. 1132–9.

Innervation of the human cricopharyngeus muscle remains historically controversial and unclear, encouraging numerous treatments inconsistently designed to pharmacologically or mechanically alter the contractile state of this muscle. Neuroanatomic controversy results from and is perpetuated by 1) use of nonhuman models, 2) observational misinterpretation of small-diameter, overlapping nerve fibres, and, most importantly, 3) lack of real-time verification of neural projections. We sought to overcome these difficulties by performing microdissections in 27 patients undergoing laryngectomy and using real-time electromyographic verification. We demonstrated 1) dual ipsilateral innervation by the pharyngeal plexus and recurrent laryngeal nerve, 2) segmental projection of the recurrent laryngeal nerve to anterior motor units, 3) pharyngeal plexus projection to posterior motor units, 4) absence of a sympathetic or external superior laryngeal nerve contribution, and 5) absence of contralateral innervation. Such dual ipsilateral innervation, segmentally projected, has not been previously described in any other form of neuromuscular organization. Neuroanatomic accuracy should improve diagnostic and therapeutic strategies for future management of pharyngeal dysphagia.

Acuteness of preoperative factors to predict hearing preservation in acoustic neuroma surgery. Ferber-Viart, C., Laoust, L., Boulud, B., Duclaux, R., Dubreuil, C. Audiovestibular Exploration and ENT Unit, Claude Bernard Lyon I University, Lyon South Hospital, France. *The Laryngoscope* (2000) January, Vol. 110 (1), pp. 145–50.

OBJECTIVES: To determine in patients with acoustic neuromas the predictive factors of hearing preservation according to clinical, radiological, and electrophysiological parameters and to evaluate, for each of these predictive factors, the percentage of patients with preserved hearing. **STUDY DESIGN:** The study involved 107 candidates for hearing preservation attempt. Mean age was 49.7 ± 11.4 years. Quantitative and qualitative parameters were prospectively studied. Quantitative parameters were age, duration of functional complaints, hearing loss assessed by pure tone and speech audiometry, and auditory brainstem responses (ABRs). Qualitative parameters (expressed in percentage of presence) were sex, functional complaints, vestibular deficit revealed by vestibular testings, well-shaped ABRs, wave I, III, or V of ABRs, and transient evoked otoacoustic emissions (TEOAEs). **METHODS:** Patients were divided into two groups according to whether their hearing was preserved (52.3 per cent) or not preserved (47.7 per cent). First, quantitative and qualitative factors were compared between both groups to identify predictive factors. Second, all patients were considered together and the percentage of hearing preservation was determined according to the presence of each predictive factor. **RESULTS:** The results confirmed the predictive value of classic parameters such as preoperative hearing level, radiological data, and trace of ABRs. They also emphasized the predictive role of other parameters such as short duration of hearing loss, presence of wave III in ABRs, and presence of TEOAEs. **CONCLUSIONS:** The size of the tumour and the preoperative hearing levels are longstanding predictive factors of hearing preservation in acoustic neuroma surgery, and candidates for hearing preservation are therefore now selected according to these factors. This study added more recent predictive factors and, among the 10 factors identified as predictive, the most relevant to hearing preservation were the presence of TEOAEs (69.7 per cent), short duration of hearing loss (66.7 per cent), and presence of wave III in ABRs (66.7 per cent).

Post-operative quality of life in vestibular schwannoma patients measured by the SF36 Health Questionnaire. Da Cruz, M. J., Moffat, D. A., Hardy, D. G. Department of Otoneurosurgical and Skull Base Surgery, Addenbrooke's Hospital, Cambridge, melvil-

led@westgate.wh.usyd.edu.au. *The Laryngoscope* (2000) January, Vol. 110 (1), pp. 151–5.

