

Cleft-palate and hare-lip : the earlier operation on the palate / by Edmund Owen.

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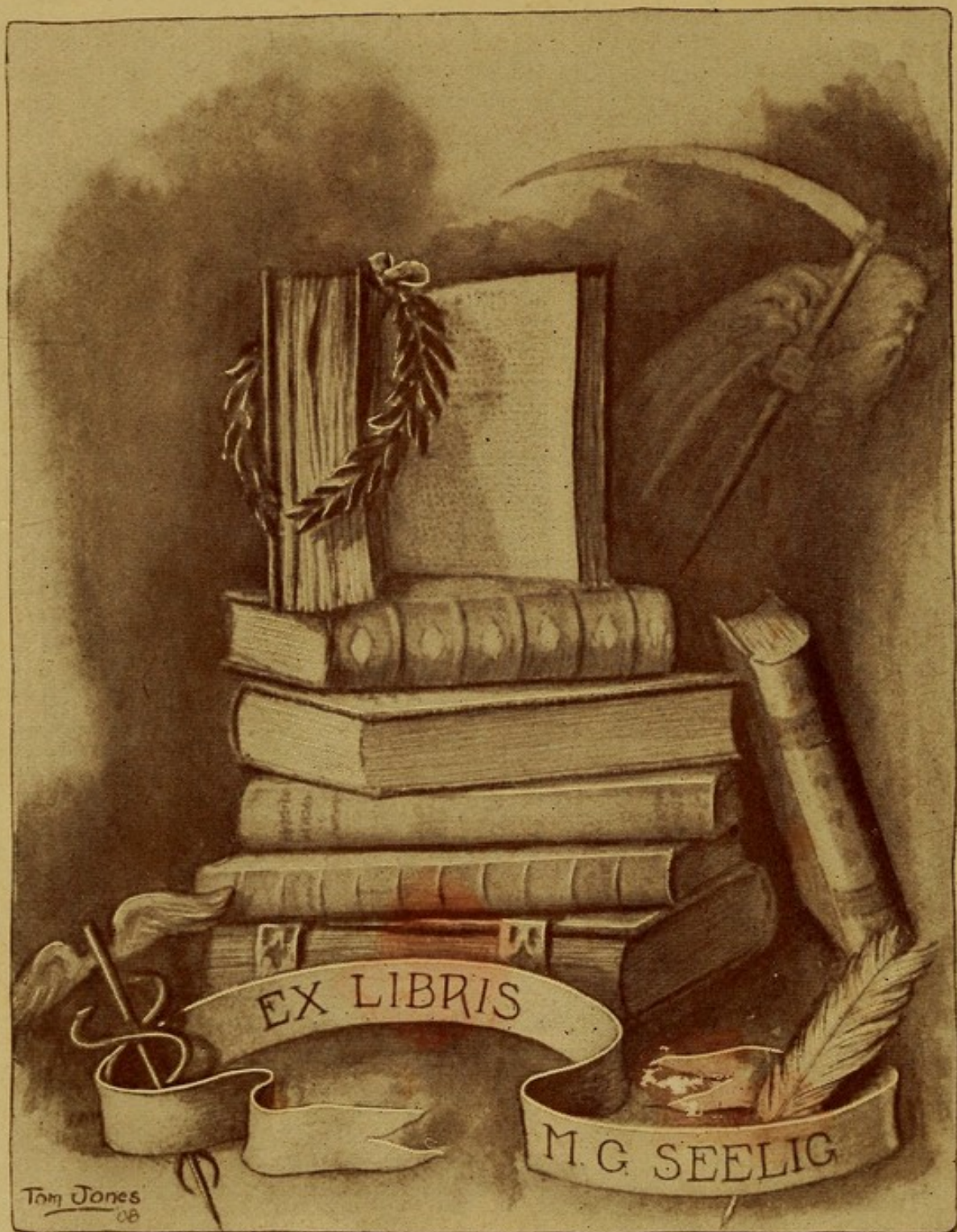
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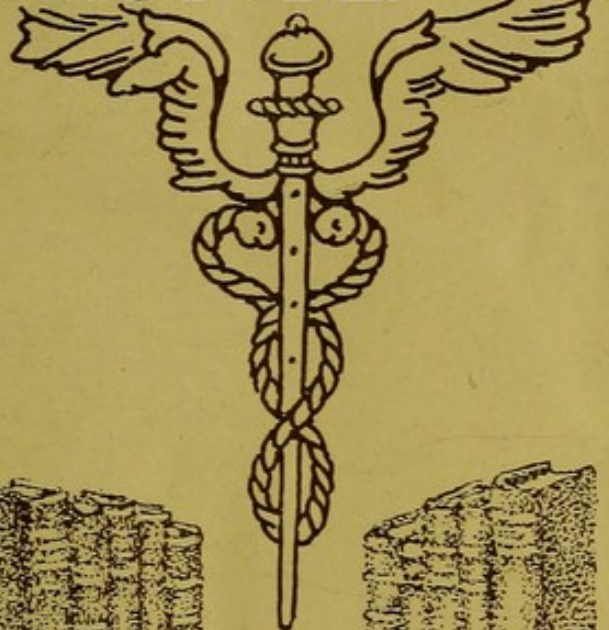
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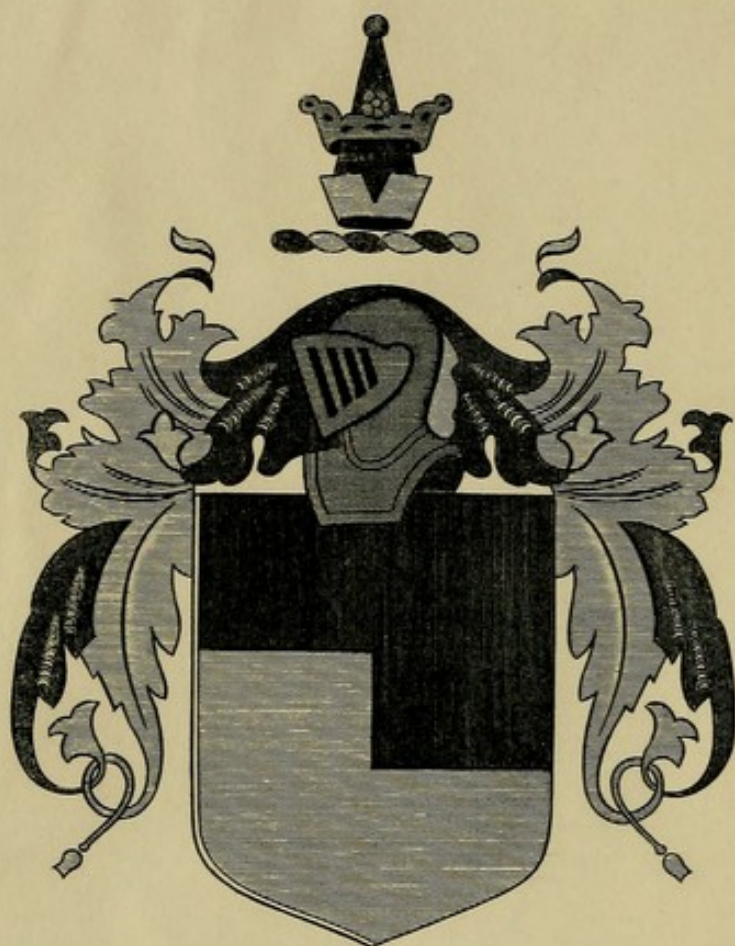
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THE EARLIER OPERATION ON THE PALATE

BY

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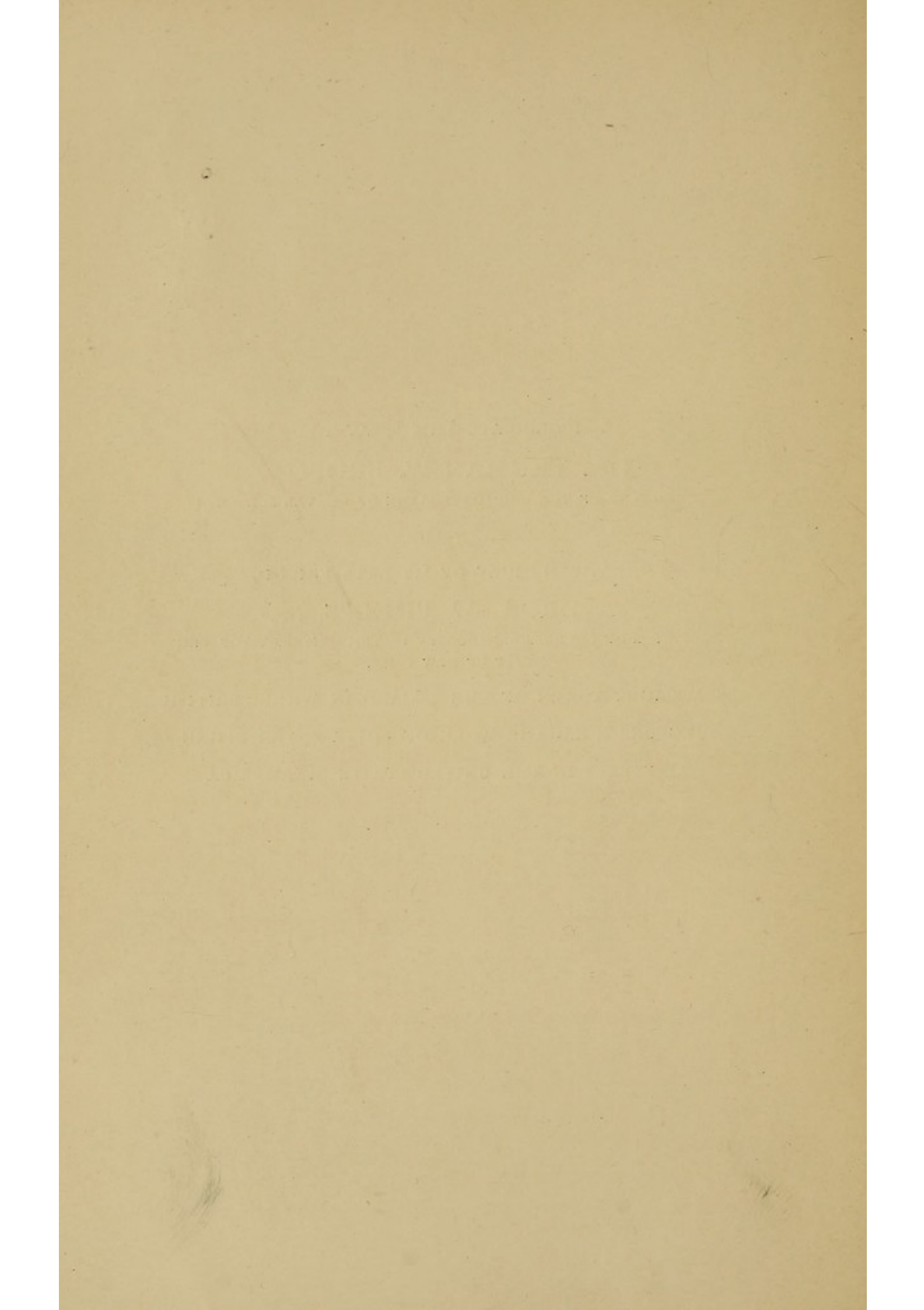
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I DEDICATE THIS ESSAY TO
DR. TRUMAN W. BROPHY,
PRESIDENT OF THE CHICAGO COLLEGE OF DENTAL SURGERY;
AND ALSO
TO THE MEMORY OF MY LATE FRIEND,
DR. A. M. PHELPS,
PROFESSOR OF ORTHOPÆDIC SURGERY IN THE UNIVERSITY OF THE
CITY OF NEW YORK,
AS A SLIGHT TOKEN OF THE REGARD IN WHICH BRITISH
SURGEONS HOLD THE WORK OF THEIR ENTERPRISING
CONFRÈRES IN THE UNITED STATES OF AMERICA



APOLOGY

It is not my intention or desire to 'write a book' upon cleft-palate and hare-lip.

To do this it would be necessary duly to set forth once again the views of the many surgeons who have written upon the subject, to describe the various operations which have been designed for repairing the defects, and, generally, to trace the history of the surgery of the palate and lip through the whole course of its development. This I deem to be superfluous.

To have set it forth would doubtless have imparted attractiveness to this Monograph, but it would have deprived it of the character which was specially desired for it—namely, that of being the personal experience of a general surgeon in a delicate and important little piece of operative work.

When a young surgeon is proposing to perform his first operation for cleft-palate, it is not unlikely that he may wish to be shown how he may overcome the difficulties which he knows to be associated with the procedure, and how he may best be enabled to secure a good result. I hope that he will find such help in these pages.

As a rule, the familiar text-books and the surgical dictionaries give but an outline sketch of the operation, whilst special works upon the subject describe so many schemes as to be absolutely bewildering.

My chief excuse for this Essay is that I desired to bring into more general notice the original and excellent work which has been accomplished in the treatment of cleft-palate by Dr. Truman Brophy, the President of the Chicago College of Dental Surgery, to which my attention was first drawn by Mr. Morton Smale, of the Royal Dental Hospital. Practical experience with Brophy's method has convinced me that it marks a great advance in the surgery of the defect.

For the woodcuts of the instruments shown in the Appendix (with the exception of Figs. 1, 4, and 9) the Author is indebted to Messrs. Krohne and Sesemann. Figs. 1, 4, and 9 were kindly supplied by Messrs. Weiss.

E. O.

64, GREAT CUMBERLAND PLACE, LONDON.

May, 1904.

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CLEFT-PALATE AND HARE-LIP

CHAPTER I

DEVELOPMENT OF PALATE AND LIP

IN early foetal life the buccal and the nasal fossæ constitute one continuous chamber. Somewhere about the eighth week, a maxillary process grows horizontally inwards from each lateral wall of this oro-nasal cavity with the view of forming a partition between the nose and the mouth. If these lateral processes, growing inwards through the whole width of the future nasal floor, and, growing equally, failed to meet, the deficiency in the palate would extend fore and aft through the exact median line. The very front part of the hard palate, however, is not developed from the inward-growing maxillary processes, but from a column of mesoblastic tissue which descends from the frontal region, in conjunction with the anterior part of the nasal septum and the median part of the upper lip.

Thus, the roof of the mouth is formed by the fusion of the palatine processes with each other (and with the descending nasal process) in the middle line. The cleft of the soft and of the back of the hard palate is in the exact median line; but at the front it passes outwards

through the midst of that half of the intermaxillary bone (Fig. 1), the inner part of each intermaxillary bone, A, with the socket for the central incisor tooth, being developed from the fronto-nasal process. And from the outer portion of this rounded bud (known as the external nasal process) are developed the outer part of the intermaxillary bone with the lateral incisor, C, and, more superficially, the ala of the nose and the adjacent part of the cheek.

When the palatine cleft extends into the lip, it generally

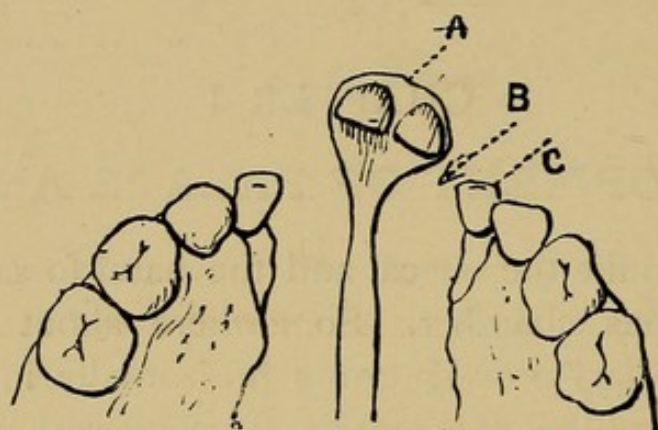


FIG. 1.—Albrecht's scheme, showing a cleft-palate and double hare-lip, with the palatine cleft, B, passing forwards on each side between the central, A, and the lateral, C, incisor teeth. The median pieces of the intermaxillary bones are advanced upon the nasal septum towards the tip of the nose, much as in the photograph represented on p. 18.

passes between the segment of the intermaxillary bone which contains the central incisor and the segment containing the lateral incisor. This explains the fact that in double hare-lip the isolated bony nodule behind the prolabium contains, as a rule, but two teeth, namely, the central incisors, the lateral incisors (if they have not been absolutely lost in the fissure) being connected with the lateral maxillary processes.

When the palatine processes first begin to pass inwards from the superior maxillary arches they have a considerable

slope upwards, in the endeavour, as it were, to meet the descending fronto-nasal process, which, with the help of the incisive or intermaxillary bones, is to complete the separation of the nasal from the buccal cavity.

In some cases the inward-growing palatine processes retain more or less of their original vertical position, and when this condition exists in a case of cleft-palate in which a muco-periosteal flap has to be detached and brought across the median line, the operation is thereby rendered much easier, as remarked on p. 63.

The posterior and external part of the superior maxillary bone—inclusive of the canine tooth—is developed from the maxillary arch.

From the deep aspect of the fronto-nasal process are developed the intermaxillary bones, as well as the vertical plate of the ethmoid and the vomer.

By the beginning of the third month these various parts should be duly united.

The adjacent wood-cut shows the oro-nasal cavity bounded

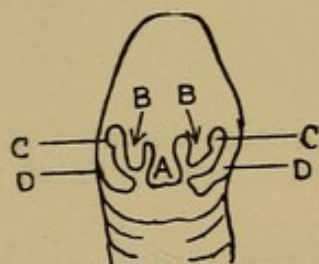


FIG. 2.—Human embryo of three weeks showing fronto-nasal process, A, descending between the superior maxillary plates, B B; eyes, C C; inferior maxillary plate, D D. (After Ecker.)

above by the broad fronto-nasal process, A. This process is deeply notched, and at either side of the notch is a globular swelling, from which the ala of the nose and the præmaxillary bone of that side are developed. Along the outer border of the fronto-nasal process, but separated from it by a deep notch, is the superior maxillary process, B.

The two maxillary processes gradually advance to meet each other, and then to join ; and they also blend with the outer side of the fronto-nasal bud, to complete the formation of the upper lip. Thus, the median part of the upper lip is formed by an embryonic bud which descends from the front of the cranium in connection with the fronto-nasal plate, the lateral parts being developed from the coverings of the maxillary processes, which, extending inwards, are eventually fused with the descending flap at a short distance from the median line.

From this it is evident that the fissure of the imperfectly-

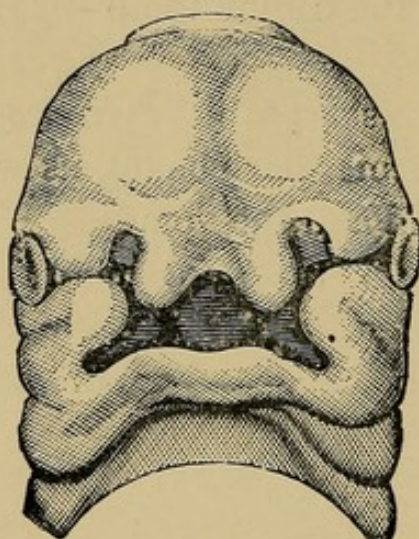


FIG. 3.—Fronto-nasal process descending to form median part of lip; a deepening of the crescentic notch gives median hare-lip.

developed lip must be at some distance from the middle line—namely, where the median process should have blended with the lateral fold.

Thus, if one or both of the maxillary buds should fail to join the fronto-nasal bud, a single or a double hare-lip and a cleft-palate would result.

The fissures of a double hare-lip represent, therefore, the notches which originally existed between the fronto-nasal and the maxillary buds of embryonic tissue.

In those cases in which the osseous tissues which develop

in the deep parts of these processes duly join, whilst the superficial parts fail to do so, hare-lip exists without a palatine cleft.

Varieties of Hare-lip.—A unilateral defect is oftener found beneath the left than the right nostril. It may be a mere notch, or it may be a fissure through the entire thickness of the lip, and very often it extends up into the nostril.

Sometimes a small triangular gap is found at the border of the lip, continuous by its apex with a vertical linear cicatrix, as if Nature herself had attempted a plastic operation with only partial success.

In other cases there may be a small notch beneath each nostril, the child being found with a conspicuously marked prolabium. Or there may be a deep notch beneath each nostril, or a fissure into one nostril and a notch beneath the other.

Or there may be a complete fissure through the lip up into each nostril, with isolation of the prolabium and the incisive bones on the tip of the nasal septum, as in Fig. 5.

