

Clinical Lecture

ON

HYPER-VENTILATION IN CERTAIN DISEASES.

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(Concluded from page 418.)

CASE 6. *Abdominal pain; much sweating; rigors occurring with high temperature; some enlargement of liver; hyper-ventilation; apparent recovery; relapse; death; abscess in liver; scirrhus growth.*—E. H. D—, male, aged twenty-eight, spring-roller maker, admitted Nov. 24th, 1876. Was taken ill three weeks ago with severe pain in abdomen and a rigor; drank a pint of cold water; the rigor ceased, but the pain in the abdomen got worse. He was very thirsty; could not swallow any solid food; no sickness; bowels have been confined three or four days at a time, and when any fæces passed, the stool was hard and white and in small rolls. He lives in a court where there are offensive smells from stables and fish offal. When admitted, he walked into the ward doubled up as if by pain; the left side of the abdomen was extensively dull, and the walls resisting. He was ordered three grains of calomel followed by castor oil. S. diet, beef-tea and milk.—25th: Much sweating, especially at night; no rose spots; no gurgling in right iliac fossa, but tenderness there; heart's sounds clear; no cough, but a little blackish expectoration with a little blood. Temperature at 11.30 A.M. 101.4°, at 3 P.M. 99.2°; pulse 76. Lung-sounds pretty normal; urine, sp. gr. 1028, not albuminous, deposits lithates copiously. Nitric acid three minims, spirit of chloroform six minims, water one ounce, three times a day.—27th: Pulse 96; temperature 100.4°. Chop. Bowels acted well this morning; had a severe attack of rigors at the same time, lasting twenty minutes; says he has frequently had similar chills in the mornings since he became ill; does not feel cold during the shivering fits; urine normal. Temperature 103°.—29th: Liver dulness extends considerably below ribs. Temperature 99°; pulse 88.—30th: Taking half a grain of extract of nux vomica three times a day since.—Dec. 1st: Temperature at 11 A.M. 98.4°, at 9 P.M. 103°.—2nd: Liver dulness extends four inches below ribs; no appetite; is very thirsty. Temperature 101.2°.—3rd: Temperature about 10 A.M. 103.6°; pulse 99.—4th: A stool this morning, very hard and pale; has pain in mid-back and all over abdomen; was threatened with a rigor this morning, but it passed away; area of liver dulness the same as on 2nd; great thirst; no albumen in urine nor blood by guaiacum test. Temperature at noon 103.6°; pulse 108. Right superficial circumflex ilii vein very apparent, left not; Weight (normal) 117 pounds, last winter 146 pounds, last summer 144 pounds.—6th: Had a rigor at 9.30 A.M., lasting fifteen minutes; temperature at the time 101.8°; tongue furred, brown; bowels not open. Pulse 96; temperature at noon 103.2°. At 6 P.M. he had another rigor, also for fifteen minutes; during this the temperature was 105.8°; a quarter of an hour later temperature 104.6°.—7th: Temperature at noon 100.8°; liver enlarged as before; no tenderness on pressure or percussion; urine normal.—8th: At 11 A.M. had a rigor lasting nearly half an hour. Temperature at 9.30 A.M. 96.6°; during rigor 102.2°; half an hour later 102.6°. Moved to aerated ward to-day; windows to be kept constantly open.—12th: Had a rigor on the 10th, lasting about twenty minutes. Temperature during rigor 105° at 11 A.M.; one hour before it was 98°. To-day, about 10 A.M., temperature 104°.