OBJECTIVE: To quantify the postoperative quality of life in patients following surgical treatment for vestibular schwannoma. **STUDY DESIGN:** Patient self-assessment using the short form 36 (SF36) multidimensional quality of life health questionnaire. Sex- and age-matched normalized scores were calculated using a standardized process and accepted normative data. **SETTING:** Tertiary referral skull base unit. **RESULTS:** An 80 per cent response rate (90 patients) was achieved. The postoperative quality of life in vestibular schwannoma patients, as quantified by seven of the eight SF36 health scales was less than the appropriate matched healthy standard. Comparison of a variety of preoperative patients and tumour factors-different operative approaches (translabyrinthine and retrosigmoid), tumour size (group cut of points of tumour diameter 1.5 mm and 2.5 mm), patient sex, and ranking of patient age-showed no statistically significant difference in measured quality of life outcomes for each of these traditional predictors. **CONCLUSION:** Reduced quality of life in patients after surgical treatment for vestibular schwannomas, coupled with the low tumour growth rates and minimal preoperative symptoms, supports a conservative approach to patient management. The advantages and disadvantages of a variety of approaches used to measure the quality of life after surgical treatment of vestibular schwannoma and their impact on clinical decision making for patients, are discussed.

Compliance with anti-reflux therapy in patients with otolaryngologic manifestations of gastroesophageal reflux disease. Giacchi, R. J., Sullivan, D., Rothstein, S. G. New York University School of Medicine, Department of Otolaryngology, New York 10016, USA. *The Laryngoscope* (2000) January, Vol. 110 (1), pp. 19–22.

OBJECTIVES: The otolaryngologic manifestations of gastroesophageal reflux include sore throat, throat clearing, sensation of postnasal drip, hoarseness, and globus. This constellation of laryngeal and pharyngeal symptoms can be referred to as laryngopharyngeal reflux (LPR). Many patients with LPR are treated empirically and the results are often rewarding. The objective of this study is to evaluate compliance with antireflux therapy to this patient population. **STUDY DESIGN:** A prospective analysis of 30 patients referred to an otolaryngology clinic for the above symptoms. **METHODS:** The patients were treated for LPR using a standardized behaviour modification form in combination with medical management. Patient compliance was followed with a patient questionnaire and evaluation of medication renewal from pharmacy records. **RESULTS:** The patients were followed for an average of four months and 80 per cent reported an improvement of their symptoms. Evaluation of patient questionnaires revealed that 50 per cent of patients reported taking their medications as prescribed. Compliance varied widely with regard to behavioural modifications. The degree of symptomatic improvement was significantly correlated with overall compliance with both medications and behavioural changes (Pearson correlation coefficient, $p < 0.05$). The individual behavioural changes that were significantly correlated with the reduction of symptoms were avoidance of food and liquid before sleep and elevation of the head of bed, but not food habits. **CONCLUSIONS:** The treatment plan for gastroesophageal reflux disease requires behavioural modifications and prescription medications that many patients may find difficult to follow. However, those patients who comply with the treatment plan can be expected to have an improvement of their symptoms. Furthermore, simplifying the treatment regimen including those elements most correlated with symptomatic improvement may increase patient compliance.

Postsurgical follow-up of children with tympanostomy tubes: results of the American Academy of Otolaryngology – Head & Neck Surgery Pediatric Otolaryngology Committee National Survey. Derkay, C. S., Carron, J. D., Wiatrak, B. J., Choi, S. S., Jones, J. E. Department of Otolaryngology, Eastern Virginia Medical School, Norfolk VA 23507, USA. *Otolaryngology – Head & Neck Surgery* (2000) March, Vol. 122 (3), pp. 313–8.

Postsurgical follow-up of children with tympanostomy tubes is becoming a contentious issue in this era of managed care. Primary care providers believe themselves to be capable of evaluating these children. Otolaryngologists, on the other hand, have more specialized equipment available to them (suction apparatus,

otomicroscopes, audiology devices, etc) for treating suppurative infections and monitoring the tympanic membrane for structural changes. In addition, the otolaryngologist is placed in an uncomfortable legal and ethical position if access to the parents with a tube-related complication is denied by the primary care provider. Attempts to develop an American Academy of Otolaryngology – Head & Neck Surgery (AAO-HNS) policy statement have been hampered by a lack of data on the incidence and severity of tube-related complications and the role that otolaryngologists can play in reducing these sequelae. A survey designed by the AAO-HNS Pediatric Otolaryngology Committee was distributed to 1000 board-certified otolaryngologists and all members of the American Society of Pediatric Otolaryngologists and the American Academy of Pediatric Otolaryngology Section regarding current practice patterns and practitioners' experiences with tympanostomy tube complications. Specific information regarding complications that could have been avoided with earlier otolaryngology referral was also obtained. The results of the survey and its implications for AAO-HNS policy are presented.

