Prince (D.)

PALATO-PLASTY.

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This Edition is printed for the Members of the International Medical Congress meeting in London, August, 1881.

I. Recommending *the employment of the galvano-cautery to diminish the loss of blood, and to secure facility of performance and certainty of result.*

II. Suggesting *the introduction of automatic needles, both for the introduction of the platinum wire for the cautery and for taking the final stitches for the closure of the fissure.*

III. Offering *a new interpretation of the functions of the muscles in the pillars of the fauces.*

IV. Reviewing *the surgery of the hard palate, with suggestion.*

Part I.—Staphyloraphy. The operation for closing the cleft soft palate, though studied and improved since its introduction by Gräfe in 1816, has not yet been brought to perfection.

The congenital cleft is not usually attended by any other loss of substance than that which is consequent upon defective development, as in the case of cleft of the upper lip, in which, though the fissure may be wide, the parts readily yield to the traction necessary to bring the lateral parts to meet in the median line.

In the case of the lip, the detachment of the elastic tissues of the face from the bone renders this approxi-

mation easy. In the cleft palate the difficulty to be overcome is the tendency of the two halves of the palate to fall asunder. To remedy this difficulty, various divisions of muscles have been practised. Dieffenbach, thirty years ago, made an incision on each side, at the distance of a line from the cleft and parallel with it. In this incision the transverse fibres were divided and the suture line was relieved in part of the muscular traction upon it. The fear of hemorrhage prevented the making of the incision at a greater distance from the margin of the cleft. It is obvious that an incision so near the suture line endangers the circulation, and the consequent vitality of the tissues.

To Sir William Fergusson is attributed the expedient of the division of the levator palati, the tensor palati, and the palato-pharyngeus. The division of the palato-glossus has been added to the list.

The division of the palato-pharyngeus and of the palato-glossus by Fergusson, was adopted on the supposition that these muscles tend to pull the two halves of the palate away from each other, but this supposition is believed to be erroneous. It is found by observation of the movements of the curtain of the palate in halves, that the contraction of both these pairs of muscles approximates the opposite sides of the cleft, causing the two halves of the uvula, in most cases, to come in contact.*

The mode of this will readily be understood by recalling the manner in which the tongue is protruded by the genio-hyo-glossus. So, while the palate is stiffened by the fibres of the tensor palati, the levator palati, the azygos uvulæ, and by a few fibres of the palato-glossus and palato-pharyngeus, the main portions of these last two muscles engage in approximating the two halves. To cut these muscles is, therefore, physiologically absurd, besides endangering their future functional perfection. Without the action of the palato-pharyngeus, the perfect articu-

* See Gray's Anatomy, American edition of 1870, p. 344.

lation of the gutturals is impossible. The loss of the function of the palato-glossus would not be seriously felt in articulation.

If this reasoning is founded on correct observation, the division of these muscles must speedily go into disuse. Their division is the result of the fear of the hemorrhage arising from the vertical incisions first made by Dieffenbach. Now that we have a safe way of making these incisions, we may dismiss this fear.

The muscular fibres of the posterior pillars are chiefly those which approximate the two sides of the palate, at the same time that the palate is drawn backward by the superior constrictor to the posterior wall of the pharynx, by which movements communication is cut off between the lower pharynx and the upper. In this act the two sides of the pharynx are approximated; and if the palate were divided vertically in the centre and again united by sutures, these muscular fibres would act with the sutures and not against them.

Again, the muscular fibres of the anterior pillars are those which approximate the two sides of the pillars at the same time that the palate is drawn forward to prevent communication between the mouth and pharynx. If, as before, we suppose the palate to be divided vertically in the centre and again brought together by sutures, the action of these muscles would be *with* the sutures and *not against them*.

