CLINICAL LECTURE

ON
THE TREATMENT OF CLEFT PALATE,*Delivered in University College Hospital.*

By CHRISTOPHER HEATH, F.R.C.S.,

Holme Professor of Clinical Surgery in University College, London.

GENTLEMEN,—Having performed the operation of staphylosaphy for the closure of a fissure in the soft palate of a girl of 14 before you last week, I take this opportunity of giving you some details of the subject which will, I think, be of service to you as practitioners.

Cleft palate occurs in infants otherwise well formed, or in combination with hare-lip; and in either case it may affect the soft palate only, or both the hard and the soft palates. When hare-lip is present, the fissure usually extends from the lip through the alveolus and the entire palate; but there are many exceptions, a fissure of the soft palate alone frequently accompanying a single hare-lip. That both affections are the result of arrest of development in the early weeks of fetal life cannot be doubted, and that they are hereditary cannot be denied; still, cases of cleft palate occur in families not known to inherit the malformation; and, in the great majority of cases, it will be found that the mother has been much out of health in the early weeks of pregnancy, or that the pregnancy has followed very closely upon a previous one, or has occurred during lactation.

The experience of Professor Haughton of Dublin first showed, in the case of the larger carnivora, the effect of diet upon the production of cleft palate; and it is very desirable, in the case of a parent the subject of the deformity herself, or having already given birth to a child with cleft palate, that, in subsequent pregnancies, every care should be taken to improve her health, and to administer food and medicines calculated to promote the formation of bone.

When a hare-lip and cleft palate are continuous, the latter deformity is sufficiently obvious; but, when a cleft palate occurs alone, it may be easily overlooked for the first few hours of life, and the earliest intimation of the malformation may be given by the inability of the infant to suck, and by the fact that milk introduced into its mouth with a spoon returns through the nostrils. Under these circumstances, infants are often allowed to pine away through insufficient feeding; but, with proper care, this may generally be obviated.

A large-sized India-rubber teat, or an ordinary covered spoon, such as is used for the administration of nauseous medicines, may be used to convey the milk to the gullet; but a much less troublesome and more effectual method is that adopted by Mr. Oakley Coles, who attaches a flap of elastic India-rubber (Fig. 1) to the nipple of an ordinary feeding-bottle. This overlies the nipple (Fig. 2), and is introduced into the mouth with it; and, when the infant is suckled, rises up against the cleft, and enables the child to swallow. The India-rubber is undoubtedly the cleanest and most effectual flap which can be employed; but I have often directed the use of a leaf-shaped piece of kid-leather with advantage, when the India-rubber could not be readily procured. Mr. Francis Mason has employed a very thin plate of soft metal, moulded to the patient's mouth, but allows that the instrument is not available in all cases. If no other plan be adopted, the mere closing of the nostrils by the nurse's finger and thumb at each effort of deglutition, will give material assistance to successful swallowing.

The question of surgical interference, in cases of cleft palate, is one which must be considered as still *sub judice*. That it is possible to close the entire length of a cleft, extending through both hard and soft palates, at an early age, is undoubted; but it may be questioned whether, in many of these cases, a better result, as regards articulation, would not have been obtained by the use of some form of apparatus. It is most satisfactory to the parents of a child, suffering from any congenital malformation, that the deformity should be repaired by operation as soon as possible; but grave disappointment is apt to follow when, as years go on, the power of articulation fails to improve in the ratio anticipated. The sufferer is inclined to complain that the operation has not improved his voice so much as his power of eating comfortably, and is sometimes annoyed to find that no mechanical contrivance can be subsequently worn, without undoing what was effected with much trouble and suffering some years before.

In deciding, therefore, as to the propriety of an operation for cleft-palate, it is necessary to take into account, not merely the mechanical difficulty of bringing the soft tissues on each side of the median line

into sufficiently close proximity to unite, but also the length of the palate, and the probability that it will sufficiently shut off the mouth from the nose, to prevent the nasal intonation commonly met with both before and after operations for cleft palate. In no case of successful operation for cleft palate, I believe, is the palate sufficiently in contact with the back of the pharynx to allow water to be injected from one nostril into the other, without entering the pharynx when the mouth is open, as is the case in well-formed throats. And yet, many of these patients have very little nasal intonation; which is to be explained, I believe, by the hypertrophied condition of the muscles forming the pillars of the fauces, which may be seen when the patient attempts to swallow with the mouth open, acting powerfully to narrow the fauces, and thus make up for the deficient length of the palate.

