X.

CONTRIBUTION TO THE PATHOLOGY AND TREATMENT OF OTOSCLEROSIS.

By JOSEPH C. BECK, M. D.,

CHICAGO.

In studying the various pathologic processes in bones of the human body, I have noted a great similarity between what is known as osteomalacia and what otologists call spongification of the bony capsule of the labyrinth. In this connection I became interested in the work done by Bossi and his treatment with adrenalin chlorid solution hypodermatically. About two years ago I saw a case of osteomalacia in the care of Dr. Carl Beck, a young lady about twenty years of age, who gave a history of having had a number of spontaneous fractures which were brought about by the slightest exertion; in fact, in bed, by the action of a severe muscular spasm. These fractures were set and in some cases opened and wired, but they healed very slowly or not at all. After about six months of this sort of treatment, C. Beck began the injection of adrenalin solution subcutaneously, beginning with one drop and increasing by one drop daily until ten or fifteen minims were used, when the dose was again reduced, probably to two to three drops. The treatment was continued for several months, the patient improving in general health while fractures did not recur. The patient was able to walk about with the aid of crutches. About this time Dr. Carl Beck made his report on this and another similar case, with a complete review of the literature.

As already stated, I had been much impressed by the similarity in the bony changes of osteomalacia and otosclerosis, so I decided to experiment with a number of cases. It is stated that osteomalacia is a disease process for which the improper or disturbed function of the organs of internal secretion is responsible, the adrenal gland in particular. Hence, by the artificial administration of the adrenal solution the process is brought to a standstill, as shown clinically. I thought that

possibly the same cause was responsible for the development of otosclerosis, and consequently placed a number of cases upon this experimental treatment. I selected three groups of cases, eleven in all.

The first group consisted of those which have practically run their course and are sclerosed, with marked involvement of the endorgan of hearing. One would scarcely expect any results so far as the hearing is concerned. While they were practically deaf, they had severe symptoms, as dizziness, vertigo, and marked subjective noises. They responded easily to the vestibular reaction by turning; inasmuch as they had severe tinnitus, the presumption was that some other part of the nervous system may be responsible for this (H. Neumann).

The second group of cases was composed of those of more recent origin, who had still some useful hearing, at least in one ear.

The third group constituted those of an indefinite type. They had fair hearing, with clear histories of otosclerosis, but with considerable evidence of tubal and middle ear inflammation. In one case there was suppuration in both ears, completely cured, but with scars in evidence about the drum.

The histories of all these cases were carefully prepared and in each instance a family tree slightly modified from those presented by Gray (Glasgow) was made (Fig. 1). The tests of hearing were recorded, the conversational tone instead of forks being taken as a standard for testing the progress.

The treatment was carried out as follows: Patients came usually about one hour before the evening meal. After being seated for five minutes, so as to get the normal blood pressure, a von Stein apparatus was placed on the radial artery and the blood pressure recorded in a book. Now, one minim of an adrenalin solution, 1-1000, is injected hypodermatically into the arm. After three minutes the blood pressure is again taken and recorded. (Not until three minims are injected is there a change noted, as a rule.) Granting that the blood pressure at the beginning was 146, it now shows an increase to 147. Five minutes later the blood pressure was again taken; at this time it will be at its height, 149 for instance. Five minutes later, or ten minutes from the time that the injection was made, the blood pressure is again taken, and ordinarily it is found that it has gone back to the normal—146. On the next day

this procedure is repeated, except that the dosage is increased one drop; this is continued for successive days, so on the tenth day there will be ten drops of adrenalin solution used. The figures will be something like this: 146, 149, 153, 146. If now, on the fifteenth day, the blood pressure goes after three minutes to 155 or thereabouts, and after five minutes to the highest point, 165, it indicates that we are reaching the physiologic limits, and we will find that the last blood pressure measured will not go back to 146, but will remain for some time above 150. We now stop injecting for a few days, and then begin again with one minim and increase. However, we never go again in this case as high as fifteen minims, but stay at ten minims, and continue as long as the blood pressure returns to normal. It, therefore, must be made a rule that the blood pressure must be the same ten minutes after the injection as it was before the adrenalin was injected.

RESULTS.

In the four cases in which there was no conversational tone heard, the vestibular irritation which was present was greatly reduced, and in one patient the "terrible" noises ceased. The hearing was not influenced in the slightest. Of the three cases in the second group, all three sisters, the eldest twenty-six years old, the youngest sixteen years old, who still have fair hearing in one ear, all improved in their hearing according to the reports of their employers and people about them. In the third group of the mixed or indefinite cases, we have noted some interesting observations. I placed them first on the adrenalin alone; then I added other ductless gland extracts, so that one case (a male) received adrenalin, thyroid, thymus. The second case (a male) received adrenalin, thyroid, thymus, spleen, pancreas, testicle. The third case (a female), adrenalin, thyroid, thymus, pituitrin and ovary. The fourth case (a male), all the above mentioned, with the exception of the ovary, and, in addition, parotid.

It must not be assumed that these organ extracts were employed indiscriminately and all at once. They were administered usually alone or two together, and the result recorded.

After several months' experimentation on these last four cases we found certain definite general symptoms, as acceleration of pulse, giddiness and vasomotor changes, as flushes, etc.,

but the analysis of these will require a great deal of time and study, and they do not appear to have any influence on the symptoms referable to the ear, that is, the deafness and disagreeable noises.

It is not intended to bring this report as a cure in this most deplorable condition, but only a report on some experiments, hoping that something has been contributed that may start some new thought which eventually will be of benefit in otosclerosis and allied affections.

I desire to express my appreciation to our pathologist, Dr. Clara Moore, who so diligently observed and recorded these cases, and who did most of this work under my direction.

In conclusion, I wish to say that only private cases are suitable for such work, because they can be relied upon. Again, in all the experiments we have not had one single instance of trouble or complication. The duration of the treatment was from three to six months, and after that they were under observation, say once a week, without treatment.

2551 North Clark Street.

Family Tree.