Again, it is very important to the future completeness of the function of the palate, that these four muscles should have their perfect activity. If the palato-pharyngeus is impaired in its action, the communication between the upper and the lower pharynx can never be closed. The impaired action of the muscular fibres of the anterior pillars is less important in relation to the voice, but the action is essential to some of the functions of the mouth, among which is the use of the blow-pipe. The division of these fibres, either by incision or by the heated wire, is to

incur the certainty of the impairment of their power of contraction, and the risk of its complete and permanent destruction.

This view of the physiology of the muscles of the pillars of the fauces, that in contracting they approximate the two sides of the veil of the palate, was explained in a lecture before the St. Louis Medical Society, in November, 1874; and in the following January the St. Louis Medical and Surgical Journal contained a report of the lecture and of this physiological view. At the meeting of the Society the view was called in question, as one which required further proof before it could be accepted. Dr. John T. Hodgen, an accurate anatomist and a careful surgeon, undertook to find out whether or not it was so. The following extract of a letter gives the result :—

"St. Louis, Mo., July 10, 1875.

"Dr. Prince—*Dear Sir :* It is due you to say (after dissecting the pharynx and soft palate, with a view to learn the action of the muscles), that the palato-glossus and palato-pharyngeus do, I am sure, in the act of deglutition, tend to draw the sides of the soft palate toward the median line, and, in case of cleft palate, to approximate the two parts, aided, of course, by the constrictors. I can not now perceive any benefit to be derived from cutting these muscles in operating for cleft palate. * * * * *

"Respectfully, John T. Hodgen."

The objection here urged does not apply to the division of those muscular fibres which traverse the veil of the palate transversely. Their action is directly antagonistic to that of the sutures, and hence the tendency is to pull apart the approximated halves of the palate. In this view, there should be a vertical incision on each side, dividing the transverse fibres of the circumflexus or tensor palati; and the more complete this division, the more complete is the suspension of the traction upon the sutures, to remove which is the object of the incision.

This free vertical incision, however, involves the risk of

troublesome hemorrhage from the branches of the posterior palatine arteries, which, from their position, can neither be tied nor compressed.

The employment of the galvano-cautery obviates this objection, and encourages the operator to make as free a division of the parts as he may think advantageous, without regard to the vessels. In executing this division, some of the fibres of the levator palati, in their terminal portion, must be divided, together with the terminal portions of some of the fibres of the palato-pharyngeus, and the palato-glossus; but being divided where these fibres are intermixed, no permanent impairment of the action of these muscles can be produced, while all the advantages of temporary inactivity are secured.

There can be no fear of the permanent impairment of these muscular fibres, because the incision can never be complete. It is like making a perforation of a muscle, leaving its border fibres uncut. The central cicatrix, ultimately forming, serves to make continuous the action of the fibres in both directions from the cicatrix.

On the other hand, as hitherto practised, the division of the pillars of the fauces by the knife or scissors, is made from the exposed or mucous side, and if complete, there is a possibility of the ultimate covering of the cut ends of the fibres by mucous membrane separating the fibres, so that the action of one part of the fibre is permanently disconnected from that of the other. If, therefore, it were thought best to divide these fibres, it would be better to make the incision without the complete division of the mucous membrane, in order not to leave a gaping wound into which the the mucous membrane may sink in healing, thus cutting off the muscular connection. This proceeding is practicable, though more difficult than the division of muscle and mucous membrane together, by a cut from the mucous surface into the muscular surface.

Previous to the adoption of Fergusson's method of dividing the muscles of the pillars of the fauces, Dieffenbach

had made vertical incisions in the soft palate. These incisions do not interfere subsequently with the functional movements of the palate.

(Velpeau by Mott. vol. III. p. 396): "Of the side incisions through the velum, one is made on each side of the cleft, plunging the bistoury in half an inch from it and half an inch distant from either end of the cleft. The bistoury is then carried, with a sawing motion, directly to the hard palate. Considerable blood flows, and the mouth must be washed frequently with cold water."

