

Reproduced from *The Journal of Laryngology, Rhinology, and Otology* 1904. 19: 402–406 (August)

## A CASE OF TINNITUS AND VERTIGO TREATED BY DIVISION OF THE AUDITORY NERVE

BY R. H. PARRY, F.R.C.S.ENG. (Glasgow)

Surgeon of the Victoria Infirmary, and Surgeon to the Royal Hospital for Sick Children, Glasgow.

S.D.—aged thirty, engineer, was recommended for treatment in February, 1902, by Dr Jones of Glasgow, who in his letter expressed a hope that something might be done by operation to relieve his condition, as all other forms of treatment had failed.

The patient stated that he had enjoyed excellent health until six years ago, when one day he was suddenly seized with giddiness while he was lighting his pipe. He was not far from his house at the time and managed to stagger to it. While the attack was on him everything seemed to be turning round. During the next six months he had several such attacks, and he had finally to give up work for two years. The giddiness became more or less constant, affecting him more particularly when walking. He improved somewhat towards the end of that period, and was able to resume work and to remain at it for two years.

A year ago he was again obliged to give up work owing to the frequency of the attacks of vertigo. He complained of noises in the left ear, but only occasionally in the right. He had always been partially deaf in left ear, from which there had been a discharge until two years ago. There is no history of alcoholism or syphilis. During the three weeks in which he was under observation before operation his suffering remained as great as before admission; and it was made absolutely clear to us that he had in no way exaggerated his misery. He expressed anxiety to be relieved of the pain in the back of his head and the vertigo, which affected him both at rest and while walking about in the ward.

Three methods of treatment were discussed, and their relative value as affording the best prospects of relieving the pain, tinnitus and vertigo were carefully considered. Most of the drugs known to have any effect in relieving tinnitus had been tried with only unsatisfactory results, and so it was decided not to return to internal medications.

Ablation of the mastoid and semicircular canals was next considered, in view of the fact that there had been a discharge of pus from the left ear, and that under treatment for that the patient had for short periods found slight relief. The relief, however, was very temporary, and ultimately the treatment afforded him none.

The fact that a mastoid operation had not been carried out suggested that, in the opinion of the several medical

men who had seen him, the seat of the trouble lay deeper, and that a simple mastoidectomy would not bring about the desired result. On the value of the removal of the semicircular canals no opinion could be offered, nor at the time (two years ago) could any information be obtained as to the probable effect of such a procedure.

As will have been gathered, this was a severe case of tinnitus, and the effect of prolonged suffering had made the patient unwilling to submit to operative treatment which held out the prospect of only partial relief. The possibility that the condition might be dependent on a central cause, primary or secondary, was not overlooked, and it was agreed that if the patient remained unrelieved by division of the auditory nerve one would be justified in adopting this view; whereas, from the results of ablation of the mastoid and semicircular canals, such a conclusion could not be arrived at, as filaments of the nerve might still have been intact. It was hoped, in the first place, that division of the nerve would effect a cure, while if it failed to do so something would have been gained as to the seat of the irritation.

The evolution of the treatment of trigeminal neuralgia is instructive, and the present opinion is that in severe cases of that disease it is better to attack the nerve within the cranium rather than to divide its branches on the face. The analogy may be, and probably is, incomplete, but it is only right to record the basis upon which the treatment in this case was worked out.

The difficulties and risks attending the operation, together with the chance that it might not be effective in giving relief, were explained to the patient; he, however, expressed the desire that the attempt should be made, and accordingly the operation was carried out.

The question of the route by which the auditory nerve could be reached was next discussed. The three most feasible routes were through (a) mastoid, (b) posterior fossa, (c) middle fossa. The first would have involved an extensive bone operation, and would necessarily have been a long and tedious one to perform, while the danger of wounding the sinuses was a serious objection to it; also the presence of bone on the one side and dura mater on the other, made it practically impossible to retract the parts sufficiently to obtain the good view of the auditory nerve which was indispensable owing to its

intimate relation to the seventh nerve. By the second route the dangers of wounding the sinuses were minimized, but on examination of the parts on the cadaver it was found that the auditory nerve was at a depth of an inch and a half from the trephine opening, which was made immediately below the curve of sigmoid sinus. The removal of bone in the direction of the foramen magnum did not materially shorten the distance from the occipital bone to the internal auditory meatus, while it tended to give a deeper wound, as measured from the skin, owing to the thickness of the soft tissues of the neck. In working at that distance from the surface, and with no definite landmarks as guides, it would have been necessary to considerably displace the left lobe of the cerebellum in case of damage to the structures entering the jugular foramen. In the author's experience, in operation on the living subject, undue pressure on the cerebellum is attended with risks of laceration owing to the fact that it is maintained within a space the walls of which are rigid and unyielding. The third route, that through the middle fossa, was the one selected. The points in favour of it were that less difficulty was anticipated as regards hæmorrhage, that it was the shortest route to the external auditory meatus (an inch and a quarter from squamous bone), and that the parts could be better retracted, so affording a good working field.