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Muscles of abdomen tense; the patient cannot relax them. Bowels very confined until this morning, when he passed a large amount of pale fæces, the first quantity very hard. Had pain in the abdomen before the evacuation, which relieved it. Pulse 120. No appetite; very thirsty. Temperature about 10 P.M. 104°.—13th: Marked tenderness on percussion over the upper part of the right rectus and epigastrium; continuous poultice to this region. No hydatid fremitus.—14th and 15th: A rigor both days.—20th: Has had very little shivering since last date until to-day at 3 P.M.—22nd: Ordered four grains of quinine twice a day.—26th: No rigors for three days; temperature 101°.—28th: Does not feel so well; has a nasty headache, and pain in the situation of the gall-bladder; tongue pale, coated, moist; pulse 93, soft, quiet; temperature 100° to-day and last night; takes his nourishment fairly. Broth diet, half a pint of ale, and four ounces of brandy.—30th: Is sitting up, dressed, before the fire. Says he feels ever so much better; but he had a strong rigor last night, and a severe one also on the 28th. The temperature at 4.30 P.M. this day was 105°, whereas in the morning it had been only 99.8°, so that it rose in a few hours 5.2° F. At 10 P.M. last night the temperature was 103.5°; this morning (30th) it is 97.8°. Enjoyed a slice of roast mutton to-day. Has lost the pain under the right ribs.—Jan. 1st, 1877: Last night the temperature was 104°; it fell to 97.6° by 10.30 A.M. to-day; went up again to 102.2° at noon; at night was 100.5°. The rigors are not followed by heat and sweating.—3rd: Temperature at 10 P.M. of the 2nd, 106°; at 10 A.M. to-day 98.2°, and at 10 P.M. 103.5°.—4th: Temperature 98.2° at 11 A.M. Abdomen rather full, but almost painless. A grain of quinine was injected subcutaneously twice a day on the 2nd and 3rd. Ordered forty grains of salicylate of soda to be taken *ad vices* six daily.—8th: Has had the mixture daily as ordered until to-day, when it was left off on account of sickness. No tenderness at all in right hypochondrium; bears firm pressure well at that part; but the whole abdomen feels full, and the walls are rather tense. Hepatic dulness extends to within an inch of umbilicus. Takes his nourishment very well indeed. Temperature has been lower the last three days, the highest registered being 102.6°.—13th: Pulse 87, quiet and weak; temperature 97.7°; no rigors for nine or ten days. Brought down yesterday from the aerated ward to the general. Highest temperature last three days 103.5°.—17th: Temperature not above 100.2° on the 14th, 15th, and 16th; at 9 A.M. to-day 99.4°. He feels well; has a wonderful appetite; no shiverings at all. Abdomen is much softer and less tense; hepatic dulness is not more than two finger breadths below ribs, and does not extend higher than the fifth space; face pallid. Ordinary diet.—18th: Temperature ran up last night, but he had no rigor, only sweated a good deal. At 9 P.M. temperature was 103°; at 9 A.M. to-day 98.2°; pulse 96, soft and weak. Ten grains of citrate of iron and quinine, ten minims of tincture of nux vomica, in an ounce of water, twice a day.—22nd: Abdominal muscles tense, especially the upper right rectus; only a little aching felt on pressure under right ribs. Pulse 108; temperature last night 101°, this morning 99.8°; tongue clean. Five minims of nitro-muriatic acid, in an ounce of water, three times a day; nitro-muriatic acid swathe.—27th: He went out for a walk yesterday, and felt very much better for it; temperature in evening 102.2°, and same this morning. Soon after he was discharged at his own request; he wished to get into the air, as it seemed to benefit him so much. He went to the asylum at Walton, but only remained there a few days. He was admitted into St. George's Hospital.—Feb. 10th: For the following record I am indebted to the kindness of Dr. Wadham and Dr. Whipham. On Feb. 2nd the pain in the back became severe, and that in the hypochondrium returned. The report on Feb. 11th states that he is much emaciated and anæmic; his skin and eyes have a pale yellow tint; there is no œdema; pain is felt at right hypochondrium, not affected by inspiration or ingestion. The liver dulness commences at sixth rib in the parasternal line; temperature on 20th was 101.1°, and never was observed higher; no rigors occurred. On the 26th the abdominal pain increased, and the abdomen became distended and tense, tender on pressure. On the 28th he became unconscious, and remained so till he died on March 2nd. On Feb. 24th the blood contained an excess of white corpuscles, thirty being seen in the field of an eighth of an inch objective.

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Table of Temperatures of E. H. D.

