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.,
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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.

plied, for nearly two months. I shall not weary you with details. Suffice it to say that the operation accomplished nothing. The patient's sufferings continued to increase, being but slightly mitigated by the large and frequent hypodermatic injections of morphia administered. Weary, sleepless nights succeeded days of monotonous pain. Convulsions set in. Appetite failed, and emaciation and debility became more and more marked. The face assumed a haggard, almost despairing expression, and the *morale* of the patient became so weakened that the worst was dreaded. Examination of the urine, as well as of the eyegrounds at this time proved negative.

Seven months after the last operation, viz: toward the end of May, 1887, I was surprised by a visit from Miss M., who drove to my office for the purpose of insisting on one more attempt being made. She said she could no longer endure the slow agony, and would prefer to die on the operating table. On consultation with Dr. Riggs, in whose judgment I had very great confidence, it was decided to accede to the patient's wishes. She was therefore again etherized May 25th, 1887; and, the soft tissues, having been well reflected, the mastoid was reopened. My object now was to make as thorough an excavation as I dared. For this purpose a large and deep opening was made as before with drills and chisels; and then the cavity was slowly and cautiously enlarged by means of the conical drill, until the end of my thumb could enter and move freely in the interior. The thickness of the process proved less at one point than I had anticipated, and, on withdrawing the trephine, I found that I had exposed the dura mater. The opening was fully one-fourth of an inch in diameter, and was at the anterior part of the bottom of the wound.

Circumstances prevented my seeing the patient for some time, and the subsequent treatment was conducted by Dr. Riggs, but I learned later that on the termination of the anæsthesia, the pain had entirely disappeared. Convalescence was speedy and uneventful. The wound was kept open for about six weeks, and then allowed to cicatrize. Dr. R. informed me that, the day after the operation, he punctured the dura mater where it bulged into the wound with a hypodermatic needle, and drew off a small quantity of clear fluid.

In February, 1888, Miss R. came to inform me of her progress. She had resumed work in August, two months after the operation, and, with the exception of a very slight earache from cold, in October, she had been absolutely free from pain. She was enjoying excellent health, and her appearance was bright and cheerful. A deep furrow was to be seen in the mastoid process. The membrana tympani looked just as it did at the first examination, and the hearing was also unchanged. A final examination made a few days ago, revealed the same happy exemption of

pain, and practically the same local appearances. Moreover, the patient states that she feels that she is entirely cured, since attacks of cold never affect the ear now as formerly.

If it is permissible at all to generalize from my limited experience, it seems to point clearly to two conclusions: first, that no treatment which does not include operative interference is of the slightest avail in the affection under consideration, and secondly, that no operation, which does not involve a pretty complete removal of the internal structure of the mastoid, will be apt to prove permanently beneficial. In the first case a partial operation gave relief for a year. In the second, without reference to the history of the case before coming under my care, one partial operation gave no relief at all; while a second, which left very little of the mastoid remaining except the shell, has conferred absolute immunity from pain, which has continued now for two years, and bids fair to be permanent.

The difference between opening a mastoid for sclerosing mastoiditis and the ordinary operation of perforating this structure for suppurative mastoiditis interna is so great that it can with difficulty be appreciated by one who has not operated on both classes of cases. In trephining for purulent inflammation a few turns of the drill, or a few blows on the chisel, and you have forced your way through a comparatively thin wall, and your instrument finds itself either in a cavity, or among the loose and friable material of the mastoid cells. Besides, you are generally rewarded by the appearance or escape of pus. But, in operating on a sclerosed mastoid; penetration is effected slowly and laboriously on account of the ivory-like density of the bone. Moreover, it is sometimes extremely difficult or impossible to find a cavity at all, no matter at what depth, because the cavity of the antrum, in an old case, is apt to be so encroached upon by the eburnating process as to be almost obliterated. Furthermore, you do not find pus—you do not expect to find it. You simply make what you suppose to be a sufficiently large and deep opening, and then you stop, trusting that the result may be good.

I can not close this paper without expressing my sense of the value of an instrument which I have heard "damned with faint praise." I refer to the conical drill. It seems to me that, in case of penetration into the cranial cavity—and this accident, in operating for sclerosing mastoiditis, it is by no means unprecedented—less harm is likely to be done to the intracranial tissues with an instrument like this, which does its work slowly and steadily, than with a chisel, which may plunge abruptly, in spite of the greatest skill and care, into the lateral sinus. On account of its tapering and rounded form a sudden plunge is impossible, since, even if the apex has made an opening, the body of the instrument is prevented

from entering. Besides, from the absence of any sharp, cutting edge, the contents of the cranial cavity are almost secure from laceration or serious injury.

