which occurred in Case II which has not given rise to any symptoms.

CASE I.—Male, aged 16; was sent to me in February, 1901, for obstruction and deformity of the nose and excessive nasal discharge. The obstruction and nasal discharge had been noticed for about a year, and had caused the boy a great deal of discomfort. The external deformity appeared to have existed from early childhood. The extremity of the nose showed a marked curve upwards and to the left, whilst the inferior border of the triangular cartilage of the septum was displaced in the opposite direction, and presented about the middle of the right nostril (Fig. 1). There was almost complete stenosis of the right naris

Fig. 1.—Case I before operation. Marked septal deflection associated with external deformity. A portion of the lower end of the triangular cartilage of the septum is seen presenting in the right nostril.

Fig. 2. Case I five weeks after operation, showing patent right nostril.

owing to the presence of the deflection. Asch's operation was performed about three weeks after first seeing the patient. There was, after the operation, neither pain, reaction, nor abnormal temperature, and the patient was discharged from hospital in about eight days, he having learnt to withdraw and insert the nasal plug himself. Fig. 2 is from a photograph taken some weeks after the operation. When seen in

December, 1901, he had a clear breathing passage on both sides, and the improved condition produced by the operation ten months ago persists. The excessive nasal discharge ceased soon after the operation.

CASE II.—Female, aged 38, consulted me in December, 1900, complaining of marked obstruction of the right nostril (but occasionally of both), headaches, and attacks of hoarseness. The septum was bulging into the right nostril, and synchia existed between the former structure and the outer wall of the fossa. There existed in addition some catarrhal pharyngitis and laryngitis. Asch's operation was followed by the disappearance of the nasal stenosis, and at the last interview the voice was clear and the larynx healthy. The headaches had also very much improved. In this case there was a small perforation of the septum.

CASE III.—Male, aged 9½, was sent to me at the hospital for a very pronounced obtuse deflection of the septum which projected into the left nostril, and could be seen without a nasal speculum as a pinkish mass. There was a complaint of nasal obstruction on both sides, that on the left being caused by the septum and that on the right by the hypertrophied inferior turbinate. The cautery was applied to the inferior turbinate on the right side in order to reduce it, and the septum was straightened by Asch's method. The patient can now breathe comfortably through both nostrils, and he remains well six months after operation.

CASE IV.—Male, aged 23. Consulted me principally for nasal obstruction, especially of the left nostril and deafness in the left ear. There was an angular bend of the septum obstructing the left nostril, and a condition of catarrhal rhinitis and also of naso-pharyngitis. He was operated on three months ago, and informs me at the present date (December, 1901) that he can breathe freely through both nostrils, and that his hearing has much improved. On examination, it was found that he was still somewhat deaf in the left ear; but considerable improvement was noted in the condition of the nasal cavities (apart from the freeness of the left nostril) and of the naso-pharynx.

The operation is suitable for almost all varieties of deviation of the cartilaginous partition, but more especially for the obtuse form. It is unsuitable for spurs and outgrowths, unassociated with an unduly-curved septum, and also for most cases where the stenosed nostril is already too narrow. And except in those instances where it is a prelude or an adjuvant to other nasal or accessory-sinus treatment, as in a case at present under my care, it should not be recommended unless there is a marked degree of obstruction associated with definite symptoms.

It appears, in view of the evidence which up to the present has accumulated in its favour, that Asch's method, if accurately performed, is one of considerable value. But a careful study of numerous anatomical preparations, and of the operation on the cadaver as well as on the living subject, has convinced me that unless the operator is very clear as to the topographical anatomy of the nasal cavities, the procedure is one which runs a great risk of being imperfectly carried out—in short, of failing and of becoming discredited. It is of course by no means sufficient to make, in the septum, two incisions which are believed to be somewhere in the desired direction; nor even when these are accurately effected should the surgeon be satisfied until the recalcitrant segments are thoroughly broken at their bases. Finally, it is not sufficient to insert the plug and, as it were, let the patient look after himself; the case should be seen every day for at least ten days, and afterwards at frequent intervals until the septum has become consolidated in its new position.

