CHAPTER XXXI.

OBTURATORS.

Breaks in the continuity of the palate surface of the mouth, congenital or acquired, are treated by operation, or otherwise through the use of obturators and vela. The present chapter considers the mechanical means.

The instrument, or plate, called an obturator, gets its name from the Latin verb *obturo*, and signifies a something that shall close or stop up an entrance or break.

Obturators correcting breaks of the soft portion of the palate, being mobile in construction, are not improperly designated vela,—artificial vela.

Obturators are used in the treatment of palatine defects where operative surgical means do not apply.

As obturators are instruments designed to meet the most varying indications, so necessarily are they apparatus of great variety in construction. The simplest of them is nothing more than a plate of metal or rubber covering a break in the hard palate; it differs but little from the support of an ordinary denture. An obturator having the meaning of a velum is an attempted duplicate of missing part in the movable, or soft, palate; it is designed not only to fill a break, but to assist in functional performance.

A simple obturator holds the same relative position to one at the other extreme that is held by the Physick-Desault leg-box to the most complex of apparatus used in the treatment of fractures of the extremities. The simple is expressive of a principle; varieties express modification on the principle. A practitioner understanding the basal idea is at no loss to appreciate the genius of the instrument in its application to all kinds of cases.

A patient presents himself, let us suppose, suffering under a deficiency in the hard palate. We examine the condition, and find the walls of the break so heavily and solidly indurated as at once to perceive that any attempt to pare and bring them together would be futile. Palato-plasty naturally suggests itself, but observation of the surrounding parts convinces that the risks are too great for a good promised. Such is a case that not infrequently offers itself to the surgeon's judgment. Dieffenbach, whose name is so honorably associated with oral operations, evidently found himself much embarrassed with just such conditions,—cases here to be presented as the easiest of remedy by use of an obturator. To correct such defect the German surgeon suggested a stud of india-rubber. Two pieces of rubber the thickness of pasteboard are cut, being somewhat larger than the opening to be closed,

and between these is placed a small round piece; the whole is then securely fastened together by means of waxed thread: one of these pieces is intended to rest on the posterior, the other on the anterior surface of the opening; the small middle piece is for the intermediate space.

A moment's reflection will exhibit the inconveniences as well as the more striking faults of such an appliance. The rubber, unless vulcanized (and, to be so applied, it cannot be vulcanized), soon becomes offensive. It acts as a continual source of irritation, particularly as the posterior base of the cleft is concerned. The centre piece, which, to hold the parts with any degree of steadiness, must fit the opening with reasonable accuracy, soon, because of the presence of moisture and heat, expands, thus enlarging the canal. The apparatus is as well very inconvenient to remove for the purpose of cleansing, which cleansing it demands daily.

A case amply illustrative of the inefficiency of this mode of combatting palatine defects, and, indeed, of the absolute harm resulting from it, is recorded by Dr. J. H. McQuillen. The patient, who had an opening in the palate, the result of syphilis, was treated by Dr. Daniel Neall, who employed, in the first instance, india-rubber as a substance from which to construct an obturator. This was cut somewhat in a button shape, being large above and below, and contracted in the centre, thus constituting an apparatus which was retained in position by resting on the parts of the nares surrounding the orifice. After this had been worn a week or two, the patient returned, when it was found quite loose and the orifice somewhat enlarged, the rubber having acted as a source of irritation and induced absorption. Another apparatus was formed from the same material, and, after being worn a week, the orifice was found larger than at the previous meeting. The rubber was also found considerably affected by the fluids of the mouth. Satisfied that it would not answer the purpose intended, this material was abandoned, and a simple obturator of silver constructed, this covering both orifice and roof of the mouth. It was found to fulfil every indication.

There is another, a somewhat domestic treatment for these defects, which may be alluded to in passing. This consists in stuffing the break with cotton or wool. The material, unfortunately, not infrequently escapes into the throat, or, passing into the nares, it has sometimes produced ozæna by lodging in a meatus, quite extensive necrosis of the turbinated bones having been provoked in this way. The practice is not without marked danger.