A NEW DOUBLE CATHETER FOR UTERINE INJECTION.

Read in the Section of Obstetrics and Diseases of Women, at the Fortieth Annual Meeting of the American Medical Association, June, 1889.

BY A. CORDES, M.D.,

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In our days of asepticism every instrument, or part of instrument, must be thoroughly scrubbed in every corner where the microbes take their abode. Following this principle, I had made in Paris a vesical catheter, made of two pieces, one sliding into the other, so as to be separable in two corresponding grooves, and being very easily cleansed with the brush. Of course the blind end, near the eyes, is filled up to the level of the eyes, with metal, so as to leave no corner or uneven space, or cul-de-sac to lodge the dreaded microbes.

That was all right, as long as the vesical catheter alone was concerned, in which the fluid supports no pressure, and which is short. But when I tried to apply this contrivance to the long sound for uterine irrigation in which the antiseptic fluid is forced with some power, I found no maker could make it tight enough; a large quantity of the fluid ran out, along the sides of the grooves. If it was nearly tight then the slide would not run easily in the groove. Moreover it would have been a difficulty almost insuperable for our makers to give to the instrument the sigmoid curve which is so invaluable, for the sliding part would not follow that double curve. Then it occurred to my mind that if, instead of having a tube for the access of the fluid in the uterus, (this tube being constituted by the two grooves, as in the vesical sound) and a groove for the return of the liquid with débris, as in Budin's sound, I could have two open grooves, and the instrument would be very easy to cleanse with a common nail brush.

These grooves in my instrument are converted into tubes by the introduction of the sound in a sheath of soft rubber, which adheres enough to the sides of the grooves to make the instrument sufficiently water tight. I was surprised to see how easy the return of the fluid and débris was rendered.

Up to this date, April the 21st, the instrument has been made of nickled metal by Collin, in Paris. But I hope to succeed in having it made of hard rubber which is not corroded by the bichloride of mercury solution, or any liquid. It has also to be made with the sigmoid flexure of Bozeman double catheter, which makes its introduction easier in some cases.

Some criticism of the double current sounds now in use may be proper. In the modification of Bozeman's double catheter, presented by Dr. Howard A. Kelley at the Obstetrical Society of Philadelphia, Pa., March the 1st 1888, the screws, nuts, etc., are not easy to cleanse. Any tube, especially a small one, is not easily kept clean. I know this instrument only by the figure given in the *Am. Jour. Obstetrics*. The internal tube of the Fritsch, which I found used at the Maternité, does not admit the brush. Besides, the openings, or the eyes being on the sides, the fluid flows out laterally, not coming in proper contact with the fundus uteri. In Budin's "horse-shoe" tube the exit of the fluid is well provided for, the injecting tube being semi-lunar, which makes disinfection, however, next to impossible, except by passing the instrument through the flame, rendering it necessary for it to be made of metal.

Dolérís' dilating sound is perfect for what concerns the irrigation; the egress of the fluid is effected between the two tubes, which are separable like the tongs used for wood fire. But to clean such an instrument, and make it aseptic (except with the flame) is an impossibility. See Fig. 1., especially the shape of the tube αD , two capital D's opposed to each other. No brush could follow the curves and penetrate the angles or curves of the tubes. Moreover, the blind end of the tubes from the openings down to the distal end is a pocket, in which the brush cannot penetrate, a very nice abode for microbes.

Pajot made two sounds; one (Fig. 2) is easy to clean, but, I believe, (having no actual experience of it) that it is difficult to make it work tight. The same inconvenience I met in my Erich. The second (Fig. 3) is too complicated to be possibly kept aseptic; all the time, hinges, screws, nuts, constantly get out of order, and are difficult to keep really clean. It cannot be made of hard rubber, consequently it cannot be kept in a mercurial solution.

Dr. A. Reverdier, of Geneva, contrived another instrument (Fig. 4) not unlike a pair of scissors. One blade is an open channel, or large groove, for the return of the fluid or débris. The other blade is a tube perforated at the distal end, with holes for the projection of the fluid into the womb. At the proximal end of the tube is fastened a lateral tube for the India rubber tubing or the canula of the syringe. One great improvement would be to have this lateral tube in the axis of the tube, not in the side, so as to make possible the use of the brush inwardly. Another improvement would be to make the distal end movable for the ramrod (or brush) to go all along the tube. Every cul-de-sac is almost impossible to keep clean. This improvement exists in A. Oliver's sound.

A. Oliver's tube is a hollow catheter, where the walls are impressed with four grooves for the