I am much indebted to Professor A. H. Young, of Owens College, Manchester, for kindly allowing me to examine a number of specimens in the anatomical department.

REFERENCE.

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THE INFLUENCE OF NASAL AND NASOPHARYNGEAL OBSTRUCTION UPON THE DEVELOPMENT OF THE TEETH AND PALATE.

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NASAL or naso-pharyngeal obstruction to respiration may be defined, according to Mayo Collier,¹ as follows: "If, by day or by night, nasal respiration must be supplemented by oral respiration, then there is nasal or naso-pharyngeal obstruction." Nasal obstruction is due to abnormal conditions of the turbinate bones by bony or soft tissue hypertrophy, to deviations or exostoses of the septum, to congenital stenosis of the nares, foreign bodies, rhinoliths, new growths, to contraction by growth or inflammatory swelling outside the nose. Nasopharyngeal obstruction is due to the presence of adenoid

vegetations, new growths, enlarged tonsils, prominence of the atlas, or inflammatory swelling.

In the naso-pharynx of all children a certain amount of adenoid tissue known as Luschka's tonsil is normally present, and in certain cases the tissue is prone to active inflammation and hypertrophy. The cause of this hypertrophy is not clearly known. It is essentially an affection of childhood and has been found in the earliest months of life. I remember assisting the late Mr. Hewetson to remove a mass of adenoid tissue from a child 10 days old, where the obstruction to nasal breathing was complete. Wurdemann, of Milwaukee,² in an analysis of 247 cases with sufficient hypertrophy to necessitate operation, finds this affection most common from 4 to 12 years of age, especially at 7 and 10, and rare after 17. My own experience coincides with this, but I have also found that cases occur in young adults from 16 to 20, without symptoms of nasal obstruction, but causing deafness.

Corwin³ remarks that owing to the small size of the respiratory passages in children functional interference occurs from the hypertrophy. The increase in the dimensions of the postnasal and pharyngeal spaces which takes place rapidly during adolescence may overcome a marked obstruction, should this remain stationary or only slightly increase in size. This may in part account for the opinion that adenoids invariably disappear or rapidly decrease in size at puberty. Boys are more frequently affected than girls, and frequently several members of the same family are affected. Other causes favouring adenoid hypertrophy are conditions of the general circulation favouring venous turgescence, such as intestinal irregularity, the strumous diathesis, damp and cold climate (Massei states that adenoids are very rare in Italy), diphtheria, whooping-cough, influenza, the acute infectious fevers, anterior nasal obstructions, and cleft palate, where probably the irritation from food and cold air is the direct exciting cause.

Nasal and naso-pharyngeal obstruction occurring during the period of growth has many and far-reaching consequences upon the development of the child. The typical picture of such a case is familiar: The vacant face, open mouth, hanging jaw, the curiously-toned voice, nasal discharge, the history of snoring at night, diminished hearing, and recurring headaches, and in older children the high palate, irregular teeth, and deformed chest.

It is to this special action on the development of the dental arches to which I wish to draw attention. So long ago as 1876 Michel had observed and pointed out the association of habitual mouth breathing with the presence of a high-arched, narrow, hard palate. Some of the earlier writers were inclined to regard it as a hereditary manifestation or as associated with rickets.

But the lesions due to rickets occur in early infancy, and manifest themselves more in the lower than in the upper maxilla, and although the congenital influence on certain types of nose, or on the formation of the face, cannot be denied, still it plays a minor part in producing the changes under consideration. Mayo Collier has seen children whose parents were possessed of remarkably well-formed upper jaws and regular features, and in early life had symmetrical dental arches, and has seen the same children in later years after a period of obstruction to nasal breathing. The jaws had then become altered to the type to be described shortly, showing clearly that the deformity was brought about not by any hereditary influence, but by the obstruction to nasal respirations produced by the presence of adenoid vegetations. Naso-pharyngeal obstruction is so frequently found in the postnasal passages of children of one family that such influence as heredity exerts is probably manifested in this direction.