Lastly, in rare instances, however, the lateral fissure in the lip travels backwards in the hard palate to the spot at which the hinder end of the os incisivum touches the intermaxillary suture.

All these conditions are, of course, but varying degrees of arrested development.

As a rule, each piece of a hare-lip is very closely connected with the gum by a strong fold of mucous membrane, which has to be freely dealt with at the operation for the repair of the lip (p. 90).

Median Hare-lip.—It has just been shown that the descending fronto-nasal bud is marked in the middle line by a deep notch. As the process blends laterally with maxillary buds, this notch becomes gradually effaced, but

in certain rare instances it persists, in which case a median hare-lip results.

Inasmuch as the median defect is but a notch in the frontal bud, it is evident that it cannot reach up through the entire length of the lip, and still less can it extend into a nostril.

I have seen only one instance of this rare defect. The child was under the care of Mr. Bernard Pitts, who kindly

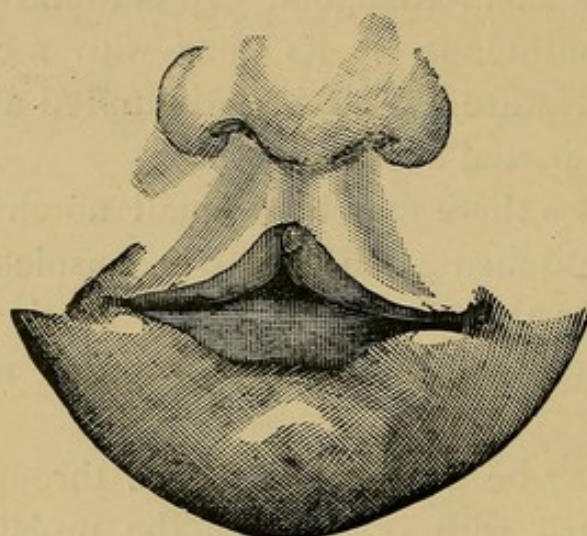


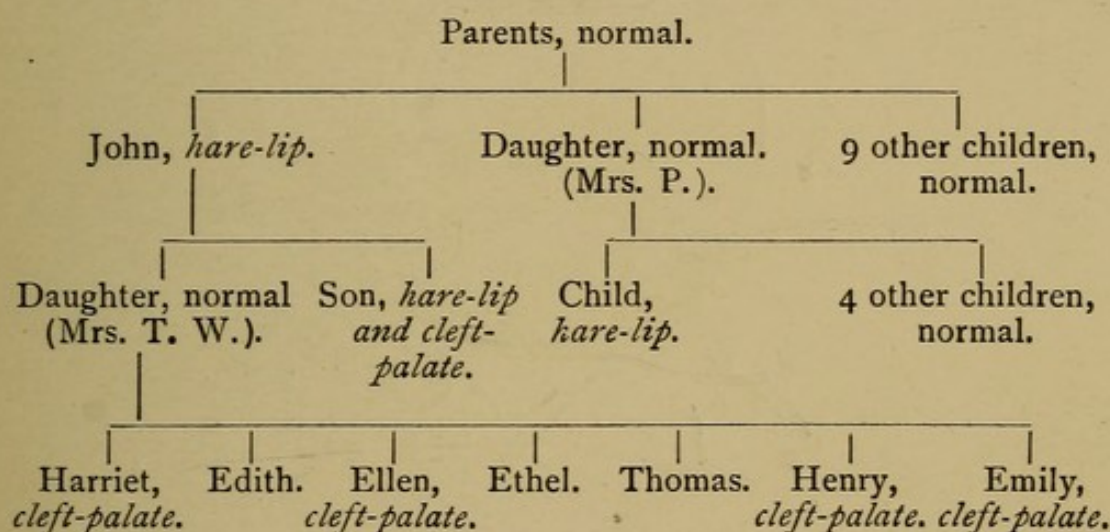
FIG. 4.—Median hare-lip.

supplied me with an illustration of it, which is reproduced herewith.

In this case Nature had limited her neglect to the integumental part of the fronto-nasal process, the præ-maxillæ, the vertical plate of the ethmoid, and the vomer being well developed. There was, however, a slight groove at the middle line of the front of the hard palate—between the intermaxillary bones—which suggested that if the defect had been a little more marked a fissure would have extended backwards between the central incisors. Some day, perhaps, a child may be forthcoming who has a lateral hare-lip associated with a median cleft of the lip, but, so far as I can ascertain, such a deformity has not hitherto been met with.

Though one is at present unable to explain why development should so frequently miss the mark in connection with the formation of the lip and palate, it is at least improbable that maternal impressions have anything whatever to do with it. As a rule, the supposed 'fright' comes long after the lips and features are developed. The lips are completely formed by the ninth week.

Heredity has a powerful influence in many cases. Here is a family-tree prepared by Dr. Guthrie Caley, of Ealing, in connection with a child whom he placed under my care for an operation on a hare-lip :



The mother, who is inclined to ascribe the occurrence of a hare-lip to some shock or fright received during her pregnancy, is generally somewhat late with regard to her explanation. At the very beginning of the third month of gestation (ninth week) the fissures about the orbit, nose, and mouth have been effaced, and the embryo, who, by-the-by, has only just made up its mind as to which sex it will join, is already beginning to assume, though, as it were, in a rough sketch, a definite facial expression. At a later period than this no maternal impression, however severe, could possibly have the least effect. What is done cannot be undone.

When the descending frontal bud loses its way, and fails to come in contact with either of the lateral portions of the lip, it is apt to be pushed forward by the septum nasi, and to form a very close connection with the tip of the nose, where, with the prolabium and that part of the alveolar process which contains the germs of the central incisor teeth, it constitutes a hideous projection. In such a case there must be, of course, a complete median cleft of the soft and hard palate and a double hare-lip. If, however,



FIG. 5.—Cleft-palate and double hare-lip. Intermaxillary bones and prolabium attached to tip of nose. (From a photograph.)

the piece of the alveolar process with the two central incisors could be thrust backwards into its proper position, the wide front part of the palatine cleft, thus greatly occluded, would be found to bifurcate, each branch of it running forwards and outwards between the central and lateral incisors of its own side, somewhat after the form of the capital letter **Y**, as suggested by Fig. 1.

A more common variety of cleft of the hard palate is that in which the median fissure runs outwards and forwards on one side only—that is, like a letter **Y** with one arm broken

off. This defect is commonly but not always associated with a single hare-lip.

In most cases of cleft-palate and double hare-lip the portion of the maxillary arch which is attached to the median septum contains only the two central incisors, the lateral incisors being altogether wanting. Sometimes it contains the germs of all four incisors, the fissures in those cases passing immediately in front of the canine teeth—that is, between the outer segment of the intermaxillary bone and the main piece of the maxillary process.

If the cleft involve one side only, the projecting piece of the maxillary arch will probably contain three incisor germs, the absent tooth being, of course, on the side of the palatine cleft.

Seeing that several conspicuous teeth are dependent upon this projection for their future development, it is manifestly expedient that the surgeon should try his best to save it in all operations upon the palate.

CHAPTER II

THE MATERIAL

THE Operating-table should not be the low one which the surgeon is accustomed to use for ordinary work. The operation may last an hour or more, and to be bending down during all that time is back-breaking work, especially for a tall man. It is well to try the height of the table beforehand, so that it may be just right. It should be between $3\frac{1}{2}$ and 4 feet, inclusive of a firm mattress, or a blanket folded about four times. The mattress or blanket should be secured to the table, so that if the child has to be brought further up, the bed on which it is lying does not slide upon the table.

The table should not be more than $1\frac{1}{2}$ feet wide, but it is not always possible to have one of so convenient a width, though a clever nurse can generally arrange one if she has time given her and is shown exactly what is wanted. It is well to have the table thus narrow so that the assistant may be able to obtain as good a view of the field of operation as the surgeon.

The **Instruments** should be laid upon an aseptic cloth spread upon a table close at the operator's left elbow, with their handles directed towards him; and he will find it convenient to have this table as high as the operating-table,

so that he can take up an instrument without having to bend down for it. The instruments should be arranged from left to right in the order in which he is likely to use them—first the scalpel and forceps, next the raspatories, then the tubular needle and scissors, and last the rectangular scissors and the torsion-forceps. They should not be placed in carbolic or mercuric lotion, as is usual in many other operations, because those chemical solutions would irritate the mouth. Nor should they be laid in boracic lotion, because it is of no value, and because it is important to keep the field of operation as dry as possible.

It may possibly appear that I am dwelling unnecessarily over details, but the surgeon who sees to these little things before beginning his operation is less likely to find cause for vexatious delays when he is in the midst of it.

It often happens, in hospital work, that when the selection of instruments has been left entirely to a house-surgeon who has had but slight experience with cleft-palate operations, he puts out from the cabinet every instrument which he thinks the surgeon can possibly want. He wishes to be on the safe side, as it were, and his liberality may prove embarrassing. There should be upon the small table only those instruments which the surgeon will need, or else he may lose time during the operation in finding what he wants.

In all cases the operator should make it his business to see exactly what has been prepared for him, to send away those instruments which he will not want, and to have supplied anything that may have been omitted.

The Gag.—A perfect gag has yet to be invented. I think that I have tried almost all of them, and I find that I get on best with one which is called, after its ingenious inventor—‘Smith’s gag.’ An essential feature of the gag, which Sir Thomas Smith first showed at a meeting of the

Royal Medical and Chirurgical Society in 1868, was the presence of teeth-plates, which were serrated in order that they might take a firmer hold. This was necessary, as the inventor preferred to operate after the child had attained an age at which the molar teeth of the first set are erupted. Notwithstanding the presence of the serrations, however, the gag was very apt to slip, and, to prevent this, arrangements were made for fixing it by straps passing round the back of the neck.

When I began to use this gag in operations in early infancy, I found that the teeth-plates were unable to take a firm hold, and that they were constantly sliding forward upon the edentulous gums. I therefore had the serrations replaced by minute spikes, and so was enabled to keep the gag in its place without the use of straps. And for the key which was originally designed for separating the branches of the gag and keeping the jaws asunder, winged screws were substituted which work upwards through the lower arm of the gag, and, impinging against the upper arm, could be depended upon for holding the mouth wide open. (For gag, *see* Fig. 1 in Appendix.)

The Knives.—As a rule, the palate-knives which are supplied by the instrument-makers are too thick in the back and clumsy. The best knives for the purpose are old, straight bistouries which have been often ground; they have a long cutting edge and a thin back. Tenotomy knives are ill-adapted for the purpose.

The rectangular knife which was formerly used in these operations was a most inconvenient instrument, and it could not be depended upon to dissect up the entire thickness of the muco-periosteum, every atom of which is needed for the flaps. And inasmuch as this is thick and tough, the blunt raspatory may be depended upon to peel it up with great precision. It does its work, moreover, with much

less bleeding than would follow the use of a cutting instrument.

The **Raspatories** are made of steel, and are about eight inches long. Each end is blunt and is curved on the flat. The ends are bent in different curves for the more convenient detachment of the muco-periosteum from variously pitched palatine arches. A very convenient instrument for use as a raspatory is the ordinary aneurysm needle, and, having an eye at the end, it can be used, in addition, for carrying the suture which holds together the flaps of bone and muco-periosteum in osteoplastic operations (Appendix, Figs. 2 and 3).

I have sometimes been astonished at the enormous size

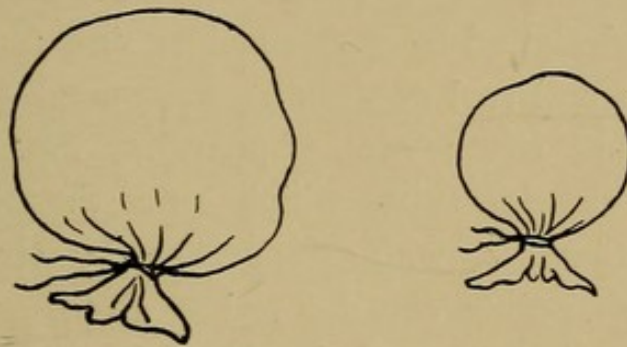


FIG. 6.—Swabs of absorbent wool in gauze.

of raspatories sold by instrument-makers for the treatment of cleft-palate, and one would think that they could scarcely be used without inflicting unnecessary bruising on the tissues of a child's mouth.

Swabs.—I have entirely given up sponges and sponge-clippings, using instead of them small tufts of plain absorbent cotton-wool which have been loosely tied up, in the shape of balls, in scraps of plain aseptic gauze. Scores of them should be ready for each operation, and they should vary in size from a small cherry to a large plum. They should be used dry.

In the early stage of the operation the large-sized swabs

are useful for quickly mopping up blood from the pharyngeal dome, or for exerting pressure against both sides of the cleft at the same time, to check the bleeding when the muco-periosteal strip has been removed. Great care must be taken that every swab is safely fixed in its holder, or one of them may hitch against the edge of the cleft or against the gag, and so get adrift.

Extremely serviceable swab-holders are those of steel, with locking jaws, as designed by the late Mr. Lund. The nurse should realize the necessity of properly adjusting the swabs, and should assure herself that each is fast held before it leaves her charge. A swab getting loose in the pharynx might cause delay and anxiety (Appendix, Fig. 4).

The Needle.—The most convenient needle is the tubular one designed by Marion Sims, and furnished at the butt with a small reel containing a practically inexhaustible supply of fine silver wire (Appendix, Fig. 9). On the top of the slender tube, which runs through the entire length of the needle, is an arrangement by which one of the curved, sharp points can be rigidly fixed. These points are, of course, hollow, and the wire is made to run through them by the movement of a small wheel upon the handle, which is worked by the thumb or the index-finger. The points are of various curves and of various sizes, and, being round, they do not cut the flaps as an edged needle does.

The needle has to be carefully handled, and, lest it should happen to get out of order, it is well to have a second one ready for emergency. No one should be allowed to meddle with it but the chief assistant.

For practically the whole of the suturing fine silver wire is used. It is quickly introduced, especially if the tubular needle is used, and it is easy to catch hold of and to withdraw. Further, as each suture is twisted up instead of being tied, there is no trouble with making knots. Another

advantage possessed by the wire is that each suture may be left only half tightened up at an early stage of the operation, and may be finally twisted up tight when the lateral incisions have been made and tension has been removed (p. 68).

There are, of course, different kinds of fine silver wire, some of which will not bear much twisting. It is well, therefore, for the surgeon to put to the test pieces of the wire which he proposes to use, a day or two before it will be wanted; otherwise, in the middle of the operation, he may find that he has been supplied with a badly annealed material, which breaks as soon as he begins to twist it up, and has to be discarded for, perhaps, horsehair or silk, which may be introduced by such a needle as that shown in the Appendix, Fig. 10.

The tenacity of silver wire may be increased by passing it through the flame of a spirit-lamp.

(The two spare needle-points represented in Fig. 9 on page 107 are represented slightly too large).

CHAPTER III

THE ASSISTANTS

AN experienced assistant is almost a necessity to the operator. He must be a light-fingered, resourceful person. He stands at the child's left shoulder, opposite to the surgeon. He specially takes charge of the sponge-holders, and, during the progress of the operation, he rapidly and gently applies swabs to the roof of the mouth and the dome of the pharynx, seizing the opportunity when the surgeon is not actually engaged in working in the mouth. He must be careful not to get his swab into the way of the operator, and if there is a pause in the operation he may hold a large swab gently pressed up to the roof of the mouth to check oozing.

When the stitches are tightened up the operator may possibly wish to do all the swabbing himself, so that there may be no risk of excessive pressure being made upon the adjusted flaps.

The assistant should take sole charge of the mechanical needle-holder ; no one else should touch it.

He will be ready with the scissors to cut each suture after the operator has drawn it to the proper length, and then to take from him the tubular needle and turn the wheel so as to draw back the wire until the cut end is just

hidden within the needle. Unless this is carefully done, when the surgeon proceeds to introduce the point of the needle for the insertion of the next suture, the projecting end of the wire will prevent its passage.

The surgeon explains to the assistant beforehand exactly how this has to be done.

After the operator has twisted up the wire suture and cut it short, the assistant takes the torsion-forceps and clears them of the loose ends of wire which are left around them.

The **Chief Nurse** should quickly wash the blood from each instrument as the surgeon lays it down—with the exception of the tubular needle, which the assistant looks after—and should then wipe it on a soft, aseptic cloth, and return it to its proper place upon the tray, so that the operator may be able to pick it up again without having to look about for it.

Directly the surgeon has used the swab-holder the nurse takes the swab from it and inserts a clean one, looking well to it that the swab is fixed firmly in the grip of the holder. She must do this carefully, for it might be a serious matter if a loosely-placed swab got adrift in the mouth or throat.

If the child has long hair, the nurse should have the head securely covered under a closely-fitting bathing-cap which she has duly prepared.

The Anæsthetist and the Anæsthetic.

In almost every case on which I have operated chloroform has been the anæsthetic employed. At first, it is given on a simple flannel mask or a folded handkerchief. Then, when the surgeon is about to begin the operation, Junker's apparatus (Appendix, Fig. 15) may be employed, a soft catheter being fixed on to the end of the delivery-

tube instead of the ordinary vulcanite mask. The administrator may prefer, however, to continue giving the chloroform by the flannel mask, or on a piece of lint, or on the stiff corner of a towel, keeping it, as best he is able, out of the way of the surgeon.

If the mask is being used, the anæsthetist should look well to it that by no chance does any of the chloroform drip through the saturated flannel into the child's mouth. I have seen this happen, and it is very dangerous. He should be careful, too, that chloroform does not come into actual contact with the mucous membrane of the lip or with the skin of the face, there to cause, perhaps, the formation of a blister.

When once the operation is started but very little of the vapour is needed, for the narcosis should not be deeper than is necessary to keep the child quiet.

Sometimes, when the operation is a long one, I ask the anæsthetist to allow the child partly to recover, in order that we may be sure that the narcosis is not needlessly deep. In my experience, there is no operation in which the need of a skilled anæsthetist is greater than in that of the closure of a wide palatine cleft in a delicate child, and especially so when the difficulty is increased by troublesome bleeding.

No one should accept the responsibility of giving the anæsthetic for this operation unless he has had experience in administering chloroform to children, and especially to children in whom the mouth has been the field of operation.

The surgeon ought to be able to feel that the child is only just 'under,' and that at any moment the anæsthetist could wake him up if need be. I do not mind the patient making a purposeless movement from time to time; indeed, I like it, for I then know that his reflexes are good, and that he is 'upon the safe side' of the border. The child

is taking in so small a quantity of air during the operation that it would be an easy matter to give an overdose of chloroform. When the operation is finished, I like to hear the child cry as I take out the gag, or very soon afterwards. This shows that the anæsthetist has been entirely successful in his administration.

The responsibility of the anæsthetist in a cleft-palate operation is unusually great. He must not give the child too much of the vapour, lest a serious state of narcosis should be induced, and he must give enough to insure the surgeon not being hindered in his work by the movements of the child.

It is well when the surgeon and the anæsthetist are accustomed to work together—when the anæsthetist feels assured that the surgeon appreciates his difficulties, and is not likely to call out in an irritable way during the operation, ‘He’s not under!’ The anæsthetist cannot but have an anxious task in keeping a small, ill-developed child under chloroform for an hour, more or less, whilst this serious operation is being performed, and he ought to be able to feel that the surgeon whom he is doing his best to help is not only not unreasonable, but is fully appreciative of the difficulty of his colleague’s task.

The child should not be strapped down to the table, for his position may have to be changed from time to time; and if he were becoming faint, or respiration were ceasing, it might be necessary to lift him from the table at a moment’s notice.

The chloroformist should not be called upon to help much in the operative work. He has fully enough to occupy his thoughts and his hands. Still, he may be asked to hold the long ends of a suture now and then by the fingers of the hand which is near the child’s forehead. He may also gently swab out the mouth from time to time,

and may squeeze up and wipe away the blood which wells through the nostrils.

But the chief part of the sponging should be done by the operator and his assistant, for they have a much better view of the roof of the mouth than has the chloroformist who is standing at the top of the child's head, as it were.

It may happen that during a most important part of the operation—as, for instance, when one of the hinder stitches is on the point of being twisted up—the anæsthetist may tell the surgeon that the condition of the child is causing him anxiety. This is not very likely to happen when a man of great experience with the operation is giving the anæsthetic, but the crisis may arise at any operation, and perhaps when least expected. Upon the surgeon is then thrust the responsibility of deciding whether he shall finish the little bit of work in hand, or whether he shall instantly loosen and remove the gag and give the case over to the anæsthetist and the assistant.

