discharge for three months following a miscarriage. On examination the uterus was found to be soft and uniformly enlarged to one and a half inches below the umbilicus. No foetal parts were felt per vaginam. The breasts were active, and the diagnosis of a normal pregnancy was made and she was discharged. Two months later she returned, having had a "flooding" ten days previously, when she passed clots and some "white tufts." At this time the uterus was not palpable per abdomen, but was found to be enlarged per vaginam (two to three months). The breasts were still active. A positive Aschheim-Zondek reaction was obtained. As the discharge continued over a period of three weeks it was decided to perform a curettage. The curettings, however, showed only blood clot and fragments of normal-looking endometrium. There were no chorionic villi or other products of conception, and no evidence of hydatidiform mole or chorionic epithelioma. All these observations have been confirmed by subsequent examination of the curettings. Three weeks later the Aschheim-Zondek test was negative. Quite recently, eleven months after the curettage, this patient returned to hospital with a large mass in the uterus which had extended into the vagina. Clinically the mass was diagnosed as a chorionic epithelioma, and a positive Aschheim-Zondek reaction was obtained. She was treated with radium, and a week later the test was repeated and was found to be still strongly positive. She died a day after the last test, and at the post-mortem examination a large mass of growth was found in the uterus and vagina, with metastatic nodules in the lungs. Microscopically the tumour was a typical chorionic epithelioma. The case is included in this series because of the interesting sequence of events. It is obvious that in the beginning a normal pregnancy was present; hence the positive reaction. The pregnancy terminated in an abortion, which explains the curettage findings and the negative test. Some residual chorionic tissue must have been present, since a chorionic epithelioma later developed, but at that stage it was not sufficient to give a positive Aschheim-Zondek reaction.

Summary

The results of Aschheim-Zondek tests on urines from patients with diseases of the secondary sex organs show that, with one possible exception, lesions of the breast and prostate are not associated with any increase in prolan A excretion in the urine. Among additional cases examined the positive results obtained with chorionic epithelioma, teratoma testis (two cases), and an unsuspected case of pregnancy confirm previous findings in these conditions, and the negative results in cases of ovarian cyst, uterine fibroids, and pituitary eosinophil adenoma are in keeping with the majority of previous observations.

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REFERENCES

- Baudler, U. (1935). *Arch. Gynäk.*, **159**, 101.
 Burrows, H. (1935). *Amer. J. Cancer*, **23**, 490.
 Cutler, M., and Owen, S. E. (1935). *Ibid.*, **24**, 318.
 Engel, D. (1930). *Med. Klinik*, **26**, 1790.
 Ferguson, R. S. (1933). *Amer. J. Cancer*, **18**, 269.
 Hamburger, C. (1933). *Acta path. microbiol. scand.*, Supp., 17.
 Love, J. (1932). *Nav. med. Bull.*, Wash., **30**, 205.
 Saphir, W. (1934). *Endocrinology*, **18**, 191.
 Taylor, H. C. (1936). *Surg. Gynec. Obstet.*, **62**, 562.
 Watts, J. W. (1932). *Proc. Soc. exp. Biol.*, N. Y., **29**, 396.
 Zondek, H., et al. (1932). *Klin. Wschr.*, **11**, 1785.

LABYRINTHINE GIDDINESS ITS NATURE AND TREATMENT

BY

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Giddiness is a vague term, and includes a very large number of conditions in which the patient either feels unsteady or is unsteady on movement. I propose to confine myself to cases in which such unsteadiness is due to a derangement of the internal ear or labyrinth, partly because this is a very common type and partly because it is the only one about which I can speak with any degree of confidence.

Some Anatomical and Physiological Points

The first problem presenting itself is to decide whether the giddiness is labyrinthine or not, and it might help if I first briefly run over some anatomical and physiological points in relation to the internal ear, as helping to clarify the picture. The internal ear consists of a very delicate perceptive nerve apparatus enclosed in a series of intercommunicating fine membranous tubes and small chambers filled with fluid (the endolymph), surrounded by fluid (the perilymph), and suspended in a dense bony capsule. The anterior portion of the membranous labyrinth we know as the cochlea, and its function is confined to hearing. It is, I think, now established that the perception of different tones is a function of the cochlea, and the analogy of a piano or other stringed instrument, each string being associated with a different tone, is near enough to the truth for our purpose. The posterior portion of the membranous labyrinth consists of the semicircular canals and otolith organs, which together constitute the vestibular apparatus. The function of this apparatus is to assist in the co-ordination of movement by informing the centres of the position or movement of the head in space. While the semicircular canals take note of turning movements, the otolith organs probably appreciate movements in a horizontal or vertical plane.

