ANÆMIA AND NASAL STENOSIS.

*Read before the Section of Laryngology and Otology, at the Fortieth Annual Meeting of the American Medical Association, at New-
port, June, 1889.*

BY H. HOLBROOK CURTIS, M.D.,
OF NEW YORK.

I think we may be justified in assuming that recent progress in nasal surgery has instituted a new era in laryngology, otology and rhinology. The reflex neuroses dependent upon nasal stenosis have been elaborated.

Simple asthma and hay fever, in a vast majority of cases, have been brought within the list of curable complaints, and to-day the most stubborn opponents to the employment of free surgical procedures within the nostrils are one by one entering the van with those who have long since disregarded the ancient traditions of laryngology. In otology, chronic otitis media and tinnitus are admitting of better explanation, and a rational treatment is being instituted whereby, to the credit of the rhinologist be it said, thousands of the deaf and distracted are finding themselves susceptible of relief. If the example set by this Association, in uniting the departments of otology and laryngology, be followed by our local societies, the science of otology may be advanced beyond present conception. It is very easy to generalize upon the brilliancy of certain operations, and enough has been written and read before the various laryngological societies of the United States during the past five years to conclusively prove that good work has been done and much benefit derived therefrom. It is the province of this paper, however, to touch upon a single condition, namely, anæmia and its relationship to nasal stenosis. In a paper read before the Ninth International Medical Congress at Washington in September, 1887, I attempted to classify the various deformities and conditions which produce stenosis, and to elaborate the great gain to be derived from radical surgical procedures in their treatment. At that time the facts were deduced from some 150 cases operated upon with the nasal saw, and about 75 in which was employed the nasal trephine. The conclusions were simply drawn from the great constitutional relief experienced by the patients, and from personal observation. The one item of mathematical accuracy in the cases there described, however, was expressed in the reported gain in body weight. Since that time my operative cases with the trephine have exceeded 400. Aside from the fact that one might be justified, from these figures, in forming a pretty exact estimate as to the value of the work, it has been my endeavor to keep more exact data as to the constitutional improvement after operations for the relief of nasal stenosis. In my recent cases statistics as to weight, chest measurement, capacity of lungs, and spectrum analyses of the blood are carefully tabulated.

While we will not go into the details of the quite unique results the remainder of the table shows, let us dwell for a few moments upon the consideration of the analysis of the blood.

The improvement in color of the skin, which phthisical patients especially exhibited after the relief of a marked stenosis, suggested the possibility of keeping a record of the relative amounts of oxyhæmoglobin existing in the blood at the time of operating, and again some weeks afterward. The most ingenious hæmatoscope of Hénocque enables one to do this with even greater exactness than with Fleischl's hæmometer, and also offers special advantages in determining the "activity of reduction," so called in the change of arterial blood to venous. The spectrum of oxyhæmoglobin may be obtained by holding the spectroscopé at an angle over the thumb nail and observing, after quickly ligaturing the thumb below, how soon the two absorption bands of oxyhæmoglobin disappear; or, in other words, in how many seconds the oxygen is absorbed by the capillary network, the spectrum of reduced hæmoglobin being invisible by this method. The activity of reduction is altered by fasting, exercise, repose, cold, heat and electricity, and more or less by all pathological conditions. In a state of health the absorption bands disappear in about one minute; in altered physical states the limitation varies between twenty-five and ninety seconds. This fact is assumed by Hénocque to possess a clinical importance in certain diseases, but it does not interest us here.

The hæmatoscope of Hénocque consists of two glass slides superimposed in such a manner that they are separated three-tenths of a millimetre at one end, but in contact at the other, the length of the slide being 60 millimetres. We thus have a prismatic space between the glass slides varying from zero to three-tenths millimetre, into which we allow a few drops of blood to flow. Then, by placing the slide under the spectroscopé and moving from right to left, for every millimetre we advance the blood layer increases five one-thousandths of a millimetre (five micra). In a series of careful experiments with solutions of oxyhæmoglobin, normal blood, etc., it has been found that a solution of 14 per cent. of oxyhæmoglobin of a thickness of 70 micra (70 one-thousandths of a millimetre) presents under the spectroscopé the two characteristic absorption bands of oxyhæmoglobin between the lines D and E. The division of the lower plate into a scale of 60 millimetres makes it possible to express in thousandths of millimetres (micra) the exact thickness of the blood layer, and hence enables the calculation of a table which at a glance shows the percentage of oxyhæmoglobin; for if we are unable to get the bands of oxyhæmoglobin distinctly and of equal obscurity until the slide has been moved to the division 28 millimetres read on the

scale of the lower slide, we have required just twice the thickness of the blood layer to obtain the characteristic spectrum; hence the blood contains but 7 per cent., or one-half the normal percentage of oxyhæmoglobin. One has consequently only to read the number on the scale corresponding to the slit of the spectroscopic and, by consulting the table, ascertain immediately the percentage of contained oxyhæmoglobin. By this method of examination, which is the quickest and as accurate as any of the methods yet advanced, we have a tolerably definite standard by which to ascertain the condition of the blood.