Tympanostomy tubes and otic suspensions: do they reach the middle ear space? Hebert, R. L. 2nd, Vick, M. L., King, G. E., Bent, J. P. 3rd. Division of Otolaryngology, Medical College of Georgia, USA. *Otolaryngology – Head & Neck Surgery* (2000) March, Vol. 122 (3), pp. 330–3.

The treatment of patients with tympanostomy tubes (Tts) and otorrhea with medication otic suspensions is well known, but confirmation of penetration into the middle ear is difficult. To address this question, we created an in vitro model of the human head and ear and then tested it with five different types of liquid exposure: tap water, soapy water, polymyxin B sulfate (Cortisporin), tobramycin and dexamethasone (TobraDex), and ciprofloxacin (Cipro) suspensions. A positive test result corresponded to liquids entering the middle ear through the TT. No positive test result was elicited with tap water (0/20), but soapy water did enter the middle ear (10/40) and was statistically significant ($p = 0.0112$). Without the use of slight tragal pressure, Cortisporin, TobraDex, and Cipro drops did not consistently pass through the TT (0/20, 1/25, 1/25). By placing the drops with the addition of tragal pressure, a statistically significant difference was obtained for each solution (20/20, 20/20, and 20/20, respectively ($p < 0.0001$)). We conclude that with a clean external auditory canal, patent TT, and no middle ear fluid, medicated otic suspensions enter the middle ear only when combined with slight tragal pressure.

Cost-effective management of benign positional vertigo using canalith repositioning. Li, J. C., Li, C. J., Epley, J., Weinberg, L. Department of Otolaryngology, Palm Beach Gardens Medical Center, Jupiter, Florida, USA. *Otolaryngology – Head & Neck Surgery* (2000) March, Vol. 122 (3), pp. 334–9.

OBJECTIVE: The misdiagnosis and inappropriate treatment of benign positional vertigo have resulted in significant costs to the medical system. In the current medical-economic climate, there is an increased emphasis on cost control. Recent studies have shown that the canalith repositioning procedure (CRP) is effective; the next step is to show the impact of CRP in cost-effective management of benign positional vertigo. **METHODS:** Forty-six of 100 patients who underwent CRP for benign positional vertigo responded to a survey regarding the financial impact of their disease. They were asked to subjectively estimate the sum of all disease-related expenses. Objective substantiation of this number was estimated by tabulating physician data, laboratory data, and failed treatment costs. **RESULTS:** The subjective figure totalled \$2684.74 per individual. Summation of the tangible objective figures yielded \$2009.63 per patient, corroborating the subjective figure. **CONCLUSIONS:** Because CRP is a relatively simple procedure that can obviate many wasted expenses in most patients, we believe that it is very cost-effective and should be incorporated into routine practice.

Endolymphatic mastoid shunt: a reevaluation of efficacy. Welling, D. B., Nagaraja, H. N. Departments of Otolaryngology – Head & Neck Surgery (2000) March, Vol. 122 (3), pp. 340–5.