The steps of the operation were as follows: A curved incision with the convexity upwards was made from the centre of the zygomatic arch to the base of the mastoid close to the parietosquamosal suture. The squamous portion of the temporal bone was drilled in six places and the intervening bridges of bone divided with a Hay's saw. The bone was then raised with elevators, when the undivided portion fractured and so permitted an osteocutaneous flap to be turned downwards. The dura mater was separated from the surface of the petrous portion as far as the promontory caused by the superior semicircular canal. On removing the roof of the tympanic cavity an excellent view was obtained of that space, and it is interesting to note that it was possible by that method to determine the presence of pus or granulation tissue in the middle ear. More bone was removed in the direction of the mastoid antrum, but as no evidence of active disease was found either here or in the middle ear the fear that a septic focus had been left *en route* was set at rest. A plug of gauze steeped in 1:20 carbolic was introduced into the middle ear as a further preventive measure against infection of the wound. The dura mater was punctured to allow of the escape of cerebro-spinal fluid, thereby permitting of the better displacement of that membrane and the brain. The separation of the dura mater from the upper border of the petrous bone required considerable care, as it was here that some apprehension was felt as regards hæmorrhage. The superior petrosal sinus in the majority of the bones examined had been found to groove the outer half of the bone, while in the remainder the grooving was continued over the internal auditory meatus. To obviate, as far as possible, puncturing the sinus by raising it from the bone, the bone was divided and gently removed from it.

The dura mater of the middle fossa, the tentorium, and the superior petrosal sinus were drawn aside by retractors. Some bleeding certainly took place from, I believe, some branches of the sinus, but it was soon arrested by the pressure of small plugs of aseptic gauze. The roof of the internal auditory meatus was next removed, when the seventh and eighth nerves were easily recognized. The eighth nerve was drawn aside and could have been divided then, but owing, perhaps, to the fact that no untoward accident had occurred and to the desire to sever completely the vestibular and cochlear divisions, more bone was removed; but unfortunately, the detached portion proved to be the commencement of the Fallopian aqueduct, and in the withdrawal of it the seventh nerve was torn. This regrettable, and, it may be added, avoidable accident, permitted of a very thorough examination of the nerves in that opening. The plug was removed from the middle ear and iodoform gauze introduced in its place through the external meatus. The flap was then replaced and its edges sutured, except at the lower angles, where a strip of iodoform gauze served for drainage. The patient passed a restless night and complained that he felt giddy when he opened his eyes. Left facial paralysis was complete. During the following week he improved considerably, but the noises in the ear were present, although lessened in degree, and the vertigo persisted.

As regards the wound, it was completely healed on the tenth day, when the stitches were taken out. The temperature remained normal throughout.

For fully a month he was kept at rest, although in the third week he was most anxious to get up, declaring that he felt quite equal to it.

When allowed to move about again he still complained of giddiness and the noises in the head. The general opinion was that he was better, although, in his anxiety for a complete cure, we found it difficult to get him to admit it.

He reported himself at intervals of two months for about a year, and, although the symptoms had modified somewhat, they were still sufficiently in evidence to cause him considerable annoyance. At the end of that period he was induced to undergo a second operation in order to overcome the facial paralysis. The spinal accessory nerve was divided and attached to the facial close to the stylo-mastoid foramen. He has no voluntary power over the facial muscles; they move in association with the movements of the shoulder. He has been at work for some months since his last operation, but in respect of the three symptoms—pain, tinnitus, and vertigo—for which he was treated the operation has considerably relieved the two first, but not, to any extent, the third.

The present is, as far as can be ascertained, the first in which the auditory nerve has been divided in the living subject. Two cases have been reported recently, but both ended fatally. It would be unwise to deduct too much from one case, but one may venture to hope that there are some points in this case of interest to both otologists and surgeons.

**Key words:** Tinnitus; Vertigo; Neurectomy; vestibular, cochlear.