Before deciding, therefore, as to the advisability of an operation upon the soft palate, it is well to grasp the chin of the patient, and hold the mouth open, so as to aid his efforts at swallowing, when, if the two halves of the soft palate come into contact in nearly their whole length, while the superior constrictor and palato-pharyngeal muscles closely approximate the palate and pharynx, the case is one in which union may almost certainly be obtained, and probably a fair result as regards phonation.

In the case of the hard palate, there is an undoubted disposition for the two sides of the cleft to approach one another for some years after birth; and this is particularly seen in cases complicated with hare-lip, in which the successful closing of the lip tends powerfully to approxi-

FIG. 1.

FIG. 2.

mate the divided alveolus and palate. But success in closing the fissure in a hard palate depends in no small degree upon the mode in which the palate is arched. As was pointed out by Sir W. Fergusson, in cases of highly arched palates, which in section would resemble a Gothic arch, it is comparatively easy to dissect down the muco-periosteum sufficiently to make the flaps approximate; while, in palates but slightly arched, and the section of which would resemble a Norman arch, it is difficult to get the flaps together, and the tension must necessarily be severe.

It is quite true that these cases of slightly arched palate give the best results as regards the voice when the operation is successful, and that the high palates when most successfully closed are apt to lead to disappointment; but this might well be anticipated, since it is by no means uncommon for a person with a healthy high palate to speak with a nasal intonation, closely resembling that of one suffering from a congenital cleft or perforation by disease.

The effort involuntarily made by all patients, the subjects of cleft palate, to shut the nose off from the mouth in speaking, is aided as they grow up by a voluntary closure of the nostrils, which is very remark-

able. Ordinarily, in man, the nostrils are perfectly quiet in tranquil respiration, and it requires considerable effort to close them, as when plunging the face into water. A patient with cleft palate, on the contrary, may be noticed to put his compressores narium into strong action every time he speaks or swallows; and it is very difficult to overcome the habit when the necessity for it has passed away, either from a successful operation, or the adaptation of a well fitting apparatus.

The operation of staphyloraphy for closure of a cleft palate was, up to the last fifteen years, almost invariably postponed until the period of puberty or later, so that the surgeon might have the patient's self-control to aid him in his troublesome and tedious operation. A few cases had, no doubt, been operated upon in childhood, with indifferent success, by Mason Warren, and others; but to Mr. Thomas Smith, of St. Bartholomew's and the Children's Hospitals, is mainly due the credit of showing that it is possible to operate in infancy under chloroform, not only without risk, but with very great success. In his paper in the *Medico-Chirurgical Transactions* (1868), Mr. Smith described a gag by which the mouth of a patient can be kept open efficiently, and which, in some form or other, is essential for the due performance of the operation, now performed by him as follows. The patient is placed on a table of convenient height, facing the window and, if possible, a northern light. The head is supported by an air-cushion, and is firmly held by an assistant standing behind, while the arms and legs are strapped down to prevent struggling. The operator stands on the right of the patient, and the chloroformist on his left. The patient being thoroughly narcotised, the gag is introduced and the mouth screwed open, the rings of the gag being held by the thumbs of the assistant supporting the patient's head. The edges of the cleft are then pared with a slender double-edged knife, which is thrust through the margin of one side of the soft palate held tense with forceps, and made to cut up and then down to the end of the uvula. The margin thus separated is caught with the forceps, and the section completed up to the angle of the cleft, if possible, at one sweep, or if not, by a re-application of the knife. The same process is repeated on the other side; and, in favourable cases, it is both possible and satisfactory to remove the parings of both sides of the palate in one piece.