Dieffenbach recommended that the parallel incisions should be made after the completion of the sutures. The dangerous hemorrhage liable to occur led to the abandonment of this plan. The galvano-cautery permits us to restore this proceeding of Dieffenbach, and to carry it so far to the lateral base of the palate as to make the incision most effectual, without fear of the loss of blood. Furthermore, we are able to make this the *initiative* proceeding in operations upon the soft palate. By this means the automatic movements of the palate are annulled, and the paring of the edges of the fissure is performed with much greater facility. Even under ether, the half uvula on each side rises and falls with respiration, and the half palate approximates and recedes. The movement, in a great degree, ceases after the vertical incision.

The incision made by Dieffenbach had for its object simply the relief of the strain upon the sutures, and was practised as the last step in the operation. With the cautery wire, and as a first step, this incision greatly facilitates the operation, at the same time that all possible strain upon the stitches is prevented.

Still further, these cautery incisions are packed full of oiled paper, which is held there by the sutures in order not only to take the tension off from the sutures, but really to crowd those surfaces together which are expected to unite. These stuffed openings, one on either side, will close up afterward. The crossing of muscular fibres favours this closure.

On the other hand, the muscular fibres all pull away from the median line, making a tendency to become larger instead of smaller. This pull upon the median line is sufficient, after union, to approximate the separated bony arch of the mouth, where there is, at the same time, an opening in the hard palate, making the fissure between the mouth and the nose narrower. This is a reason for closing the soft palate first and the hard palate afterward.

The vertical division of the outer part of the veil of the palate, including the mucous membranes, the greater part of the transverse fibres of the tensor palati, and portions of the fibres of the levator palati, the palato-pharyngeus,and the palato-glossus, is executed in a manner readily comprehended by a glance at Fig. 1.

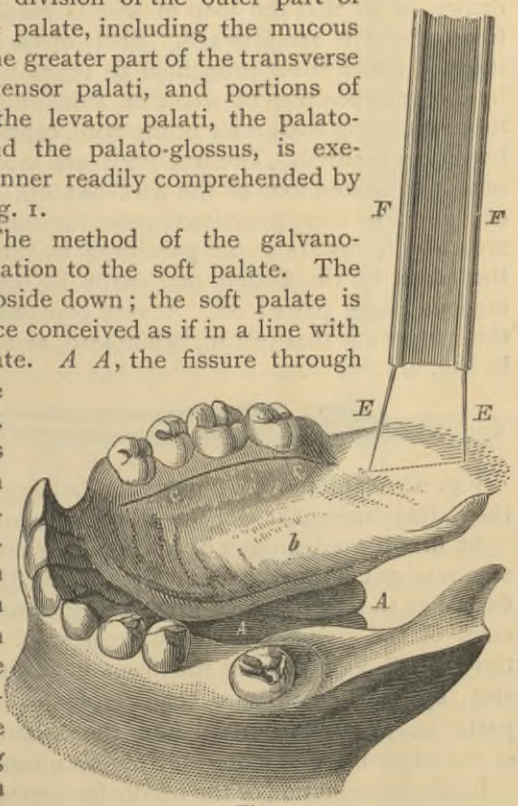

Fig. 1. The method of the galvano-cautery application to the soft palate. The field is as if upside down; the soft palate is for convenience conceived as if in a line with the hard palate. *A A*, the fissure through the hard palate and the soft. *b* and *C C*, lines of incision in the hard palate. *E E*, platinum wire in position with the loop on the other side of the membrane to be divided, being thus hidden from view. The dotted line between the portions of the wire indicates

Fig. 1.

the line of cautery incision. *F F*, silver tubes with wood intervening, sliding down on the wires to the surface of the palate, where the incision is to be made. The passage of the current is controlled by an interrupter in a pedal. The strength of the current is regulated by the depth to which the plates of the battery are immersed.

