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LABYRINTHITIS

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MY special interest in Labyrinthitis commenced in Edinburgh in 1920 when I was a clinical Tutor in the clinic of the late Mr. J. S. Fraser. Here I learnt the rotation caloric and table tilting methods of testing the labyrinth, then in vogue. Every case of chronic mastoiditis was tested by rotation and caloric tests. I saw several labyrinthine operations, but all were fatal, death being due to meningitis.

In 1922, I went to Bradford where I carried on the methods of testing the labyrinth that I had been taught in Edinburgh, with the same results, namely that in three years, 1922 to 1925, *I had three cases* of labyrinthitis on which I operated and *three deaths from meningitis*.

My colleague, during this period, had done no operating on the labyrinth and so he had had no deaths from meningitis following labyrinthitis. When I, a young surgeon, became aware of this, I was extremely worried and thought about the matter a great deal.

I soon discovered that my colleague did not test any labyrinth and I concluded that my testing of labyrinths *in the presence of pus in the middle ear* was responsible for the acute labyrinthitis and so the meningitis.

In 1926, I decided to conduct an experiment. I stopped all testing of labyrinthine function in cases of infected mastoiditis. When there was a labyrinthine upset with symptoms, I rested the patient in bed, lying on his back, keeping the head steady with sand bags, the affected ear being uppermost.

This experiment has now been going on for 27 years, but alas, as my clinical life is over, it is now ended. I gave some details of this work in my Presidential address to the Section of Otology of the Royal Society of Medicine in 1947 and this paper is a more detailed account of my views.

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During this past 27 years, the only death I have seen from labyrinthitis and meningitis occurred in a boy of 6. He had a severe mastoid infection with labyrinthitis, lateral sinus thrombosis and meningitis. He died 24 hours after admission. I had performed a Schwartze operation in the meantime. This was a fulminating generalized infection. At the post-mortem the saccus endolymphaticus was a bag of pus—the only case I have seen. I am aware that through the years recoveries of a few cases of acute diffuse labyrinthitis have been reported in the journals, but this rare complication of mastoiditis primary acute purulent labyrinthitis is almost certainly a blood-borne infection as is primary pan-ophthalmitis.

I have observed many cases of labyrinthine irritation, i.e. so-called serous labyrinthitis and all have cleared up on treatment.

I think it was the late Mr. Albert Gray in one of the many discussions we had on labyrinthitis and meningitis in the 1920s who said that the labyrinthine capsule had great powers of defence and was capable of looking after itself in the presence of aural infection.

Without doubt, the labyrinth is endowed by nature with strong defensive powers against infection. It is separated from the middle ear by a thin layer of bone—the stapes in the oval window—and the round window. It has to resist infection from a vast number of cases of acute middle-ear suppuration annually. I have seen at least six cases of petrositis, but none complicated by labyrinthitis: cases of Gradenigo's syndrome without labyrinthitis: cases of herpes zoster of the geniculate ganglion, all of which had labyrinthine upset, but all recovered.

In chronic mastoiditis I have had a number of cases of circumscribed labyrinthitis with the fistula sign. Since 1926 none have been tested and so none have developed diffuse labyrinthitis. All these points are evidence of the great resistance of the labyrinth to infection. The rarity of labyrinthine infection compared to the vast number of middle-ear infections bears witness to the efficiency of its defensive mechanism.

It was as a result of these theoretical and practical considerations that I decided, in 1926, to stop testing the labyrinthine function with the caloric and rotation tests in cases where there was an infected mastoid. Instead I put the patient at rest as stated above.

Where the labyrinth has been mildly infected and nature has succeeded in walling off the infection it is surely dangerous to subject the patient to physiological tests which, I believe, are well calculated to break down the natural barriers, lower the resistance of the tissues and set up diffuse labyrinthitis.

If acute surgical treatment is indicated for the mastoiditis it should be carried out, but the labyrinthine upset should be left undisturbed and allowed to settle.