A case of a different class, yet belonging to the same category so far as treatment is concerned, invites, in connection with the consideration of simple obturators, a moment's attention. This is the existence of a cleft or break associated with subacute or chronic disease,—cases not fit, of course, for operation.

Some time since, Mr. ——, a French teacher of this city, had necrosis of the palatine arch, the result of venereal disease; the sequestrum that came away was quite large, producing a break in the continuity of the hard palate

at least an inch in diameter, freely exposing, of course, the nares. A result was, as might be anticipated, that his vocation as a teacher had at once to be relinquished.

This case was seen, in consultation with the attending physician, about a month after the patient had resigned a situation which he held in one of our principal private schools, and upon which, up to this time, he had mainly depended for his income. The necessities of the man were immediate; operation for the restoration of his speech was out of the question. The writer had the happiness of relieving this patient of his trouble so perfectly after three days, by the use of an obturator, that every time we have since met he laughingly asserts that he speaks better English than before his accident. It is certainly true that he speaks it quite as well.

An obturator for cases like this consists simply of a metal plate that fits accurately every part of the hard palate. Such a plate is to set with the greatest nicety, and is to be held in place either by bands placed around certain of the teeth, or by means of atmospheric pressure. The first plan of fastening is to be employed when disease is associated with the cleft. The latter is well adapted when the break is not too large, and where all disease is long passed away. To make such an obturator, first take an ordinary impression-cup, such as is employed in taking casts of the mouth for teeth. This cup is filled with beeswax, softened to the consistency of dough. Thus prepared, the operator takes his position behind the patient. The cup is now to be introduced carefully into the mouth, and carried just so far back as will allow of the teeth being included within the arch, or rim. This accomplished, cup and wax, in a body, are to be pressed firmly up into the roof of the mouth, and the wax worked around the necks of the teeth and about the alveolar border. The patient holding his mouth very wide open, the mass is to be removed even more carefully than it was inserted. This manipulation, if properly executed, gives the exact impression of the palate. The next step is to make a model. To do this, take the impression just obtained, and, surrounding it with a rim of paper, the rim to be, say, one and a half inches in height, stir into water the common calcined plaster —sulphate of lime—until a very thick paste is obtained. This paste is poured into the impression, and should be enough in quantity to fill from the wax, which lies at the bottom, up to the top of the rim. The model thus made is not to be disturbed for three or four hours; it must have time to set.

The next step in the operation is to remove, from about the plaster cast just made, the paper and wax. This is accomplished, first, by heating gently the cup in which the wax lies, which permits of its easy removal; and next by carefully trimming from about the necks of the teeth, by means of a knife-blade kept constantly warm, the wax which so closely surrounds and imbeds them; in this way it is all safely to be taken away. The paper is, of course, simply torn off. Comparing the face of the model thus made with the

mouth from which the impression has been taken, we find a common likeness to the minutest particular.

As the model expresses the break in the arch, and it is the intention to restore this arch to its original contour, so is it at this point in the procedure that the step is to be taken which insures such result. This step is easily accomplished by taking a little ball of warm wax, and filling with it the hole or break in the model. The natural concavity of the arch is in this way restored. Of course this is not at all difficult, nor is there any guess-work about it, as we have the inclinations of all the surrounding parts to guide us, and all we have to do is simply to model this wax to the proper curve. The cast is finished by bevelling the portion which rested against the paper; this bevelling to be so done that the greatest diameter of the model shall be its base, the object of the shape being to permit of easy drawing of the model if a sand cast be made.

This completes the model to which an obturator is to be made.

A next step is the preparation of dies.* These are to be made, one of zinc, the other of lead; and the process of getting up such casts is precisely the same as that adopted by a moulder.

