Vestibology in the School of Bologna

Antonio Pirodda

I was asked by my friends Sandro Martini and Gianni Ralli for a brief mention of the activity of the Bolognese School in the field of vestibology: I have tried not to be long-winded, and for this reason decided not to recall all the contributions that have followed one another over time enriching the scientific production and clinical activity ; I have limited myself to underline the aspects that have probably best characterized our group in terms of scientific mentality and specific interests. The development of vestibology in our School is primarily due to Ettore Pirodda (Figures 1-2), my father,

Figure 1. Prof Ettore Pirodda

Figure 2. Prof. Ettore Pirodda (in the mid) between Prof. Michele Arslan (left) and Vittoria Arslan (right)

who had an innate vocation to deepen the themes most related to physiology in the area of competence of our varied discipline. I believe that his most decisive contribution consisted in the constant attitude to transmit to his pupils the curiosity for everything that was not yet sufficiently or satisfactorily explained and understood. He was a teacher in the true sense of the word. From a practical point of view, this impulse has been translated - since the early 60s and despite the scarce means available at the time to the newborn Institute of Otorhinolaryngology Clinic of the University of Cagliari, which he founded - into assiduous work to acquire the most complete instrumentation possible: it was a pioneering refinement for the time, implemented with the first objective of contributing to the advancement of knowledge (Pirodda E, 1961,

Pirodda E, 1963, Pirodda E, 1964, Pirodda E, 1965). It is due to this period that he gave impetus to the clinical application of thermal and rotoaccelerator tests, which made it possible to equip first the Clinic of Cagliari, then that of Bologna with cutting-edge diagnostic tools; this quality was maintained over time in step with new international scientific and clinical acquisitions. In this context, I would like to point out the organization of the Congress of the Bàràny Society, which was held in 1987 in Bologna under Pirodda's chairmanship. Also in the '80s, his ever-lively curiosity about one of the most complex systems led him to explore the possibilities offered by vestibular evoked potentials (Pirodda E et al. 1987, Marcellini et al. 1988); his interest in the topic, which at the time was not particularly taken into consideration by the mainstream of research, was periodically but stubbornly re-proposed by him, within the School, to anyone preparing to deepen studies on vestibology. Finally, after a certain time, the input found fertile ground in a very young man who at the time spent most of his working days in vestibology laboratories: Giovanni Carlo Modugno, better known as Gianni (Figure 3).

Figure 3. Gianni Modugno (1961-2014)

Gianni was probably, in all of my father's scientific lineage, the one who most followed him in this specific field, on the one hand developing ideas already in embryo, on the other yielding original and fundamental contributions: practically every phenomenon brought to light by scientific progress, on which he was constantly updated, pushed him to search with interest for possible interpretations (Figure 4).

Figure 4. Gianni Modugno (1961-2014)

An example of this is his widely cited hypothesis of a link between autoimmune thyroiditis and benign paroxysmal positional vertigo (Modugno et al., 2000), derived from the clinical observation and the subsequent idea that a macromolecule could be responsible for the abnormal stimulation as well as otolithic fragments. More generally, starting from his exceptionally in-depth knowledge of vestibology, he has ranged in this field in search of explanations that are never trivial, and have often opened the way to new knowledge: as already mentioned, he has resumed an interest of the School by studying in depth the vestibular evoked potentials (Modugno et al., 2003), and has experimented with their application in the problems related to labyrinthine dehiscences and perilymphatic fistula (Modugno et al., 2005; Modugno et al., 2006, Manzari et al, 2008). This was a topic that mostly has raised his interest during the last period of his brief life, leading him to provide fundamental contributions in terms of theoretical acquisitions and diagnostic protocols. On dehiscence in particular, I have personal memories of how in the early days the national scientific community of our specialty was skeptical in acknowledging the consistency of our case history - and consequently of the interest we attributed to the phenomenon: at that time, it had not yet been established that dehiscence is anything but marginal. I believe

that Gianni should be credited with having a great merit in diffusing the awareness that this condition may be responsible for many vestibular disorders otherwise unexplained; moreover, he has emphasized the role of diagnostic tools, such as CT, often not sufficiently used in the study of many abnormal manifestations of the vestibular sphere that were previously not well framed.

Finally, I quote two contributions by the writer that may perhaps deserve to be mentioned. The first is related to MRI in the study of vestibular disorders: due to a series of fortunate circumstances I had access, in the mid-80s, to the only magnetic resonance imaging device present at the time in the area, managed by a neurologist friend. Thanks to my distrust (never denied) towards the excessively detailed interpretation of electronystagmographic surveys, I enthusiastically welcomed the possibilities opened up by the new technique: I was therefore able to underline, as far as I know among the first ones, the importance of this method, which later proved to be fundamental, in the discrimination between peripheral and central syndromes (Pirodda A et al, 1986, Pirodda A et al, 1988).