From a physiological point of view both the auditory and the vestibular organs are extremely sensitive, but while the stimulation of the auditory organ is recognized by our consciousness, normal stimulation of the vestibular organ is not. Our own experience, however, in crossing the Channel, ascending in an aeroplane, or, if we belong to the Victorian era, waltzing in the old style, teaches us that a relatively moderate degree of excess of normal stimulation will both impress our consciousness and produce a widespread disturbance of the vegetative nervous system as shown by nausea, vomiting, pallor, sweating, etc. Fortunately, however, this organ, although extremely sensitive, is adaptable, with the result that Nelson was able to win battles at sea and Miss Colledge is able to spin on skates at an incredible speed and stop instantaneously without feeling any discomfort.

While from the examples I have given we appreciate that giddiness results from overstimulation of the vestibular apparatus, it may also occur as a result of the unbalanced action of the two sides. Thus if the labyrinth be destroyed on one side, for a time the individual is incoordinate and therefore giddy; but experience shows that in the course of a few weeks or months this also is allowed for, and both the unsteadiness in movement and the subjective giddiness pass off, the individual becoming normal, at any rate for the ordinary movements of everyday life.

Apart from inherent sensitiveness, the fact that the membranous labyrinth is enclosed in a bony cavity filled with liquid renders it extremely appreciative of changes in tension. Trivial alterations in the air pressure in the middle ear, such as are induced by an obstructed Eustachian tube, may, by the tension transmitted through the oval or round window to the labyrinth, sometimes induce both tinnitus and giddiness.

As part of its inherent sensitiveness the membranous labyrinth is also affected by toxic substances in the blood stream. This explains the feeling of fullness and buzzing in the ears that is induced by certain drugs, such as quinine and salicylates, and by other substances, such as tobacco. Being situated in the base of the skull the labyrinth is also apt to suffer injury either from concussion or from an actual fracture of the bony capsule within which it is contained. Finally, being situated in close relation to the middle ear, it suffers occasionally by the direct spread of infection from the middle ear.

Types of Giddiness

From the point of view of diagnosis it is important to recognize the following types of giddiness which may be met with as a result of labyrinthine derangement:

1. Typical semicircular canal attacks in which the patient has the feeling that objects are rotating around him or that he is himself rotating.
2. A sensation of being forced to one side or the other, which sensation may be actually accompanied by an inability to walk straight.
3. Attacks in which the patient is suddenly thrown to the ground, either forwards or backwards, as if he had been hit on the head by a hammer. This is possibly due to involvement of the otolith organs.
4. The occurrence of a more or less constant unsteadiness, so that the individual has to hold on from pillar to post and both feels and is unsteady.

In almost all cases labyrinthine vertigo may be recognized by the coincidence of auditory symptoms, although in a few instances these may be absent in the early stages. These auditory symptoms consist of tinnitus and deafness. In addition, particularly early in the case, there may be distortion in the hearing of sounds. This distortion may be such that certain tones are heard at a higher or a lower pitch in the affected than in the normal ear. Not infrequently, also, although deafness is present there may be an undue sensitiveness to sounds, so that the hearing of certain tones may be described by the patient as being actually painful.

In considering the clinical picture of giddiness resulting from a disturbance of the internal ear it will, I think, be helpful briefly to mention those conditions the nature of which is firmly established.