Directions.—Procure a moulding-flask or a circle of tin: a common tin cup, with the bottom broken out, answers the purpose well enough. Lay the model you have prepared upon the table, the palate face looking up. Now place the circle of tin over it, and with some moulder's sand, very fine, which you have previously moistened and tempered, cover in the model, packing and filling the circle completely. Now turn the circle, or cup, so that the base of the cast looks up. Next a penknife-blade or a small gimlet is to be inserted into a square of wood previously inserted into the plaster, and by striking it several light taps the cast will be loosened. It is now to be lifted from the sand. Thus we have a mould for a metal casting. The next step is the making of such a cast. To do this we have only to melt, in any convenient vessel, one or two pounds of common zinc, and pour it slowly into the mould. This done, let the whole remain undisturbed until cold.

Thus, it is seen, we have prepared, with little or no labor, a correct model of the mouth in metal. It is to this zinc model we are to fit and adapt our obturator. Now, this latter process is easy or difficult, according as one goes about it. One method is to take hammer, files, and pliers, and cut, file, and mallet until the adaptation is secured. Such a task is almost as hard as was the cleaning of the Augean stables; besides, it is next to an impossibility to accomplish the work property. A second plan, and one which is as easy, simple, and interesting as the other is difficult, perplexing, and annoying, consists in making a counter-model in lead, between which and the model, or

* A surgeon being the operator, the model, or even the impression, may be handed to a mechanical dentist, who makes the obturator ready to put in place, without further trouble to the practitioner.

male cast, as it is called, the palate, or obturator, is struck up. This counter-model is very easily made, as follows:

Take the zinc die and lay it upon a table, with the face or palate surface looking up; place about it the cup, or circle, precisely as in the case of the plaster model. Now, with the sand moistened as before, fill up the cup covering in the die, packing the sand as solidly as possible. Next, without disturbing the cup as it rests upon the table, take a knife and dig away the sand until the face of the die is exposed, together with a reasonable space between zinc and cup. You are now prepared to make the counter-model. Take a vessel (not the one in which the zinc was melted), and place in it two or more pounds of lead; when fluid, pour this over the face of the zinc die, filling up to the very top the cavity which you have dug out in the sand. When the lead has become cool, remove the castings from the sand, and with a hammer knock the two apart.

To make an obturator by means of dies thus obtained, the procedure is as follows: A piece of thin sheet-lead is forced with the fingers over the face of the zinc die, and with a sharp and delicate-bladed knife this lead is cut so as to cover accurately the hard palate, being festooned so as to adapt itself accurately about the necks of all the teeth. This palate of lead, being nicely and correctly fitted to the parts, is taken off the die and carefully spread. Next it is laid on a piece of gold or silver plate, and the outlines distinctly marked; using a pair of cutting forceps, the shape of the lead is repeated in this second piece of metal. A next step is the process of annealing, or softening the metal, so that it shall be as malleable as possible. This consists in subjecting it to a red heat, which may be done in any convenient manner. The mechanical dentist lays the piece upon charcoal, and throws over it, by means of a blow-pipe, the flame from his alcohol soldering lamp. Another manner is to lay it upon hot coals.

The metal being annealed, it is taken up and so bent with pliers as to fit the die tolerably; it is not, however, at all necessary, in this procedure, to give one's self much trouble. Next take up the counter-die, and lay it carefully over the zinc,—the plate being between the two. Employing a heavy hammer, the dies are now driven together. In this step of the operation it is desirable that the worker feel his way,—that is, hit the zinc model a few slight taps, and then, taking the two apart, see if the plate is going as required. If all be right, the casts are to be driven into each other with reasonable force. If, on the contrary, the metal is not taking a proper direction, it must be properly inclined by means of the pliers. To complete the finish of the plate itself, the festoons, which are to embrace the necks of the teeth, are to be cleanly cut out by means of a round file; polishing completes the manipulation.

Thus we have an obturator finished. If now it be placed in the mouth, we shall see that we have restored the arch, by our contrivance, to its original condition, at least so far as purposes of speech and mastication are concerned.

Nothing now remains but to secure the piece firmly to its place. This brings us to the consideration of modifications of the instrument.

