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DRILLED OUT BY THE

"DENTAL ENGINE."

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ARTHUR MATHEWSON, M. D.,

BROOKLYN, N. Y.

[*REPRINT FROM THE TRANSACTIONS OF THE INTERNATIONAL OTOLOGICAL CONGRESS*, 1876.]

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A CASE OF EXOSTOSIS OF THE EXTERNAL AUDITORY MEATUS DRILLED OUT BY THE "DENTAL ENGINE."

By ARTHUR MATHEWSON, M. D., Brooklyn, N. Y.

The following case is presented as worthy of record from the fact of its being one of the very few cases of exostosis of the auditory meatus successfully removed by surgical operation, and because it illustrates a new and, as it seems to me, better method of operation—namely, the application of the "dental engine," or lathe.

The class of cases to which it belongs is not unimportant, for aural exostosis may not only impair the hearing but endanger life. The patient was the one whose previous history is given on page 407 of Dr. Roosa's treatise on "The Diseases of the Ear."

Miss M. M., aged twenty-five, small, delicate, and subject to neuralgic pains, but in fair general health, was put under the influence of ether in March, 1873, for the purpose of thoroughly examining, and, if practicable, removing a tumor blocking up the right external auditory canal. The examination was conducted by Dr. Loring, under whose care she was, assisted by Drs. Roosa and Pardee.

"The tumor arose from the posterior portion of the osseous canal of the right ear, and nearly occluded the passage. There was a minute opening between it and the anterior wall, through which a No. 2 Bowman's probe could be passed into the cavity of the tympanum. The tumor was of bone, and covered by a movable integument, which was red, and very sensitive. On passing the probe into the minute opening that

has been mentioned, it could be passed under the growth, and, when pressed upon, the growth was seen to move slightly.

"The history of the case was, that there were frequent attacks of pain in the ear, without discharge, until the patient was eleven years old; since which time there has been no 'true earache,' although the parts are tender, and there is a great feeling of fullness in the ear. The watch is not heard at all on the affected side." The voice was heard very imperfectly. At this time Dr. Loring, using one branch of a pair of short, straight scissors, passed in with a boring motion through the opening by the side of the tumor, and removed some of the soft tissue covering the exostosis. On May 8, 1873, as there was considerable pain in the depth of the ear, Drs. Loring and Roosa advised that some operative means be taken to remove the growth. After a time, however, there was a cicatricial shrinking of the soft tissues attacked by Dr. Loring, so as to leave the opening larger and the hearing much better.

The case went on without serious symptoms until the winter of 1875–'76, when she began to experience a sense of pressure in the head, and had attacks of loss of consciousness, and other cerebral symptoms, recurring at intervals until the time of the operation in May. Dr. Loring had seen her at intervals, and advised an operation, intending, he has told me, to resort to the same method as was employed by me; but, as she came to reside in Brooklyn, kindly referred her to me for further treatment.

I found the meatus nearly occluded by the exostosis, over which the integument was thin and very sensitive. The growth had become immovable, and had evidently increased somewhat since the time of Dr. Roosa's report. There was no discharge. The hearing was much impaired.

The history of similar cases showing that they sometimes have had a fatal termination, and the symptoms in this case seeming threatening, an operation for the removal of the growth, or the formation of a larger opening in the meatus, was urgently advised, and finally consented to. It had occurred to me, at my first examination of the case, that the engine used by dentists in their operations might be satisfactorily employed for the purpose. The machine used was that

known as Elliott's suspension dental engine, shown in Fig. 1, in which the power is supplied by a treadle worked with the