The absence of colour in and the changed aspect of the face, or the cessation of respiratory movements, may demand immediate interruption of the operation. Moreover, the anæsthetist may desire at once to start artificial respiration. So the surgeon quickly removes the gag, and tells the assistant to hold the child up by the feet, so that blood may more easily reach the anæmic brain. With the child in this position, and turned to the light, the anæsthetist swabs the face with cold water and then rubs it dry.

In a few moments the breathing may thus be restored, and the flickering pulse may again be felt. If not, with the child still in the inverted position, the anæsthetist gently compresses the chest and then relaxes the pressure, so that the heart and lungs may be stimulated by the entrance of air. But these movements of artificial respiration should

not be performed too rapidly or energetically. There should be plenty of time allowed for the air to enter the lungs before it is expelled—four seconds at least. If the bellows-movements are performed too energetically, they may be prejudicial to the heart.

If the condition still continues grave, the nurse should be instructed to bring the hypodermic syringe filled with ether or brandy, or to give a small hot-water and brandy injection by the bowel.

With treatment thus carried out I have never known a fatal result to occur, but I confess that I have on one or two occasions been anxious as to what might be the issue of the crisis.

In that this treatment may have to be resorted to at any operation, and may demand that the child should be taken for five minutes or more from under the cover of the blanket, and from off the warm mattress of the operating-table, it is evidently a wise precaution that he should be securely swaddled in a sheet of Gamgee-tissue before the operation is begun.

CHAPTER IV

PREPARATORY TO OPERATING ON A CLEFT-PALATE SUBSEQUENT TO EARLY INFANCY

IN the most favourable circumstances the cleft-palate infant does not generally flourish, for he is under the double disadvantage of being brought up by hand, and, in all probability, of being fed on so-called 'artificial foods.' And, unfortunately, because he does not thrive he is too apt to be 'tried' with one patent food after another, each mess proving more unsatisfactory than that by which it was preceded, until, in a condition of dietetic bewilderment and gastro-intestinal irritability, he well-nigh or actually falls a victim to inanition.

To operate on a case of cleft-palate when the child is obviously out of condition is to court failure or disaster. As a rule, the subjects of the defect are thin and miserable-looking, and, therefore, unsuited to bear the loss of blood and the shock which are inseparable from the operation, unless some special care is bestowed upon them beforehand.

The first thing to be done is to inquire as to the food and feeding. It too often happens that the children are being brought up on patent foods, condensed milk, or such-like products of chemico-commercial enterprise. For this

fresh cow's milk and water must be substituted, the milk being treated after the manner which renders it as close an imitation of human milk as possible. Above all people, children require 'fresh' food—living food, as it were—not stuff which is shipped in tins or kept in boxes or bottles in a druggist's or a grocer's store.

The readiness with which mothers and nurses have availed themselves of these 'artificial foods' is quite remarkable, and must be due in chief measure to the specious and persistent way in which they have been advertised.

If an infant is in poor condition, it is advisable that he should be rubbed over with olive oil—regularly massaged in front of the fire—after his warm bath before being put to bed. He should, moreover, sleep in a long flannel nightdress. Cod-liver oil is an invaluable food for ill-nourished children, and I am disappointed when I am told that a weedy, cleft-palate child, of three or four years or more, cannot take it—that it 'always disagrees with him.' It is a peculiar fact, however, that it agrees perfectly well with many a child who 'cannot take it,' provided he does not know that it is being given to him. Most children like sardines—which, by-the-by, is about the only tinned food which one should allow them—and when one wants to give a child cod-liver oil without his knowing it, he should empty out the cotton-seed oil in which the dainty fish are packed, and then fill up the box with fresh cod-liver oil. Thus given with sardines, children take the oil splendidly. From time to time more oil may be added to the sardines, and duly dispensed upon the breakfast-plate.

Fresh cream also is a very useful food in many cases, added in small quantities to the milk, or given in any other way which may seem desirable.

The child must be in a good state of health when the question of operating upon a cleft-palate is being considered;

due regard should be paid to his aspect, and careful inquiry should be made as regards digestion, excretions, and so on. The same precautions are, of course, advisable in the case of every operation in which, urgency being out of the question, the surgeon can choose his own time and place. But in the case of operations for cleft-palate there is this difference—that if primary union is not secured, disappointment is likely to result. If the edges of the palatine cleft do not adhere from the first, the child's tongue and his food find their way between them, inflammation, ulceration, and suppuration ensue, and the stitches cut their way out or adhere uselessly to one side. Failure to secure primary union after this operation is far more serious than it is, for example, in the case of the radical treatment of hernia, or in the case of a hare-lip. In the former instance suppuration, though greatly to be regretted, does little more, as a rule, than delay the healing of the wound; and in the case of the hare-lip, as soon as the inflammatory swelling has subsided, the granulating margins of the labial flaps can be brought together and a secondary union promoted, which, in all probability, effects in due course a most excellent result, as referred to on p. 103.

For a cleft-palate operation, then, the child should be in the best condition obtainable, and the surroundings should be such that nothing is likely to disturb him. With the object of getting him to adapt himself to the environment, it is well to have him placed in the charge and under the authority of the trained nurse for a few days before being operated on. Some children learn their first lessons in obedience in these circumstances.

And if, just before the hour has arrived for operating, the tongue be found coated or the breath foul, or if the child be vomiting, purged, or coughing, or the temperature be raised, the operation had better be postponed.

An important thing is to see that there are no carious teeth, enlarged tonsils, or adenoids. Carious teeth should be extracted, or cleaned and filled. Enlarged tonsils should be amputated, and adenoids should be cleared away.

Some time ago I saw it recommended that enlarged tonsils and adenoids should be dealt with *after* the palatine cleft has been operated on, but such practice appears highly injudicious, especially when one sees how greatly, in the ordinary way, children improve in health, strength, and appearance when these tissues have been duly dealt with. Moreover, the crypts and crevices of enlarged tonsils and post-nasal growths are likely to be haunted by curds of milk or shreds of food, which, decomposing, may set up harmful irritation. It should be a rule never to operate on a cleft-palate until the mouth and teeth, fauces and pharynx, are brought to as wholesome and healthy a condition as possible.

If the surgeon can have the choice, he should prefer to undertake the operation in fine, warm weather, so that the child can the sooner be taken out of doors. Nevertheless, experience has abundantly shown that a cleft may be successfully closed in bad, wintry weather, with a low barometer. But even in these circumstances, the less the child is kept in bed, or confined to his bedroom, the better. Change of room and fresh air are very necessary. A tented cot and a hot, stuffy bedroom or ward are to be carefully avoided.

It is not a bad plan for the surgeon to keep out of sight upon the day of the operation, so that when he subsequently appears upon the scene he may be regarded as a kind and sympathetic friend. In this way he will be more likely to gain the child's confidence and to secure the privilege of looking at the palate whenever he wishes.

For a day or two before the operation the nurse may

gently wash the roof of the mouth with a hand-spray (Appendix, Fig. 12), in order to accustom the child to it, so that, subsequent to the operation, when its use is highly desirable, he may not object to it.

Most of what is written above applies, of course, to the operation about to be done in children after infancy; but the caution that the child must be in the best possible health holds with even greater force with respect to the operation in early infancy.

An infant with a cleft-palate cannot draw nourishment from the mother's breast; and it not infrequently happens that the fact of the mother noticing the eager and fruitless attempts of her child to feed himself has so depressing an influence upon her that her milk at once dries up. Supposing, however, that her supply continues abundant, the milk should be drawn off for the infant by a breast-pump.

But if the mother is unable to supply the milk, fresh cow's milk, diluted with double its bulk of hot water, must be given, with a little white sugar and a small pinch of salt dissolved in it. If the cow's milk is ejected from the stomach in the form of hard curds, it may be just brought to the boiling-point before being mixed with the water, as the curds are thereby rendered less solid, or some peptonizing material may be added to the milk.

'Little and often' is a good system for artificially feeding an infant with a cleft-palate; and during the feeding it is well to have him sitting up, so that the milk may pass easily towards the stomach, and have no inclination to escape by the nasal cavity. This should be done every two hours, the fluid being at about 'blood heat.'

The food may be conveniently given by an old-fashioned slipper-bottle, with a soft, giant teat which has a hole on the under-surface. Thus, as the infant sucks, the teat fills the

palatine cleft, and as he compresses the teat in sucking, the milk is directed downwards.

But if the large teat does not work well, the milk may be given in a warm teaspoon passed far back over the tongue, the infant, of course, being kept upright.

CHAPTER V

THE ADVANTAGES OF EARLY OPERATION

INASMUCH as cleft-palate is but an arrested development of the roof of the mouth, it is obviously expedient in theory that the gap should be closed at the earliest possible moment. The surgeon is called upon, as it were, to complete the work which Nature has overlooked.

In some instances of arrested development, as in the delayed descent of a testicle, for example, or in the patency of an inguinal or umbilical opening, Nature is able quietly to accomplish her work after birth, and without needing any assistance from the surgeon. But in the case of the defective palate or lip she must depend entirely upon surgical help.

It is scarcely necessary to discuss the question of **Diagnosis** of cleft-palate. But when the defect is confined to the soft palate it not infrequently escapes detection. The mother brings the infant, saying that he does not thrive, and that some of the milk escapes by the nostrils. If the practitioner gives a mere casual look at the mouth, he will probably fail to discover that the velum is fissured. He should in all such cases depress the tongue by a spoon, or spatula, and make a thorough inspection. I have met

with several cases in which this cause of an infant's want of nutrition had not been suspected.

It seems almost superfluous to insist on the advisability of the practitioner making an examination of the front and back of the roof of the mouth in all infants who are more greedy than successful in their endeavours to feed from the breast or bottle. If there be a cleft of the *hard* palate, it is, as a rule, quickly discovered by the nurse or mother, for the infant, being unable to create a vacuum above the tongue, cannot suck at all. But if there be a fissure of only the *soft* palate, the child is able to obtain *some* milk, but, not getting sufficient, he becomes thin and pale.

In all but the most recent treatises on the subject of closure of cleft-palate by operation it was advised—indeed, it was a matter of necessity—that no active surgical interference should be attempted before puberty, or until the unfortunate subject of the fissure were possessed of sufficient fortitude and self-control to prevent his obstructing the surgeon in his tedious work.

In the year 1864 Sir William Fergusson wrote that he had never operated for the congenital defect under chloroform, but that whilst he did not deny the possibility of doing so, he was of opinion that, as a rule, it was absolutely necessary to have the patient conscious, so that he himself might facilitate the steps of the operation in various ways. Thus, at the dictation of the operator the patient should move his head from one position to another, clear his throat of the collecting blood, bring into view the muscular bands of the soft palate by swallowing, and so on.

But in those times the operation was so distressing to the unhappy sufferer, and so complicated and difficult, that few surgeons made themselves practically familiar with its details.

Fergusson's operation, though accomplished with ease by

that great master, demanded for its successful performance a more than general knowledge of the palato-pharyngeal region. The knife, bent so as to cut round the corner and in the dark recesses of the pharynx, had to be directed by a cunning hand, in order that its edge might surely sever the fibres of the levator palati without risk of wounding, amongst other innocent structures, the neighbouring internal carotid artery.

Mr. Pollock simplified that part of the operation by dividing all those tissues which interfered with an unrestrained approximation of the pared edges of the cleft by means of a straight and narrow-bladed bistoury, which he thrust from before backwards through the soft palate.

My colleague, Sir Thomas Smith, of the Hospital for Sick Children, was the first surgeon to teach that cleft-palate might be operated upon under the influence of chloroform. He also showed how, by this means, it was not only possible, but also expedient, to operate during early childhood, and so to close the fissure before the voice had permanently assumed the characteristic and unpleasant tone.

The reading of Sir Thomas Smith's paper upon the operative treatment of cleft-palate before the Medical and Chirurgical Society in January, 1868, exerted a great and lasting influence upon the question of the age at which the operation should be undertaken. Mr. Pollock, writing in the first edition of '*Holmes' System of Surgery*,' had said: 'For many reasons the age of fifteen appears to be the earliest period for the operation.' But in the second edition of the same work, which appeared in 1870, two years after the reading of the paper in question, he remarked that the operation might be performed when the child was two or three years old.

But the same writer, quoting from a memoir on the

subject by Ehrman, recorded the deaths of four children who had been operated on at ages varying from four days to two months.

One of the chief reasons against operating for cleft-palate in early infancy was the fear that the shock of the very serious operation might prove more than could be borne. Further experience in this matter has shown, however, that this fear was much exaggerated.

One cannot, of course, say that there is no cause for apprehension of death from shock after operating on the palate of an infant a few weeks old. Anxiety in this matter there must always be, but it need not of itself cause the surgeon to decline to give the infant the obvious advantages of the early operation.

Surgical opinion and practice have undergone great change since the time when Fergusson published his views upon the age at which the closure of the cleft should best be undertaken. Gradually one has been getting earlier and earlier at the operation, until now, by preference, it is undertaken within a few weeks of birth.

The most favourable time in life for operating on a cleft-palate is between the age of two weeks and three months.

Dr. Brophy, of Chicago, who has had an unusually extensive experience in cleft-palate operations in infants within a few weeks of birth, affirms that at this early age there is less shock, because the nervous system of a young child is in a rudimentary state of development, and, therefore, incapable of receiving the same impressions that it would in later life. And I confess that increasing experience with the operation at the early age has greatly modified the opinion which I formerly held with regard to the question of shock in this matter. I have been surprised to find how slight a disturbance has followed even a prolonged operation upon the mouth of a delicate infant with defective palate.

Certainly, if the operation is to involve the principle of thrusting the maxillary arches towards the middle line—the description of which is the chief feature of this monograph—the earlier that it is undertaken the better, as the bones, being then comparatively soft, can be moved with far less injury than would be the case if they were more fully ossified.

Further, there can be no doubt that the sooner the muscles of the soft palate can be called upon to work against a normal resistance, and with a definite scheme of vocalization in view, the earlier will their development take place, and the more perfect will their action eventually become. As long as the median border of the soft palate is loose and free (as must be the case until the cleft is closed) a great part of the lower fibres of the tensor and of the levator palati, and the entire upper part of the palatopharyngeus—those important muscles of vocalization—are, as a sailor would express it, ‘at a loose end,’ and their proper development is a matter of physiological impossibility.

If the early operation is done, and the bones and soft tissues then begin to undergo a natural development, there need be nothing to prevent their regaining the lost ground. But even at the present day one occasionally sees young adult subjects of cleft-palate, with such marked deficiency of hard and soft tissue in the roof of the mouth, that operative measures seem to offer but a slight chance or prospect of improvement, and all that one can do is to advise the employment of an obturator.

Moreover, if the operation were undertaken at the late age, and, so far as the closing of the gap in the hard and soft palate, turned out a complete success, little or no improvement in vocalization would be obtained. Indeed, every now and then one sees an individual whose cleft-

palate had been quite successfully operated on at the age of three, four, or five years whose tone of voice gives unmistakable evidence of his having been born with an undeveloped palate. Had the closure been effected directly after birth this might probably have been avoided.

Everything points to the fact that, if the best results are to be secured for an infant with a cleft-palate, the operation must be undertaken at the earliest possible moment, and this will generally be within three months of birth.

Cases Unsuitable for the Radical Operation.

But if a new-born infant be extremely ill-nourished, weighing, perhaps, only a very few pounds, and apparently incapable of making even an attempt at the struggle for existence, it would manifestly be wrong to submit him to the severe operation in question, or, indeed, to an operation of far less severity. In such circumstances it will be best to wrap him in Gamgee-tissue, cotton-wool, or flannel, and to have the entire surface of its body rubbed night and morning in front of the fire with cod-liver oil. This is, doubtless, a disagreeable process for the nurse, but the effect upon the development of the infant may be found fully to justify it.

In the meanwhile the question of the feeding of the infant should be carefully gone into, as briefly set forth on p. 33.

If the infant has diarrhoea, this, of course, should be corrected before the question of operation is considered. Probably the diarrhoea will cease as soon as the diet has been adjusted.

An infant with one congenital defect may possibly give other evidence of imperfect development. The subject, therefore, of cleft-palate may have spina-bifida or some other serious malformation, the presence of which might make the

surgeon hesitate to advise operation upon the palate. But if, as he watches the infant, he arrives at the conclusion that it is not improbably going to survive, he must make up his mind to deal with the palatine defect as if it were the only feature of the case. It is manifestly unfair to allow a child to grow up with a cleft-palate for the simple reason, forsooth, that he has some other physical imperfection. The presence of this other defect may possibly, indeed, be taken as an indication that the defective palate deserves the very best efforts of the surgeon.

CHAPTER VI

THE EARLIER OPERATION ON THE PALATE

FOR about twenty of the years that I was upon the active staff of the Hospital for Sick Children, it was my practice to operate upon hare-lip in early infancy, but to postpone the treatment of the cleft-palate until the child was two, three, or four years old.

This plan of procedure was, indeed, a very general one. It had been adopted for several reasons. The fissured lip was dealt with before the cleft-palate, because experience had shown that if the infant were in a fair state of health he could confidently be trusted to stand the shock of that lesser operation. Moreover, it was thought that if the gap in the lip were soundly closed, the anterior part of the palatine cleft would keep on growing narrower up to the time of the operation on the palate. The palatine cleft was left uninterfered with, because it was thought that, at this tender age, the infant would not be likely to survive the shock of the prolonged operation for its closure, accompanied, as it must be, by a considerable loss of blood.

A few years ago my attention was directed by my colleague at St. Mary's Hospital, Mr. Morton Smale, to the method of treatment of cleft-palate which he had seen

Dr. Brophy adopt at Chicago. Dr. Brophy not only operated upon the palate before the lip, as others had done, in early infancy, but he dealt with the palatine cleft in an original and very radical manner, namely, by boldly thrusting the maxillary and palate bones together in the middle line.

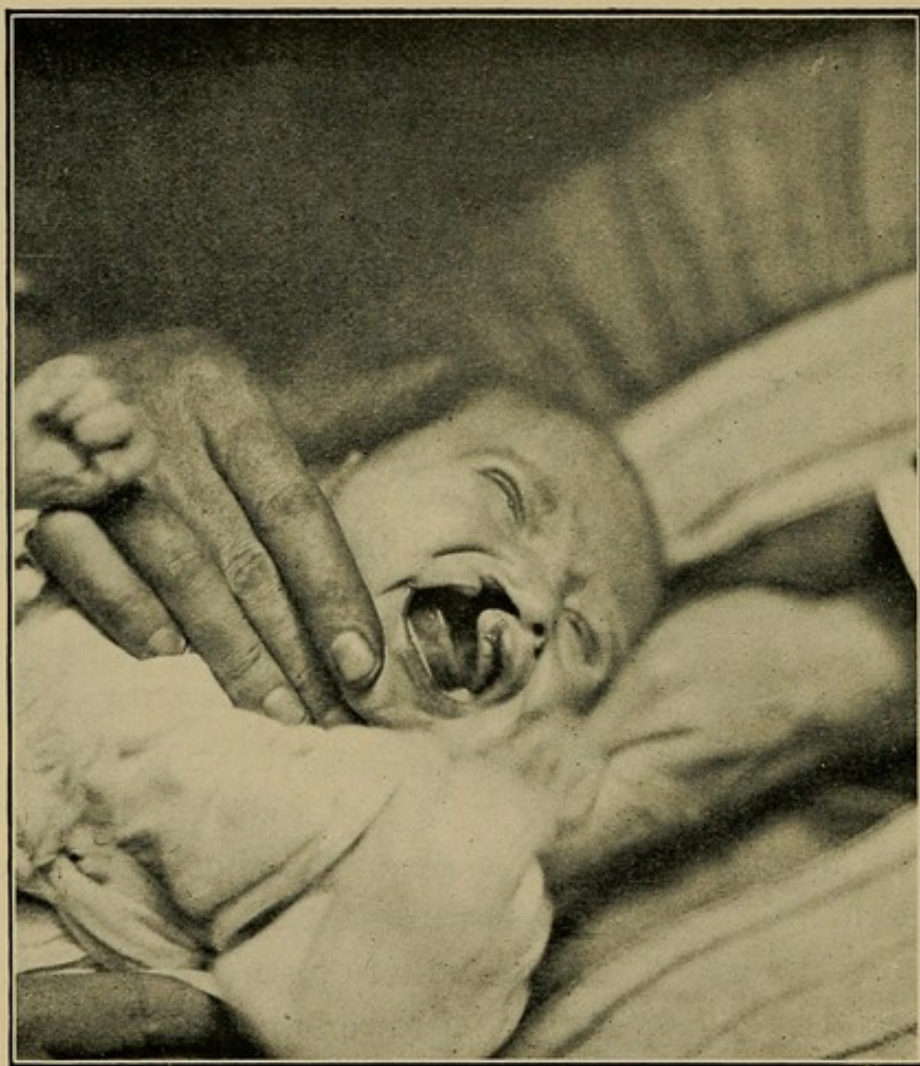


FIG. 7.—Cleft-palate and hare-lip in an infant aged three months.