If a patient, for whom had been made such an obturator as that the manufacture of which has just been described, had certain good sound teeth, we might proceed to fix the piece in the mouth as follows. Going back to the plaster model, we would fit around such teeth as might seem best adapted to the purpose delicate bands of metal,—gold is always to be preferred; these bands should fit the teeth with accuracy, and are to be fixed to their places while the obturator is lying on the model. Take next particles of wax, and stick the plate and bands together. Now carefully lift all from the model, and set in plaster. This last manipulation is accomplished by laying the piece on charcoal, and pouring over it, the wax alone excepted, the creamy plaster before alluded to. When this plaster sets, the wax is to be delicately picked away, and thus are exposed small portions both of plate and bands. These parts are to be soldered together.

This last process completes the piece for the mouth. In placing it in position, we have only to slip the bands over the teeth to find it held with all security.

Another plan of fixing the apparatus to the mouth is by means of atmospheric pressure. To accomplish this, a cavity is made in the piece. This is done by placing on the plaster model, before making the castings from it, a piece of wax: its shape may represent, in diameter and thickness, the ordinary half-dime. Or perhaps we cannot find a surface on the arch for a suction of such size and shape; if so, it may be lessened, or the shape modified so as to suit the case; what is wanted is a cavity in the plate, the size and location are not of special consequence. Such a piece of wax will, of course, be represented by zinc in the casting, and by a depression in the counter-cast. In forcing the plate between the dies, the portion represented by the wax is thrown up; thus, when the plate is in the mouth, a cavity is formed. The instrument is held, in this case, by making an air-pump, as it were, of the tongue, and sucking the air from the cavity. Obturators are seen thus dependent on atmospheric pressure for fixedness, held so tightly that it requires considerable force to effect their removal. The principle is the same as that employed for holding artificial dentures in place. The *modus operandi* will be perfectly understood at a glance by looking at any set of teeth made for the superior jaw.*

Another modification of the obturator is that in which the piece is held to its place by a bulb, or rim which passes into the cavity of the break. This adapts the instrument to such cases as have neither teeth for clasps nor site for suction; where disease has destroyed the whole of the hard palate, leaving alone, as boundaries of the cleft, the alveolar processes and velum. Such an obturator and the character of cleft for which it is adapted are

* Plates, whole or partial, for the support of artificial teeth, are made and fixed as here described. For repetition, after different manner, of the description, see page 415.

happily and truthfully exhibited in the accompanying drawings. Fig. 342 represents the mouth, Fig. 343 the obturator. This case, and others which

Fig. 342.

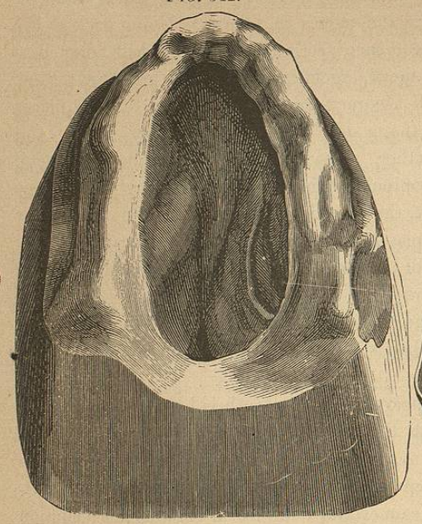
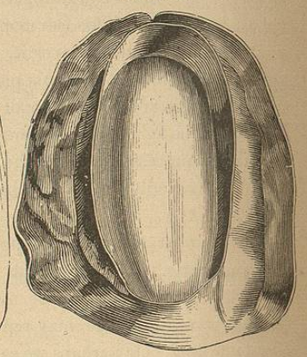


Fig. 343.



represent various modifications of the apparatus, are from life, having occurred in the practice of different dentists.*