Infection of the Labyrinth from the Middle Ear

This may occur as a result of either acute or chronic middle-ear suppuration, and may present itself either as a very acute condition in which the suppuration invades and destroys the whole of the labyrinthine structures, or as one in which there is a more or less localized spread of infection to a portion of the internal ear only. In the former case the patient becomes acutely giddy, with vomiting, violent nystagmus, and incoordination. This giddiness is accompanied by absolute deafness and intense tinnitus on the affected side. Should further complications, such as meningitis, not supervene the acute symptoms gradually subside, and, as has already been said, after a period of a few weeks or months the indi-

vidual learns to be co-ordinate with one labyrinth only. In the latter variety, in which there is a limited and circumscribed infection of the labyrinth, some degree of subjective and objective giddiness is present, and this may occur in attacks with in addition the well-known fistula sign—that is, vertigo on increasing the air pressure in the meatus. Certain other diseases may affect the labyrinth. They are:

Mumps.—A rapid effusion into the labyrinth occasionally occurs in this disease, and is characterized by an acute attack of giddiness with absolute deafness during the first week of the complaint, leaving when the acute stage has subsided an absolutely deaf ear. Fortunately the condition is usually unilateral.

Herpes.—This occasionally involves the ganglia of the eighth nerve, not infrequently with an involvement of other cranial nerves, particularly the seventh. This condition produces the typical eruption on the pinna, meatus, and membrane, with acute vertigo, vomiting, nystagmus, and loss of hearing in the affected ear. Unless its existence is recognized the condition is apt to be mistaken for an acute suppuration of the middle ear with a labyrinthine involvement.

Congenital Syphilis.—In about half the cases of congenital syphilis a labyrinthine invasion takes place, accompanied by acute vertigo with vomiting. This as a rule leaves a completely deaf ear, usually on both sides.

Acquired Syphilis.—This does not very often involve the labyrinth, but when it does the picture is a dramatic one. Such involvement occurs as a late secondary manifestation, is bilateral, and gives the picture of an acute destruction of the labyrinth with vertigo, vomiting, nystagmus, etc., the whole process being one of considerable rapidity, with complete destruction of the labyrinth in the course of two or three weeks.

Focal Labyrinthitis

Having briefly mentioned what may be regarded as clear-cut cases of giddiness associated with known diseases of the labyrinth, we are left with a large number of cases in which we have the picture of labyrinthine giddiness but without any of the causes I have detailed. This group of cases has been very ill defined, and as a result of this lack of definition has been given a number of names, such as "Ménière's disease," "aural vertigo," and "neuritis of the eighth nerve." During a period of some years I have been attempting, by an examination of case-records and the obtaining of after-histories, to classify such cases, and have formed the opinion that we are dealing with a distinct and defined disease.

This condition, which I venture to christen "focal labyrinthitis," presents the following picture: It affects both sexes equally, the average age in the series being 47. In more than half the cases the first symptom noted was auditory—for example, deafness and tinnitus—and not vertiginous, and in this former group a period of months or years elapsed before the giddiness began. A defect in hearing in the affected ear is almost always found, and may be extreme in degree up to total deafness. In a few cases, at the beginning of the complaint, a defect in hearing may be absent, but in these the history of a temporary defect during the attacks of giddiness is generally obtained. The deafness is usually variable in degree, as is also the tinnitus. It has been thought that when the hearing in the affected ear was destroyed the giddiness would cease, but my experience shows that this is correct in only half the cases. In addition to the giddiness, during the attacks there is a wide-

spread upset of the vegetative nervous system, giving rise to nausea, vomiting, sweating, pallor, and not infrequently diarrhoea, the general picture of sea-sickness being closely reproduced. The middle ear is usually normal, the proportion showing some changes in the tympanic membrane being not greater than is met with in a similar group in which vertigo is absent. On careful search a focus or foci of infection can be found in all cases, most usually in maxillary antra, tonsils, or teeth. In regard to the antral cases it is interesting to note that the infected side does not necessarily coincide with that in which the ear is diseased.

The course of the complaint is infinitely variable, long periods of partial or complete freedom from giddiness occurring, perhaps alternating with attacks of extreme severity, and this fact renders it very difficult to assess with certainty the results of treatment. The disease is a progressive one, as evidenced by the defect in hearing, and its duration in the cases under review varies between the limits of two and thirty-nine years. Although there is a temporary ebb and flow in the course of the complaint I have not as yet met with a case in which spontaneous cure has taken place, as judged by the hearing.

I find on examination of my records of cases which I have had under observation from the beginning and subsequently over a long period that in all cases the initial diagnosis was one of middle-ear or Eustachian catarrh. This diagnosis was based, I find, on tradition and on the observation that inflation usually produced some improvement in the hearing. The subsequent course of these cases has convinced me that this initial diagnosis was mistaken and that the condition was a labyrinthine one from the start.