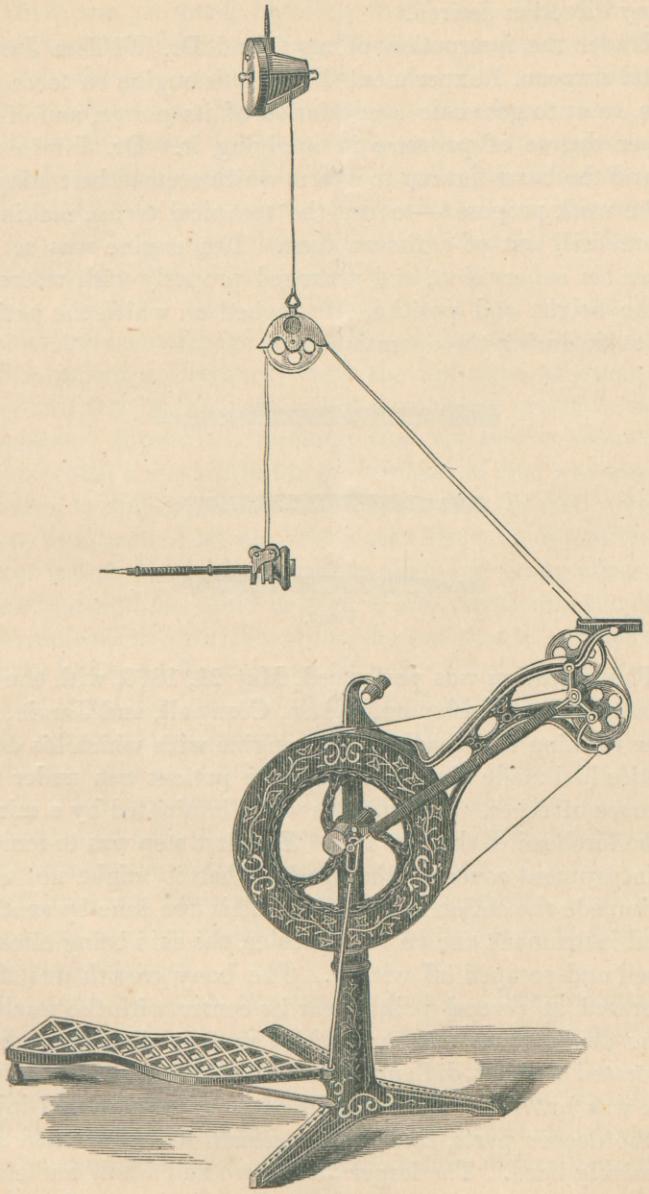

Fig. 1.

foot, while the hand-piece, to which the burrs or drills are attached, held like a pen, can be raised or lowered, and turned in any direction desired.

Under the instruction of my friend Dr. William Jarvie, dental surgeon, I experimented with this engine on teeth and bone, so as to get some appreciation of its power, and of the proper degree of pressure in applying it. Dr. Jarvie also ground the burrs figured to a form which seemed best adapted to the work proposed—to use the technical terms, making a square drill out of a fissure burr. The engine was set up under his supervision, and arranged properly with reference to the height and position of the bed on which the patient was to lie during the operation.

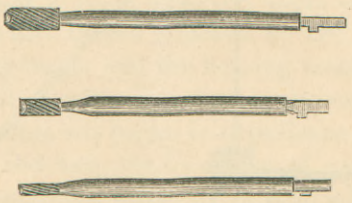

Fig. 2.

The operation was performed, May 21, 1876, with the assistance of Drs. Rushmore, Colton, Cornwell, and Jarvie, the latter working the treadle of the engine with which his daily practice had made him familiar. The patient was under the influence of ether. The meatus was illuminated by a mirror on the forehead of the operator. The first step was to remove the integument covering the growth, that it might not clog and impede the action of the drill. This was done by another dental instrument known as the scaler, the skin being circumscribed and scraped off with it. The bony growth was then perforated at several points near its centre with the smallest of the drills, about one and a half mm. in diameter, which penetrated without difficulty, with so slight a pressure, that there was but little danger of its slipping forward and injuring the deeper parts, though the growth was eburnated and excessively hard. The larger drills (two and a half and three mm. in diameter) were next used successively to enlarge the

perforations and run them together, and by lateral pressure to ream out the meatus.

There was so much bleeding that I was obliged, in spite of frequent swabbing with styptic-cotton, to depend much on the probe for guidance in the operation. The excavation was continued cautiously till the largest drill—about three mm. in diameter—passed freely through, with room to spare, and the probe could be carried in the whole length of the meatus. Besides using the styptic-cotton on cotton-holders, the meatus was repeatedly syringed during the operation for the removal of blood and *débris* of soft and bony tissues.

The operation occupied twenty to thirty minutes. No troublesome hæmorrhage followed, and the pain experienced by the patient on recovery from the influence of ether was easily subdued by the warm-water douche and moderate doses of opiates. A purulent discharge from the meatus soon came on, for which a weak solution of sulphate of zinc was used, at first after syringing, and later the parts were touched with solutions of nitrate of silver. For weeks after the operation the meatus was so nearly filled with swollen and granulating soft tissues that nothing could be seen of the membrana tympani, but examinations with the probe showed that a considerable opening in the hard structures existed. Gradually, and with occasional applications of nitrate of silver, these soft, granulating tissues thinned down, till now there is an opening of nearly the full size of the meatus, except at one point where there is a thin remnant of the exostosis projecting from the anterior upper wall of the meatus. The posterior lower part of the membrana tympani can be seen.