The closure of the soft palate is then proceeded with, fine silver-wire being used, with horsehair or silk for the uvula. Mr. Smith employs a sharply curved tubular needle for the wire, which is carried on a wheel in the handle of the instrument, and can be projected when the point has traversed both sides of the palate. A twister is employed to twist the wire up, but the last two turns are more conveniently given at the conclusion of the operation with a pair of torsion-forceps. The horsehair is softened in warm water, and is introduced with a small curved or rectangular needle set in a handle, being passed through both sides of the palate, and caught with a "catcher" or forceps. The horsehair is simply tied with three knots, so as not to slip.

Should there be a fissure of the hard palate, the operator proceeds to detach the muco-periosteum by a modification of Langenbeck's uranoplastic method. Making a puncture near the alveolus, he introduces a palate-raspatory of small size, and brings the point out in the fissure. Then, meeting this with a strong aneurysm-needle, he replaces the raspatory with the needle, withdrawing the former altogether, and working with the needle from the fissure towards the alveolus. In this way, aided, if necessary, by the leverage of strong curved scissors, the muco-periosteum of the hard palate is sufficiently detached; the hæmorrhage, if troublesome, being controlled from time to time by a small sponge pressed against the palate. With the curved scissors, the soft palate is then detached from the bone of the hard, one blade being passed beneath the muco-periosteum, and the other above the soft palate, so as to divide the tissues transversely close to the horizontal plate of the palate-bone.

The muco-periosteal flaps of the hard palate are now closed by a sufficient number of fine wire sutures; and, lastly, an incision, as recommended by Dieffenbach, is made on each side of the soft palate, so as to thoroughly loosen it, and take all tension off the stitches, which are then finally adjusted with torsion-forceps.

In this operation, no formal division of the levator palati muscles, as recommended by Sir W. Fergusson, is undertaken; but it is probable that the lateral incisions in the soft palate divide, to a great extent, the insertions of the levators; while the detachment of the soft from the osseous hard palate must necessarily divide the insertion of the tensors of the palate.

Many operators, myself among them, have found that they have obtained good union of the soft palate without even lateral incisions; but, when the tension is great, these should not be omitted; and, in cases of great muscular irritability of the palate, the systematic division of the levators may be undertaken with advantage. Whether the division is performed, as recommended by Sir W. Fergusson, with a lancet-

shaped blade set at right angles to the shaft of the knife, and introduced above the soft palate, or with a straight knife thrust through the palate, as proposed by Mr. Pollock, the division should be performed after the introduction of the stitches, which both serve to render the muscles tense, and also are more readily introduced before the hæmorrhage, sometimes severe, caused by the myotomy, obscures the view.

The material for, and the method of introducing, the stitches, vary in the hands of different surgeons. Sir W. Fergusson preferred purse-silk, and employed the method devised by Mr. Avery for introducing it, as follows. An ordinary palate-needle carrying the silk was passed from before backwards through the margin of the soft palate, and the loop caught with forceps and drawn out of the fissure. This being repeated on the opposite side, one silk was looped through the other and drawn by this means across the fissure and through both sides of the palate. In tying the silk, it is convenient to use a sliding knot—*i.e.*, one end is simply knotted firmly upon the other, when, by pulling the silk, the knot is slid up to the palate, and will keep its place while a second knot is made over it.

In the after-treatment of a case of operation for cleft palate, it is essential that plenty of liquid nourishment should be given in the first day or two, and be followed up by semi-solid food, so that the patient's strength may be well supported, and the process of healing accelerated. The idea that any effort at swallowing, even of the saliva, must necessarily tear open the wound, was shown, by Sir William Fergusson, to be fallacious; and the practice of starving the patient, first decryd by Sir Philip Crampton, is now universally abandoned. Talking should be forbidden for the first few days; and it is undesirable that the patient should be exposed to any chance of taking cold by exposure to draught or east wind.

The time for removing the stitches after an operation for cleft palate has been greatly modified of late years, and it has come to be thought by the most experienced operators that the longer they are left the better. In most cases, silk or horsehair sutures should be removed in from ten days to a fortnight; but fine wire sutures may be left for weeks, or even months, so long as they do not scratch the tongue.

In order to improve the voice in cases of successful staphyloraphy in which the nasal tone persists, Mr. Francis Mason has proposed to divide the united soft palate on each side by a vertical incision, so that the soft palate may be loosened and made more flexible. The results are, however, disappointing, as the cicatrisation which necessarily ensues leaves the parts much *in statu quo antea*.