OBJECTIVES: The main goal of this paper was to statistically reevaluate the efficacy of the endolymphatic shunt procedure for Meniere's disease. **METHODS:** Thomsen *et al.* (*Arch Otolaryngol* 1981;107:271–7) reported on the placebo effect in surgery for

Meniere's disease in a controlled double-blind study. Thirty patients with typical Meniere's disease in whom medical treatment failed participated in the study. A placebo-controlled blinded surgical study has not since been replicated. We performed a retrospective statistical analysis using data extracted from the published report and reanalysed it using both the original and new statistical measures and techniques. **RESULTS:** The original conclusions drawn by Thomsen *et al.* differed considerably from ours in five key areas, including postoperative vertigo, nausea and vomiting, tinnitus, and combined score. **CONCLUSIONS:** This analysis strongly supports the effectiveness of the endolymphatic shunt in the management of Meniere's disease and refutes the placebo effect previously proposed.

Treatment of benign paroxysmal positional vertigo: no need for postmaneuver restrictions. Nuti, D., Nati, C., Passali, D. ENT Department, University of Siena, Italy. *Otolaryngology – Head & Neck Surgery* (2000) March, Vol. 122 (3), pp. 440–4.

The liberatory maneuver of Semont is an effective physical treatment for benign paroxysmal positional vertigo. It works because it causes otoconia to move out the posterior canal. The effectiveness of the maneuver is thought to be indicated by the appearance of a liberatory nystagmus. After the maneuver, patients are usually instructed to keep their heads erect for several days and not to lie on the pathologic side for about a week. Here we investigated the prognostic value of liberatory nystagmus and whether restrictions are necessary after treatment. Fifty-six patients with posterior canal benign paroxysmal positional vertigo underwent the Semont maneuver and were checked after 20 minutes, 24 hours and one week. The patients were told that they could sleep or move as they pleased, without any particular precautions. We found that liberatory nystagmus had a high prognostic value and that it was not necessary for patients to avoid certain positions or movements after treatment.

Postmeningitic ossification in pediatric cochlear implantation. Young, N. M., Hughes, C. A., Byrd, S. E., Darling, C. Division of Pediatric Otolaryngology, Children's Memorial Medical Center, and the Department of Otolaryngology – Head & Neck Surgery, Northwestern University Medical School, Chicago, Illinois 60614, USA. *Otolaryngology – Head & Neck Surgery* (2000) February, Vol. 122 (2), pp. 18–8.

OBJECTIVE: The goals of this study were to retrospectively review high-resolution CTs (HRCTs) of pediatric postmeningitic cochlear implant recipients and to correlate results with surgical findings. **METHODS:** HRCTs of 20 children (11 months to 12 years old) who underwent implantation with the degree of ossification observed at surgery. **RESULTS:** Ninety per cent of subjects required drilling of ossified bone within the basal turn at surgery. HRCT of the cochlea suggested ossification within the basal turn in 45 per cent (50 per cent sensitivity). Ossification of the lateral semicircular canal on HRCT was present in 72 per cent (77 per cent sensitivity). Five of six cases without radiographic evidence of ossification had positive findings at surgery. **CONCLUSION:** Ossification is a common occurrence in postmeningitic deaf children. Ossification of the lateral semicircular canal on HRCT is a more sensitive measure for predicting ossification than evidence of cochlear involvement. Absence of ossification on HRCT is no guarantee of cochlear patency at the time of implantation.

Evaluation of a new procedure for nasal alar rim and valve collapse: nasal alar rim reconstruction. Troell, R. J., Powell, N. B., Riley, R. W., Li, K. K. Stanford University Sleep Disorders and Research Center, California, USA. *Otolaryngology – Head & Neck Surgery* (2000) February, Vol. 122 (2), pp. 204–11.

OBJECTIVE: A new operative technique to improve nasal valve collapse by placement of cartilage struts along the alar rim was compared with the standard nasal valve cartilage graft (NVG) technique. **METHODS AND PATIENTS:** A retrospective study of consecutive patients with nasal valve collapse was performed at Stanford University Medical Center. Seventy-nine patients with nasal valve collapse underwent reconstruction with either the classic NVG technique or a newly developed nasal alar rim reconstructive (NARR) procedure. The mean age of the NARR group was 50.13 years (SD \pm 9.40), with 36 men (92.3 per cent) and three women (7.7 per cent). The mean age of the NVG group

