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BRONCHOMONILIASIS COMPLICATING PULMONARY TUBERCULOSIS IN A NATIVE OF THE GOLD COAST, WEST AFRICA

BY

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Since Castellani discovered the condition in Ceylon in 1905, bronchomoniliasis has been identified in many parts of the world, especially in tropical and sub-tropical countries. In Africa, Chalmers and Macdonald (1920) studied a number of cases in the Sudan and Egypt, and Pijper (1917) has noted the presence of the disease in South Africa, but, so far as we are able to ascertain, no cases have hitherto been recorded from West Africa. For this reason, a short account will be given of a case which has recently come under our notice at Accra, in the Gold Coast, West Africa. The case was not a pure bronchomoniliasis, but occurred in a patient suffering from pulmonary tuberculosis, a form of mixed infection which apparently is not uncommon, and has been observed previously by de Mello and Fernandes, Castellani and Chalmers, and others.

History. We are indebted to Dr. J. R. Moffatt for the following history of the case. I. D., a native (Buzaburime), aged about twenty-five years and a member of the Police Force, admitted to the Native Hospital, Accra, on the 29th of September, 1920. The patient stated that he had suffered severely from cough for at least two months previous to admission. Upon being closely questioned, he further admitted that for at least eighteen months he had experienced attacks of illness, accompanied by cough, at irregular intervals. Physical examination revealed dullness at the apex of the right lung, chiefly supra-clavicular; at the base of the left lung there was a considerable area of dullness extending as high as the

angle of the scapula, and at its upper portion, especially on the anterior aspect, bounded by a hyper-resonant area. The cough was frequent and harrassing; the sputum copious and in appearance like thin flour paste. Sweating was inconsiderable. Although the breathing was rapid, the patient never suffered from dyspnoea. The temperature chart kept whilst the patient was in hospital showed an irregular fever similar to that which might have been expected in a case of pulmonary tuberculosis. The treatment given was cod-liver oil and, for a few days only, potassium iodide. During the last two weeks of his illness the patient showed some improvement and gained weight; on the night of the 8th of November, however, he had a sudden and copious haemoptysis and died within an hour.

A specimen of the sputum of this case was forwarded to the laboratory for examination as to the presence of tubercle bacilli upon the 30th of September; none were found on this occasion, but it was noted that the sputum had a curious appearance, suggestive of saliva containing small particles of macerated bread, and accordingly another specimen was asked for which should be taken after thoroughly washing the mouth with a weak antiseptic solution. On the 2nd of October the second specimen of the sputum was examined, and was found to contain numerous yeast-like cells (*Monilia* sp.) but no tubercle bacilli. Cultures were made from this specimen of the sputum upon Sabouraud's maltose agar and glucose agar, and within twenty-four hours a copious creamy-white growth of the *Monilia* had made its appearance on both media. On the 5th of October the sputum again showed yeast-like *Monilia* cells and also a few coarse hyphae; tubercle bacilli were not detected. As potassium iodide has proved a valuable remedy in bronchomoniliasis, it was suggested that it should be tried in this case, and this was done for a few days, ten grains being given thrice daily. The effect was to reduce the number of *Monilia* cells in the sputum very greatly, and to reveal the presence of tubercle bacilli which in all probability had been overlooked at previous examinations. A specimen of the sputum examined on the 8th of October showed very numerous tubercle bacilli and no *Monilia* cells, and as the potassium iodide appeared to be causing the patient some discomfort, owing to the increase in the quantity of his sputum, it was then stopped. Sputum examined on the 14th of October, and

later, showed that the *Monilia* cells had reappeared and that the number of tubercle bacilli appeared to be fewer. The patient died on the 8th of November as the result of an haemoptysis, and a post-mortem examination of the body was made on the following morning.