Since becoming more fully acquainted with this method, I have cordially adopted it, and though I realize that its performance is not unattended with increased risk, still, I consider the advantages associated with it are so great that the extra risk may be unhesitatingly accepted.

By way of illustrating Dr. Brophy's method, I will briefly describe it as carried out in the case of a male infant whom Dr. Bennie Hewat recently sent to me from Cape Town. The infant was three months old on February 3, 1903, the day that I first saw him. He was a miserable-looking object, and he weighed but $6\frac{1}{2}$ pounds. When he cried, the mouth and naso-pharynx showed as one large cavity (Fig. 7), which the maxillary processes very ineffectually attempted to separate. Indeed, for so small an infant, the cleft was enormous—which is much the same thing as

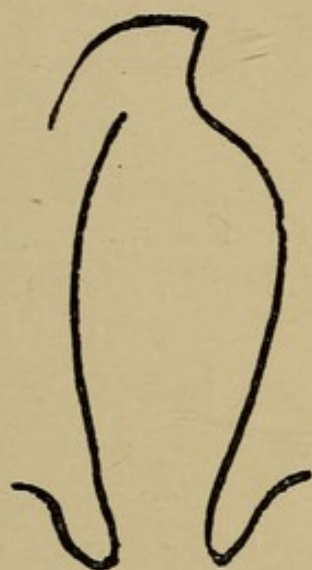


FIG. 8.—Cleft of palate extending into the right nostril in the infant shown in the preceding figure.

saying that the horizontal processes of the maxillary and palatine bones offered but scanty material for the formation of a roof to the mouth. This is not shown in the illustration, but the width of the gap in the lip more than suggests that the palatine cleft was a broad one. Its exact width, as determined by a pair of compasses, is shown in Fig. 8. The cleft extended into the right nostril. The vomer was adherent to the left maxillary process.

Before the operation, a warm enema of peptonized beef-tea with a little brandy was given, and the infant was

swaddled in Gamgee-tissue. Chloroform was the anæsthetic, which Mr. Henry Davis gave on a small mask. The tongue was drawn forward by a long suture, and the mouth was kept open by a modified Smith's gag, as described on p. 21.

The operation was begun by paring the edges of the cleft, and after this I tried, but ineffectually, to thrust the maxillæ towards each other by firm pressure with the fingers and thumb. Next I raised the cheek, and, well back, towards the posterior extremity of the hard palate, just behind the malar process, and above the level of the horizontal process of the palate bone, drove the end of a strong needle on a handle through the substance of the maxilla (Appendix, Fig. 13). This needle carried a thick silk pilot-suture through to the cleft, where its loop was pulled down towards the mouth. Then the needle was similarly passed through the opposite maxilla, the loop being brought down as before.

This second loop was passed through the first, which, being drawn upon, was made to bring the second loop through both of the maxillæ and across the nasal fossa, above the level of the hinder part of the alveolar processes. The sharply-bent end of a thick silver wire was then hooked on to this loop, and, by pulling back the latter, the wire was made to take its place. The wire suture thus lay above the horizontal processes of the palate bones, where it could be seen through the cleft.

Similarly, a wire suture was taken through the maxillæ above the front part of the cleft.

Two small, oblong leaden plates, with a hole drilled near each end (Appendix, Fig. 14), had already been prepared, and one of them was then laid along the outside of the right maxilla, under the cheek, the end of the hinder wire being passed through the posterior hole and the end of the front wire through the anterior hole. The right ends of the wires

were then twisted together from left to right, the plate being closely applied against the maxilla, after which the twisted ends of the wires were pressed down flat. The ends of the wires under the left cheek were then similarly treated, and as they were being twisted up the maxillæ were squeezed together, or, rather, another vigorous attempt was made to squeeze them together. But I could not move them. So, in accordance with Dr. Brophy's method, I then incised the mucous membrane over each malar process, and, introducing a scalpel, divided the maxillæ sufficiently to enable me to thrust their palatine processes into the middle line.

After this it was at once seen that the width of the gap in the lip had been greatly reduced, and that the lateral halves of the soft palate were brought closer together. Fine wire sutures were then passed through the freshened borders of the entire cleft.

When the maxillæ have been thus thrust together, the wires extending between the leaden plates have to be tightened up and again twisted. These wires and plates are not disturbed for three or four weeks. Some superficial ulceration sometimes takes place beneath or against the borders of the plates, but it is not of importance. The wires and plates may be removed after about the third week.

The infant was very ill for two or three days, and the union of the sutured borders was only partial, but the front of the cleft was solidly closed, and a useful bridge held securely at the junction of the hard and soft palate.

Subsequently, by the aid of three small supplementary operations, the cleft was entirely closed with the exception of a spot of the size of a rabbit-shot about a quarter of the way along the line of suturing. (This I closed just before the child was about to depart on his journey home to the Cape.) On May 5, after he had been for a visit to the

sea-side, I operated on the hare-lip, his weight being then 12 pounds. The condition of the infant at that time is shown by the photograph which is reproduced at Fig. 9.

In a letter dated October 13, 1903, Dr. Hewat sends me the report of his examination of the child on its return to

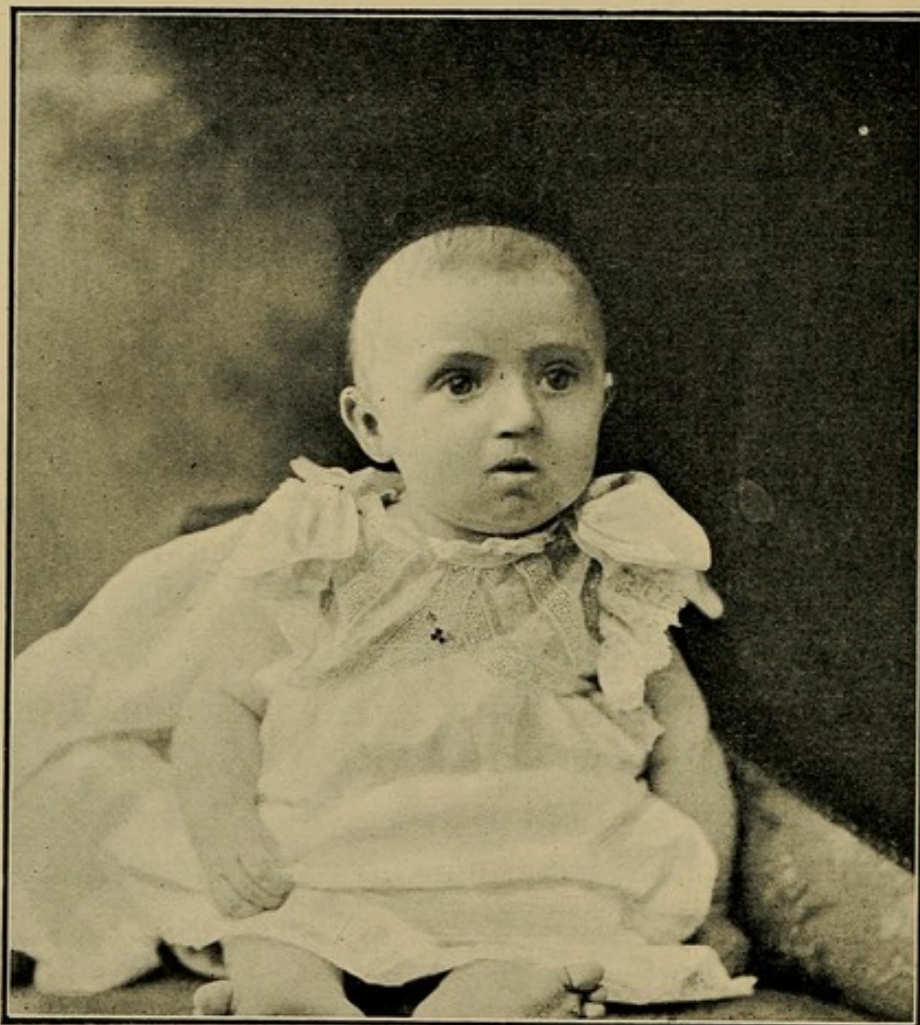


FIG. 9.—Appearance of the infant shown on page 46 after the operations on the palate and lip.

Cape Town. He says that he deems the result an excellent one, both as regards the palate and the lip; 'very much better than I thought possible, on account of the gap being so large and there being so little tissue available for the purpose of filling in.'

In this particular case, the cleft was so wide that, when I had with difficulty approximated the anterior parts of the maxillæ, I was afraid to deal with the hinder part of the cleft as thoroughly as I had intended. In ten days' time, however, I did a little more, and after another ten days I again vivified and sutured the sides of the soft palate and uvula, the opposed borders of which were lying quite close to each other.

The essential, and at the same time the most difficult, part of this radical operation is the approximation of the maxillæ. Brophy, however, apparently finds little trouble or difficulty with it. He says: 'If we are unable to close the fissure with these wires, if from lack of tissue or from firm resistance of the parts it cannot be done, there is a further method to be employed which will obviate these difficulties. With your knife, after the cheek is well raised, divide the mucous membrane just over the malar process. Here insert a knife in a horizontal direction,' dividing the bone freely, but damaging the mucous membrane as little as possible. The lower parts of the maxillæ are thus loosened, and on again twisting up the wire the front of the palatine cleft is closed by their approximation.

A priori I should have expected that this thrusting inwards of the maxillæ would have determined the occurrence of a contracted palate. Up to the present I have been unable to inform myself on this matter, but Brophy, who speaks from ample experience, affirms that this is not so. He argues that the alveolar process develops with the eruption of the teeth, and that in due course the teeth of the upper jaw will be found antagonizing those of the lower jaw 'in a normal way.' But should this antagonism not take place, Brophy, speaking *ex cathedrâ* as Professor of Dental Surgery, says that the arch can be expanded and the slight abnormality removed.

If, as the child grew, the superior maxillary arch did not widen out sufficiently to embrace that of the lower jaw, it would be no difficult matter, I imagine, for the dental surgeon to insure this taking place. But even if the arch were found comparatively small, that defect would be more than counterbalanced by the fact that, owing to the approximation of the hinder ends of the maxillary processes, the surgeon had been enabled to form a soft palate without the occurrence of tension, and without interfering in any way with the palatine attachments of the tensor palati and the levator palati.

After operating by the old method, it is quite a common experience to find the velum as tight as a drum as soon as the sutures are inserted, and if it were so left not many hours would elapse before the edges tore themselves asunder. But, of course, the surgeon does not leave the adjusted velum in that condition. He relieves it of all tension either by the method of Fergusson or Pollock, or in some other way. The plan which I have been accustomed to follow is that of making a free incision from before backwards through the entire thickness of each half of the velum near its lateral attachment, as described on p. 68. And when the cleft has been wide, the available tissue of the soft palate scanty, and the tension, therefore, considerable, it takes no little courage to make these lateral incisions sufficiently free.

Subsequently, whether the line of sutures holds, or whether it breaks down, these lateral incisions gradually fill up. But inasmuch as they fill up with granulation-tissue, which is eventually converted into scar-tissue, the muscular or aponeurotic fibres of the velum cannot escape permanent damage, which must surely have a prejudicial effect upon those delicate movements of the soft palate which make for clear articulation.

To what extent this injury may be responsible for the imperfect results—so far as intonation is concerned—which sometimes follow even an entirely successful operation upon a wide palatine cleft, one cannot say. But I must regretfully admit that in some cases in which I have secured a perfect closure of a palatine cleft at the age, say, of three or four years, I have found that when the child reached puberty the clearness of articulation and the tone of the voice left much to be desired, even though considerable care might have been expended over the vocal education. And if to this damage to the soft palate must be ascribed a fair share of the defect in the intonation of later years, Brophy's modi-

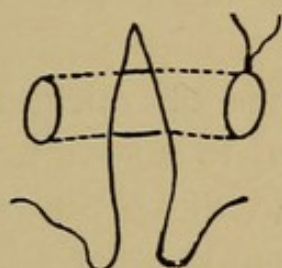


FIG. 10.—Manner of rendering the tensor palati inactive by looped wire suture and beads.

fication in operating is an important and valuable one. For when the halves of the hard palate have been forcibly approximated, the borders of the soft palate hang so close together that their adjustment can generally be effected without tension, so that it is unnecessary to make lateral incisions, or in any other way to interfere with the insertion of the tensor palati or with any other element of the velum.

In some cases it may be advisable to steady the adjusted halves, and to relieve them of all tension, by the use of a large suture of silver wire, the ends of which are secured by a split shot. This keeps the insertion of the tensor palati temporarily at rest (Fig. 10).

Inasmuch as vocalization is greatly dependent upon the anatomical integrity of the soft palate, and as this early and

radical method enables the velum to be repaired with less interference with it than does any other operation with which I am acquainted, it might be advisable somewhat to sacrifice the hard palate to the soft, if sacrifice were demanded. But this, Brophy affirms, is not the case. He says, indeed, that the palate with a congenital cleft is too large for the lower jaw to the extent of the width of the cleft, and that the approximation of the superior maxillæ is in itself advantageous (*see* page 56).

And just as the approximation of the hinder part of the maxillary processes gives assistance in the closure of the cleft in the soft palate, so does the approximation of their anterior part simplify the subsequent operation on the hare-lip.

Serious as is this radical operation on the palate, the infant may be expected to survive it. Indeed, I have been surprised at the way in which the infants recover from it. Brophy goes as far as to say that 'the shock following the operation is not so great if performed within the first month as it would be later in childhood.' Of this I am by no means sure, however.

It is certainly a very great advantage of this operation that, as the maxillæ are closely approximated, the halves of the velum can be stitched together without tension and without the need of interfering with the attachment of the muscles of the soft palate.

It is obvious, moreover, that as the approximated halves of the soft palate can be sutured without interference with the muscles of the palate, the prospects of securing a natural voice are greatly increased.

Another advantage is that, as the maxillæ have been brought together in front, the subsequent operation upon the hare-lip is rendered much easier of performance, and a far more artistic result is obtainable.

If the prolabium and incisive bone occupy a very isolated and advanced position, the surgeon may be entirely unable to make use of them, but it should always be his endeavour to save them.

Sometimes the projection can be thrust into position only by bending down the tip of the nose, but when it has become firmly attached in its new position the connection with the nose may be divided.

Figs. 14 and 15, which are modified from Brophy's monograph, show how the removal of a triangular piece

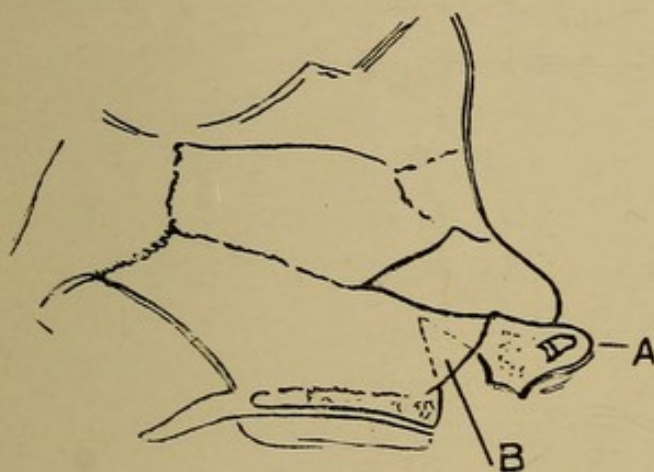


FIG. II.

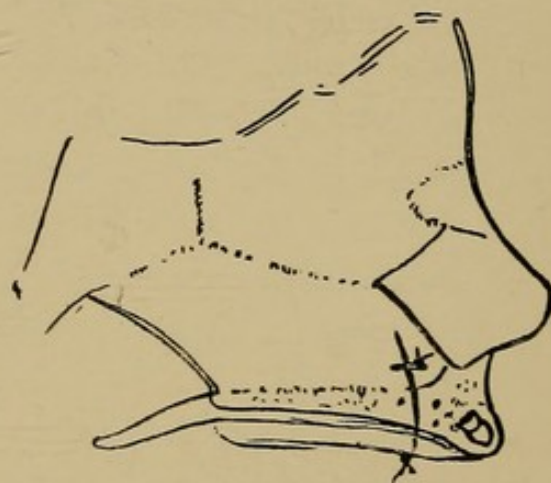


FIG. IIA.

FIGS. II and IIA show how, by the removal of a triangular piece, B, from the front of the nasal septum, the incisive bones and the prolabium, A, may be utilized in the repair both of the palate and the lip.

from the septum may enable the surgeon to make excellent use of the median bud.

To allow the palatine cleft to remain unoperated on during infancy is to invite its becoming still wider. The pressure—slight as it may be—of the food in the movements of mastication, and the constant thrusting of the tongue into the cleft, cannot but have the effect of gently pushing the maxillary arches further apart. Indeed, one is sometimes surprised at seeing how very wide apart are the maxillary arches in a grown child. There is certainly no

inclination whatever for the edges of a cleft to come together of themselves.

Brophy makes a great point of the excessive width of the roof of the mouth in a child with cleft of the hard palate when arguing in favour of his operation. He maintains that the roof of the mouth in these cases is excessive in diameter by just the width of the cleft, and that if the maxillæ can be thrust together, the transverse arch actually becomes of normal size. And he affirms that when the

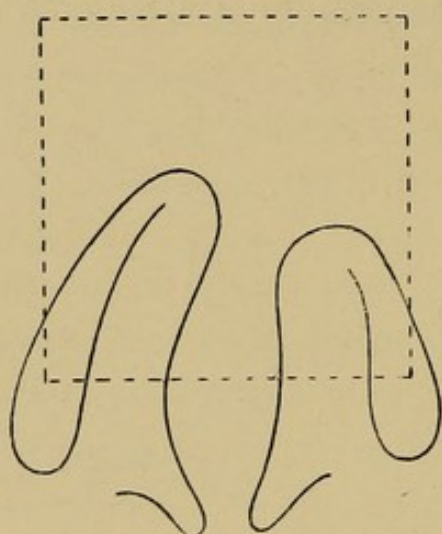


FIG. 12.

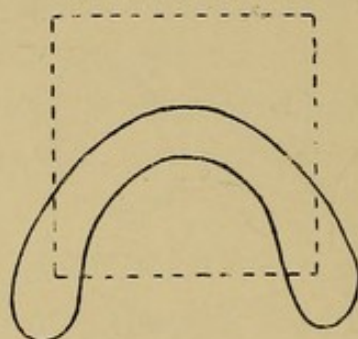


FIG. 12A.

FIGS. 12 and 12A.—Superior and inferior maxillary arches from an infant with cleft-palate, showing that the transverse measurement of the former exceeds that of the latter by exactly the amount of the width of the cleft. (After Brophy.)

palatine processes of the maxillæ are united, the development of the alveolar processes of the upper jaw assumes a form nearly or quite normal, and that when the teeth are erupted, they will properly occlude with the lower ones, or nearly so.

He places side by side representations of the casts of the upper and lower jaw of a child on whom he had successfully operated for cleft-palate, and showed how the transverse diameter of the superior maxillary arch, when the child was eleven years old, exactly equalled that of the lower.

The cleft, which, as shown by a photograph, must have been a very severe one, had been operated on by him when the infant was ten days old.

If, after a lapse of time, the teeth of the superior maxillæ which have been shifted inwards by the radical operation exactly meet those of the lower jaw, the bite cannot, of course, be termed *normal*, for in the normal bite the upper teeth overlap the lower. But in certain individuals without any other physical defect the lower teeth bite outside the upper, and without any marked inconvenience. If, therefore, after the performance of this operation, the child should by chance grow up 'underhung,' the defect need not be regarded as something very extraordinary. And if the closing of the cleft by the early and radical operation has been effected without any disturbance of the attachments of the muscles of the soft palate, the underhanging bite may be regarded, in the circumstances, as a matter of little importance.

In all cases of a wide cleft of the hard palate, the greatest difficulty in the operation is in successfully suturing without tension the anterior part of the soft palate. But when the operation is performed after Brophy's method this difficulty should entirely disappear.