M. Passavant, with the same object in view, has proposed to make a transverse incision in the soft palate, which can then be drawn forward and reversed. A portion of the mucous membrane of the upper surface is then dissected off, and a corresponding portion of the mucous membrane of the pharynx, and the two raw surfaces are brought together with a few sutures. As M. Sédillot remarks, however, it is difficult to understand how the two surfaces can be brought into contact; and the experience of all surgeons goes to show that permanent separation of the posterior nares and pharynx by cicatricial tissue is certain to produce nasal intonation.

In describing the operation usually performed by Mr. T. Smith, it will be noticed that the entire fissure in both hard and soft palates is closed by the same operation. This practice is not followed by some surgeons, who content themselves with closing the soft palate first, hoping thus to influence the approximation of the two halves of the hard palate, or, in cases too wide for closure, to employ an artificial palate. It seems to me, however, that it is very undesirable to close the soft palate when the hard palate cannot be closed, for in these severe cases the soft palate is both small and short, and the results, therefore, as regards the voice are most unsatisfactory, even after the gap in the hard palate has been filled artificially. Again, if the patient is to be subjected to the inconvenience of wearing an artificial palate at all, he may as well be fitted with one to fill up the whole cleft, and thus improve the voice, which will be impossible if the scanty soft palate has been united.

The late Dr. Mason Warren, of Boston, was one of the pioneers in closing fissures of the hard palate by dissecting down a flap of mucous membrane, and his success was such as to encourage other surgeons to imitate his practice. He worked from the margin of the cleft, using sharp knives set at a right angle to detach the periosteum, which was then united with sutures. Mr. Avery was the first to follow his example in England.

In 1862, Langenbeck published his experience of operating from the alveolus towards the margin of the cleft, and laid especial stress upon detaching the periosteum by means of blunt raspatories to form part of the thickness of the flap. Having performed this operation on several occasions with good success, I can speak well of it, notwithstanding the incision near the alveolus, which may, if carried too far back, give rise

to troublesome hæmorrhage. Two instances, in which nearly fatal hæmorrhage occurred from the posterior palatine artery, have been recorded by Mr. Howard Marsh, in both of which the hæmorrhage was successfully arrested by plugging the palatine canal with a wooden plug pushed through the palate.

In 1874, Sir William Fergusson brought forward what was then believed to be a new proposal, but was afterwards shown to be a revival of a suggestion of Dieffenbach's, viz., to detach the bony edge of the hard palate with a chisel, and to push the two portions of the hard palate towards the median line. In his early cases, Fergusson used silk sutures, but in his later ones he found he gained sufficient approximation by stuffing the gap made on each side with lint. In this proceeding the damage done to the parts is considerable, and necrosis, with some exfoliation, is apt to follow. Mr. Mason has proposed to limit the action of the chisel by boring holes in the line of incision with a brad-awl before the chisel is applied; but even with this modification the operation is one of limited application, which has not found favour with many surgeons.

Although the surgeon will not undertake to supply artificial aid himself in cases of deformity of the mouth, it is essential that he should be able to advise his patient in the matter, and possibly direct the dentist or mechanician as to the method to be adopted. In Mr. James Salter's and Mr. Oakley Coles' works, there will be found complete historical accounts of the methods adopted by successive practitioners to obviate mechanically the deformities of the palate; but for surgical purposes it will be sufficient to say that, as regards congenital cleft-palate, it is only during the last sixty years that anything like success has been attained. In 1820, M. De la Barre seems first to have employed "elastic gum" in making artificial palates, and in 1828 Mr. Snell made a palate of gold with a movable velum, which was subsequently improved by Stearn (1845), Sercombe (1857), and Parkinson (1867). All these palates acted simply as obturators, *i.e.*, were placed below the palate, and overlapped the margins of the cleft, thus more or less completely shutting off the nose from the mouth. In 1864, Dr. Norman Kingsley, of New York, brought before the Odontological Society of Great Britain an artificial palate made entirely of vulcanised rubber, cast in moulds of metal taken from impressions in plaster-of-Paris. The velum of soft rubber (Figs. 3 and 4) had the great peculiarity that it fitted between the

halves of the split palate and moved with them, at the same time filling up the gap between the palate and back of the pharynx. With this palate, adapted by Mr. Coles, I have seen very remarkable results; but the method has the drawback that, if applied to patients whose growth is not complete, frequent alterations are required, in addition to the fact that the soft rubber wears out and requires renewal.