Post-mortem Examination. The following were the notes made at the examination. Body: that of a young native man, rather emaciated. Abdominal cavity and its contents: appeared to be normal. Spleen: not enlarged, weight seven and a half ounces, no visible morbid condition. Kidneys and liver: showed venous engorgement but no other pathological signs. Gall bladder: collapsed, empty. Mesenteric glands: not enlarged. Right lung: adherent to the chest wall at its apex; on removal and section a cavity about the size of a walnut was found at the apex, it contained a blood clot; the whole of the upper lobe and a portion of the middle studded with small tubercles. Left lung: completely collapsed, visceral and parietal pleurae very greatly thickened and of a creamy-yellow colour; the pleura covered in parts with a deposit of the colour and consistence of cream cheese, the pleural cavity contained about four ounces of turbid straw-coloured fluid; the substance of the lung studded with numerous caseating tubercular nodules, and at one point apparently communicating with the pleural cavity. Lymphatic glands at the root of the neck and in the mediastina: enlarged, tuberculous.

Smears of the creamy exudate in the left pleural cavity showed numerous tubercle bacilli and yeast-like *Monilia* cells, also a considerable number of short septate branching hyphae. Sections of the lungs showed that both were the seat of advanced tubercular disease; sections of the thickened pleura of the left lung and of a mass of the pleural exudate showed also the presence of *Monilia*.

Organism. The *Monilia* found in this case was easily obtained in pure culture by inoculating tubes of Sabouraud's maltose agar and glucose agar. It was gram-positive but not acid fast. It grew well on most solid media, but especially well on glucose agar, and produced rapidly a diffuse, spreading, creamy-white growth. Under anaerobic conditions its growth was slower. Gelatin and blood serum were not liquified by it, and did not become pigmented. In broth and peptone water it caused a white deposit to be thrown

down whilst the media themselves remained clear; in peptone water a slight surface pellicle was formed. It produced a thick white growth on potato. On solid media the growth was almost entirely composed of yeast-like cells; in some fluid media hyphae predominated.

Its qualitative bio-chemical reactions may be tabulated as follows :—

Arabinose	...	...	...	O	Inulin	...	...	...	...	O
Rhamnose (isodulcitol)	...	...	...	O	Amygdalin	...	...	...	...	O
Galactose	...	...	...	AG	Helicin	...	...	...	...	O
Glucose	...	...	...	AG	Phlorrhizin	...	...	...	...	O
Laevulose	...	...	...	AGs	Salicin	...	...	...	...	O
Mannose	...	...	...	O	Glycerol	...	...	...	...	O
Lactose	...	...	...	O	Erythrol	...	...	...	...	O
Maltose	...	...	...	AGs	Adonitol	...	...	...	...	O
Saccharose	...	...	...	AG	Dulcitol	...	...	...	...	O
Amylum	...	...	...	O	Inosite	...	...	...	...	O
Dextrin	...	...	...	O	Mannitol	...	...	...	...	O
Glycogen	...	...	...	O	Sorbitol	...	...	...	...	O

The symbols representing: A—acid; G—gas; s—slight; and O—neither acid nor gas.

The production of gas in laevulose and maltose was slight. If the cultures were kept for two weeks or longer the acidity produced in the five sugary media indicated tended to be superseded by alkalinity; this was earliest seen and most pronounced in glucose and saccharose. At first no change was produced in litmus milk, but later, after about ten days, alkalinity developed; no clot was formed and the medium was neither decolourised nor peptonised. Indol was not produced in peptone water.

As gas was produced in glucose, laevulose, maltose, galactose, and saccharose, the organism comes into the fifth group of species of *Monilia*, called the *Tropicalis group*, according to the classification of Castellani and Chalmers (1919). In this group are placed (*loc. cit.* p. 1084) *M. tropicalis*, Cast., *M. paratropicalis*, Cast., *M. pulmonalis*, Cast., *M. nivea*, Cast., *M. insolita*, Cast., and *M. enterica*, Cast.; but from the table given by the same authors (pp. 1082-1083) it would appear that *M. faecalis*, Cast., and *M. metatropicalis*, Cast., should also be included. A somewhat later table given by Castellani (1920) differs slightly from that given by Castellani and Chalmers and omits certain species whilst intro-

ducing some additional ones. According to it, acid and gas are produced in the five sugary media mentioned by five species only, namely, *M. enterica*, *M. faecalis*, *M. metatropicalis*, *M. paratropicalis*, and *M. tropicalis*.