J. Loos has reported that careful tests made in von Jaksch's clinic have led him to place more reliance in the hæmatoscope for rapid demonstration than on any of the numerous hæmometers, hæmatimeters, etc., yet discovered. The rapidity and ease with which this instrument may be employed makes the method contrast sharply with the tedious detail of other means. By it one is enabled to estimate the improvement of a patient while taking iron, and to observe, unfortunately, that the percentage of oxyhæmoglobin decreases at once upon discontinuing the dose. On the other hand we demonstrate that the increase brought about by opening the nasal passages remains constant. The physiology of nasal breathing has been made the subject of a carefully prepared thesis by E. Bloch, of Freiburg¹, who has determined, by a most exhaustive series of experiments, the laws which govern nasal respiration, the most important of which is the following: "Inspired air, in its passage through the nose, gains in heat five-ninths of the difference between its temperature and that of the body," which, expressed mathematically, would be: $x = \frac{5}{9}(98\frac{1}{2}^{\circ} \text{ t.})$, t , being the temperature of the inspired air; x will represent the added increment of heat resulting from nasal respiration. The important bearing this has upon the respiratory act is self-evident, and it is chiefly due to the restoration of a process which adds so much heat and aqueous vapor to the inspired air as does nasal breathing that the extraordinary good done the individual is accounted for.

Patients with nasal stenosis, as will be seen by referring to the tables, are invariably anæmic. The twenty cases given below are taken without selection, and represent an average of the blood analyses found in these conditions.

It is not the intention of this paper to inquire further into the specific causes which bring about the increased oxidation, as shown in the tables, nor to attribute to the relief of nerve strain, or to the increased lung capacity, their respective shares as elements of constitutional improvement, but to simply advance the proposition that anæmia is due in very many cases to nasal stenosis, a fact which was commented upon by me several

years before I made use of the hæmatoscope to demonstrate it.²

Time elapsed after operation.	Weight.	Chest.	Spirom.	Oxyhæmoglobin. Per cent.	Increase Percent.
No. 1, 8 weeks.	130-134½	30-30	205-215	6.9-9.3	2.4
No. 2, 8 "	132-137	31½-32	245-256	7.5-9.5	2
No. 3, 10 "	143-150	33¼-33¾	185-190	5.5-9.3	3.8
No. 4, 10 "	126-129	31½-31½	200-219	7.5-8.5	1
No. 5, 13 "	115-126	30-32	215-265	4.5-9.5	5
No. 6, 3 "	140	...	...	9.5-10.0	0.5
No. 7, 4 "	134	...	150-165	9.3-11.0	1.7
No. 8, 1 "	...	...	...	10.0-9.3	0.7
No. 9, 10 "	139	...	...	6.0-11.5	6.5
No. 10, 6 "	120	...	145-155	12.0-12.5	0.5
No. 11, 3 "	196-200	42	320-330	14.0-14.0	...
No. 12, 4 "	92	...	...	7.8-9.0	1.2
No. 13, 4 "	140-149	...	190-220	6.5-8.0	1.5
No. 14, 6 weeks.	127	27½	...	9.3-11.5	2.2
No. 15, 10 "	110	28	120	3.5	Refused.
No. 16, 10 weeks.	134	...	...	11.5-11.5	...
No. 17, 8 "	211	...	...	7.5-12.0	4.5
No. 18, 7 "	126-132	29½	115-130	6.5-13.0	6.5
No. 19, 2 "	170-171	...	295-315	10.0-10.0	...
No. 20, 9 "	165-168	...	275-279	9.3-12.0	2.9

The cases presented represent markedly deflected septa, or enchondroses, simple turbinate hypertrophies, or polypi, not being included (in which latter condition the percentage gain is much greater than in the present compilation). It has been the intention to tabulate an average run of patients referred for operation. It may be interesting to take up one or two cases as examples. For instance, No. 5 presents the following history: Girl, aged 18, with nearly complete stenosis on both sides, a mouth breather and profoundly anæmic. Her family physician has considered her trouble to consist of consolidation of both apices of the lungs. In thirteen weeks after freeing the nostrils her entire condition was transformed, her chest having expanded 2 inches, and the sallow complexion giving way to the ruddy hue of health. No. 14 I include as one of the few instances in which I have found a normal blood state with a deflection of the septum narium. The case, however, is that of an athlete whose time is mostly spent in the open air. No. 9 is of interest because of his pronounced anæmia and from the fact that he possessed a hæmorrhagic diathesis, it having been necessary to ligate his extremities to stop the bleeding after operation. This is the only case among those tabulated in which any treatment was combined in order to overcome the impoverished condition of the blood.