Date. 1876.	Hour.	Deg. of temp.	Date.	Hour.	Deg. of temp.
Nov. 25	11.30 A.M.	101.4	Dec. 26	11 P.M.	101.1
	3 P.M.	99.2	27	11 A.M.	100.6
26	6 A.M.	100.6		P.M.	99.6
	P.M.	100	28	10 A.M.	99.8
27	A.M.	100.4		4.30 P.M. } rigor on } 105	
29	A.M.	99.8	29	11 A.M.	97.4
30	Noon	103		9 P.M.	99
Dec. 1	11 A.M.	98.4		10 P.M. } strong rigor } 103.6	
	9 P.M.	103	30	10 A.M.	97.8
2	A.M.	101.2		11 P.M.	100.2
3	A.M.	103.6	31	10 A.M.	99.4
	P.M.	99		11 P.M. } rigor on } 104	
4	Noon	103.6			
	P.M.	102	1877.		
5	10 A.M.	101.6	Jan. 1	10.30 A.M.	99.6
	8 P.M.	103.1		Noon	102
6	9.30 A.M.	101.8		9 P.M.	100.4
	Noon	103.2	2	10 A.M.	103.6
	6 P.M. } rigor on } 105.8			10 P.M.	105.8
	1/2 hour after } rigor } 104.6		3	10 A.M.	98.4
7	9 A.M.	101.8		10 P.M.	103.6
	Noon	100.8	4	11 A.M.	98.2
	P.M.	104.6	5	11 A.M.	99.4
8	9.30 A.M.	96.4		11 P.M.	98.6
	11 A.M. } rigor on } 102.2		6	11 A.M.	98.6
	1/2 hour after } rigor } 102.6			4 P.M.	102.6
	8 P.M.	102.8	7	2 P.M.	101.6
9	9.30 A.M.	99.2		11 A.M.	99
	P.M.	100	8	11 P.M.	101.4
10	10 A.M.	98		11 A.M.	100.2
	11 A.M. } rigor on } 105		9	11 P.M.	103.4
	P.M.	102.4		10 A.M.	101.2
	A.M.	100.6	10	11 P.M.	103
11	A.M.	101.4		10 A.M.	101
	P.M.	104.4	11	11 P.M.	102.2
12	A.M.	104.4		11 A.M.	102.2
	P.M.	104.4	12	P.M.	102.4
13	A.M.	104		A.M.	99.8
	P.M.	103.4	14	P.M.	100.4
14	A.M.	102.6		A.M.	100.4
	P.M.	102	15	P.M.	99.8
15	A.M.	101.6		8 A.M.	99.2
	P.M.	101	16	9 A.M.	100.2
	2 P.M. } in rigor } 106.4			8 P.M.	99.4
16	11 A.M.	102		8 P.M. } not in rigor } 103	
	11 P.M.	103.2	18	9 A.M.	98.2
17	11 A.M.	99.4		8 P.M.	98.6
	6.30 P.M.	104.8	19	9 A.M.	97.4
	11 P.M.	105		9 P.M.	98.2
18	11 A.M.	102	20	9 A.M.	97
	11 P.M.	103		8 P.M.	100.6
19	A.M.	102.2	21	9 A.M.	97
	P.M.	102		P.M.	100
20	A.M.	97.4	22	10 A.M.	99.8
	3 P.M. } rigor } 102.2			8 P.M.	100
	11 P.M.	102.6	23	9 A.M.	100.6
21	11 A.M.	103.2		8 P.M.	101.6
	11 P.M.	102	24	10 A.M.	100.8
22	11 A.M.	100.4		8 P.M.	102.6
	P.M.	103.4	25	9 A.M.	100
23	A.M.	98		8 P.M.	100.4
	P.M.	104.2	26	10 A.M.	98.4
24	A.M.	99		8 P.M.	102.2
	P.M.	101.8	27	10 A.M.	102
25	A.M.	98.6		8 P.M.	98.2
	P.M.	99.4	28	8 A.M.	98.8
26	11 A.M.	99.8		8 P.M.	102.2