CHAPTER VII

THE OPERATION FOR CLEFT-PALATE AFTER INFANCY

As already set forth (p. 41), the best time for operating on a cleft-palate is within the first few weeks after birth. But it may happen, either from necessity or from some other cause, that the child has passed the age at which it may be expedient to undertake Brophy's operation without any attempt having been made to remedy the defect. This chapter deals with the operative treatment of these belated cases.

The anæsthetist, standing, or sitting on a high stool, at the head of the patient, watches for the earliest moment at which the gag may be introduced, so that the child may not be under the anæsthetic an instant longer than necessary. On receiving this intimation, the surgeon passes a long suture through the tip of the tongue in the exact median line, and, having tied the ends, he gives the loop to the assistant to hold whilst he introduces the gag. With this the assistant gently pulls the tongue forward, so that when the gag is fixed in the mouth the hinder part of the tongue may not bulge against the soft palate or block the air-way.

As the surgeon is introducing the gag (Appendix, Fig. 1), he sees well to it that the tongue-plate is *downwards*. If the

gag does not appear quite suitable for the case, another can be tried, larger or smaller, as may seem advisable.

Position.—The best position for the child during the operation is upon his back, with his head hanging over the end of the table, so that the blood, instead of finding its way into the larynx or stomach, may sink into the nasopharyngeal dome, and, welling up by the mouth or nostrils, may find harmless escape. This position, however, is not without its disadvantages, as it sometimes causes embarrassment to the respiration. I well remember the occurrence of such embarrassment in the case of a young woman on whom I operated a few years ago for a cleft-palate. She had a short, thick neck, and a rather large thyroid body, and when the operation was half finished the breathing (which had throughout been unsatisfactory) silently and entirely ceased. Having brought her head up, however, drawn forward the tongue, and started artificial respiration, she recovered, and the operation was completed with the head and neck less extended.

For a fat-necked patient the over-extended position of the head is not usually convenient; still, it should be tried in every case. It must not be assumed, however, that this inverted position entirely precludes the possibility of blood entering the stomach or larynx. If the child bleeds freely the flow cannot be completely controlled even by careful and persistent pressure and swabbing, and, somehow or other, although this position is maintained throughout the entire operation, some blood is apt to be taken into the stomach. It often happens that directly after the operation the child vomits a certain amount of blood; and sometimes when there has been little or no vomiting, it is noticed that the first motion passed after the operation is black and tarry, on account of the blood which has found its way along the alimentary canal.

In rare instances, moreover, some blood finds its way into the larynx, which is a far more serious matter. As an example of this, I will mention the case of a little boy on whom I was operating at St. Mary's Hospital a few years ago. He had bled freely, and he made us very anxious because blood had found its way into his larynx and windpipe. Indeed, he was so bad that I called for the tracheotomy instruments, with the intention of letting air into the windpipe, and of endeavouring to fish out a clot. Just at that moment, however, he took a gasp, expelled a good deal of congealed blood from the larynx, and so far recovered that we were enabled to finish the operation.

Though I have on other occasions seen children in a critical condition, from one cause or another, when being operated on for cleft-palate, I have, I am thankful to say, never seen the crisis end fatally. Thus, when the patient is in the head-downward position, there may be serious trouble with respiration, and, if hæmorrhage is free, the danger of blood going the wrong way is not to be ignored. Still, this risk is far less than it would be if the child were lying flat on his back.

It not infrequently happens that when the surgeon says, or thinks, that the case with which he is about to deal will be a simple and short affair, contingencies arise during the operation which show that he was greatly mistaken. On the other hand, if he has had a prolonged and anxious operation, which he has finished with difficulty and left with gloomy forebodings, the result may turn out most happily. It is wise not to prophesy. The operator can never know how the gag will work, how the child will take the anæsthetic, how he will breathe, to what extent the operation will be impeded by bleeding, how the stitches will run, and so on.

I am opposed to the plan of operating on the cleft of the soft and of the hard palate on separate occasions, for, as a

rule, one operation suffices for them both, and it is a pity to submit the child to a second operation when this may be rendered unnecessary.

The **operation may be begun** by delicately but firmly taking hold of the left border of the soft palate with finely-toothed forceps, and then thrusting the slender knife-blade through the velum (the edge being directed towards the vertebræ, and the surface of the blade being kept close to, and parallel with, the cleft). Then, having removed the strip to the tip of the uvula, the surgeon reverses the

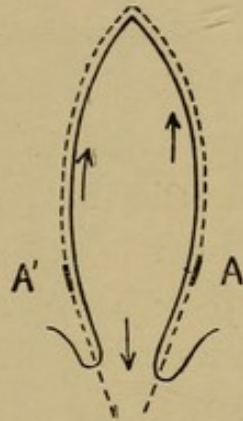


FIG. 13.—A and A' show the spots at which the soft palate may be transfixed by the knife, and the dotted lines and arrows show the directions in which the knife may be passed in making the raw edges.

position of the knife, and, directing it forwards, continues the removal of the strip by cutting towards the anterior extremity of the cleft in the hard palate and just beyond it, so as to be sure of dealing efficiently with that one side. As the knife is travelling forwards it is in contact with the bony margin of the palate. And in case this contact dulls its edge, it is well to have a second knife for operating on the right half of the palate.

The strip of mucous membrane being left attached to the front of the cleft, the right half of the palate should be dealt with in a similar manner, the strip from the soft palate

being first removed, and then the dissection carried forward until the front of the cleft is reached. Then, if all has gone well, the strip comes away entire.

When this strip is afterwards laid out in position, it will be seen that the part which came from the soft palate and uvula is much thicker than the paring from the hard palate, which is sometimes but a very thin covering from the edge of the bone. Whilst the assistant is pressing a swab into the cleft to arrest the bleeding, it is well for the surgeon just to examine the strip or strips which he has just removed, so

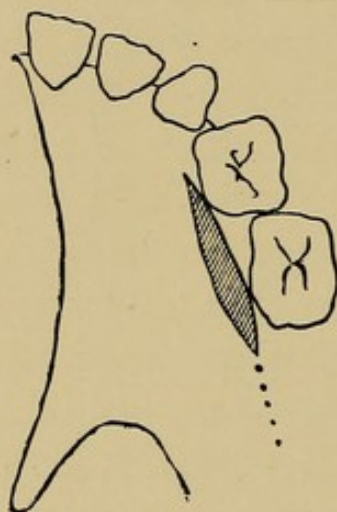


FIG. 14.—Left side of hard and soft palate showing line of incision along alveolar process, with dotted line in which incision may have to be extended backwards.

that he may assure himself that a serviceable raw edge has been left along both sides of the entire cleft. If by chance he should not have removed the strip whole, it is quite possible that there would be some part of the edge not vivified, and there it would be impossible to obtain union.

Incisions are then to be made along the alveolar aspect of the palate close against the inner border of the teeth, as shown in Fig. 14. These incisions pass through the muco-periosteum right down to the bone. They had better be made with a small scalpel, and as it is inevitable that they

divide some of the branches of the descending palatine arteries, it is well, then, to pause for a moment, and, at the same time, to keep up firm pressure against the incisions with a dry swab on either side of the roof of the mouth.

The closer that these incisions are made to the teeth the less the chance of wounding large branches of the descending palatine arteries, the broader will be the flaps, and the less the likelihood of their blood-supply being materially interfered with.

The length of the lateral incision will vary with the width and the length of the cleft. If the incision runs through the entire palate, and the roof is low-pitched and ill-calculated to supply serviceable flaps, the lateral incision will have to extend from the canine tooth, or even from the lateral incisor back to the last molar. Later, as is explained on p. 68, it may be necessary to prolong the incision to a considerable distance through the entire thickness of the soft palate. But if the cleft is a narrow one, and the maxillary processes are directed somewhat perpendicularly so as to promise a good flap, the lateral incisions may be quite short, or may not be called for at all.

By means of raspatories of various curves (Appendix, Fig. 2) introduced through the lateral incisions, the muco-periosteum is then to be detached from the hard palate. The higher the pitch of the roof of the mouth, the more extensive is the area of these flaps, and the greater is the probability of their median borders being brought together without tension. Indeed, in some cases of high roofs, the flaps, when brought down and drawn inwards, are found to be so slack that not only their bare edges, but even a slight portion of their raw upper surfaces can be brought together for suturing. And this, of course, increases the chance of securing prompt union.

As soon as the end of the raspatory has been seen to

emerge from between the muco-periosteum and the palate at the edge of the cleft, it should be used as the guide for introducing the point of another raspatory, which should then be made to work in an outward direction, the former raspatory being withdrawn. And thus, by alternately working with raspatories, first in the inward direction and then in the outward, the long, broad strip of muco-periosteum is completely detached.

The great advantage of detaching the muco-periosteal flap by working with the raspatory inwards through the alveolar incision and outwards from the vivified border, is that one can thus entirely dispense with the rectangular knife which was formerly much employed for starting the separation of the flap from the border of the cleft. Thus, the surgeon can be certain of making use of the whole thickness of the muco-periosteum near the cleft, of which he could not be when he was cutting outwards with the knife. Moreover, as the flap is loosened up by a blunt, rather than by a cutting, instrument, there is less bleeding.

But when the muco-periosteum has been thus detached, it is in most cases impossible to induce those parts of the flaps which have been brought down from the horizontal plates of the palate bones to come together in the middle line without tension. This is due to the fact that they are continuous with the velum, which is very firmly connected with the posterior border of the hard palate. In the substance of the velum is a strong fibrous foundation, or aponeurosis, which, attached to the border of the hard palate, receives part of the insertion of the tendon of the tensor palati, as well as attachments of the levator palati. And in order to get the half of the velum and the hinder part of the muco-periosteal flap to the middle line, this aponeurosis must be disconnected from the bony arch.

The success of the operation upon the cleft depends very

largely upon the thoroughness with which this disconnection is effected.

The best way of doing it is by using a pair of scissors bent on the flat almost to a right angle (Appendix, Fig. 11). One blade is passed between the detached muco-periosteum and the under-surface of the back of the hard palate, and the other is passed through the cleft and over the back of the velum, where it springs from the posterior border of the hard palate, as shown in Fig. 15. Thus between the blades are placed the layer of mucous membrane, which is continued on to the back of the velum from the floor of the

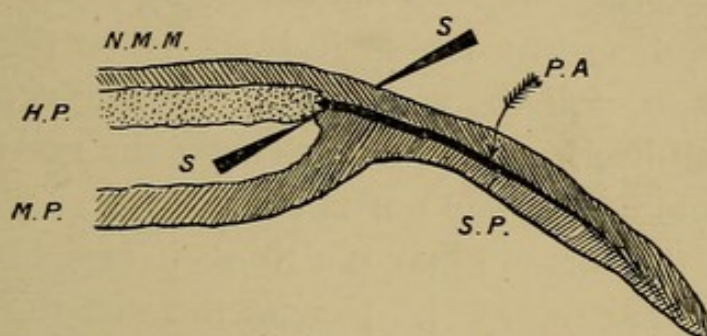


FIG. 15.—Diagrammatic representation of junction of (H.P.) hard and (S.P.) soft palate; M.P., muco-periosteum detached from hard palate; N.M.M., mucous membrane from floor of nares; P.A., aponeurosis of soft palate; S.S., blades of curved scissors about to cut through the aponeurosis and the membrane.

nasal fossa and the aponeurosis of the soft palate, with that part of the spreading tendon of the tensor palati which is inserted into the under-surface of the horizontal process of the palate bone. When this scissor-cut has been made, the whole sheet of muco-periosteum and velum hangs loose, and, after a little more sponging, the flaps are ready for suturing.

For introducing the sutures, the left border of the velum is held and steadied by the hook (Appendix, Fig. 8) or by the forceps—the former for choice, as it is less likely to injure the tissues.

As soon as the point of the needle (Appendix, Fig. 9) has passed well through the approximated flaps, a slight movement of the thumb or the index-finger upon the wheel, *in the right direction*, makes the wire emerge into the mouth. The handle of the needle being held firmly, the end of the wire is to be caught with the forceps, and as much of it pulled out as seems advisable—6 inches or 7 inches, for instance. The point of the needle is then withdrawn from the flaps, and another 6 inches of the wire should be pulled out by the forceps and cut off, so that there may be about the same length of suture on either side of the cleft.

In drawing the wire from the needle the operator must be on his guard against letting it drag against the flap. He must, in short, pull the wire out of the needle, and not let the wire pull itself out as he takes away the needle, lest the suture should cut its way out of the flap.

Possibly the surgeon may not think it expedient to twist up the suture as soon as he has got the wire through, so he roughly bends the ends together and gives them in charge of the anæsthetist, who holds them with his finger against the child's forehead. But if there is no tension he will tighten up this suture before he introduces the next. He will not cut it at once, but will use it for steadying the flaps as he introduces the next suture, and so on.

Very possibly the operator will not twist up the suture finally until a later stage of the operation, for as he is twisting it up he may find that he is putting so much tension upon it, or upon the edges of the flaps which he is endeavouring to adjust, that he deems it best to leave the twisting but loosely done. Later, when he has perhaps increased the length of the lateral incisions, or has eased the strain upon the stitch in some other way—as, perhaps, by twisting up adjacent stitches—he may tighten up that individual stitch to the utmost point considered expedient.

If the wire is properly annealed it will stand a large amount of twisting.

In introducing the stitches it is well to be able to drag down the muco-periosteum with the sharp hook before the stitches are inserted, so that when they are twisted up something better than the edges of the flaps are in contact. It is expedient to have a little of the upper surfaces held together by the twisted wire, as well as the bare edges, as already remarked.

Perhaps from seven to ten sutures are required for the secure adjustment of the flaps, and it matters little of what material they are composed. In my own experience, there is nothing better for the purpose than fine silver wire, which has been so prepared that it is soft, tough, and flexible. Occasionally, however, I put in a few stitches of well-chosen horsehair, which has been rendered aseptic, and has been soaked in hot water to increase its pliability. Silk sutures can scarcely be as suitable as those of wire or horsehair, on account of their liability to soak up discharges, to swell, and to become septic. Moreover, by using the mechanical needle silver sutures can be introduced with great ease and precision. No other kind of suture can be thus dealt with. Another advantage attached to the use of wire is that a suture may safely be left half tightened up, to be finally twisted up close after the tension has been eased.

With regard to **tightening up the silver sutures**, this is best done by the ordinary torsion-forceps, as the operator can thus see exactly what he is doing, which might not be the case if he were making the twist with his fingers. And as in the course of the operation he may be called upon to tighten up this suture or that, it is necessary that he should know in which direction he should make the twist. The wire sutures should always be twisted from left to right, as in dealing cards (Appendix, Fig. 7).

In tying up the horsehair sutures it is advisable to add a 'half hitch' as an additional precaution after the reef-knot has been tied, as the movements of the tongue might untie the simple reef.

When the sutures are being inserted, it may be found that, as the flaps are drawn together in the neighbourhood of the junction of hard and soft palate, there is so much tension that, if the silver sutures were fully twisted up, either the wire would break or cut its way through the flap. It will then be necessary to prolong the incisions which have already been made through the alveolar muco-periosteum backwards into the halves of the velum, so that the edges of the flaps may be adjusted along the middle line entirely free of tension. The course which this prolongation would take is shown by the dotted line on Fig. 14. The incisions thus made cut through the aponeurotic insertion of the tensor palati and the chief part of the insertion of the levator palati. When the tension has been thus eased, the sutures may be caught by the torsion-forceps and twisted up tight. Branches of the descending palatine arteries being divided, there is now some more bleeding, but, as a rule, it quickly stops under pressure.

When the flaps are adjusted the lateral cuts sometimes look unpleasantly large, especially if a wide cleft demanded a considerable drawing inwards of the flaps. Often the gaps are so extensive that they serve for the introduction of small pieces of gauze, held in slender forceps, for removing the last of the clots or of the fluid blood from the nasopharynx. Sometimes the incisions have to be made so freely that the flaps look as if they would not improbably slough. As a matter of fact, however, they do not slough.

The **backward extension of the lateral incisions**, with division of the levator and tensor palati muscles, is left to the last, in order that one may see to what extent the

division is needed. If the cleft was a narrow one, and at the same time the roof of the mouth was high pitched, it is probable that the flaps will come together without any tension, in which case no division of the muscular insertions will be needed.

The lateral incisions having been made with sufficient freedom, it is never necessary to divide any of the muscular fibres of the anterior or posterior pillars of the fauces, as was practised by Fergusson and others.

As soon as the lateral incisions are completed and the surgeon has assured himself that the flaps can remain together without tension, and, moreover, that the bleeding caused by prolonging the incisions is not serious, he takes out the gag and removes the looped suture from the tongue. It is not necessary to attempt to clean up the area of operation by irrigation.

It may be asked if the continuation of the lateral incision backwards through the insertions of the levator and tensor palati will not be followed by permanent injury to those muscles.

Brophy is of opinion that when the tensor palati has been completely divided at or near the hamular process it never unites, as the portions retract and separate so widely as assuredly to prevent it. With all respect, however, I would affirm that union can and does take place in the palate as certainly as in any other part. One might as well say that when, in the case of a club-foot, the tendon of Achilles is divided, union of the separated ends cannot occur. As a matter of fact, however, it scarcely ever fails to take place, and, personally, I have never seen an instance of such failure.

In the case of the divided heel-tendon, plastic exudation soon puts a solid splice into it, making it as strong as ever. And in the case of the divided palate muscles, the conver-

sion of granulation-tissue into a delicate patch of fibrous tissue soon effects the needful repair. And, in the meanwhile, the muscles have been put completely out of action, and all dragging on the line of suture has been checked.

If it should be urged that although a tendon may be repaired muscular tissue may not, the reply would be that muscular tissue is constantly being cut across in operative work, and that union takes place with such precision that its physiological action is in no way impaired.

Brophy advises that the line of suture in the soft palate should be relieved of the drag of the muscles by a strong wire suture passing through each half of the velum, and secured by a split shot, as set forth on p. 53.

However wide a cleft of the hard and soft palate may be, it is advisable to operate upon the entire cleft at once rather than to divide the operation into two parts, one for the hard palate and one for the soft. Indeed, it is necessary freely to detach the muco-periosteum of the back of the hard palate before one is able to bring the edges of the adjoining part of the soft palate into apposition. And, similarly, the hinder part of the cleft in the hard palate cannot be closed without freely loosening the anterior part of the soft palate. Thus, in either instance, going a step further, and dealing with the remaining part of the cleft, adds so little to the time expended over the operation, or to the shock inflicted upon the patient, that in every case it should be undertaken. Nothing succeeds like success; and in a large proportion of cases both parts of the cleft when thus dealt with are entirely and permanently closed at the one operation.

Cleft of the Soft Palate.

Though in many instances the cleft implicates only the soft palate, it often happens that when this appears to be the case the defect does actually extend a certain distance into the back of the hard palate.

The sooner after birth that a cleft of the soft palate is remedied the better. Infants bear this operation extremely well, and the result is satisfactory.

If the cleft extends into the hard palate, or comes right up to its posterior border, the vivified edges of the halves of the velum cannot, as a rule, be brought together unless the aponeurosis is first loosened from the hard palate, as already remarked.

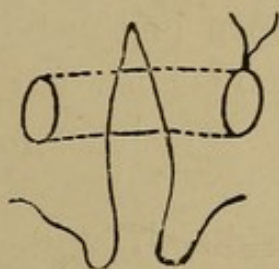


FIG. 16.—Method of rendering the tensor palati inactive by looped suture and beads.

It is necessary, therefore, in these cases thoroughly to use the curved scissors, as shown in Fig. 15, and to prolong the lateral incision backwards.

Instead of easing tension by lateral incisions, Brophy would take the strain off the adjusted edges of the flaps by passing a strong suture through each half of the velum. He thus describes the method:

‘It consists in passing a wire through the tensor palati muscle as it passes around the hamular process, and fixing the loop, with a large bead resting upon the visible surface of the hard palate, directly over the tensor palati. The wire passing the bead and muscle is carried also to the

opposite side, and thus pressure is brought to bear upon the fibres, which will temporarily paralyze it, and thus removes the tension from the freshly approximated surfaces of the palate' (Fig. 16).

I have had no experience with the method, but it appears to be quite practicable.