A palate on a totally different principle, contrived originally by Dr. Wilhelm Suerssen of Berlin, and lately brought to my notice by Mr. Oakley Coles, appears in many cases to afford the most satisfactory means of treating cases of wide congenital cleft of the palate. It consists entirely of hard rubber (Fig. 5), the posterior part being much thicker than the hard palate, to which it is attached by a narrow stem. The posterior part, which is triangular shape, is set at an angle so as to pass above the soft palate, and fill up the cavity of the pharynx, the edges of the soft palate coming in contact with it in deglutition and phonation. Mr. Coles has found that the tone of the voice is improved by substituting gold in the hard palate, and having induced a highly intelligent medical student to try one of these palates after having worn one of Kingsley's, he informs me that he has no hesitation in giving the preference to the former, whilst I am able personally to testify to the improvement of his voice.

Whatever method of treating a congenital cleft palate may be adopted, the improvement in the voice must be gained to a great degree by education. A patient has in the first few years of life acquired vicious habits of speaking, and particularly a guttural and nasal tone,

Fig. 5.

which requires great care to overcome. It is essential that he should be taught to speak with his lips, and to throw the voice forward; and, with proper teaching and diligent practice, he will in time speak as distinctly as the majority of healthy persons.

ANTISEPTIC INHALATIONS.

By WILLIAM HARTIGAN, M.K.Q.C.P.I., Hong Kong.

THE antiseptic treatment of lung-disease being still to a certain extent on its trial, I have thought that the report of a few cases occurring in the tropics, where infectious germs seem to be more numerous and active in direct proportion to the heat and moisture prevailing, might be of interest.

These cases, purposely selected as representing different types of lung-disease, seem to confirm the opinions of Drs. W. Williams and Coghill, that, by killing infectious bacteria, the purulent secretion of cavities is rendered innocuous, and that thereby the spreading of destructive action is prevented, or the setting up, by means of emboli, of foci of infection elsewhere; and that this leads first to arrest of disease (at least, of non-tubercular disease), and finally to repair.

CASE I.—In September 1880, I first saw a man aged 29, who had resided in China for five years, having left England to get rid of the sequelæ of catarrhal pneumonia. Though feeling better than when at home, he was still troubled with cough, and had been sent down to Hong Kong on account of serious pulmonary symptoms. He had lost forty-two pounds in eight months, and perspired profusely at night. The left chest was much flattened, scarcely expanding on inspiration; it was dull on percussion. Vocal resonance and fremitus were somewhat diminished; and coarse muco-crepitant *râles* were heard over its whole surface, both anterior and posterior. The right chest was fuller, and expanded more; but, on percussion, the cracked-pot sound could be heard immediately below the clavicle and nearly to the nipple-line; and over this space the respiratory sound was loud and blowing. The rest of the lung was resonant, but crepitant. The expectoration was profuse, muco-purulent, nummular, and offensive; it amounted to about thirty ounces in twenty-four hours. There was great dyspnoea; and the face had that unhealthy, livid grey colour so often accompanying septic absorption. Temperature 102° Fahr.; pulse 130; respirations 40. In addition to general treatment, antiseptic inhalations were ordered. At the expiration of four months, both lungs were resonant, and expanded fairly well. There was slight dry crepitation at the right apex; bronchial respiration over the left. He coughed only on waking, and about a drachm of frothy mucus was expectorated. He had no night-sweats. He had gained twenty-eight pounds. He could run up stairs without distress. Temperature 98°; pulse 78; respirations 16. The respirator used was at first a double fold of wadding, as suggested by Mr. Wilson Hope; subsequently, an imitation of Dr. Coghill's instrument, made by the patient with pasteboard and wire, but deeper than the original form, which was, I think, an advantage; at least, the patient, after procuring a respirator from England, continued to use his own in preference. The antiseptic was carbolic acid in solutions varying from 1 in 20 to 1 in 5. No difficulty whatever was expe-