A double or looped thread is first secured in the position desired, and by means of this thread a platinum wire is drawn in so that the loop of wire is behind and the two free ends of it are forward. Each of these free ends is inserted into a silver tube, held in relation with its fellow by the interposition of wood or vulcanite, and by these tubes inclosing each a leg of the wire, connection with the battery is secured. The free ends are moderately drawn until the heated loop of the wire has cut through. The expedient is then practised upon the other side. The muscular fibres are so far paralyzed by this division, that the edges of the fissure can easily be seized, and their mucous edges paired off. A very convenient forceps for this purpose is that of Dr. Whitehead, and is reproduced in Fig. 2.

Fig. 2. Whitehead's forceps for holding the margin of the palate during the working of the scissors.

At first the advantage of first making the cautery incision was not appreciated, and in paring the edge of the fissure as the preliminary step, the movements of the two sides of the palate were very perplexing. On adopting the plan of first making the deep incision, one on each side, by the heated wire, this perplexing motion of the parts no longer occurred, and the seizing and paring of the edges became more easy of execution.

In the introduction of the needle for carrying the thread, which is the pilot for the platinum wire, it is important that the operator should be able to appreciate where the

point of the needle enters and where it is to come out. It is to be remembered that each lateral half of the soft palate is wedge-shaped, and it is in the thick part of the wedge that this incision is to be made. One mucous surface, with its muscular substratum, glides easily upon the other, and the needle, owing to this gliding, may come out too near the fissure or too distant from it.

FIG. 3. NEEDLE.

a a. Shaft, with handle, bent backward to be out of the line of vision.

b b. Thread which will in use fall below the hook, and be drawn through the substance perforated by the point of the hook or needle *d*.

c. Slide, with a foot-piece, having in it an orifice to receive the needle, and a slit in the orifice to allow a thread to pass through it.

d. Hook with an eye near the point.

The thread is picked up by a tenaculum.

To remedy this difficulty, the needle described in Fig. 3 was contrived. The guard over the point makes it easy to be certain of the position of the point of the needle in entrance behind the palate, and the pressure of the guard makes the place of exit equally certain.

Fig. 4. Needle with Black's pick-up (approaching).

a a. Shaft and needle point *c*.

b b b. Slide for fixing the needle-point *c* in the tissue to be perforated. Upper *b* the thumb-piece; middle *b* the shaft; lower *b* the foot-piece, with an orifice to receive the needle-point under *c*.

c. The needle-point of the shaft *a a*, curved and perforated for the thread *e e*, represented in the cut as passing through a piece of paste-board *p*.

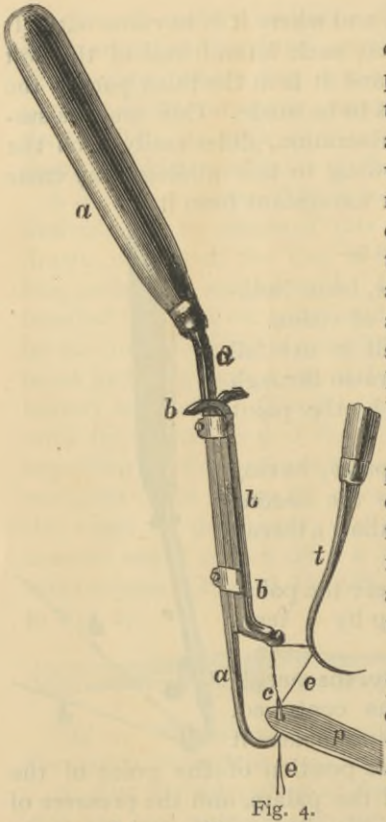

Fig. 4.

d. The thumb-piece of the shaft of a pick-up pin, which seizes the thread and retains it after the slide *b b b* is withdrawn from the needle. The lower end of the thread *e* is behind the paste-board (or in actual use membrane), and the upper end is shown in the cut as having been hooked up by a tenaculum.

p. Paste-board to represent the palate or other tissue to be perforated. *t.* Tenaculum for lifting up the thread after it has been drawn up by the slide *b b b.*

The thread is easily picked up by the point of a tenaculum. It was thought that this device was perfect. My friend, G. V. Black, D.D.S., saw me use this needle, and suggested an improvement by adding a pin, which would automatically pick up the thread. This suggestion was soon realized in the two needles (Figs. 4 and 5); one working from front to rear, and the other from rear to front. The value of these needles can only be appreciated by those who know the difficulty with which those previously constructed are employed.