The first case, as seen in Fig. 342, from the practice of Dr. McGrath & Son, was that of a female over fifty years of age. In this instance the fissure was confined to the hard palate and was undoubtedly the result of syphilis. Of the history of the case, all that could be obtained was derived from answers to indirect questions which were put to her. The gentlemen learned that the defect was the result of a disease which commenced as sore throat and continued its ravages for over three years before it was arrested; this, together with the appearance of the pharynx and uvula,—these being covered with cicatrices, the result of old ulcers,—left them without any doubt as to the true nature of the complaint. The parts which had been destroyed during the progress of the disease were the palate-bones and the palatine processes of the superior maxillaries (making an opening into the nose nearly two inches in length and one inch in breadth), the turbinated bones with the exception of the middle one on the left side, which is represented in the cut as projecting from the side of the cavity), and the vomer, producing an enormous irregularly-shaped cavity, extending as high up as the nasal bones, which latter, however, bore no traces of ever having been affected by the disease.

* Report by George T. Barker, D.D.S.

The patient, in order to prevent the passage of the food into the cavity during mastication, had been in the habit of filling the opening with a fold of muslin, which answered the purpose to a certain extent; the velum was entire; the patient had also lost all the teeth of the upper jaw.

The kind of obturator employed in this case was simple and uncomplicated in its mechanism, Fig. 343. A plate was made to fit accurately to the alveolar ridge, extending about one-eighth of an inch beyond the posterior margin of the opening; also passing in to a distance of nearly an inch, and fitting as closely as possible to the anterior and lateral sides of the cavity. The object of this latter arrangement was to render the piece firm in its position. From the posterior margin of the opening, and extending forward about half the length of the alveolar ridge, was a fold of mucous membrane projecting inward and upward, over this margin; that portion of the plate which was opposite to it was bent. This, together with the suction obtained by the plate fitting closely to the alveolar ridge, enabled the wearer to keep it in its place. The opening was then covered by soldering to this a second piece of plate, so fashioned as to represent as nearly as possible the form of the lost palate.* The object in not extending the plate into the cavity on the posterior edge of the opening was to prevent a lodgment for the nasal secretions, which by their accumulations would prove offensive to the patient. The artificial teeth were then fastened in their proper position, and the apparatus was complete. This obturator the patient had been wearing for about three months; it remained in place and fulfilled the office of mastication as well as any ordinary suction plate in a mouth where no defect of the palate exists.

The second case, Fig. 344, was also that of a female, but the fissure was confined to the soft palate. This, as in the former case, was the result of syphilis. The break extended from the posterior opening of the nares through the velum looking backward, and was nearly an inch in breadth. The uvula was entirely gone, as well as the lateral half-arches, and along with them the palato-pharyngei and constrictores isthmi faucium muscles. In this case deglutition was impaired to a great extent; the food would get into the nares, and the fluids would also pass into the nasal cavities and out through their anterior openings. The disease had not confined itself to the palate, but, extending to the nose, had destroyed its internal structure, as well as portions of the nasal bones, to such an extent as materially to change the external shape of the organ. The obturator, Fig. 345, constructed for this case, was of one piece, and made to cover the hard palate completely, extending from the central incisors to the posterior wall of the pharynx, and passing a short distance beyond the edges of the opening on each side. The plate was made to press firmly against that portion of the soft palate which remained, yet not so firmly as to be the cause of irritation, the edges of the plate being slightly bent downward for the same reason; the object being to prevent the possibility of the soft parts being drawn above the palate, which would afford a communication with the nares. The posterior edge of the

obturator was bent downward at a right angle with the body of the palate, and curved so as to form, with the posterior wall of the pharynx, an oval

FIG. 344.

