TUBERCULOSIS OF THE MIDDLE EAR.*

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Because of limited time, I shall confine myself to four phases of the subject, "Tuberculosis of the Middle Ear," namely: 1, the frequency; 2, the diagnosis; 3, the treatment, and 4, the bacteriology.

The relative frequency of tubercular middle ear disease is of great clinical importance. We may investigate this by three methods chiefly, *i. e.*, by post-mortem examination of ears, by examination of the ears of living tubercular patients, and by general examination of patients. My own investigations have been concerned with the study of the frequency of tubercular middle ear diseases among patients suffering from purulent otitis media in the University Hospital in Christiania. As it is impossible always to correctly diagnose tuberculosis of the middle ear clinically, we must call the laboratory to our aid. In my opinion, the most trustworthy methods are histological examination of tissue, removed at time of operation, and inoculation of guinea pigs with exudate from suspicious cases. My study includes two hundred cases of purulent otitis media, all but one of which had a mastoid performed. In one case, granulation tissue was removed from the ear through the external canal. The first patient was operated on September 2, 1915, and the last on March 7, 1917. I have observed all of these patients personally and operated upon about 170 of them.

The guinea-pig inoculations were made subcutaneously and the material used was not treated with antiformin. In fifteen cases the pig died from causes other than tuberculosis and in these cases the nature of the disease was determined largely from the histological examination of material taken. The results are as follows:

200 PATIENTS SUFFERING FROM PURULENT OTITIS MEDIA.

Male	95.....	{	Acute	55	}		{	Tuberculosis	7
			Sub-acute	5				"	4
			Chronic	35				"	2
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Female	105.....	{	Acute	60	}		{	"	3
			Sub-acute	2				"	1
			Chronic	43				"	3
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200		200						20	

*Read before the Otolological Section of the New York Academy of Medicine, November 12, 1920.

The more detailed figures will be seen from the table below:

200 PATIENTS SUFFERING FROM A PURULENT OTITIS MEDIA.

Age	Number	Sex	Tuberculosis of the Middle Ear	
Less than 1 year	5	M1	0	
		F4	1	1
1 to 5 years	24	M20	4	
		F4	3	7
5 to 10 years	28	M15	11	
		F13	3	4
10 to 15 years	27	M11	1	
		F16	1	2
Above 15 years	116	M57	6	
		F59	0	6
	200			20

It will be seen that tuberculosis was found most commonly in children between 1 and 10 years old. Under 1 year, scarcely any cases were found. Between the ages of 3 and 7 years the percentage is high—nine cases in thirty examined. In seven of these nine cases the disease started as an ordinary acute otitis media later complicated by mastoid disease.

While the literature on this subject is not extensive, it seems to show a striking frequency of tubercular otitis media in children between the ages of 3 and 7 years. I am unable to explain this fact satisfactorily, but wish to point out that tuberculosis in children is common. Tuberculin tests upon school children in large cities prove this point. Dr. Hamburger of Vienna obtained positive tests on examination of hospital children suffering from non-tuberculous diseases, as follows:

In the second year, 9%; third year, 20%; fourth year, 52%; fifth year, 51%; seventh year, 61%; eighth year, 73%; ninth year, 71%; tenth year, 85%; eleventh year, 93%; twelfth and thirteenth years, 94-95%.

It is seen that the period where there is striking frequency of tubercular middle ear disease is the same period when tuberculosis infection elsewhere is common. Limited time prevents further discussion of this interesting point. For the same reason I can only call attention to the fact that contagious diseases of childhood are doubtless of etiological importance in these conditions. A number of my own patients had measles just before the ear disease began. My investigations cover only 200 cases, and these were severe cases which came to operation, so that one can hardly draw any general statistical conclusions from them alone. Certainly, further investigations are needed.

We now come to the question of *diagnosis*. Let us study the clinical features which distinguish proved tuberculous otitis media from the common purulent type. I have compared the 180 non-tuberculous cases mentioned above with the 20 tuberculous ones and also with five tuberculous cases examined later. I shall mention briefly some points of interest. Most writers state that the finding of more than one perforation in the drum is significant of tubercular otitis. In my 25 cases this symptom was observed but once (a phthisical man). In the 180 non-tuberculous cases this sign was observed five times. Consequently, this sign seems to be of little diagnostic value. We may explain the opinion that *multiple perforations* are common in tubercular otitis by the fact that until recent years we have failed to recognize this disease in cases other than phthisical subjects. In phthisical patients with middle ear disease multiple perforations are rather frequent. Now we know that tubercular otitis is not uncommon in patients who have no lung lesion. In the latter type multiple perforations are uncommon.

Observable *tubercles* in the drum head are rare. If present, the sign is characteristic. A feature of importance is abundant and rapidly recurring granulations in both acute and subacute tubercular otitis. In chronic cases the presence, color, consistency, etc., of granulations is of no diagnostic value. Prominent English authors have regarded enlargement of the periauricular glands as characteristic. However, these occur chiefly in infants and young children suffering from severe forms of tuberculosis. From observation of my own cases, I believe that the appearance of old abscesses in the region of the ear points to a tuberculous infection of the mastoid process. *Facial paralysis* is considered common in tubercular otitis and variously reported to occur in from 19% to 65% of cases. On the other hand, paralysis of the nerve in the common type is assumed to be rare. My statistics are as follows: Of 25 cases of tubercular otitis media none had facial paralysis associated with the disease. One infant had a paralysis of central origin on the side opposite the diseased ear. In the other group of 180 non-tubercular otitis patients there were four with facial paralysis. The striking difference in my figures and those of other investigators is doubtless due to the difference in material investigated. I think you will find that most other writers who reported a frequency of facial paralysis in tuberculous otitis media have examined either patients in the advanced stages of pulmonary tuberculosis or infants and small children suffering from some fatal form of tuberculosis. Most of my patients, except for their ear condition, were in fairly good health.