The Osteoplastic Method. — In 1874 Fergusson introduced a method of dealing with certain difficult cases of cleft in the hard palate, which is thus described by him :

'My project was that, instead of making the separation between the soft tissue and bony palate, I should divide the palate, soft tissue, and bone about $\frac{1}{4}$ inch from the margin of the gap on each side, cutting the soft tissue in the roof of the mouth with a scalpel, and the bone, with mucous membrane above in the nostrils, with a chisel, by means of which I could push the margins towards the mesial line, so that, having been previously made raw by removing the mucous membrane, they might be brought into apposition, and held so by stitches.'*

He then gave several instances in which he had successfully used this method (which, however, he found was not original).

'These observations,' Fergusson continued, 'apply solely to instances where the surgeon, in a first operation, has not attempted to close the gap, or has failed in a design to secure union throughout.'

He then showed how the procedure might be used in cases in which no previous attempt had been made to close a cleft in the hard palate. He concluded his paper by expressing his conviction that in instances where there is only a slight fissure in the hard palate the surgeon would be able to close it by the use of the chisel with greater certainty than by any other method.

* *British Medical Journal*, April 4, 1874.

The late Sir William MacCormac, in referring to these observations,* remarked that Dieffenbach had practised a similar operation in certain cases, and had affirmed that in wide fissures of the hard palate, where the soft palate is only rudimentary, union might be accomplished by first diminishing or closing the gap in the palate bones, and that the lateral incisions in the bones might be trusted to fill up with abundant granulations.

MacCormac went on to say that Langenbeck's experience of this osteoplastic method was that it was superior to all other plans of operating in cleft-palate.

I have occasionally employed the method in the case of grown children who, after a partial failure of the ordinary operation, had been left with a hole in the hard palate, which seemed to be too large for obliteration by muco-periosteal flaps, and in each instance I found it giving exactly the help which was needed. I have, however, never used it as the principal means of closing a complete cleft.

Professor Rose, who helped Fergusson in some eighty cases of this osteo-plastic method, formed the opinion that its results were unsatisfactory. He says that in many instances the detached pieces of bone became necrosed, and that inflammation and suppuration led to non-union. 'The bone, moreover, did not always cleave in the desired direction, and although the late Mr. Mason endeavoured to obviate this by punching holes, as a preliminary step, along the line the chisel was subsequently to take, the results were not improved.'

If at the present time one desired the help of the osteoplastic method in a considerable cleft in a grown child, it is probable that a small circular electric saw might be used for cutting the bone. It would work cleanly and precisely, and might be depended upon not to break the bone.

* *British Medical Journal*, June, 1874.

CHAPTER VIII

AFTER THE OPERATION

ON the completion of the operation the child should be so placed that the saliva, mixed with blood and mucus, may dribble out of the mouth. In the case of an infant, the nurse had better keep him in her arms for a while, with the face directed downwards.

If the child is too big to be thus nursed he should be put back to bed in the half-sitting position, and partly turned to one side, with the head bent down, so that the blood-stained fluid may dribble into a napkin conveniently arranged for that purpose. If it is thought advisable to place a hot bottle in the bed after the operation, let the surgeon himself see to it that it cannot possibly come in direct contact with the insensible child, and also that it is not needlessly hot.

Though I have never known serious harm to arise from a child vomiting after the operation, still, this act cannot but put a severe strain upon the sutures, and it is highly desirable that it should not occur.

If the child is to remain in the room in which the operation was done, the window should be opened for a while, so as to get rid of the chloroform vapour, the child being, of course, kept well protected against cold air. After this the

blinds should be drawn down, and he should be encouraged to sleep off the effects of the anæsthetic.

He should not be made to take bromide of potassium or any other medicine, given with a view to soothing him.

If he makes signs that he wants a drink, a sip of water, hot or cold, as thought best, may be given him in a teaspoon, with, perhaps, a trace of sugar added.

It is better not to give milk. It does not allay thirst as well as water, and as soon as it is in the stomach it forms solid curds, which, in his present feeble condition, may make him vomit. Moreover, flakes of it hang about the stitches and the wounds, and militate against the cleanliness of the mouth.

If the child appears faint, it may be that he is going to vomit. Undesirable as this is, it cannot be prevented. Perhaps the stomach may be irritated by the presence of blood which has entered it from the mouth, and as soon as it has been ejected the child may be more restful, and may look much better. If the stitches were well inserted the act of vomiting will probably not do any harm. If after the vomiting, or if independently of vomiting, faintness continues, it may be well to inject a couple of ounces of water into the rectum at a temperature of about 100° F., with or without brandy or beef-tea, as may be thought advisable, and the injection may be repeated later on.

After twenty-four hours the child is comparatively comfortable. And if during this time there has been no vomiting or coughing, and not much loud crying, and if reaction has been fully established, and the temperature has shown no great excitement, everything is promising extremely well.

In the case of an infant it may be advisable, or even necessary, to give some milk with the water in about six or eight hours after the operation. The milk should be fresh and unboiled, and no patent food of any sort should be

mixed with it. In addition, some warm peptonized milk and water may be given by the bowel, and especially so if the infant does not take the sips well from the teaspoon. But if he declines to take food by the mouth it is inadvisable to attempt to force him, or to frighten him by resorting to nasal feeding—which, indeed, is unnecessary.

The child must not be given enough by the mouth to tempt sickness. But when the nausea has apparently passed off, small quantities of beef-jelly may be given in a teaspoon. The jelly slips down easily, and is a *clean* sort of food. It is far preferable to milk; it does not form curds in the stomach as milk, and it is, I think, more easily absorbed. In the course of a day or two a little sweetened orange-juice, chicken or meat which has been run through a fine sieve, bread and milk, or a soft custard pudding may be given.

I am quite sure that good, home-made beef-tea, beef-jelly, chicken broth, and all other foods for children are far better than the various meat essences, extracts, and juices, and the many patent preparations which are so widely and so speciously advertised.

If when the feeding is begun the child will allow the nurse gently to spray or syringe out the mouth into a basin, so much the better. But it is a mistake to attempt such irrigation if it frightens the child. As regards the fluid for irrigation, Sanitas and water, a very mild solution of Condy's fluid, or a solution of boracic acid with glycerine, answers well. If the nurse has accustomed the child to the spraying for a day or two before the operation, he may now submit to it with all the greater confidence and advantage. Some children like the spraying, readily open the mouth for it, and lean forward over the basin whilst it is being done. But as the nurse is doing it she should not think it part of her duty to look to see if the stitches are holding (Appendix, Fig. 12).

If the patient is an infant, as it lies back and opens its mouth in crying, the nurse may gently brush over the field of operation with a camel's-hair pencil, which she keeps clean by washing it in a glass of warm boracic lotion.

Each time after feeding the child she may clean up the mouth with the brush, removing any particles of food which she sees adhering to the stitches or to the edges of the wounds, before using the spray.

Though it is obviously impossible to secure perfect asepticity for the entire region of the operation, the surgeon and the nurse should, nevertheless, do their best towards maintaining cleanliness. Infection of the line of suturing is, unfortunately, just as likely to take place from the nasal aspect of the wounds as from the buccal cavity itself, and upon that area it is impossible to bring any effective influence to bear. Happily, however, wounds of the mouth have a great capacity for taking care of themselves, and it is quite remarkable how large a proportion of the sutured palates heal by primary union, even when no spraying or cleansing of the mouth has been undertaken or attempted.

I have never known the operation to fail because of the suturing giving way when the child cried. The cause has been that the wound for some reason or another has become septic.

The child must be watched continuously night and day lest he get his fingers or toys into his mouth. If his arms be run through stiff tubular splints so as to prevent his getting up his hands he will not need such constant supervision. If he be beyond the age of infancy, he must be thoroughly amused when awake, in order to keep him from crying or screaming. On no account must he be allowed to talk; every wish, so far as is possible, must be anticipated. If old enough, he can make his wants known on a slate. Toys and picture-books while away the time, and if

the child be good and the weather fine, he need not be kept in bed or indoors for more than a day. It is, I am sure, advisable to get him into the fresh air as early as possible.

Removal of Sutures.

It is unnecessary for the surgeon to remove the sutures ; they will gradually and quietly ulcerate their way out and disappear. This refers, of course, only to the fine wire and horsehair sutures, not to those more solid ones of silver wire which pass through the maxillæ and the lead plates (p. 48). These last should be removed, as already stated, at about the fourth week.

If a suture is keeping up an unusual amount of irritation, or is making a sore place upon the tongue, it may be snipped and extracted. But in the case of a grown child the proposal or attempt to remove the stitches is almost certain to cause alarm. If, then, the child struggles, and the surgeon insists on carrying out his intention of removing the sutures, there is a considerable chance of the line of union being damaged by the scissors or forceps. The only way of insuring that a troublesome child is kept quiet is by giving him chloroform, but the removal of the sutures being unnecessary, the administration of an anæsthetic is superfluous.

If the surgeon thinks that a stitch had better be taken away because its presence is annoying a sensitive child, he may pretend that he sees 'a little fish-bone, which has stuck in the roof of the mouth,' and explain to the child that it is stuck so firmly that the only way in which he can get it out would be by the child keeping his head steady and his mouth wide open while he snips it with the scissors. It would be a mistake to hold the child by force in order to remove the stitch.

In the case of an infant, if the hands are held, the eyes covered up, and the head kept steady, there is not, as a rule, much difficulty in effecting the necessary removal of a stitch.

Secondary Hæmorrhage.

I have had no experience with secondary hæmorrhage, and were I confronted with it, I should not be in too great a hurry to adopt active measures to arrest it. I should sit by and watch, and would probably apply a piece of ice to the back of the neck, with the view of stimulating the vessels to contract.

If the bleeding still continued, I should have chloroform administered, insert the gag, and make a careful inspection. All clots hanging about the incisions or the sutures should be removed, and the mouth and naso-pharynx should be gently syringed out with warm water, the head being hung backwards, as already described (p. 59).

This syringing might very likely suffice to arrest the bleeding. If it did not, and if I found—as would probably be the case—that the bleeding was from one of the lateral incisions, I should gently stuff into it a pledget of gauze dipped in a solution of adrenalin, which I would leave in position.

I should also try the effect of carefully directed pressure with a dry swab.

If these measures failed, I would stuff a long strip of gauze (soaked in the adrenalin solution) through the incision and to the back of the velum, so as to produce considerable localized pressure, and I would discreetly thrust the soft palate up against this packing by means of a dry pad of gauze secured in the grip of a holder.

But, as I say, before attempting to arrest the bleeding, I should have chloroform administered, so that every act

might be carried out with a clear view, with deliberation, and with gentleness. To be able to see exactly what one is doing in such circumstances is absolutely necessary. To attempt blindly to arrest bleeding in the mouth of a frightened and struggling child would probably be to make it worse.

If the position of the bleeding-point seems apparent, though there is nothing on which the clip-forceps can be fixed, it may be well to try the effect of a strong suture passed deeply on a curved needle on a handle.

Improvement of the Voice.

Amongst the various functions of the palate there are two which are of predominant importance, one being that of preventing the food entering the nasal fossæ, and the other being that of rounding off the words and rendering articulation distinct and pleasant. The former of these functions, being chiefly mechanical, is, to a great extent, attained as soon as the palatine fissure has been successfully closed, though for a while, until the muscles have become accustomed to the altered circumstances, some of the food may 'go the wrong way' during deglutition.

The narrower the cleft and the earlier the date at which it is closed the more perfect will be the phonation, and the more promptly will this be obtained. On the other hand, the closure of a wide cleft in late childhood sometimes brings but slight improvement to the voice. The immediate improvement is not nearly so great in those cases in which the hard palate is involved in the cleft, and unless the parents have been prepared for this, they may be disappointed with the results of even a most successful closure of the cleft.

When they have the child back again, and, looking into

the mouth, find the gap soundly closed, they cannot comprehend why the improvement in the voice is not more marked.

They must be made to understand that the amount of the subsequent improvement will depend to a large extent upon the attention which they devote to trying to get the child to pronounce his words distinctly. And they must diligently and persistently set to work in drilling the muscles of vocalization.

Unfortunately, however, parents are often but imperfectly qualified for carrying out this education, being deficient in the skill, patience, and persistence needful for the work. But if the vocal education of the child be intrusted to some lady teacher who has experience in the matter, the parents may learn a great deal from her methods, and thus be enabled to give valuable supplementary aid to her work.

Mr. R. W. Murray, who has had much experience in the treatment of cleft-palate, emphasizes the importance of persistently training these children after operation to articulate correctly. They have the greatest difficulty with the 's' and the 'th,' and the plan which he usually adopts is to get the mother to teach the child some nursery rhyme, as 'Seesaw, Margery Daw,' and ask the child to repeat it from time to time.

The child should be shown the exact movement of the lips and tongue of the teacher when the difficult words are being pronounced, and he should be made to imitate these movements with care and diligence over and over again. A person accustomed to teaching deaf-mutes would give very helpful instruction.*

If the operation be performed late in childhood the intonation is but slowly and but partially improved.

* See Haward's paper in *Lancet*, January, 1887.

Sir Thomas FitzGerald, of Melbourne, is of opinion that the improvement in the voice may be accelerated by massage of the soft palate. In the case of a little child this could scarcely be undertaken, but provided that a patient could be induced to submit to it, the method might prove of considerable help.

CHAPTER IX

FAILURES AND INCOMPLETE SUCCESSSES

THE chief cause of the failure to obtain union after the operation upon a cleft-palate is, in my experience, that the area has become septic.

In a case which is thus going wrong the child's aspect continues unsatisfactory after the operation, and his temperature not only goes up—which, indeed, it generally does—but it keeps up. His tongue is coated, and his breath is foul. The line of suture is swollen and unhealthy, and a thick, slimy discharge collects about the roof of the mouth.

For two or three days most of the stitches may hold, and then one by one they give way. In some cases I have seen the entire line thus break down from incisor teeth to uvula, the wounds being slimy and foul, and the child being pale and ill, and obviously under the influence of some septic absorption.

I know of nothing which will check this disastrous process. Strong antiseptic applications obviously cannot be used against it, and mild ones, such as boracic acid, have no influence upon it.

In rare instances the inflammation is so intense that a

certain amount of sloughing takes place. But even when septic inflammation and localized sloughing do occur, the operation need not necessarily prove a hopeless failure. Some part of the cleft is generally closed, and healthy granulation-tissue arises in due course, and helps to close a little more of it.

The cause of the inflammation is a pure or a mixed cultivation of staphylococci, as was shown by cultures which have been made in several cases.

These germs want no better nidus than that supplied by the muco-periosteal flaps, which have necessarily been injured by the operation on the palate. There they find moisture, warmth, and oxygen. No incubator could afford them a more generous or favourable treatment. If such germs be anywhere within reach, the wound is more than likely to attract them, and when once there they cannot be dislodged or even controlled. It is well, therefore, that the operation should be done in an atmosphere which is as free, fresh, and favouring as possible. My own experience has been that cleft-palate operations turn out better in private practice than in hospitals. In hospital-work many cases did perfectly well, but then came a series of disappointments, partial or complete. Yet, so far as one could tell, the second set of cases resembled the others as nearly as, in clinical work, balance and average could be obtainable.

It has been remarked that, as regards the healing of wounds, the mouth may be left to take care of itself; and, for the most part, this is true. Taking into account the work of the dental surgeon, there is no region of the body in which so many wounds are daily inflicted as the mouth; and, with all this, how rarely does one hear of either constitutional or local trouble being caused by them. They all heal quietly, though, for the most part, by granulation. But

something better than this is, of course, expected after operating on a cleft-palate.

But because the wound has become septic and the union has failed, the surgeon must not give up hope of securing a good result.

Up to the year 1897 it had been my custom in such circumstances to send the child away into the country, and to operate again some months later. But in the case of a failure which then occurred, I was anxious to see if the unfortunate septic outbreak had not rendered the child temporarily immune against further attack of a like nature. So soon, therefore, as the effects of the local storm had passed away, I again did the operation, and, as the following report shows, secured an excellent result :

On May 25, 1897, I operated on a boy of five years. The cleft involved the soft palate and the back of the hard, being $\frac{5}{8}$ inch broad and $1\frac{1}{4}$ inches long (Fig. 17). Within

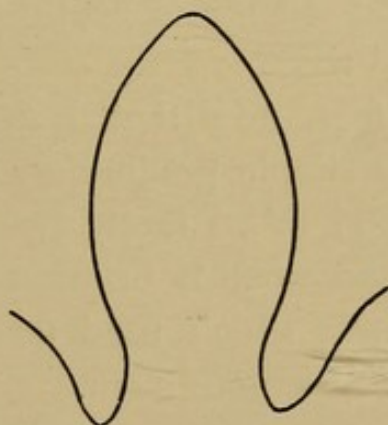


FIG. 17.—Actual size of cleft which broke down after first operation, but was successfully closed three weeks later.

a day or two of the operation the temperature went up, and the boy broke out in a punctiform, septicæmic rash. The wounds were covered with thick muco-pus, and the suturing gave way entirely. A fortnight after the operation the wounds looked clean, and the child's general health was good, so I arranged to operate again the following week,

hoping that the child had by that time established in himself an immunity against another staphylococcic attack. On June 16, therefore, with knife, raspator, and scissors, I brought the freshened edges of the flaps together, and adjusted them by wire sutures. The operation turned out a success, the child being sent home three weeks later with the cleft completely closed.

In every unsuccessful case it must surely be an advantage to make the second attempt when the child is well broken in and amenable, and, in private practice, when the nurse is still in the house and the child has become accustomed to her, and has very probably grown attached to her.

I think it not improbable that, as time goes on, a child on whom a staphyloraphy is to be done will have an artificial immunity established in him by the injection of anti-staphylococcus serum. But, for my own part, I shall be unlikely to have recourse to it. I shall still be content to let the children run the chance of septic inflammation rather than court unknown risks.

As a matter of fact, now that I am very strict in the carrying out of the simple preliminary methods of asepsis referred to in Chapter IV., I rarely find the line of suture breaking-down or the wounds becoming coated with that foul, stringy muco-pus which used formerly to be a not infrequent herald of disappointment.

It is remarkable to find to what extent a perforation remaining after a not entirely successful operation may close itself with time. A hole as large as a pea may be left in the hard palate after the performance of an otherwise successful operation. The child is sent into the country, and the operator does not see him for a month, perhaps, by which time the size of the aperture has decreased by one-half. And in another month's time it may, perhaps, only admit the end of a probe, when the introduction of the

slender blade of a thermo-cautery may effect its complete obliteration.

The cautery acts by destroying the ring of squamous epithelium which surrounds the aperture, and by causing the adjacent tissue to necrose. This necrosed film is cast off by the subjacent growth of granulation-tissue, which sprouts into and entirely occupies the gap. The granulations are then converted into fibrous tissue, over which the surrounding epithelium quickly spreads.

If, however, the obliteration of the aperture is not so happily effected, if, after waiting a certain number of weeks, it becomes clear that the closure has no inclination to advance, a supplementary operation may be undertaken. This may be done by making a semilunar incision on either side of the aperture at the distance from it of about $\frac{1}{2}$ inch, raising the muco-periosteum, and suturing together the vivified edges.

If the opening is entirely in the hard palate, and if the circumstances are such that this operation does not seem to promise success, the question may arise as to whether Fergusson's osteoplastic method (p. 72) should be resorted to. Flaps of bone and membrane may be steadied together by passing a large wire suture around them by means of an aneurysm needle.

Nitric acid is an unsuitable material to apply to a mucous membrane, as was formerly recommended. It is apt to spread on the moist surface, and so to effect an escharotic action more extensive than was intended. By the use of the cautery blade, however, the destructive action can be precisely limited to the very margin of the aperture, and this is exactly what is desired.

CHAPTER X

THE OPERATION FOR HARE-LIP

The best time for operating on a hare-lip depends upon various circumstances. Thus, if the defect is associated with cleft-palate, the palatine cleft has to be closed before the lip is dealt with (p. 41), in which case the child will probably be several months old before the lip is operated on.

Then, if the hare-lip be in an infant in so poor a state of nutrition that it appears unsuitable for any surgical treatment, the operation must be postponed until his condition has been rendered satisfactory by the adoption of dietetic and other measures.

But, assuming that the infant is in a fair state of nutrition—that he is taking his food well and thriving on it, that he is not troubled by vomiting or diarrhoea, and that the hare-lip is not associated with a defective palate—the sooner it is operated on the better. Objection used to be strongly urged against early operations. It was said that the tender infant would be unable to stand the inevitable shock and loss of blood, and that, the labial tissues being soft and friable, the stitches would very probably cut their way out before they had done their work. Experience has shown, however, that, with due care the operation may

be successfully performed within a few days, or even a few hours, of birth.