Fig. 5. Needle and pick-up (receding.)

A A. Shaft and handle.

B. Foot-piece of the shaft, curved. Its extreme point has an orifice, the place of which is indicated by the vertical dotted line. This orifice is perforated by the needle *C* carrying the thread *E E*.

C. Needle, with a thumb-piece above and a point below; curved, so that the point will pass through the eye indicated by the vertical dotted line.

D D. Pick-up pin, with a thumb-piece above, its sliding shaft intermediate, and its pin-point above the lower *B*. As the shaft (upper *D*) goes down, the pin (lower *D*) moves horizontally and picks up the thread carried by the needle *E*.

E E. Thread carried by *C* and picked up by *D*, and retained while the needle *C* is withdrawn, so that, on displacing the shaft *A A*, with its foot-piece *B*, the thread is exposed, and can be seized with a tenaculum.

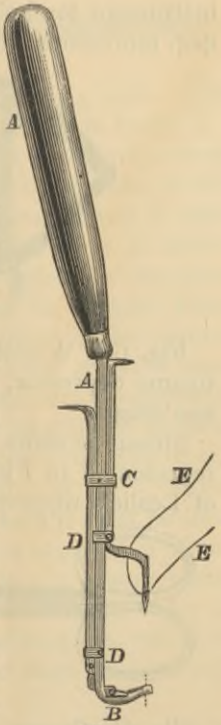

Fig. 5.

The introduction of the sutures is equally facilitated. The point of exit of the needle is invariably determined by the point of entrance, and the stitch never fails to be picked up by the proper management of the instrument.

Silver wire is drawn in by looped thread pilots previously introduced. The pilots are all first introduced, and then another pilot is introduced, through the galvano-cautery incision, across from one side to the other. These pilots having been all drawn in, the silver wire is drawn in by the pilot, one for each stitch, and twisted one stitch after another, until the stitches are all secured.

While this proceeding is going on, the most convenient

instrument for holding the mouth open is Whitehead's gag, represented in Fig. 6.

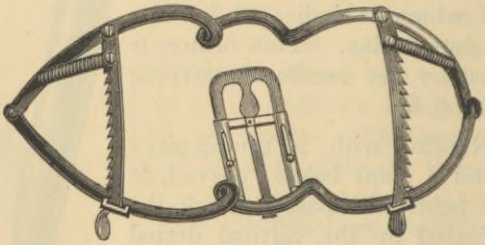

Fig. 6.

Fig. 6. Whitehead's gag or oral speculum, with a tongue depressor, which may be adjusted for greater or less length.

Strong scissors, slightly curved on the flat surface, represented in Fig. 7, are indispensable in the absence of Leslie's nippers.

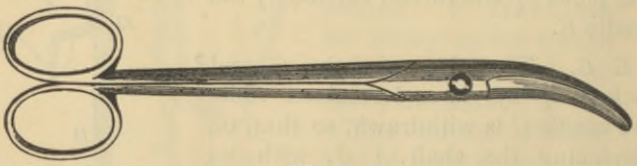

Fig. 7.

Fig. 7. Strong scissors, curved on the flat surface.

For holding the silver wire while it is being twisted, there is nothing better than Sims's wireholder, represented in Fig. 8.

Fig. 8.

Fig. 8. Sims's wire-holder, in which the claw is bent at a right angle with the shaft, instead of being straight or at an obtuse angle, as arranged for the operation for vesico-vaginal fistula.

For twisting the wire, a very convenient forceps is that of Emmet, seen in Fig. 9.

Fig. 9.

Fig. 9. Emmet's twister, held closed by a slide, which can be moved by the thumb of the hand which holds it.