was 52. Fourteen years (SD \pm 10.93), with 36 men (90 per cent) and four women (10 per cent). **MAIN OUTCOME MEASURES:** These included functional and subjective evaluation of nasal valve collapse. **RESULTS:** Forty patients (50.6 per cent) underwent the NVG technique, and 39 (49.4 per cent) received the NARR procedure. The NVG technique revealed 0 per cent worsened, 15 per cent (6/40) unchanged, 25 per cent (10/40) improved, and 60 per cent (24/40) free of obstruction. The NARR procedure revealed 2.6 per cent worsened, 2.6 per cent unchanged, 7.7 per cent improved, and 87.1 per cent free of obstruction. **CONCLUSIONS:** Nasal alar cartilage struts placed along the caudal alar rim offers sufficient support to the alar rim and valve area. This procedure appears to be as effective as currently available reconstructive alternatives, while being technically uncomplicated.

Virtual labyrinthoscopy: visualization of the inner ear with interactive direct volume rendering. Tomandl, B. F., Hastreiter, P., Eberhardt, K. E., Rezk-Salama, C., Naraghi, R., Greess, H., Nissen, U., Huk, W. J. Division of Neuroradiology, University of Erlangen-Nuremberg, Schwabachanlage, Erlange, Germany. *Radiographics* (2000) March–April, Vol. 20 (2), pp. 547–58.

Computed tomography (CT) is the modality of choice for detailed imaging of the bony labyrinth. Usually, information about the complex three-dimensional anatomic structures of the inner ear is presented as two-dimensional anatomic structures of the inner ear is presented as two-dimensional section images. Interactive direct volume rendering is a powerful method for visualization of the labyrinth. Unlike other visualization methods, direct volume rendering enables direct visualization of the bony labyrinth without explicit segmentation prior to the visualization process. Direct volume rendering was applied to visualization of the structures of the temporal bone in five patients without pathologic conditions and four patients with pathologic conditions. In all cases, clear representations of the bony labyrinth and the facial canal were provided. Because standard CT examinations combined with interactive visualization based on direct volume rendering are used, the method is fast and flexible. Therefore, this approach is applicable in routine clinical work. Problems occur in patients with effusion in the temporal bone because adjustment of imaging parameters for proper delineation of the target structures is difficult in this situation. However, direct volume rendering can produce meaningful images of high quality even in these problematic cases. The term virtual labyrinthoscopy is suggested for visualization of the labyrinth by using direct volume rendering.

Database for a hearing conservation program. Pyykko, I. V., Toppila, E. M., Starck, J. P., Juhola, M., Auramo, Y. Department of Otolaryngology, Karolinska Hospital, Stockholm, Sweden. *Scandinavian Audiology* (2000), Vol. 29 (1), pp. 52–8.

We have developed a database and an analysis program (NoiseScan) for noise-induced hearing loss (NIHL). The exposure data are based on the evaluation of the noise immersion level, which includes duration, frequency content, and the use of, and the attenuation performance or, hearing protectors. The input data can handle an unlimited number of exposure periods. If the noise exposure level is not known, the program lists noise levels of comparable work places, and thus provides an estimate of exposure. Confounding medical factors that may contribute to NIHL, such as elevated serum cholesterol level, hypertension, and extensive use of pain killers, are collected. Combined exposure to agents that clearly contribute to NIHL, such as hand-arm vibration, tobacco smoking, use of aminoglycosides and exposure to solvents are also assessed. An unlimited number of audiograms can be stored, and all the data can be completed and edited following collection. The program gives the predicted hearing loss according to the ISO 1999 model based on total exposure. At present, our NoiseScan program (under continuous development in an EU research program) is suitable for the data collection of various risk factors. It can be used to determine whether the hearing loss is occupational in origin and to estimate the efficiency of hearing conservation measures. NoiseScan also predicts the development of hearing loss in individuals in five year periods. The goal is to improve and validate the rules by which single and combined risk factors contribute to HIHL, thus leading to more precise prediction of individual hearing loss, and for the evaluation of success of the hearing conservation programs.