Körner has pointed out that two varieties of deformity of the maxilla are found dependent upon the presence of adenoid vegetations before or after the second dentition. When nasal respiration is obstructed in a growing child before the second dentition the palate assumes a higher elevation in course of time, and appears in section dome-shaped instead of slightly curved. The alveolar process forms an ellipse instead of a semicircle, and the lateral portions are approximated, the whole growth of the maxilla is retarded, but the milk teeth are in their normal position. But after the second dentition, if the adenoids have not previously

been removed, the maxilla undergoes much more pronounced changes. The alveolar processes become still more approximated, the palate more elevated, even resembling a Gothic arch, the anterior part of the alveolar process becomes inclined forward, the lateral halves form an angle at their median junction, and the jaw assumes the V-shaped form so well known.

These changes necessitate alterations in the position of the teeth. The median incisors are turned so that their lingual surfaces look towards each other. If the growth has been much retarded by prolonged obstruction, the teeth are crowded out of their normal places. The lateral incisors, and frequently the bicuspidals as well, are pushed inwards, whilst the molars turn outwards. Since the lower maxilla develops at the normal rate, it frequently happens that the outer edges of the upper bicuspidals strike against the inner ones of the bicuspidals of the inferior maxilla. In consequence of the elongation of the antero-posterior axis and of the oblique position of the incisors, it frequently happens that the incisors do not approximate. The V-shaped superior maxilla and the anomalous position of the teeth have been well known for some years, and many appliances have been suggested to rectify the deformity. The consideration of these is beyond the province of this paper.

The direct method in which the obstruction to nasal respiration brings about these changes is a matter for speculation, but that they are brought about by this agency is quite certain. Ziem has produced similar changes in young animals by blocking the nose for a long period with cotton wool. The alterations produced when only one nostril was blocked were obvious. There was a general arrest of development, not only of the upper jaw, but of the palate bone, frontal bone, the ear, and the whole side of the face.

Three explanations have been suggested. The first is based on the interference which obstructed nasal respiration necessarily has upon the development of the nose. As Freeman has pointed out, the hard palate in the infant is normally highly arched, so that in the ninth month of fetal life the hard palate lies above the level of the Eustachian tubes, at birth it is on the same plane, and later on considerably lower. This is due to the downward growth of the hard palate, so that one factor in the production of a highly-arched palate is a lack of development of the walls of the nose, more especially of the sphenoid and the septum, while the alveoli and the rest of the face develop at the ordinary rate. This descent of the hard palate is made still more evident when we recollect that in the infant the posterior nares are almost round, while in the adult they measure twice as much in the vertical meridian as in the horizontal. If, therefore, any factor interferes with the development of the child and of the nasal cavities, it will retard the proper development of the hard palate and its consequent descent.

The second theory is one about which the most divergent opinions are held, that is, the lateral pressure which the cheeks, aided by the weight of the lower jaw, exert against the maxilla when the mouth is kept open. By some authors this is regarded as the chief agent in the production of the changes in the upper jaw, and their explanation is as follows:—The position of the tongue is altered in the habitual mouth breather. Normally when the mouth is closed the tongue lies against the teeth, the palate, and the alveolar processes, but when the mouth is open the tongue lies in the lower maxilla and there is no pressure against the upper maxilla. Before dentition the unopposed lateral pressure of the cheeks produces a narrowing and lengthening of the alveolar process, and during both periods of dentition, especially during the second, the processes are still more closely approximated, the maxilla becomes more elongated, the descent of the palate is still further retarded, and the resultant changes in the position of the teeth follow, whereas the lower maxilla develops in the ordinary way and remains practically normal. The loss of the milk teeth and the greater vascularity of the maxilla during the period of growth of the permanent teeth are regarded by Körner as the causes of softening of the maxilla, which explains the marked character of these changes during the second dentition.