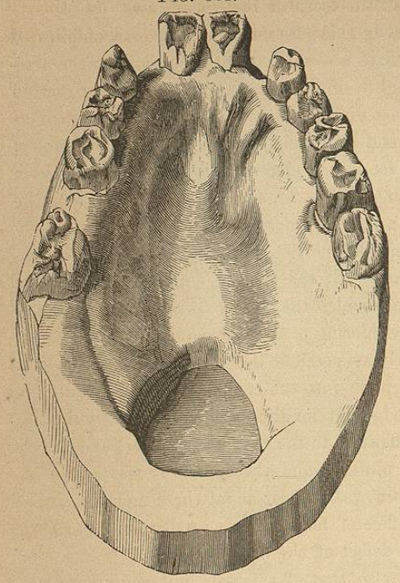
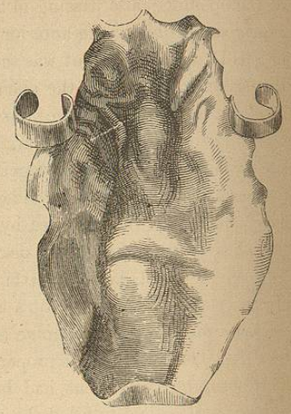


FIG. 345.



opening sufficiently large to permit the patient to breathe freely through the nostrils. In the act of deglutition, the muscles would contract and press against this portion of the plate, thereby cutting off the communication with the nares. To this plate were attached three artificial teeth,—two lateral incisors and one molar,—the whole being retained in position by means of clasps around the teeth.

This obturator the patient had been wearing a little over two months, and, like the former one, it had proved successful, deglutition being restored, and speech considerably improved.

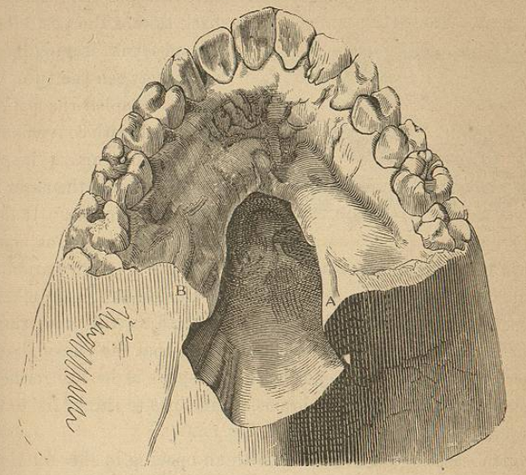
The practice of Dr. T. L. Buckingham, Professor of Chemistry in the Pennsylvania College of Dental Surgery, offers the following cases:

The first is that of a gentleman who had an opening through the hard palate, in the centre of the arch, about as large as a ten-cent piece. This patient had worn an obturator with a sponge attached to it, made in the following manner: A plate was modelled to fit the roof of the mouth, and a piece of sponge was sewed upon the palatine surface, to fill the break, and hold the plate in its place. Objections to this obturator were that the opening became enlarged from the absorption occasioned by the pressure of the sponge upon the sides of the cavity; the sponge would also become

very offensive, requiring frequent removal. In this case a plate was struck to fit the mouth, and attached to the teeth by means of clasps. This simple appliance answers better than any other that had been made for him.

The second case is one of a gentleman who had an opening into the left antrum, at the point where the second bicuspis and the first molar had been, but

FIG. 346.



on the outer surface of the alveolar ridge, or rather seat of original ridge,—for the alveolus was entirely absorbed opposite the opening, which was about half an inch in length by a quarter in width. The nasal bones were diseased, which caused an almost intolerable odor.

There was made for this case a small obturator to close the opening. This was left open at the top, to allow the placing in it of a small portion of chloride of lime, the intention being to correct, if possible, the offensive smell. The patient did not live long enough, however, to give it a fair trial. Dr. Buckingham remarks that while any of the chloride of lime remained in the obturator there was no unpleasant smell; but, unfortunately for the experiment, the gentleman had lost nearly all the sense of smell, and therefore could not tell when the agent had evaporated. The obturator was held in position, to a great degree, by a plate and teeth, to which it was attached.

In the two preceding cases voice was not altered when the appliances were in the mouth.

The third case is that of a gentleman who on a previous occasion had a tumor removed which covered a portion of the posterior surface of the hard and the anterior surface of the soft palate. The surgeon, in the ablation, had divided the velum and uvula, so that the case resembled a congenital de-