By observing very many cases I have come to the conclusion that the increase of oxyhæmoglobin in the blood after operations on the septum is directly proportional to the relief afforded an impeded nasal respiration. This increase is constant and averages about 2 per cent. in the six weeks following operations in which the stenosis does not amount to more than 50 per cent., that is to say in cases where the nose is doing but half its work.

If the amount of oxyhæmoglobin is directly

¹ Archives of Otolaryngology, Vol. xvii. No. 4.

² "Headaches," by Allan McLane Hamilton.

proportional to the number of red blood corpuscles, this increase may be expressed by an increase of 100,000 corpuscles to the cubic millimetre.

Cases should not be operated upon whose blood shows, by spectrum analysis, lower than 6 per cent. of oxyhæmoglobin. In four cases of alarming hæmorrhage this state was always observed. As reference to the table makes other matters I have touched upon apparent, I will postpone the further consideration of the subject for another occasion.

A CASE OF SCLEROSING MASTOIDITIS OCCURRING SUBSEQUENTLY TO PURULENT MASTOIDITIS INTERNA—OPENING OF MASTOID—EXPOSURE OF DURA MATER—RECOVERY.

Read in the Section of Laryngology and Otology, at the Fortieth Annual Meeting of the American Medical Association, Newport, R. I., June 25, 1889.

BY J. A. LIPPINCOTT, M.D.,
OF PITTSBURG, PA.

Sclerosing or eburnating mastoiditis is a disease characterized chiefly by pain, continuous, grinding pain—pain so remorseless and incessant as to stamp upon the features a peculiar expression, appealing, yet hopeless, like that on the face of the Beatrice di Cenci. The pain centres in the mastoid, but radiates over the whole side of the head. I have seen the pain of mastoiditis eburnans closely simulated by the reflex pain of a diseased tooth; and in suspected cases an examination of the teeth ought to be made by a competent dentist.

The affection is comparatively rare in this country—at least not many cases have been reported in the journals. My own experience is limited to two cases, the first of which was reported at the meeting of the American Otological Society in July, 1884, and was that of a young lady who, after twelve months of treatment, local and constitutional, and of the most varied character, was finally operated upon, the mastoid being opened with a drill down to the antrum. Complete relief followed the operation, but unhappily lasted only a year. A second and more complete operation has been since suggested, but the patient is not yet ready to give her assent.

The following case, apart from the rarity of the disease, seems worthy of record on several grounds,—the origin of the trouble, its obstinacy, the opening into the cranial cavity, and the final result.

Miss F. M., æt. 24, had in childhood had frequent attacks of earache on the left side but never otorrhœa. These attacks gradually ceased, but she continued to suffer frequently from quinsy. In

Sept., 1885, while pursuing her occupation—dentistry—in St. Paul, Minn., she had what she describes as a peculiar attack of sore throat, affecting the left side, which presently disappeared, leaving a severe continuous aching in the mastoid region. Leeching and other local and constitutional treatment proving ineffectual, Dr. Fulton¹ opened the mastoid and found a large abscess which he carefully washed out. The result was quite satisfactory, the wound soon healing, and the pain being relieved entirely. Six months later, in April, 1886, the earache returned, and from that time until I saw her in the following July, continued to increase in severity. When she consulted me I found the following condition: A vertical, linear, depressed cicatrix behind the ear. Above the scar, slight swelling, rather tender to touch. External auditory canal normal. Mt. slightly shrunken, lustreless, and dusky in color. No light-cone. Watch of forty inches hearing-distance heard on contact. Voice at ten inches. Air conduction better than bone conduction. Eustachian tubes pervious. Politzer bag causes transient distress in left ear. Throat and nares healthy looking. Right ear normal in appearance and function. The pain in the left mastoid was almost constant, but was subject to exacerbations.

In view of the fact that an operation had already been performed, and by so accomplished an operator as Dr. Fulton, I naturally hesitated to subject the young lady to further operative procedure. I must remark, parenthetically, that at this time I was not aware of the previous suppurative character of the case, as Dr. Fulton's report of it had not yet been published. I made the diagnosis of sclerosis, and I supposed the disease to have been sclerotic *ab initio*. I suggested to her family physician, Dr. E. S. Riggs, of Allegheny, that the treatment which he had already instituted be continued. Accordingly, for three months an energetic course of tonics and alteratives was maintained, and various applications, revulsive, and emollient, were made to the painful region.

During this period, instead of diminishing, the pain steadily increased in intensity, necessitating the frequent administration of anodynes. In the latter part of October, at the urgent solicitation of the patient, and with the aid of Dr. Riggs and the resident staff of the Allegheny General Hospital, I made with drills and chisels a pretty large opening about five-eighths of an inch deep in the mastoid process. The bony tissue was dense and firm, the cellular structure having almost completely disappeared. There was some hyperæmia especially of the deeper parts.

This opening was maintained and poultices ap-

¹ This case was without doubt one of those reported in the interesting article by Dr. Fulton in the Proceedings of the 9th International Congress.