The wire which is to pass through the cautery openings, and is to encircle the central part of the palate, is first armed with an oiled paste-board square, having a small perforation in the centre; and as the wire is drawn through, the other end of the wire is armed in the same way. As the wire is drawn down to be twisted, these paste-board squares are made to slide into the fissures occasioned by the cautery, so as to keep the wire from cutting into the tissues. By this means a very considerable degree of compressure upon the inner cauterised surfaces may be secured, without the subsequent ulcerating of the silver wire into the tissues. All possible strain upon the suture line is thus avoided. If union fails it must be from some other cause than the mechanical separation of the surfaces. It is also convenient to place a square under the central part of the wire last mentioned, in order to cover the points of the wires constituting the principal stitches. The tongue is thus protected from contact with their points.

In the preparation of these squares or wafers, thin paste-board is cut into squares, one-third to half an inch in diameter, and perforated in the centre. The wire passes through this perforation, and the squares are slipped down at the time of tightening up the wire, so as to bring the paste-board between the wire and the tissue. In order to prevent the early formation of an infectious compound in the paper by the decomposition of the mucus and saliva, the squares are first soaked in a solution of carbolic acid in castor oil, one in eight. By the time these agents have been dissolved out of the paste-board, the cut surfaces have become proof against the absorption of septic products.

The employment of a spray of ether during this and other operations upon the mouth and fauces, is of no little importance. The patient is first etherized in the ordinary way. The gag is then placed between the jaws, and an assistant commences to blow a spray of ether into the patient's mouth. This he does constantly, except when interrupted by such of the procedures as are inconsistent with it. Care is taken not to blow so continuously upon one spot as to freeze it.

The flow of blood from the surfaces is very much diminished, and much time is saved which would otherwise be consumed in applying the etherized napkin to the patient's mouth.

Dr. Edmund Andrews, of Chicago, has been the first to report this valuable expedient, and he ascribes the suggestion to Dr. Ira Manly, of Markezan, Wisconsin. The surgeon who once employs this expedient will be likely to employ it again.*

Dr. Thomas F. Rumbold, of St. Louis, suggests blowing a stream of cold water through a nebulizer upon parts undergoing dissection, in order to blow away the blood, so that the dissection may go on without interruption at the same time that the constringing effect of cold is produced.

PART II.—URANOPLASTY. Dr. Whitehead's articles, in the American Journal of the Medical Sciences for July and October, 1868, and for July, 1871, afford a full account of Langenbeck's method of closing the cleft of the hard palate. His improvements consisted not so much in doing

* Chicago Medical Examiner, May 1, 1874. An improvement upon this expedient is the blowing of the vapour of ether (or of chloroform) into the mouth. For this purpose it is convenient to employ the blowing apparatus of the thermo-cautery. The ether is placed in the bottle intended for the benzine, and the cautery is slipped off from the tube. The apparatus is then ready for use. If chloroform is employed, the apparatus is unfit for use as a cautery-blower for some time afterward, as a minute portion of chloroform prevents the condensation of the vapor of benzine upon the platinum.

what had never been done before, as in the recognition of what he was doing, viz., that he was dissecting up the periosteum along with the mucous membrane of the roof of the mouth.

The knowledge of the possibility and the importance of this proceeding, has led to a method and to a boldness of execution, which have greatly favoured both the simplicity and the success of the operation. The incisions are illustrated in Fig. 1, one being made along the inner margin of the teeth, and the other along the margin of the fissure. The strip of membrane, both mucous and periosteal, is then dissected up between the incisions; but the anterior and posterior extremities of the isthmus are left attached, in order to preserve the circulation through the anterior and the posterior palatine canals. That this has been done before will be seen from the following quotation from Dr. J. Mason Warren in the American Journal of the Medical Sciences for April, 1848, p. 330:

"When the bones composing the arch of the palate are divided, to dissect off the mucous membrane covering them on each side as far back as the aveolar processes, if necessary stitching it" [the mucous membrane] "across the fissure, and confining it in this situation by sutures; the flaps, it is understood, being made continuous with the fissured halves of the soft palate."