Autopsy, twenty-four hours after death.—Height 5 ft. 3 in. Body emaciated. Abdomen prominent. Hair dark brown. Some serum in left pleura, a few adhesions in right. Upper lobe of left and middle of right were crepitant; the rest of the lungs was oedematous and congested; sank in water. Bronchi congested, especially on right side; cretaceous deposits in the bronchial glands. Heart weighed 10 oz.; right ventricle uncontracted, left semi-contracted; their contents were semi-fibrinous. Spots of atheroma at root of aorta, and on mitral valve; other valves normal. Spleen weighed 15 oz., was normal but for its large size. Kidneys normal. Peritoneum contained a good deal of rather turbid serum; there was no peritonitis. Stomach and colon much distended with gas. Intestines normal, except a partial constriction of the distal end of the duodenum, between the epigastric tumour and the colon, which was firmly adherent to the tumour. The pylorus was surrounded by a scirrhous growth, which rendered it rigid without constricting it. The scirrhous mass was of considerable size, and established a firm connexion between all the neighbouring organs. The ductus communis choledochus, which passed through the scirrhous mass, was compressed and obliterated. The thickening extended upwards for some distance between the liver and gall-bladder. In this

situation the wall of the gall-bladder was ulcerated, and communicated with a large cavity, which ramified in all directions in the substance of the liver, and was filled with creamy matter stained with bile. The stomach-walls were infiltrated with hard cancer in the neighbourhood of the pylorus; the small curvature was to some extent adherent to the left lobe of the liver. The mucous membrane was stained with old extravasations, and congested at various spots. In the neighbourhood of the scirrhous, and also at a distance from it, there occurred, under the mucous membrane, small swellings about the size of a large bean, containing green creamy matter. The pancreas was surrounded by cancer on all sides, and its tissue hardened.

In the first of these cases we have a history of chronic illness and emaciation, the presence of fluid in three serous cavities, no disease of heart or lungs, a febrile temperature. The diagnosis made was of chronic miliary tuberculosis. As long as she remained in the general ward she rather got worse than better, but free exposure to fresh air certainly coincided with, if it did not produce, a very remarkable improvement, issuing in recovery.

The second case was undoubtedly one of pyæmic infection from disease of the middle ear. How far the rigors were the result of blood-poisoning, and how far of irritation of the nervous centres conveyed from the tympanic focus of disease, cannot precisely be stated. Only this much seems certain, that more or less blood-poisoning did exist, as testified by the occurrence of an abscess in the neck and a threatened one in the right iliac region. There were also indications of lung inflammation, but this probably did not go to the extent of producing abscess.

The third case was diagnosed as one of pneumonic consolidation, the consolidating material tending very strongly to caseate, if indeed it had not already done so to some extent. The absence of expectoration is rather opposed to this view. And it is not maintained that effusion into the pleural cavity did not also exist to some extent, especially at the time when the breath-sound in the back was nil. But even admitting that lung phthisis would not have set in had the lad remained in the general ward, it admits of no doubt at all that great improvement ensued within two or three days of his removal to the purer atmosphere, and that it continued uninterrupted, though previously his condition was very unsatisfactory.

In the fourth case hyper-ventilation, having been put in force at an early period, seems really to have availed to arrest the malady, which was doubtless pyæmia.

In the fifth case, also one of pyæmia, hyper-ventilation failed—perhaps from having been too long delayed.