The position of labyrinthitis in the 1920s, and even in the early 1930s, is clearly summed up by E. D. D. Davies (1928). He stated:

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Labyrinthitis

" The records of cases of meningitis which followed chronic suppuration reported by Logan-Turner, Fraser, Jenkins and myself have shown that the symptoms and signs of labyrinthitis were present in a very large proportion. Vertigo, tinnitus, nystagmus and a marked degree of deafness accompanied by headache and fever with an increase of cells in the cerebrospinal fluid call for a translabyrinthine drainage of the meninges without hesitation. There are certain signs of the spread of infection which forecast coming events. *Labyrinthitis* is such a sign, and it requires *careful investigation and prompt action* as soon as it becomes apparent."

Tweedie (1934) who knew as much as anyone of his generation about the physiology of the labyrinth, supports the above view. In a paper published in 1934, he stated " that in inflammatory lesions of the labyrinth—as in inflammation of any other organ—the normal responses to stimuli were upset and all sorts of contradictory results obtained". In his seven-point summary of the tests, in point six he stated, " that an attempt should still be made to assess the inference of spontaneous nystagmus in cases of acute otitis media". Previously he stated "that it is in these acute cases where we require assistance in assessing the amount of labyrinthitis that we shrink from applying the tests, and that generally we restrict the use of the labyrinth tests to chronic inflammatory cases of otitis media to determine whether or not the labyrinth is still functional".

In my opinion the above views are entirely wrong and if carried into practice, as I believe they still are, increase the danger to life in the treatment of labyrinthitis whether associated with acute or chronic mastoiditis.

The caloric and turning tests are dependent on the *movement of endolymph* and whilst the former must depress the tissues, both these factors tend to spread any infection that nature is attempting to localize, throughout the organ and cause a *diffuse labyrinthitis*.

These tests are laboratory tests for use on normal or nearly normal ears, and should not be used as clinical tests where suppuration in the middle ear or mastoid is present or suspected. We have other means of assessing the presence or absence of a labyrinthine lesion.

Heart tolerance tests appear to me to be similar. They are used to test normal or near normal hearts. Would any medical clinician ask a patient with valvular disease of the heart to jump up and down from a chair just to see the effect on his heart or would he ask a patient with acute myocarditis to run up and down the staircase a couple of times just to observe the effect ?

This is what we have been doing with the diseased labyrinth, the possessor of which has had, perforce, to submit *mutely*, to these misguided examinations.

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If all cases tested had shown some ill effect we should have discarded these as clinical tests almost at their inception, but, unfortunately, ill effects were reserved for comparatively few of the number tested and the danger to patients was not realized.

I am certain that the use of the physiological tests, turning and caloric, has been the direct cause of many cases of *induced* diffuse purulent labyrinthitis in chronic aural suppuration hence the reason for trans-labyrinthine drainage for the subsequent meningitis—and death of the patient. These operations with their fatalities are a blot on our escutcheon. This sequence has frequently occurred and has been responsible for the operations on the labyrinth and for most of the papers written on labyrinthitis in the past. There has been no progress in the management and treatment of labyrinthitis in any published material that I have read.

There are analogies between the eye and the ear. Both are developed from ectoderm. Primary acute pan-ophthalmitis and acute suppurative labyrinthitis are rare, but induced or secondary pan-ophthalmitis and induced or suppurative labyrinthitis due to operations or trauma are, unfortunately, not so rare. The serous labyrinthitis is more common and if treated medically will recover, as recorded above.

Labyrinthine symptoms, the so-called serous labyrinthitis, even when associated with acute mastoiditis, if rested and not tested, will recover. The degree of the labyrinthine symptoms in serous labyrinthitis is variable and *there is no known test to differentiate a serous from a suppurative condition*. I have not seen a case of meningitis follow labyrinthitis except where the latter has been induced. I have seen two cases of meningitis with some labyrinthine symptoms (serous labyrinthitis).