Treatment

Labyrinthine giddiness occurring in cases of middle-ear suppuration is usually an indication for operative drainage of the middle-ear cavities. Formerly, in addition to such drainage of the middle ear and mastoid, an attempt was made by many to pursue the infection into the labyrinth also. This surgical adventure never appealed to me, and I think it is now largely abandoned as being more likely to expedite the spread of infection to the cranial cavity than to prevent it. In the case of giddiness due to labyrinthine involvement in mumps or herpes no treatment is available. In the case of syphilis any evidence of labyrinthine involvement, as shown by giddiness and defect in hearing, is an indication for immediate and thorough treatment of the disease.

In the remaining and far greater number of cases, which I have designated "focal labyrinthitis," careful search for a septic focus or foci, followed by their appropriate treatment, which is usually operative, will, in my experience, give very satisfactory results so far as the giddiness is concerned. My results are as follows:

All cases treated in this way—that is, by the eradication of a septic focus or foci—have been included, and, with two exceptions which are mentioned below, these patients are now completely free from vertigo. The total number is twenty-three, and in ten of these what may be described as a cure resulted—that is, both the cessation of the vertigo and the return of the hearing to normal. In a further three cases the vertigo ceased and some improvement took place in the hearing; in eight the vertigo ceased but the hearing remained unaltered. Of the remaining cases, in one the tonsils were removed a year ago without any diminution in the vertigo, but recent examination has

shown some dead and infected teeth, which may be regarded as responsible. The other failure is represented by a case of twelve years' duration in which intranasal drainage of the maxillary antra has produced no improvement. Recent examination of this case suggests that a chronic tonsillitis may be responsible, and removal of the tonsils has been advised. I feel that, although the number of cases is small, in view of the fact that all are included and that the results are so uniform one must regard them as whole-heartedly supporting my hypothesis.

Finally, as it is sometimes helpful to excise an eye which is hopelessly disorganized by inflammation and which is of no functional use, so is it desirable to destroy a diseased labyrinth that, while no longer useful for hearing, is still producing distressing vertigo. Various methods have been employed to this end. The earliest was the opening of the labyrinth either through the promontory or the external semicircular canal. Later the opening of the external canal was augmented by the injection of alcohol along its lumen into the centre of the labyrinth; and recently cranial surgeons have been increasingly advocating and employing division of the eighth nerve within the skull for the relief of giddiness. Some three years ago the idea occurred to me of injecting alcohol into the labyrinth through the intact membrane and the footplate of the stapes. After a considerable amount of preliminary experimental work I have now carried out this procedure on a number of cases and am satisfied that it achieves the desired end without any appreciable risk to the patient. The procedure necessitates a general anaesthetic, of only very short duration, and the method is therefore particularly applicable to aged or debilitated individuals.

Summary

1. Giddiness due to derangement of the labyrinth is common.
2. Of such cases of giddiness a very considerable proportion are of doubtful nature, and have been given such names as "Ménière's disease," "aural vertigo," etc.
3. As a result of the clinical study of some seventy cases I believe that the labyrinthine derangement is inflammatory and secondary to a focus of infection.
4. The favourable results following the eradication of a focus of infection strongly support this hypothesis.
5. The injection of alcohol through the intact tympanic membrane and footplate of the stapes offers a simple and satisfactory alternative to the surgical opening of the labyrinth or division of the eighth nerve.

The third International Goitre Conference will be held in Washington from September 12 to 14. On the first day attention will be paid to endemic goitre, cretinism, and myxoedema, with special reference to aetiology, pathology, types, geographical distribution, iodine, prophylaxis, thyroiditis, and malignant goitre. On the second day the thyroid will be considered in relation to metabolism, nutrition, and the endocrine glands, comprising a study of its physiological and pathological interrelationship and the clinical application thereof. On the concluding day hyperthyroidism will be discussed, including questions of metabolism, iodine, complications, recurrences, and "goitre heart," with consideration of the diffuse and nodular toxic goitre types and the surgical and medical treatment. The official language of the conference is English; interpreters will be available for papers read in other languages. The papers read and the speeches made will be published afterwards in the form of *Transactions*. Further details may be had from Dr. Allen Graham, 2020, East 93rd Street, Cleveland, Ohio.