The sixth case was one of great obscurity during life, although there was little doubt that the liver was the seat of the mischief. The rigors of course pointed to the existence of abscess, but they might, I thought, have been occasioned—as in a case related by Frerichs—by the presence of gall-stones in the hepatic duct. The autopsy established the existence of abscess, though it does not seem to have demonstrated how the abscess was produced. It cannot be questioned that very remarkable improvement ensued in this instance while the patient was in the aerated ward. The rigors ceased, the temperature rose less high, the pain in the right hypochondrium and the tenderness ceased entirely, the appetite became wonderful, and the general health improved. Still there remained the suspicious circumstance that the temperature ran up now and then without apparent cause, and that sweating occurred. I had some misgivings about sending him to Walton, but he seemed to long for the fresh air so much, and had found a walk out of doors so beneficial, that I concluded it might be as well to let him go. Had he remained in the aerated ward it is hardly doubtful to me that his life would have been considerably prolonged—perhaps until the cancerous growth produced its own destructive effects. The point that I would lay stress on is, that the patient's system under hyper-ventilation had got to be tolerant of an abscess which before had been causing serious disturbance. It is difficult to say whether the other remedies used contributed at all to the improvement. With the exception of the continuous poultices to the region of the liver, which I quite believe were really useful, I do not think they effected much.

Summarising these cases, we have two of probable tuberculosis, ending in complete, or almost complete, recovery; and four of pyæmia, of which two recovered from the

pyæmia, one was not benefited, and one very much, so as to be able to leave the hospital, though death ensued not long after. Here the pyæmia was complicated with scirrhus. The numbers are far too small to justify any positive conclusion, but the results afford some encouragement to the repetition of similar trials.

It may be well that I should tell you what I mean by the term "hyper-ventilation," which is perhaps convenient, though etymologically incorrect. To carry out the method completely, the first thing is to have a pure surrounding atmosphere, which of course involves that the hospital or the patient's residence be in a healthy situation, say a breezy heath, or an upland, such as that on which the Caterham Lunatic Asylum stands. If such a site is unattainable, the next best thing is to have a lofty building, standing high above all sources of air-contamination, such as manure-heaps and gully-holes. The ward where all my patients (except one) were placed, stands about sixty feet above the ground, and as the windows were always opened from the top, the entering air came from a level outside about ten feet higher. It seemed fairly fresh and pure. If the patients are well supplied with good bed coverings, have warm shawls fastened round their shoulders, and hoods with flaps over their necks, they run no risk of being chilled by currents of cold air. The upper sash of the windows should be sufficiently lowered to leave a space of three or four feet vertical and of the width of an ordinary window, for the outside air to enter. The door should be open sufficiently to allow a very free passage of air, especially in the summer. In the winter a good fire should be kept up, and the door need not be so wide open. It is perhaps better that the patients' beds should not be placed directly between the windows and the door, but a little to one side. The nurses are to be strictly charged to keep the windows and doors open night and day—an injunction which, for their own comfort, they are too apt to disobey. Visits should therefore be made at unexpected hours.

Such ventilation as this is intended to place the patient in as nearly as possible the same condition as if he were in the open air, except that he is sheltered from wet and cold, or excessive solar heat. Its object is to increase the aeration of the blood, induce or promote destructive oxidisation of morbid matters, and to favour also their elimination from the lungs in the expired air. It is a special means for special cases, and not at all to be regarded as a slight advance on the ordinary hygienic requirement. To many maladies it would be quite inappropriate or highly pernicious. I should never recommend it to sufferers from rheumatic fever, Bright's disease, laryngitis, acute or chronic bronchitis, or, indeed, to most of those labouring under our ordinary diseases. While believing strongly in the virtue of abundance of pure air, I equally believe in the injurious action of cold, which the Registrar-General has so forcibly demonstrated. I hold that for the proper management of our hospital cases it is of the first importance that they should be classified. Some there are to whom a warm genial atmosphere is quite necessary, others who need pure air in abundance no matter how cold, and others again who do well enough with moderate ventilation and moderate warmth. It is especially for cases of tuberculosis, pyæmia, septicæmia, puerperal fever, and perhaps typhus, that I advocate the trial of hyper-ventilation. Our means of help in these terrible disorders are all too scanty to warrant our neglecting any that seem rational or hopeful. The difficulties in the way of employing hyper-ventilation are often considerable, perhaps as much from the prejudices of the patient's friends as from any other cause. They are not, however, greater than those which the iced bath had to contend with, and will be easily overcome if we find that the remedy merits to be used.