My conclusions are that facial paralysis is to some degree characteristic of grave cases; but in general this sign is not common. In other words, it is more significant as regards the prognosis than as regards the diagnosis.

We will now speak of the *findings at operation* in a few words. It is said that tubercular granulations have a characteristic appearance. Among other things, they are pale and flabby. I can not admit that in my experience any conclusions can be drawn as to the diagnosis from the appearance of the granulations, but in this connection I will say that I consider the presence of a putty-like matter the color of which is either yellow-white or gray-white to be actual proof of the presence of tuberculosis. In my twenty-five cases this substance was observed six times. Once I found a cheesy mass. In the 180 non-tubercular cases there were never any such findings. As to the destruction of bone, it is to be observed that a perforation of the external lamina due to a breaking down of bone cells is met with more frequently in tubercular than in other cases, though this is a rather uncertain sign. None of my cases have showed cholesteatoma, though reliable surgeons have observed it in their cases. A sub-periosteal abscess is more common in the non-tubercular cases. The amount of pus in the mastoid process is usually small in tuberculosis. No conclusion may be drawn from the microscopic picture of the ossicles.

Most authors assume that tuberculosis starts insidiously without pain. As far as patients in ear hospital are concerned, this is not the case. Out of my twenty-five cases, twelve ran an acute otitis, two with slight pain, while the history in one case is indefinite; six cases were sub-acute, four starting with pain, one without, and one with an uncertain history; seven cases were chronic, three starting with pain, two without and in two cases no history regarding this symptom was given.

As will be seen, it is often very difficult to distinguish between tuberculous and non-tuberculous middle ear disease by means of the clinical symptoms and findings at operation. However, the course after mastoid operation is more characteristic. In tubercular cases the wound does not heal rapidly. This is true where either the simple or the radical operation has been done. Often there remains a long narrow sinus with a small crust over the external opening. The wound may require six months or a year to heal or it may not heal at all. Especially in children is this course seen. Of other diagnostic resources I shall deal only with the Von Pirquet test. This test was used as a routine in 191 of my cases. Of these, 67

were negative and 124 positive. A table of the findings is given below.

Age		Number suffering from clinical tuberculosis			
1 to 12 months.....	1	(	tuberculosis	of	middle ear)
1 to 2 years.....	0	(	"	"	" " " ")
2 to 3 years.....	1	(	"	"	" " " ")
3 to 4 years.....	5	(4	"	"	" " " ")
4 to 5 years.....	1	(	"	"	lung)
5 to 6 years.....	2	(	"	"	middle ear)
6 to 7 years.....	2	(	"	"	)
7 to 8 years.....	1	(	"	"	)
8 to 9 years.....	3	(1	"	"	)
9 to 10 years.....	1	(	"	"	)
10 to 15 years.....	2	(1	"	"	meninges)
Above 15 years.....	10	(2	tuberculosis	of	the middle ear)
	56	(5	"	"	" " " ")
			(2	phthisis)	

These figures, though small, seem to show that a positive test is rather valuable clinically in children under 7 years of age, suffering from otitis. A negative test is valuable in all ages.

We shall now consider the treatment briefly. It is taken for granted that proper general treatment be given these cases. It is also generally agreed that operation should be performed except where there is some special contraindication. Therefore, I shall speak of the specific treatment only. According to the literature, subcutaneous injection of tuberculin seems to be ineffectual on the one hand and not without danger on the other (facial paralysis and labyrinthine symptoms having been observed). I therefore have tried to eliminate the danger and increase the effect by giving the tuberculin directly into the diseased middle ear cavity. This treatment was always given a long time after operation in those cases where improvement was not satisfactory. I have treated nine patients with old Koch tuberculin of 10-100% strength and given 15-30 applications during six weeks to three months. Four of the patients were cured during the treatment, three later on and in one case improvement was doubtful, while in the last there was no improvement. I report these observations without trying to draw any conclusions, though in some cases the improvement in the granulation tissue followed the treatment so closely that one was inclined to believe there was a connection between the two.

Finally, I shall summarize my bacteriological investigations. From twenty cases of middle ear disease I have cultivated a like number of strains of tubercle bacilli in order to test the type. The material used was always the tuberculous glands of the guinea pig, which correspond to the place inoculated. The tests were made by subcutaneous inoculations of rabbits in doses of 10 mgr. bacilli. The

results showed all strains to be of the human type. It has been suggested by Dr. Brieger that the relative benign forms of tubercular middle ear diseases were due to the bovine type. As we find the human type in mild cases as well as in severe, I conclude that the clinical picture does not depend upon the type of organism.

I have dealt with my subject in a rather sketchy manner because of limited time. Many questions concerning tuberculosis of the middle ear are as yet unsolved. A greater amount of material must be studied by competent men. Gentlemen, this country is well equipped in all points to carry on these investigations.

COMMUNICATION.

Editor THE LARYNGOSCOPE: The communication from your cheery correspondent, Dr. Newton Craig, in *THE LARYNGOSCOPE* for February of this year (p. 100) interests me particularly, because in an address on "Reminiscences, Aural and Laryngological, and Their Lessons," which I delivered at the Central London Throat and Ear Hospital last November, I touched on the same subject. I dwelt on the importance of suspecting the development of presbyopia on one's own part or that of one's colleagues of "riper years" when tympanic or laryngeal appearances became habitually ill-defined or unusual. I have derived the greatest satisfaction from the use of glasses of one dioptré stronger than my reading glasses and differing from them in what I consider a most important point. This is that the "centring" of the lens shall be at the height of the horizontal diameter and not below it, as in ordinary reading glasses.

JAMES DUNDAS-GRANT.