One case (R.P.) I should like to quote. In 1933, she had meningitis with marked labyrinthine symptoms complicating an acute mastoiditis. I did a Schwartze operation on her and treated the meningitis after Layton's method. This was, you observe, in 1933, before the introduction of sulphonamides. She recovered and what is more regained her hearing. She could not have had a purulent labyrinthitis, yet her labyrinthine symptoms were so extreme that I diagnosed her as a fulminating case of acute diffuse purulent labyrinthitis plus meningitis and gave her father who was a doctor, a fatal prognosis.

In this case, there were marked symptoms of labyrinthitis plus meningitis. These should be regarded as *two manifestations or complications of the parent acute otitis media and mastoiditis*—twins if you like, but not Siamese twins—separate entities. In many clinics on the Continent and elsewhere, *if such a case of labyrinthitis plus meningitis with an increased cell count had occurred, labyrinthine drainage would have been done at once*, on the supposition that the meningitis develops from the labyrinthitis and this, I think, is wrong. Nearly all are simply cases of serous labyrinthine

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upset. The meningitis is the danger. It must be treated as a separate entity and has nothing whatsoever to do with the labyrinthine condition. The labyrinthitis, heretofore, has been regarded as the danger causing the meningitis.

In 1946, this patient (R.P.), again developed meningitis and I was called in to see her, when she was being treated by a medical colleague. She recovered without labyrinthine upset on treatment by injection of penicillin and sulphonamides by mouth.

I had another case at the Royal Eye and Ear Hospital (M.C.) February 23rd, 1949, with acute mastoiditis with meningitis plus labyrinthine symptoms. I was treating this case by lumbar puncture, rest, penicillin and sulphonamides. I went away to London on a visit and my colleague, 14 days after admission, operated on the mastoid. The patient recovered and the lumbar punctures all showed a clear fluid under pressure. This was a serous labyrinthitis plus a meningitis.

Summary

1. *Infection.* The labyrinth is very resistant to infection and primary acute diffuse purulent labyrinthitis is a rare disease. Induced or secondary purulent labyrinthitis is not so rare and is caused by :

(*a*) Testing the labyrinthine function in the presence of pus by caloric and turning tests.

(*b*) Various forms of trauma, accidental or operative.

2. *Tests.* Physiological tests of the function of the labyrinth which depend on a movement of the endolymph should never be used on a labyrinth in a pathological state, i.e. in the presence of pus, as they have been followed in the past by many cases of purulent labyrinthitis and meningitis and so death.

Since discarding these tests 27 years ago, I have not seen a case of induced labyrinthitis and only one of primary acute suppurative labyrinthitis and the latter is the only death I have had.

It is said that figures can prove anything. I have no figures of cases of suppurative labyrinthitis nor of operations on the labyrinth. Surely this absence of figures is eloquent proof of the validity of my case to treat all cases with labyrinthine symptoms by rest and not to *test* any case of mastoiditis.

Meningitis invariably follows induced labyrinthitis.

Labyrinthine symptoms complicating either a chronic or acute mastoiditis may be extreme, but may not be due to a purulent infection of the labyrinth, which if rested as advised, will clear up although the successful treatment of the mastoiditis required surgical interference.

I believe that meningitis in such a condition is not due to infection

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from the labyrinth, but is a *primary complication of the mastoiditis*. The two conditions are entirely distinct.

I have had only two cases of definite meningitis complicating mastoiditis with labyrinthine symptoms. After treatment of the meningitis: both these cases recovered with good hearing. If the labyrinthitis had been a suppurative condition I believe deafness would have resulted.

In my experience (more than 3,000 mastoid operations) of the past 27 years, I am certain that the mutilating operation of translabyrinthine drainage of the meninges is quite unnecessary and I think it should not be performed. I wonder how many surgeons think the same!

REFERENCES

DAVIS, E. D. D. (1928) *Proc. roy. Soc. Med.*, **22**, 678.
LAYTON, T. B. (1935) *Proc. roy. Soc. Med.*, **28**, 529.
TWEEDIE, A. R. (1934) *J. Laryng. and Otol.*, **49**, 160.

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