After what has been already stated as to the ability of an infant to undergo the far more serious operation for the closure of a palatine cleft in early infancy (p. 41), nothing further need here be said as regards the risks of shock and hæmorrhage.

When a hare-lip is unassociated with cleft-palate, the infant may very possibly be enabled to take the breast within a short time of the gap being closed. In such a case the operation may be advisably undertaken within the first few days of birth, as it is highly important to afford him the power of feeding directly from the mother. But if the question of the direct maternal supply of milk is out of consideration, the operation had better not be hurried on, for the child with hare-lip may be apparently quite healthy at birth, and may then, from no definite, or, at least, from no recognised, cause, begin to fall away; so that, in the general run of cases of hare-lip, it is expedient to delay operation for at least a week, in order that the child may be well started in life, and that it may be ascertained that the food which it is proposed to give does actually agree with him.

The case, then, being a suitable one, **the operation may be undertaken at any time after the tenth day.**

It is well, I feel sure, to give the infant time to 'turn round,' as it were, and to become accustomed to his separate existence and its new system of nutrition. And during these ten days the surgeon can take stock of him, and assure himself—so far as he is able to do—that he will come safely through the ordeal.

Much of what has been written in Chapter IV. on the preparation of an infant for the operation for a cleft-palate

will apply to that for a hare-lip. Briefly, it may be here repeated that, for the operation, the surgeon should see that every precaution is taken against shock, that the room is warm, that the infant is well wrapped up (p. 48), that the anæsthesia is not too profound (p. 28), and that he has the services of a handy assistant, with plenty of clip-forceps and a good supply of swabs (p. 23) at his disposal.

In some cases there is apparently no deficiency of tissue in the lip, but in others the material is so scanty that it is obvious that a good lip can be formed only by drawing the cheeks well towards the middle line. That there is in most cases, however, an actual want of tissue is manifest when the lip has been operated on; for, even if there has been nothing removed but thin parings of mucous membrane, the lower lip still appears disproportionately large.

The Operation.—Inasmuch as the operation which I am in the habit of employing in cases of hare-lip differs considerably from methods usually given in text-books, I propose describing it in detail.

But, before doing so, I would remark once more that the surgeon must carefully assure himself that the child is in a satisfactory state of health, or else his handiwork will not improbably fail. Because of the labial fissure, the infant was unable to take the breast, and his days were therefore passed, if not in absolute want, at least in a state which is far removed from hygienic perfection. It is a matter of common experience that many such children fail in the early weeks or months of their existence, and chiefly because they cannot be properly fed.

Chloroform may be given on a piece of lint, or on the stiff corner of a towel. The operation should never be done without an anæsthetic.

The freeing of the tissue of the lip and cheek is one of the most important points in the operation.

For this purpose the point of the knife only should be used for making a shallow incision—a mere scratch—into the mucous membrane just where it is passing in a thickish fold from the gum to the lip. Then the end of the flat handle of the scalpel, or the end of the blunt-pointed scissors, should be used for tearing up the lip and cheek. If the freeing of the lip were done by dissection, the hæmorrhage would be considerable; but, effected in the way just described, and by keeping the blunt instrument close against the bone, there is very little bleeding.

Unless the freeing of the lip be very thoroughly accomplished, it would be impossible to get the vivified edges approximated across a wide gap without such tension upon the sutures as to spoil the chance of primary union.

Bleeding is, however, apt to hinder the progress of the operation when the lip is being detached, but it can generally be at once stopped by the use of a few pairs of clip-forceps. But if there is persistent bleeding from some vessel of the gum which cannot be caught by the point of the forceps, the assistant may firmly press a dry swab against it for a little while. He must, however, see to it that the blood does not trickle into the mouth, and that the swab does not get adrift into it.

The coronary arteries are sure to give a good spurt. They may at once be caught by the clips, and if the handles of the clips are then turned up towards the forehead for the anæsthetist to hold, the lip becomes everted, and all bleeding-points are brought out into view and under easy control. Various lip-compressors have been invented for use in hare-lip operations, but, in my opinion, none of them is as efficient as are the fingers of a smart assistant and the clips which bear the name of Spencer Wells.

When the labial flaps have been thoroughly loosened up, the incisions are planned for obtaining the raw edges. By

the old, and usual method of procedure, this was effected by dissecting away the mucous membrane from each side of the gap. There were two objections to this plan: in the first place, it was wasteful of valuable tissue, and, secondly, when the raw surfaces were drawn together, a triangular notch was apt to permanently mark the spot where the vertical scar ran somewhat conspicuously on to the free border of the lip. Certain surgeons, I know, planned their operations to avoid the presence of this notch at the border of the lip, but some of them accomplished it by wastefully cutting out so much of each border of the cleft as to cause the production of a prominence at the lower end of the wound when the raw surfaces were closely sewed together.

On no account should the borders of the lip be vivified by scissors. It cannot possibly be done cleanly, precisely, and economically in that way, and the scissors injure the tissues far more than a sharp knife does. The blade of the knife should be small, and it should be quite thin, with a fine edge and a sharp point. A tenotomy-knife does not serve for the purpose, as, being made for strength, its back is thick. An old scalpel which has been worn thin by frequent grinding is well suited for the purpose. It is convenient to have, in addition, a small, strong-bladed scalpel, for detaching the nostril, and for other parts of the operation for which the finer blade is unsuitable.

The red border of the lip being seized by fine dissecting-forceps, the mucous membrane is economically yet sufficiently peeled from one side of the cleft and from along a good deal of the free border of the smaller side of the lip, whilst from the other side a very bold flap is cut which is tapered off to the top of the cleft (Fig. 18). This flap is afterwards brought across and laid along the denuded border of the lip upon the other side. Its thickest part is eventually to form a prolabium, whilst that part which was

previously the red, mucous border of the vertical cleft becomes the free, horizontal border at the bottom of the obliterated fissure as well as of the opposite side of the lip.

I would particularly insist on this, that the piece which should be brought across is not a mere paring of one border of the cleft, but a thick, wedge-shaped flap, as shown in Fig. 18, which is boldly tilted down, so as to leave an angular space into which the opposite side of the lip, which has been already denuded in its vertical and horizontal borders, may be accurately dove-tailed. Such a flap is far

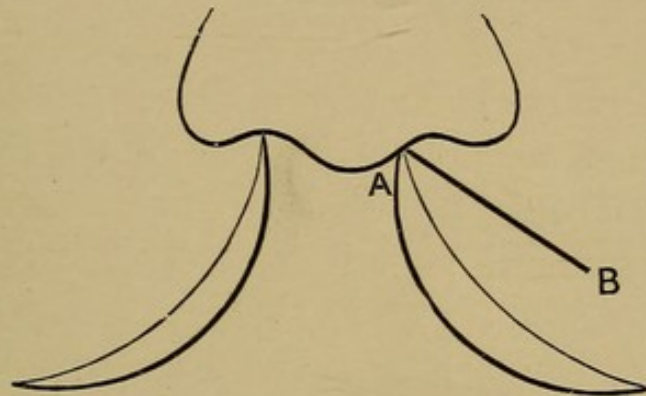


FIG. 18.—The mucous border of the right side of the lip is to be peeled off in the whole thickness of the lip, and the flap which is set free by the incision AB is to be brought across the gap.

more likely to take union than is a thin paring, and, in addition, it should form a good prolabium.

A great advantage of this method, as, indeed, of any other flap operation for hare-lip, is that the resulting and inevitable scar does not traverse the mucous membrane in the line of the scar in the skin, but, being deflected outwards, may escape attention as it gradually tails off to the free border, which it may reach at a slight distance from the corner of the mouth.

In the case from which these woodcuts were designed, the left side of the lip was deemed the more suitable for supplying the prolabial flap; the incision AB was, therefore,

made downwards and outwards in its substance, beginning up in the nostril.

The right side of the lip having had its mucous membrane carefully pared off up to the curved line CDE (Fig. 19), the lateral halves of the lip are then drawn forwards to the middle line. This could not be done, however, unless their connections, and those of the cheeks, with the maxillæ have been thoroughly torn through, as already described. When the right half of the lip has been thus brought to the middle line, the incision AB, which had been made obliquely into the lip (*see* Fig. 18), forthwith becomes

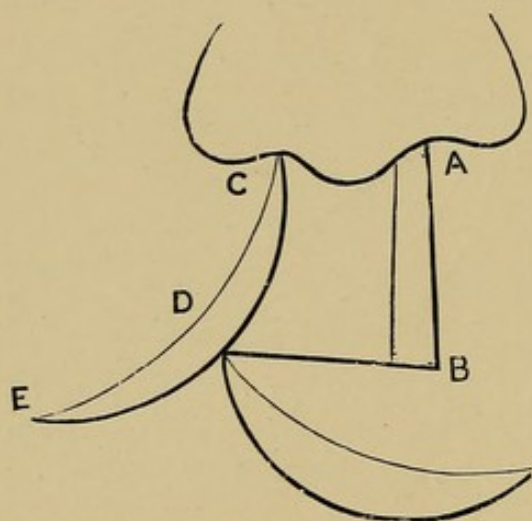


FIG. 19.

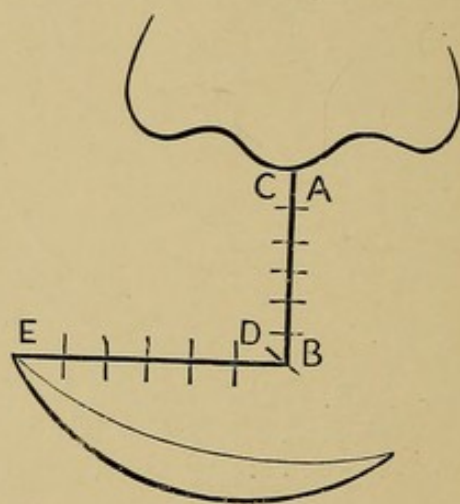


FIG. 20.

vertical, the thick flap, which had previously been vertical, becoming horizontal and ready for adjustment, so as to form the mucous border of the restored lip.

The right side of the lip being drawn inwards, some of its freshened border, CD, is placed vertically in the middle line, whilst the rest of it, DE, forms a horizontal edge to which the deflected flap from the left half of the lip is then adjusted, the middle part, D, being fitted into the retiring angle on the left side, as at B, in Fig. 20.

Usually, the flap is long enough to reach almost to the labial commissure of the side to which it is reflected, so that

it saves time if the operator thinly peels off the mucous surface in nearly the whole extent of the short, horizontal part of the lip, as well as in the vertical part. The pink membrane must be cleanly and entirely removed, for if any of it be left, primary union at that spot is impossible. It should be removed from around the entire thickness of the lip, so that the approximated raw surfaces may be thick and serviceable. Not a particle of the skin, however, should be sacrificed.

The sketches by which I have endeavoured to show the scheme of the operation are purely diagrammatic. Each

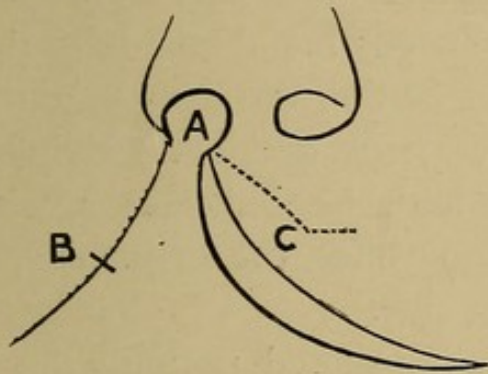


FIG. 21.—Mucous border removed from right side; flap cut from left side.

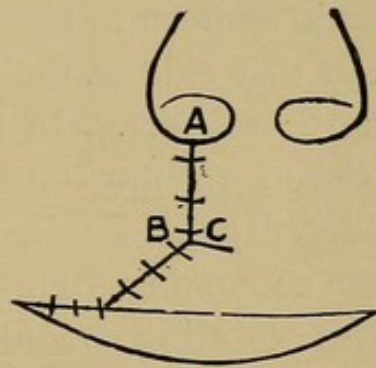


FIG. 22.—Flap from left side adjusted along right half of lip.

case requires some modification of the plan, and, adapting an old adage, 'One must cut one's coat according to one's cloth.'

The sketches fail to show a peculiar puckering which often occurs at B (Fig. 19) when the vertical flap is brought across in the horizontal plane. This can be remedied by continuing the end of the incision a little outwards through the thickness of the lip, as shown by the short limb of the incision AC, in Fig. 21.

Further, the sketches fail to show how conveniently the flap may be stretched outwards towards the angle of the mouth.

The operation described above is by no means identical with Mirault's; it resembles it only in that a flap is brought across the fissure. Mirault's operation consisted in cutting with a pair of scissors a small flap from the lower border of the lip 'six or eight millimetres long,' which was to be arranged to form a normal prominence for the lip. The flap thus measured but $\frac{1}{4}$ inch, and it hung from the border of the lip (before being fixed with a pin) by a sort of pedicle. Mirault constantly speaks* of it as 'un petit lambeau,' which is very different from the massive piece which is carved out of the lip in the manner just described.

Having cut the small flap from the lower part of the lip, Mirault went on to remove the mucous membrane from the rest of that side of the fissure by cutting vertically upwards with the scissors. In the rather poor woodcut which he published to illustrate his method, he indicates a very slender flap, and this, to his annoyance, the engraver has shown as coming from the wrong side.

The **stitches** should be liberally inserted not only down the front of the lip, but also on the dental aspect, so as to prevent the child putting his tongue into the wound, and also to protect it from the irritation which would be likely to be set up by the entrance of food. In a case which I once saw, in which posterior stitches had not been used, the uniting medium between the halves of the lip was of the mere thickness of the skin.

Certain of the sutures, front and back, should be inserted more deeply than the rest, so as effectually to prevent the halves of the orbicularis and the associated muscles dragging upon the wound. Prepared horsehair may be used for adjusting the edges of the skin and for securing the transplanted flap along the opposite half of the lip, but most of the stitches, and certainly all the deep ones, had

* *Journal de Chirurgie par Malgaigne*, Paris, 1844.

better be of silver wire. Silk is not a suitable material for the purpose, as it becomes swollen and septic.

Not only must the anterior and posterior edges of the flaps be accurately adjusted, but the *surfaces* themselves must be kept in close contact. This is effected by passing two or three of the posterior stitches very deeply and boldly with a curved needle, the needle being brought almost through to the skin. These stitches are of the greatest possible use in steadying and securing the flaps.

Though I had been brought up in the belief that steel pins were essential for the successful treatment of hare-lip if the defect were considerable, I have long since given them up, even in operations upon the very worst cases. Not infrequently the spots at which they had traversed the skin remained permanently marked by conspicuous white dots of scar-tissue. A few sutures deeply passed at the front and back of the lip render their use superfluous. A great advantage of the deep sutures at the dental aspect of the lip is that they may be used without any fear of their leaving a mark. They may, indeed, be left indefinitely, steadying the line of suture and doing no harm. They promptly arrest bleeding, and they adjust the surfaces and edges of the wound so well that, with the exception of a wire suture at the top of the lip, near the nostril, possibly only a few additional stitches may be required, and these may be of horsehair.

The stitches should not be fastened up too tight, or they will endeavour to cut their way out by ulceration; they are wanted merely to hold the surfaces gently together. It is advisable not to cut off the ends too short; one end at least should be left about $\frac{1}{4}$ inch long, so that it can be more easily seized by the forceps when the time comes for removing the stitch.

A Badly-shaped Nostril.—The wide and flattened

nostril which is a characteristic feature of many cases of hare-lip needs careful attention at the time of the operation. The size and shape of this orifice have to be carefully adjusted. Possibly some of the cartilaginous ring will have to be cut away when the fissure of the lip runs into it, in order to reduce its size and round it off. So as to be able easily to move, fit, and plan the nostril, the ala of the nose must be thoroughly separated from the subjacent bone, and it may be advisable to hitch up the lower and outer part of the nostril by a strong silver-wire suture, securing it with a split shot, or not, as the operator may think fit.

It sometimes happens that when a very satisfactory shape has been thus imparted to the nostril, a blockage of the aperture has unfortunately been produced by the bulky cartilage being thrust in upon itself. In such a case it is well to turn up the mucous membrane from the projecting ring of the occluded nostril, and then, having shaved off a thickish slice of the cartilage, to bring down the mucous membrane again and secure it by a couple of stitches.

The Dressing.—As soon as the last stitch has been inserted, and the face has been washed and very thoroughly dried, the assistant should purse up the lip with the finger and thumb whilst the surgeon applies the dressing. This should consist of narrow strips of gauze dipped in collodion, and long enough to reach well on to the cheeks. If they have been successfully adjusted they will keep all strain from the line of suturing.

Next day the dressings had better be removed, and if it seems expedient, a little chloroform may be administered. The nurse then pushes the slack of the cheeks towards the middle line, and the surgeon peels the gauze strips by pulling them *towards* the area of operation, so as not to put any drag upon the sutures.

Then, when the wound has been cleaned up with a small

dry swab, the surgeon decides which of the sutures may with safety be taken out. Probably he will find that every other stitch may be removed, as the edges of the wound are closely adhering. If a large stitch has been deeply inserted from the front, it certainly ought to come away. The sutures up by the nostril may also be ready for removal. Then the gauze and collodion dressing is applied as before.

Next day, or the next day but one, the wound should be dressed again, a few more of the anterior stitches being removed, lest, remaining too long, they should set up ulceration of the skin, and cause disfigurement. Those sutures, however, which are upon the back of the lip may be left to find their own way out. Thus, within four or five days all the visible sutures are removed, those of horsehair, which were at the tail end of the flap and at the free border of the lip, being last dealt with. For ten days or a fortnight after this the lip must be kept free from muscular disturbance by the use of gauze and collodion or waterproof strapping.

If the surgeon does not think it necessary to have chloroform administered for the dressings, the child's head must be steadily held by the nurse. Or she may sit in a chair opposite the surgeon with the child lying on her lap, whilst the surgeon grips its head firmly between his knees. The child is sure to cry, but if the nurse is shown how to purse the cheeks together the crying will do no harm.

I do not know if Hainsby's cheek-truss is ever used now in hare-lip operations. I have never used it nor seen it used. Seabury and Johnson's waterproof strapping, and the dressings of gauze and collodion have rendered it obsolete.

When the operation is done in a bad case, in which the prominent intermaxillary bones with the prolabium have been sacrificed (Fig. 23), the new lip is of necessity very

small, and the lower lip appears extremely prominent. To remedy this unsightly want of proportion, the only expedient is the levelling down of the prominent lower lip by the removal of a wedge-shaped piece from the middle of it, the raw surfaces being carefully adjusted by sutures upon both the dermal and the mucous aspects. It is a method well worthy of adoption in certain bad cases.

Double Hare-lip.—If the hare-lip is double and the prolabium has been left, the latter may need to be lowered

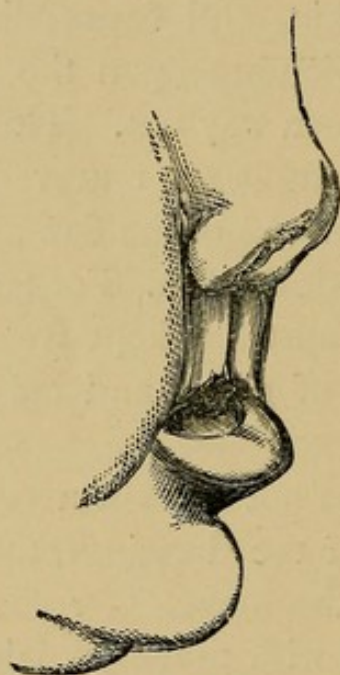


FIG. 23.—Case of double hare-lip from which the intermaxillary bone had to be removed, showing prominence of lower lip (Holmes).

somewhat before it can be made available for the new lip. This being done, the mucous membrane should be thinly and cleanly dissected off its borders, and the two sides of the lip should be arranged for blending with it. Probably one side of the lip is larger than the other; this, therefore, should be chosen for being brought across to form the prolabium and the lower border of the new lip, by cutting from it a bold flap, as in Fig. 24.

A flap is also cut from the other side of the lip. But, before this is done, the mucous membrane is peeled from its free border, so that the flap can be dove-tailed in between the vivified border of the median bud and the fresh-cut surface of the other flap, as suggested in the sketch. If this flap, which is denuded on both its upper and its lower surfaces, is long enough, it may be bent around the border of the median bud towards the opposite side, lying between the median bud and the large flap. In this position it is duly secured by a few deeply-placed wire sutures, as described on p. 97, and by superficial ones of horsehair.