It is impossible to execute this proceeding without taking up the periosteum with the mucous membrane.

There is, however, no recognition by Dr. Warren, of the importance of preserving an anterior attachment, in order to maintain the circulation of the detached membrane.

The proceeding of Warren, and the methods also of Mütter and Mettauer, were crude, from crude conceptions of what should be done and of what they were doing. The sutures employed by Langenbeck are of silk, very probably from the force of habit, and a slowness in recognizing the great superiority of what Sims was the first

distinctly to recognize, viz., the quality in a suture which enables it to remain an indefinite length of time in the tissues without irritation or injury; and from being slow to learn that it is easier to twist a silver suture than it is to tie a knot in a thread.

For the details of Langenbeck's method, it is sufficient to refer to the articles of Dr. Whitehead, already mentioned. The writer has found a convenience in using Warren's knife (Fig. 10) with which to divide the mucous membrane and subjacent periosteum. Langenbeck recommends making the incision along the teeth, and also that along the fissure, before lifting the periosteum from its bony bed. There may, however, be a convenience in some cases in making first the incision along the teeth, then inserting Sayre's periosteum-lifter, and detaching the periosteum as far as the edge of the fissure, and then cutting the inner edge of the flap loose from the bony edge of the fissure by Warren's knife, passed between the flap and the denuded bone. A wider strip of periosteum can be obtained in this way on account of detaching it from the bone to the very margin of the fissure.

Another variation from Langenbeck's method, after the line of sutures near the margin has been inserted, consists in inserting one or more sutures entirely around the flaps, guarded by squares of pasteboard, to distribute the pressure of the stitches, at the same time that the strain is taken off from the line of sutures employed to approximate the margin.

Fig. 10.

Fig. 10. J. Mason Warren's Periosteum Knife. Strong pointed, and curved upon the flat. *a*, flat view; *b*, edge view.

Fig. 11.

Fig. 11. Sayre's Periosteum Scraper. A convenient instrument for raising the periosteum.

The introduction of thread or wire for conveying and holding the prepared paper compresses is conveniently done with an aneurism needle. This expedient of paper pledgets is adapted to a great many plastic operations, adding greatly to the chances of union by exempting the stitches of the suture line from strain.

When the aid of the outside stitches, with their paper compresses, has become no longer necessary, or at the end of two days, they can be removed, and some days afterward, the stitches of the suture line.

The preparation of these paper compresses has been described in connection with the surgery of the soft palate.

Sir William Fergusson has modified Langenbeck's operation by sliding in some cases, the whole thickness of a section of the hard palate, instead of the periosteum and mucous membrane of the lower surface. The primary incisions are the same, only that the outer incision is nearer to the cleft or farther from the teeth. The bone corresponding with the posterior portion of the outer incision is cut through with a chisel as far back as to the soft palate. This is done on each side; and on bringing the parts together in the median line, an opening is left into each nostril. This opening is expected to close by the development of granulations. The sutures are passed through the lateral incisions, thus completely encircling the central strips.

After describing the proceeding for the employment of the chisel, and the approximation of the parts, Fergusson says of anomalous cases:

"In the generality of severe cleft in the hard roof, the lower and back part of the vomer is incomplete, but in some cases, the vomer is entire, though swayed to one side, and it remains attached by its lower margin to one side of the hard palate throughout.

"Here would be a difficulty which might puzzle; for

although the chisel might permit the approximation of the edges, it would be difficult to introduce stitches. But even here there would be a redeeming quality in the new process; for, pushing the parts to the middle line might lay them so together that though union should not occur, they might lie so close, that a fissure might elude ordinary observation."

The obvious suggestion, in this condition, is to peel off the periosteum on the side of the bony arch to which the vomer is attached, while on the other side, the defective palatine arch is chiseled loose from the alveolar ridge, and brought over to meet the detached mucous membrane and periosteum of the side first mentioned. This method has been practised by the writer with very satisfactory result.