The second contribution concerns the possible, hypothetical therapeutic link between proton pump inhibitors and Meniere's disease (Pirodda A et al., 2009, Pirodda A et al., 2010, Pirodda A et al., 2012, Pirodda A et al., 2013), recently taken up by other Authors (Zhao et al., 2025) and still awaiting a definition, which can represent a promising track for better understanding the mechanisms of hydrops.

In conclusion, I think I can say that our School has distinguished itself not only and not so much for the analysis and application of what was already known but for the search for something new in the field of ideas, the interpretation of phenomena and, ultimately, a more in-depth and convincing level of knowledge.

References

Manzari L, Modugno GC, Brandolini C, Pirodda A. Bone vibration-induced nystagmus is useful in diagnosing superior semicircular canal dehiscence. Audiol Neurootol 2008; 13(6): 379-87.

Marcellini S, Modugno GC, Rinaldi Ceroni A, Pirodda E: Influence of the vestibular stimulation on the activity of muscles of the lower limb in man. Electromyographic evidence. Adv Otorhinolaryngol 1988; 41: 184-9.

Modugno G, Brandolini C, savastio G, Rinaldi Ceroni A, Pirodda A. Superior semicircular canal dehiscence: a series of 13 cases. ORL J Otorhinolaryngol Relat Spec 2005; 67(3): 180-4.

Modugno GC, Magnani G, Brandolini C, Savastio G, Pirodda A. Could vestibular evoked myogenic potentials (VEMPs) also be useful in the diagnosis of perilymphatic fistula? Eur Arch Otorhinolaryngol 2006; 263(6): 552-5.

Modugno GC, Magnani G. (Vestibular neurogenic evoked potentials (VNEPs). Acta Otorhinolaryngol Ital 2003; 23(5 suppl 75): 80-5.

Modugno GC, Pirodda A, Ferri GG, Montana T, Rasciti L Rinaldi Ceroni A. A relationship between autoimmune thyroiditis and benign paroxysmal positional vertigo?. Med Hypotheses 2000.; 54(4): 614-5.

Pirodda A, Brayda G, Trevisan C, Pirodda E. Magnetic resonance imaging in the diagnosis of lesions of the central vestibular system. Adv Otorhinolaryngol 1988; 41: 216-23.

Pirodda A, Modugno GC, Manzari L, Raimondi MC, Brandolini C, Ferri GG, Borghi C. Meniere's disease and the use of proton pump inhibitors. Swiss Med Wkly 2010 Oct 7: 140:w131.

Pirodda A, Rinaldi Ceroni A, Ambrosetto P. (Magnetic resonance in the topodiagnosis of vertiginous syndromes of central orgin). Acta Otorhinolaryngol Ital 1986; 6(4): 423-30.

Pirodda A; Brandolini C; Raimondi MC et al. The possible role of proton pump inhibitors on the homeostasis of inner ear. Med Hypotheses 2009; 72: 325-6.

Pirodda A; Raimondi MC; Ferri GG et al. A possible mechanism to explain how ischaemia and the maintained function of gastric type proton pumps could lead to hydrops of the inner ear in Meniere's disease. Hearing Balance and Communication 2013; 11: 3-5.

Pirodda A; Raimondi MC; Ferri GG et al. Proton pump inhibitors: A possible effect in Menière's disease? Audiological Medicine 2012; 10: 178-81.

Pirodda E, Cenacchi V, Musinu C. (Behavior of the nystagmic reflex due to accelerator stimuli of constant value applied for a period longer than the indication time of the cupula-endolymph system). Clin Otorinolaringoiatr 1964; 16:229-504.

Pirodda E, Ghedini S, Zanetti MA. Investigations into vestibular evoked responses. Acta Otolaryngol 1987: 104(1-2): 77-84.

Pirodda E. (A new electronystagmograph). Otorinolaringol Ital 1965; 34(1): 75-85.

Pirodda E. (Considerations on the methods for using the acceleration stimulus in tests directed at obtaining a clinical evaluation of the functional efficacy of the vestibular apparatus). Arch Ital Otol Rinol Laringol 1963; 74: 633-63.

Pirodda E. (Device for the termal stimulations of the ampullar receptors). Otorinolaringol Ital 1961; 30: 417-25.

Wen Zhao; Xu-Rui Hao; Han-Lin Zhao et al. Association Between Gastroesophageal Reflux Disease, Barrett's Esophagus and Ear Disorders: A Mendelian Randomization Study. Journal of Multidisciplinary Healthcare 2025; 18: 5061-74.