All discharge has ceased ; there is no irritation or unpleasant symptoms of any kind, and the hearing has risen to nearly the normal standard.

In connection with the foregoing case, a brief *résumé* of the history of the therapeutics of exostosis of the auditory meatus may not be inappropriate.

Toynbee reports nine cases, one of which was treated by local applications of strong solutions of nitrate of silver frequently repeated for a long period, with the ultimate result of

a perceptible diminution of the tumor, due, as he thinks, to decrease in thickness of investing membranes.

In another case the size of the growth was diminished and the hearing improved by the application of the tincture of iodine to the tumor and behind the ear, with the internal administration of iodide of potassium in four-grain doses, repeated thrice daily between two and three months.

Wilde recommends in the earlier stages of the growth, when it is the result of chronic periostitis, counter-irritation, bleeding, and bichloride of mercury internally, but has not much confidence in treatment when the growth is farther advanced.

In one of the cases of exostosis reported in Dr. Roosa's work, it is stated by the attending physician that "any increase of the impairment of hearing is always relieved by an application of the tincture of iodine to the bony growth."

Gruber, in his book, published in 1870, reports no case, but says in general that the prognosis is unfavorable with all the means of treatment hitherto applied. The soft tissues covering the tumors may be diminished, but not the bony mass itself. Compression by bougies, he thinks, could not, in most cases, be endured.

Von Tröltsch reports a case in which a laminaria bougie, introduced for the purpose of dilating the meatus, could not be removed for two months. Small sequestra came away, and the passage was so enlarged that the hearing was restored.

One of the cases of exostosis recorded by Dr. Roosa was treated while in London by Toynbee with bougies to dilate the meatus, but they caused much pain, and accomplished nothing. Besides causing great suffering and aggravating the symptoms of pressure, it is logical to suppose that bougies would as readily cause necrosis of the walls of the meatus as of the exostosis. The last-mentioned case had afterward a fatal termination from retention of pus.

The first reported case of surgical operation on exostosis of the auditory meatus is the celebrated one of Bonnafont, of which there is an account in *L'Union Médicale*, May, 1868. The growth filled up the meatus and obstructed the hearing. The soft tissues over the bony growth were first

destroyed by applications of nitrate of silver for five or six days, and then the attempt was made to bore through the bone with a fine rat-tailed file. It was only at the fourth sitting, and after causing much pain, that he succeeded in gaining a starting-point for the end of the file. The boring was continued for ten days. After each sitting a whale-bone probe was introduced to maintain the opening gained. The perforation finally made was still open some years after with satisfactory results in improvement of hearing.

Since this case of Bonnafont's, the following cases of operation have been reported: Dr. L. B., of Hamburg, relates, in the *Archiv für Ohrenheilkunde*, vol. x., p. 110, the history of his own case. Having been troubled at intervals for several years with deafness and tinnitus, caused by the presence of exostoses in each auditory meatus, operations were begun by Dr. Knorre, in July, 1873, with a drill—kind not stated—and continued for four days, with much pain, caused by slipping of instruments and inflammatory reaction of meatus. After a pause of two days an unsuccessful attack on the growth with a chisel and hammer caused severe headache. In ten more sittings, in which forceps as well as drills were used, small pieces of bone of cancellated structure were brought away, the operation being attended with great pain. Muriatic and sulphuric acids were next applied to the tumor for eight weeks two or three times a day with small effect. The actual cautery was applied several times. After a cessation of treatment, when the swelling of the soft tissues had subsided, it was found that a probe could be passed between the tumor and the walls of the meatus. On the 29th of October the patient began to operate on himself with a small, blunt file, roughened only on one surface, which could be introduced along by the side of the growth, and continued filing at it at intervals till the end of the following January. An opening, through which a pretty thick probe could be passed, was finally attained with restoration of hearing and relief of tinnitus. He states that the sensitiveness of the parts increased after each operation. Probably few patients could be found to voluntarily endure so long a course of suffering.