In this case, the vomer was so bent at its lower edge, as only to be distinguished from the palatine arch by the character of the mucous membrane, the junction of the nasal and the palatine mucous membrane being marked by an abrupt line of color.

A needle in the form of a tenaculum (the eye being near the point,) to which Black's pick-up attachment is applied, greatly facilitates the introduction of sutures. The tenaculum is placed in the mouth, and the pick-up shaft in the nose, striding the alveolar and labial tissues in front, and picking up the stitch in the dark.

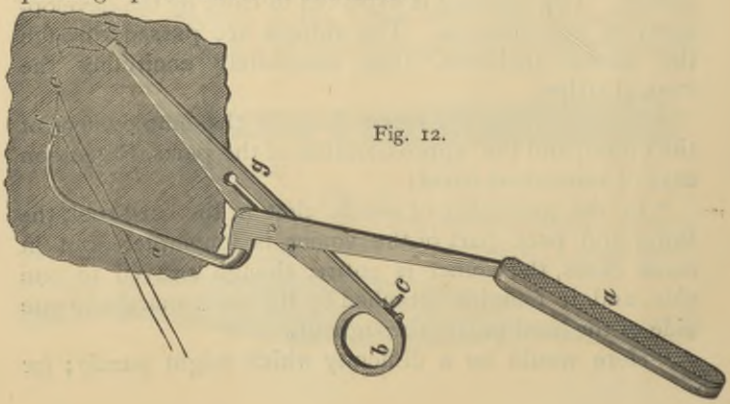

Fig. 12.

Figure 12. *a a*, shaft and handle of the needle. *b*, the finger end of the pick-up shaft, which terminates at *d*. *c*, thumb-piece of the pick-up stilette, the point of which is in *d*. *d*, the terminal end of the pick-up shaft, which receives the point of the needle. *e*, thread, which is seen passing through the eye of the needle, then hidden beneath the tissue engraved dark, and again emerging to be connected with the pick-up mechanism. The view is taken at the time when the pick-up stilette is ready to let go its hold. *f*, point of the needle perforated for the passage of the suture thread. *g*, slot in the pick-up shaft to enable it to be drawn out of the way and detached.

Fig. 12 is an illustration of this instrument. The needle is made in three forms, with a simple curve like that of a tenaculum, and curved to the right and to the left. The first form is most useful in the operation under consideration; the other two in the surgery of the vagina and rectum.

A convenient length for this instrument, and for all other instruments for the surgery of the mouth, is eight inches, or about twenty centimetres.

Another expedient previously recommended by Dieffenbach, and lately practised by Fergusson, consists in the introduction of sutures through the bony plate of each side.

This is Dieffenbach's method, copied from Velpeau's Surgery (Townsend's translation, edited by Mott, vol. III., p. 396): "He punches a hole through the edge of the cleft, and inserts a thick, soft silver wire, which is to be drawn and twisted as close as can be, after having first cut down upon and separated the palate bones, where they join the alveolar processes, by means of a thin, smooth concave chisel."

When the division of the three layers (two membranous and one bony) of the hard palate is made, there is evidently greatly increased exemption from gangrene, as the vessels of the palatine vault are very little disturbed.

It is found in the experience of the writer that openings

along the alveolar border have a strong tendency to close by the process of granulation, though no such tendency exists in the median line. A knowledge of this tendency makes the operator bold in bringing the two sides of the cleft bony arch together, without fear of the large openings which he leaves alongside of alveolar ridge. The chief caution to be exercised is to provide against too much diminishing the size of the isthmus through which the circulation must be maintained.

* For notices of Fergusson's revival of this method, see Medical News for January and April, 1874; from the Medical Times and Gazette, October 18, 1874; the Lancet for February 28, 1874, and the supplement to the Medical News, July, 1874; from the British Medical Journal, April 4, 1874, and the New York Medical Record, August 1, 1874; from Lancet, June 20, 1874.