Before concluding, I will make a few remarks on the great and often rapid variations of temperature which occurred in two of the cases of pyæmia, as they seem to have a considerable bearing on the theory of fever. Thus, as the table shows, in Case 2, at 10 P.M. on Oct. 10th the temperature was 100°; fourteen hours later it was 105°. On Nov. 5th, about 10 P.M. it was 99·8°; on the following day at noon it was 105·4°, and the same twenty-six hours later, but in twenty hours more it had fallen to 98·6°. On Nov. 13th the temperature was 105·2° about 10 A.M.; at about 10 P.M. it was 99°. In Case 6 the temperature at 10 A.M. on Dec. 10th was 98°; at 11 A.M., during a rigor, it was 105°.

On the 15th, at 2 P.M., in a rigor, the temperature was 106·4°; about eight hours later it had fallen to 100·8°. On the 17th, at 11 A.M., the temperature was 99·4°; at 6.30 P.M. it was 104·8°. On Jan. 2nd, at 10 P.M., it was 105·8°; twelve hours later it was 98·4°. It is perfectly certain that the toxic matter, which was the primary cause of the disease in these instances, was present in the system, and effective during the whole time of their continuance. The protoplasm of the body must have been similarly modified by it all the while. But the amount of heat generated by the infected protoplasm was very much influenced by some other factor—viz., the "Etwas schützendes," which, as Dr. B. Sandersson says, is of course the nervous system. Paralysis of heat-regulating centres caused increased generation of heat.

FILARIA SANGUINIS HOMINIS (MATURE FORM), FOUND IN A BLOOD-CLOT IN NÆVOID ELEPHANTIASIS OF THE SCROTUM.

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THE LANCET of July 14th last contains a very interesting communication from Dr. Cobbold, announcing the discovery in Australia, by Dr. Bancroft, of "the sexually mature form of one, at least, of the various kinds of minute nematoid hæmatozoa." One of the specimens was obtained from a lymphatic abscess of the arm, and the others were caught in a trocar whilst puncturing a hydrocele of the spermatic cord. It will be interesting to know whether the blood of these persons contained embryos of the same character as those referred to as escaping from the bodies of the worms, and comparable to the filariæ described by Carter, as hitherto none of the filariæ described by this distinguished observer have been found in the blood.

During the last five years I have availed myself of every opportunity that presented itself of minutely examining the tissues of persons, who have either died or been operated upon, in whose blood the embryo filaria sanguinis hominis had been observed. All attempts, however, to find the parent worm had been unsuccessful. Speaking of these matters a short time ago with Dr. Gayer, professor of surgery at the Medical College, Calcutta, he very kindly promised to let me have for examination the diseased growth of the first case of "nævoid elephantiasis" of the scrotum which might be operated upon by him.

Yesterday (August 7th) such an opportunity occurred. A young Bengalee was admitted into hospital, under Dr. Gayer's care, affected with disease of the scrotum of this nature. It was a very characteristic example of the affection; the cutaneous tissues manifested the usual soft, spongy character, with, here and there, somewhat bleb-like elevations, but unaccompanied by any sero-chylous discharge, nor was there a history of previous chyluria.¹ The first incision, however, revealed the fact that the tissues were soaked in chylous-serous fluid of a pinkish hue, which rapidly coagulated. This exudation flowed copiously from the incised tissue, although the general circulation was completely arrested by means of an elastic bandage. The fluid which thus escaped, the diseased tissues, the fluid from a hydrocele of the cord, and some varicose enlargements around the tissues surrounding the cord, were carefully collected in separate vessels, and removed for examination. The blood and the chylous-serous exudation from the diseased parts contained numerous embryo filariæ, but none could be found.

¹ I have, on former occasions, taken the opportunity of observing that this condition of the urine sometimes precedes, at other times follows, the manifestation of the scrotal affection; and that the fact of the urine being affected is sometimes concealed or disowned by the patient. There is at present, in the Medical College Hospital, a case recovering after an operation for the removal of this elephantoid kind of scrotum, in whom no suspicion of the co-existence of chyluria was entertained until after a catheter had been passed, and the state of the urine thus accidentally detected.