In some cases the median bud is so hopelessly out of

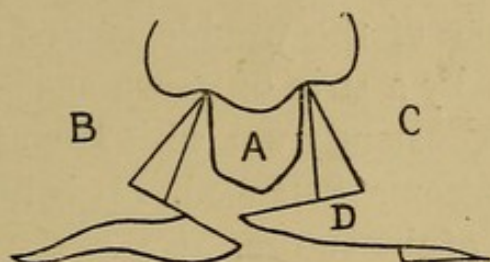


FIG. 24.—Double hare-lip, the chief flap being brought across from the right side.

place that it is unavailable for the repair of the lip, but by trimming off the sides it may be made to form an excellent columella between the nostrils.

Dyspnœa after the Operation. — When the wide fissure of a hare-lip has been closed by operation, the child's breathing is necessarily embarrassed for a short time afterwards; for, whereas the air-way had been unusually free, he is subsequently obliged to breathe only through the nose and mouth, and the nostrils are apt to be a good deal blocked by dry blood and mucus. In such circumstances the nurse has to guard the child from suffocation by gently depressing the lower lip, until the child has accustomed himself to the altered conditions.

Probably the surgeon notices the dyspnoea as he is finishing the operation, and, if it is very marked, he may feel inclined to pass a suture through the back of the lower lip and bring the two ends round the border of the lip to securely fix them down to the chin by a piece of waterproof strapping. The sucking in of the lower lip and the difficulty of breathing will thus be obviated, and as there is no tension on the suture it does not hurt the lip.

This matter of dyspnoea should be carefully attended to, for if, after the surgeon has taken his departure, the respiration becomes increasingly embarrassed, and the nurse is not equal to the emergency, the child might possibly die of asphyxia.

Another way out of the trouble is to fix the lip to the front of the chin by a strip of gauze soaked in collodion; but as the lip is constantly wet with mucus and saliva, the gauze is apt to become detached. It is not so trustworthy a method as that of the suture.

A Notched Lip.—If the lower border of the lip be marked by a notch—either with or without an operation having been performed—it may be effaced by making a horizontal incision into the substance of the lip a little above the notch, and by then closing the wound in such a manner that it seems to have been made vertically. The operation is on the principle which is adopted for widening a short constriction in the alimentary canal, an incision being made in the length of the bowel and then closed at right angles to its long axis.

Failure of Union.—There are few surgical disappointments more keen than that which one experiences when, after a carefully planned and successfully accomplished plastic operation, he realizes the fact that everything is going wrong, that flaps are failing to unite, and that every suture is freeing itself in a quiet ulceration.

But when, after a hare-lip operation, the surgeon finds that all has 'broken down,' and that there is no chance of obtaining the smallest amount of primary union, he may still hope for a good result by granulation, and should do his best to secure it. If the flaps fall apart all the sutures should be removed, and the lip should be frequently bathed in warm boracic lotion, and kept covered with wet boracic gauze.

So long as the tissues are acutely inflamed, nothing can be done with a view to bringing the parts together again ; but as soon as the inflammation has subsided, and healthy granulations begin to cover the raw surfaces, the sides of the lip should be readjusted by gauze and collodion, or by strips of waterproof strapping, as may seem advisable. In one case of this sort what might almost be called an excellent result was secured for an operation which at any time during the first week threatened a complete and hopeless breakdown.

1861
The first of the year was a very
dry one, and the crops were
very poor. The weather was
very hot, and the crops were
very dry. The crops were
very poor, and the weather
was very hot.

The second of the year was a
very wet one, and the crops
were very good. The weather
was very cool, and the crops
were very good. The crops
were very good, and the
weather was very cool.

APPENDIX

INSTRUMENTS USED IN OPERATIONS FOR CLEFT-PALATE

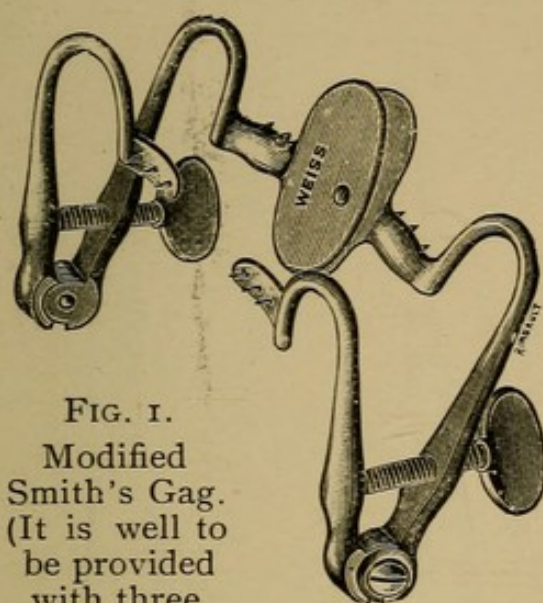


FIG. 1.
Modified
Smith's Gag.
(It is well to
be provided
with three
sizes of the
gag.)

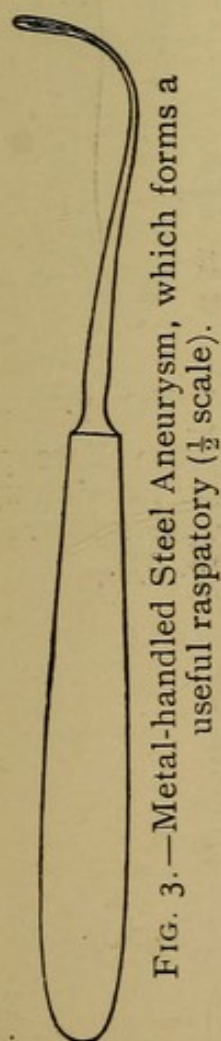


FIG. 3.—Metal-handled Steel Aneurysm, which forms a
useful raspatory ($\frac{1}{2}$ scale).



FIG. 4.—Lund's Steel Swab-holders (p. 24).

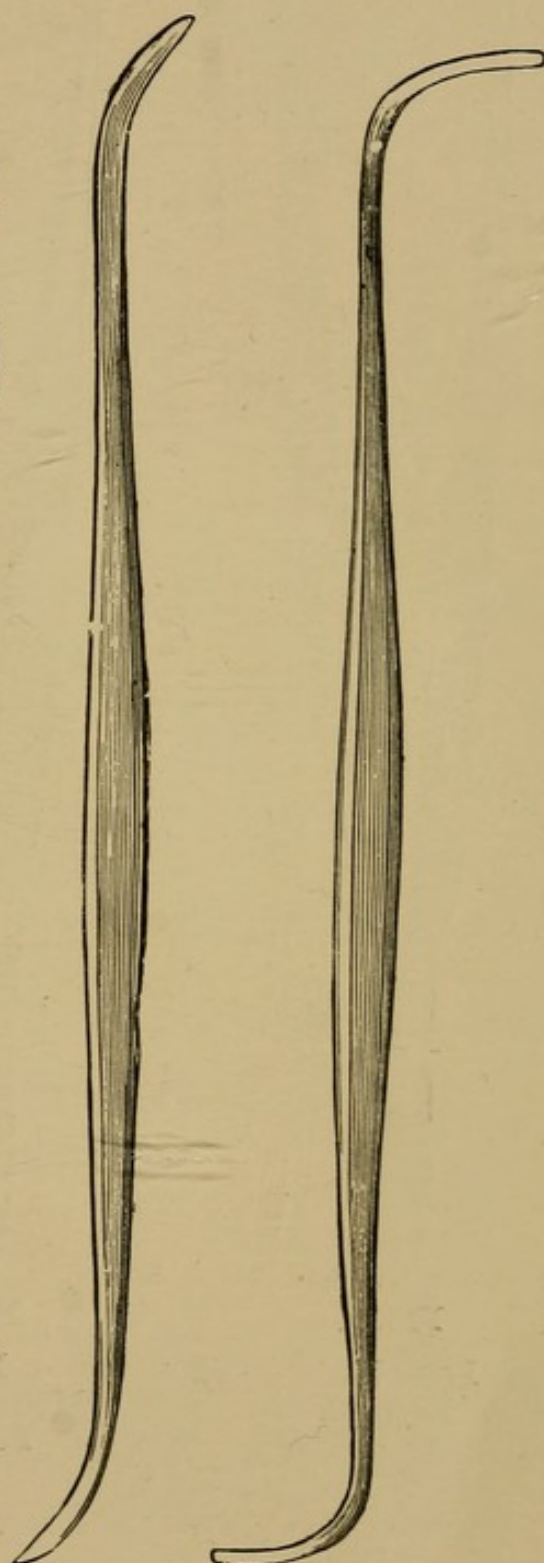


FIG. 2.—Steel Raspatories
(pp. 23, 63).

$\frac{1}{2}$ SCALE

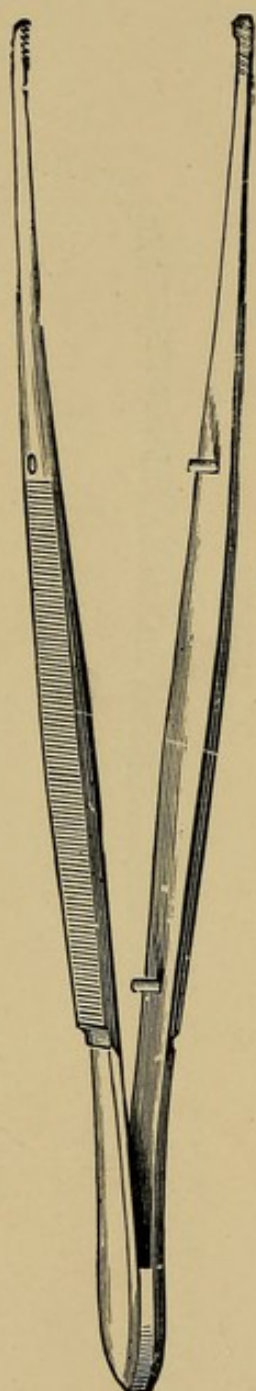


FIG. 5.
Long Plain
Forceps.

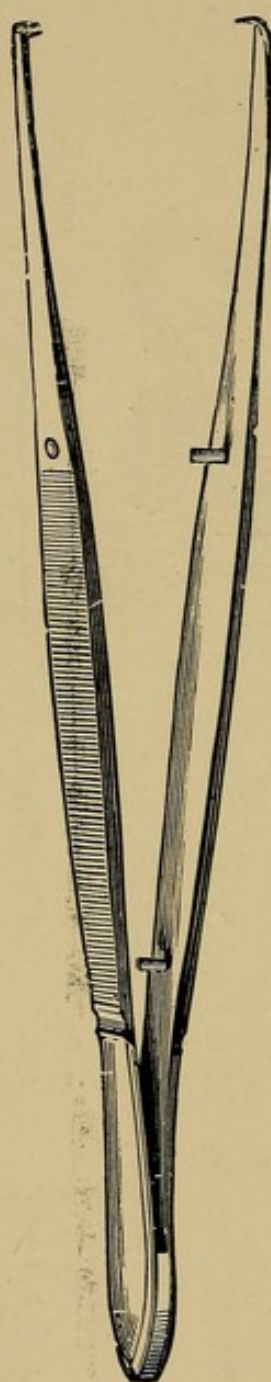


FIG. 6.
Long
Mouse-toothed
Forceps.



FIG 7.
Torsion Forceps
for twisting up
wire sutures
(p. 67).

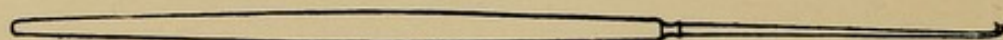


FIG. 8.—Sharp Hook for holding flaps, $\frac{1}{2}$ scale (p. 65).

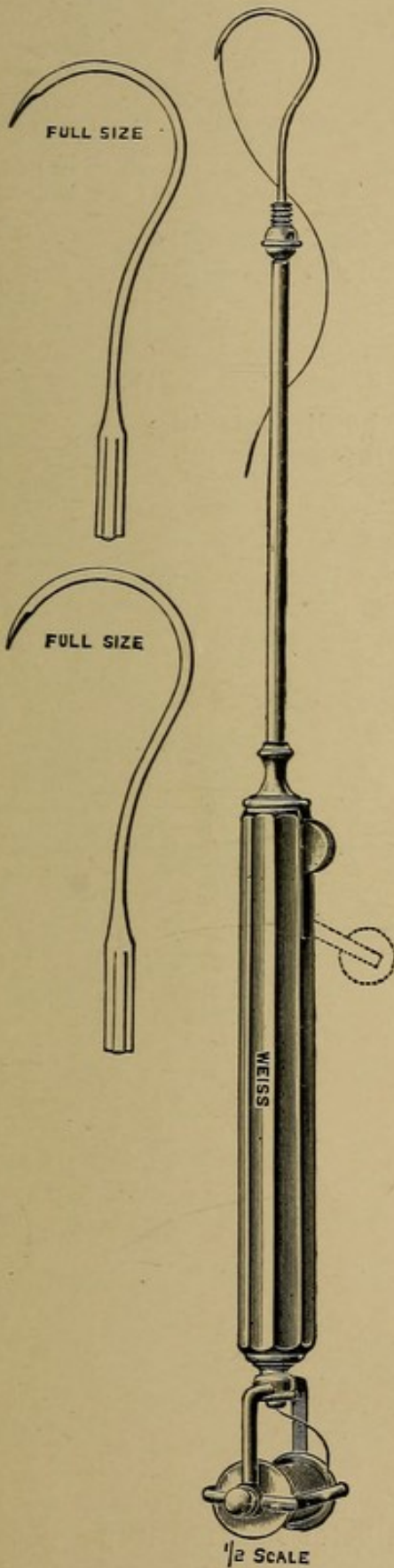


FIG. 9.—Tubular Mechanical Needle (pp. 24, 66).



FIG. 10.—Rectangular Needle for horse-hair sutures (p. 25).

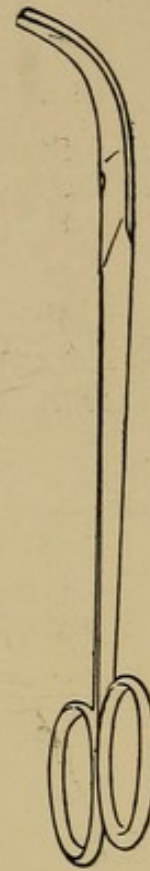


FIG. 11.—Scissors curved on the flat almost to a right angle (p. 65).

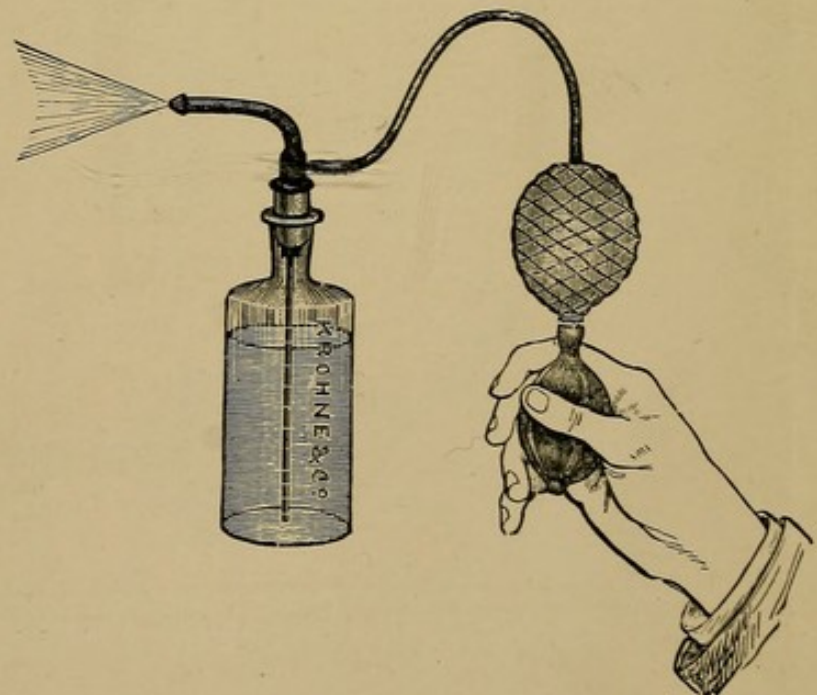


FIG. 12.—A Convenient Spray for the mouth (pp. 36, 76).

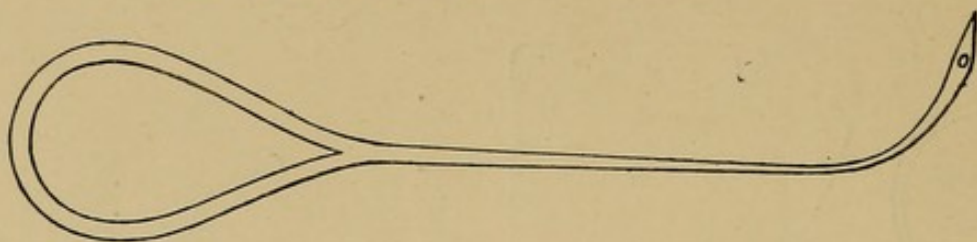


FIG. 13.—Strong Needle for carrying the pilot suture in the radical operation of infancy (p. 48).

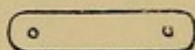


FIG. 14.—Lead Plate (actual size) for holding maxillæ together in the radical operation of infancy (p. 48).

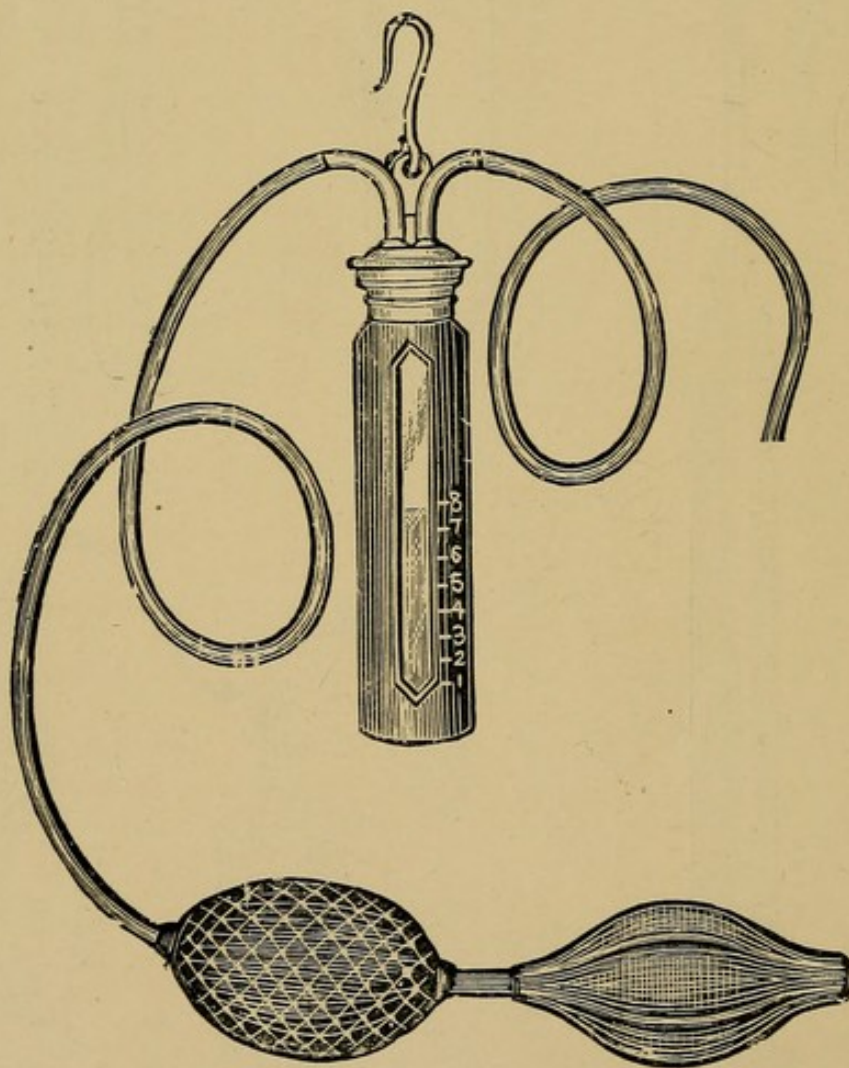


FIG. 15.—Junker's Inhaler. The chloroform vapour may be conveniently given through a soft catheter inserted into the delivery tube (p. 27).

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THE END

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