

NEUROTOLOGY: PAST, PRESENT, AND FUTURE

Cecil Hart

It is exciting to be riding the crest of a wave! Neurotology began as a small ripple, and has built up rapidly in the past few years. It has been a "heady" experience!

From earliest times, there has always been a medical interest in the ear and hearing. Prosper Ménière pioneered the clinical relationship between the ear and balance well over a hundred years ago.

Originally, the discipline was concerned primarily with the hearing and vestibular systems, especially as they related to the ear. The field has grown and evolved, and is continuing to do so.

At first, the discipline was termed oto-neurology, later neuro-otology, and now neurotology. More precisely, given current practice, it might be better termed neurology/neurosurgery of the medical specialty of otolaryngology — head and neck surgery.

Jorge Corvera¹ has defined neurotology as "the science of the inner ear, the cerebellum, the brainstem and the ocular motility." This description might suitably be expanded as follows:

1. Hearing and hearing dysfunction, including tinnitus
2. The vestibular system, balance and spatial orientation
3. Gait and locomotion
4. All cranial nerves, in addition to the CN-VIII (cochlear and vestibular nerves), and especially CN-VII (facial)
5. Brain function as it subserves the field of neurotology

In the United States the American Otological Society (AOS) was founded in 1868, and the American Neurotology Society (ANS) in 1965. The constitution of the latter delineates the scope of neurotology to be the "sensory-neural systems of audition and equilibrium."

Over the years, leadership of the ANS has expanded the original scope of the society. Early on, the Facial Nerve Disorders Committee was established, and the society became very much involved in skull base surgery, to the point where a Chief of Neurotological Skull Base Surgery was appointed.

There are now committees on tinnitus, auditory electrophysiology, cochlear implants and semi-implantable devices, among others, reflecting the ever-widening horizon of interests of the neurotologic community.

On the issue of physical balance, the interest of otolaryngologists has progressed from the labyrinth into the much broader field of spatial orientation, with all that that it implies.

From the perspective of tinnitus (and hearing), we have also progressed from the cochlea into brain auditory pathways, with all intrinsic and related neurologic functions and dysfunctions.

Insofar that, for the most part, tinnitus is an hallucination, inevitably the study and treatment of this phenomenon must involve the mind.

Where will all this lead? What is developing is, in reality, a specialty of the neurologic and neurosurgical aspects of the head and neck. This might be called Neurotorhinolaryngology (NORL) or, alternatively, neurology of the head and neck (NHN).

Neurotologic surgeons are making rapid advances in developing skull base surgery to its full potential, and cochlear implant developments have led to the implantation of electrodes to stimulate the brain stem directly. Radiosurgery is another exciting technique undergoing rapid development. Our interfaces with other specialties already include neurosurgeons, who have developed an interest in these matters, partly in response to innovations made within our own specialty.

Second, neurologists are becoming more familiar with those diagnostic techniques pioneered by neurotology and are becoming more involved in these areas at various levels.

Medical *turf wars* are basically destructive. The best situation is one of collaboration among the medical specialties involved. Just as neurotologic and neurologic surgeons now work together in operative teams, the same approach must be used for medical interfaces. A very successful example of this has been the development of clinics to give therapy for dizziness.

Symptom-oriented clinics are becoming more popular. They serve the needs of a self-defined group of patients and can focus on the problem rapidly and efficiently. In my experience, and that of others, the typical patient referred for a tertiary level consultation with the complaint of dizziness has already seen five or six other physicians, has had a magnetic resonance scan (all at considerable expense), and has been given the diagnosis of Ménière's...!

A given symptom has a finite number of known causes. Within neurotology, the differential diagnosis of symptoms such as hearing loss, tinnitus, and dizziness has been so addressed. Neurologists have established headache clinics, and multidisciplinary pain clinics have become popular.

Because we do not yet have training programs in such neurotologic interdisciplinary efforts, the leadership roles have been assumed by individuals from different medical disciplines, which is as it should be at the time.

Disciplines that should be represented in a tinnitus clinic include neurotology (otology and otolaryngology), audiology, neurology, psychology, psychiatry, and pharmacology. Disciplines that should be represented in a clinic to treat dizziness include neurotology (otology

and otolaryngology), neurology (neurotology and neuro-ophthalmology), ophthalmology (neuro-ophthalmology), internal medicine, geriatric medicine, psychology, psychiatry, audiology, orthopedics, physical medicine and rehabilitation, physical therapy, occupational therapy, pharmacology, and nutrition.

Hearing loss is usually handled primarily by otologists and audiologists working in close collaboration, either in major university clinics or in private practice. The team concept, incorporating as it does other medical disciplines, does not seem to have developed in this context, however.

In the United States, unfortunately, the specialty of ear, nose, and throat, that is, otolaryngology - head and neck surgery, remains that, which is a *surgical* specialty. We have no sister medical specialty as, for example, neurosurgery has neurology. Some countries have already achieved this, including England, the nations of Scandinavia, Italy, and Greece.

Several neurotologic fellowships have been established, but always with the emphasis on surgery. This is an excellent development, but most patients with symptoms of tinnitus or dizziness do not require this form of treatment. Organized medicine would seem unlikely to establish such training programs unless prompted to do so. In the United States, establishment of a sister medical specialty to otolaryngology - head and neck surgery, seems unlikely to be possible at this time.

The needs of these patients must be met by the leaders of the symptom-oriented clinics combining to share experiences, develop methods, and establish criteria for initially accepted training programs at all levels. In time, this may evolve into more formal university-based training programs, certification, and other forms.

A good role model in this respect might be that of the American Cleft Palate Association. This association has established its own foundation and publishes a *Team Directory*, listing worldwide those clinics offering specialized services for such patients.

We remain in the early stages of the evolution of the discipline of neurotology. The establishment of this field has been in response to a need. Further development will no doubt continue for the same reason, but it is, at the same time, a wise measure to anticipate what future needs may be and to plan for them accordingly.

REFERENCE

1. Corvera J: What is Neurotology? *Am J Otol* 15:455, 1994.