Reverting to the species given by Castellani and Chalmers, which include the five given by Castellani alone and three others, it will be seen that the bio-chemical reactions of the organism isolated from our case do not agree entirely with those of any of them (see table). The reaction in litmus milk suffices to distinguish it from

Table showing the more important biochemical reactions of the species of *Monilia* of the *Tropicalis* group.

Species of <i>Monilia</i>	Litmus milk	Glucose	Laevulose	Maltose	Galactose	Saccharose	Mannite	Dextrin	Raffinose	Arabinose	Broth
<i>M. enterica</i>	O/Alk	AG	AG	AG	AG	AG	As	As	O	O	C
<i>M. faecalis</i>	A/DPs	AG	AG	AG	AGs	AGs	O	O	O	O	C
<i>M. insolita</i>	As/Alk	AG	AG	AG	AG	AG	As	O	O	O	C
<i>M. metatropicalis</i>	AC	AG	AG	AG	AG	AG	O	O	O	O	C
<i>M. nivea</i>	O/Alk	AG	AG	AG	AG	AGs	O	O	AG	O	C
<i>M. paratropicalis</i>	As/Alk	AG	AG	AG	AG	AG	O	Avs	O	O	CTP
<i>M. pulmonalis</i>	O/AlkD	AG	AG	AG	AGs	AG	Avs	O	A	AGs	CTP
<i>M. tropicalis</i>	A	AG	AG	AG	AGs	AGs	O	O	O	O	C
Species isolated from case of Bronchomoniliasis at Accra	O/Alk	AG	AGs	AGs	AG	AG	O	O	?	O	C

A = acid; G = gas; s = slight; vs = very slight; O = neither acid nor gas produced; Alk = alkalinity; C = clot; D = decolourisation; C = clear; CTP = clear thin pellicle; P = peptonisation.

all the other species of the *Tropicalis* group excepting *M. enterica* and *M. nivea*. The former of these two produces slight acidity in mannitol and dextrin, reactions which are not produced by our species. As regards the latter, *M. nivea*, acid and gas are produced

in raffinose, and acid but only a small amount of gas in saccharose. We were unable to test the reaction of our species in raffinose, but in saccharose much gas was produced, and only a small amount in laevulose and maltose. It is admitted, however, that many of the species of the Genus *Monilia* have not permanent bio-chemical reactions, a point emphasised by Castellani himself, and if they are liable to vary outside the body, it seems not unlikely that they may vary also according to their host. The very slight differences noted between the bio-chemical reactions of the organism recently isolated by us and those of *M. nivea* are, therefore, probably unimportant.

M. nivea was originally found in sputum, and is considered by Castellani and Chalmers to be of doubtful pathogenicity. It is of interest, therefore, to recall that the organism resembling this species which we have isolated was found not only in the sputum but also, after death, in the body of the patient.

SUMMARY

A case is recorded in which bronchomoniliasis complicated pulmonary tuberculosis in a native of the Gold Coast at Accra.

The patient died of an haemoptysis whilst under observation. At the post-mortem examination both lungs were found to be tuberculous. The left lung was collapsed, and the pleural cavity partially filled with exudate. In this exudate and in the thickened pleura over the lung *Monilia* was present.

The organism, which belonged to the *Tropicalis* group of Castellani and Chalmers, closely resembled in bio-chemical reactions *M. nivea*, Cast. (1910); without raffinose we are unable to state whether the species found at Accra is distinct from *M. nivea*, Cast.

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