In a note to this case, Schwartze states that two cases of

successful operation on exostosis of the auditory meatus by chisel and hammer had recently come to his knowledge, but gives no details. Whether they are the same as the two reported by Aldinger, of Fürth, near Nuremberg, in vol. xi., part ii., of the *Archiv für Ohrenheilkunde*, does not appear. The latter were both performed on the same subject by Prof. Heinecke in 1875. Exostosis had first been found in both ears of a middle-aged man eight years before, and had grown slowly till 1874, when the right meatus was completely filled, and the hearing abolished. In December, 1874, severe pain came on in the right ear, and four days later profuse discharge of pus. On the 2d of January following, the indications for the removal of the growth seeming urgent, Prof. Heinecke made an attempt to cut through the base of the tumor with a gouge three lines in breadth, driven by heavy blows of a hammer. It was unsuccessful on account of the hardness of the growth. After repeated efforts, several small fragments were chipped off the edge of the exostosis, so that a sound could be passed through to the membrana tympani. Other fragments were removed by the forceps during the next ten days, and the caliber of the meatus opened to half the normal size. The membrana tympani was found perforated; granulations which formed were removed by the snare, and treated also with astringents and applications of nitrate of silver. In March, 1876, the opening in the meatus was stated to be four lines by two; the perforation in the drum membrane closed and the hearing was completely restored.

In August, 1875, the left ear of this patient became completely deaf and painfully inflamed in consequence of the growth of the exostosis on that side, and Prof. Heinecke operated for its removal with gouge and hammer on the 25th of October, 1875. Setting the gouge near the base of the tumor, he succeeded in starting a considerable piece of the growth by repeated powerful blows with the hammer, and prying it off so that it was removed by the forceps. Several small pieces were chipped off, and a free passage opened through the meatus. On the third or fourth day after the operation there was great pain in the ear, and a sense of pressure in the occiput. In March, 1876, the opening in the meatus remained,

though smaller than it had been at one time after the operation, and the hearing was very good.

Voltolini has suggested the application of galvano-cautery to the periosteum of exostosis, with the hope of causing it to be thrown off. According to Schwartze's experience, there is danger to the walls of the meatus, from slipping of the galvano-caustic noose from the smooth surface of the growth.

In a note to Aldinger's paper, the editor of the *Archiv* refers to a case of exostosis reported by Hinton, which had been operated on by Clark, of Clifton, England, with the constant galvanic current. He says, briefly, "After two applications of three needles under chloroform, the exostosis came away in mass, and the patient heard again; entirely well." There is no history of the size or shape of the growth, or of its attachment, but it seems hardly probably that such a result could have been attained in a broad-based, eburnated tumor.

In comparison with any of the methods of operation employed in the cases collated, that with the dental engine seems to me the best, as being less tedious, less dangerous, and more effective. That it is less tedious, a few tests of this and any hand-drills in perforating dense bone will demonstrate. It is less dangerous for the reason that, with the rapidly revolving drills, perforations can be quickly made with so slight a pressure that there is little risk of injuring the deeper parts of the ear, or the walls of the meatus, by the slipping so likely to occur in operations with hand-drills, or with hammer and chisel. The instrument is also held between the thumb and fingers in such a way as to interfere to a less degree with the illumination and inspection of the meatus during the operation. The drills and burrs can also be used, not only to perforate with their points, but also to enlarge openings, already made, to any desired extent or direction by lateral pressure with their sides.

Other uses for the dental engine in surgery readily suggest themselves. There is a great variety of burrs, drills, and saws—more than three hundred in all—figured in the manufacturer's catalogue, which can be attached to the engine and would be of great assistance in operations on bony

growths occurring elsewhere, like those of the orbit, in some cases of resection, and in any case where there is small space to employ the ordinary instruments effectually without endangering the neighboring parts. The form of dental engine which seemed to me best fitted for the purpose is that figured, known as Elliott's suspension engine, the price of which is fifty dollars. Another form called the Morrison engine, which costs only twenty-five dollars, can be set up without the necessity of screwing a fusee into the ceiling, as is the case with the suspension engine, and for most surgical purposes may do sufficiently well. These engines and their attachments can be seen at Johnston Bros., 812 Broadway, New York.

There is no necessity, however, for the surgeon to increase his armamentarium—already perhaps too large—by the purchase of an instrument so costly, as most dentists are now provided with them, and their services can be readily engaged for special occasions.