Mayo Collier's theory that the air stream passing through the mouth and past the naso-pharyngeal space produces a negative pressure in the nose, and therefore a positive upward

pressure on the lower surface of the hard palate, while ingenious, cannot be regarded as a complete explanation.

It seems very probable that each of these theories is to some extent correct, but that no single one is sufficient to fully explain the mode of production of these deformities. It is, however, quite certain that interference with nasal respiration is capable of producing serious and extensive deformity of the teeth and jaws, and that by the restoration of nasal breathing this disfigurement of the maxilla can be prevented, and if seen at an early stage considerably alleviated, the constant stream of air expanding and developing the upper jaw. There are many cases of V-shaped deformity of the maxilla with anterior protrusion due to other causes, but interference with nasal respiration is so common a cause that the condition of the nose and nasopharynx should be investigated in all these cases.

Breathing exercises as advised by Mr. Arbuthnot Lane are undoubtedly valuable in some cases of naso-pharyngeal obstruction produced by the presence of an abnormal quantity of adenoid tissue, especially if the obstruction to nasal respiration is a first attack or the repetition of a previous one with a history of free nasal breathing in the interval. But when the obstruction is chronic, especially if acute exacerbations also occur, when secondary aural affections exist, and more especially when the deformities in the teeth and palate above described are present, it will be found that breathing exercises, unless preceded by operative measures, will be almost invariably ineffective, and valuable time will have been irretrievably lost.

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FOREIGN BODY IN OESOPHAGUS.

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CASE.

J. W., a girl aged 12, was admitted into one of Mr. Paget's wards in the West London Hospital on December 13th, 1901.

History.—She stated that about 1 p.m., on coming home from school, she seized and swallowed hurriedly a piece of cake which was lying on the counter in her mother's shop. She felt something hard pass over the throat, and found that she was unable to swallow anything more. Neither the child nor her mother having any idea of the nature of the obstruction, various domestic remedies were employed to "get it down." All attempts to swallow pieces of crust, etc., were followed by their prompt return, and about 5 p.m. the child was brought to hospital.

Condition on Examination.—With the *x* rays a dark-coloured disc about the size of a penny was seen lying, as it were, in the episternal notch, the lower edge of the disc being just behind the upper edge of the manubrium. On looking from the side, a dark line was seen lying almost vertically just in front of the vertebral column. The case was obviously one of a coin impacted in the oesophagus.

Treatment.—All attempts to remove it with coin-catchers and probangs failed, although a small oesophageal bougie was passed into the stomach, and gave a grating sensation on withdrawal. It was decided to attempt its removal under an anaesthetic by means of a laryngeal forceps, and with the help of the *x* rays. The child was placed on a table lying on her back, and with the vacuum tube close to the left side of the neck. Chloroform was given, and a crocodile-bladed laryngeal forceps was passed into the oesophagus. With the screen placed close to the right side of the neck the blades of the forceps were passed down until they were seen to touch the upper end of the black line; they were then opened slightly and passed down so as to get a firm hold. On putting on light traction the coin refused to move, and I imagined for a moment that the wall of the oesophagus must have got caught in the blades; but with the employment of a considerable amount of force (less has been used in extracting a tooth) the resistance was overcome; and the interesting picture was visible of the coin enclosed in the blades of the forceps moving up towards the mouth and being finally removed. After the

first pull no more force was necessary, and the coin was removed with great ease. It turned out to be a penny.

After-History.—The patient was discharged from the hospital on the following day. Two days after the operation all that remained was a little discomfort on swallowing.

REMARKS.

It appears likely, from all the circumstances of the case, that it would have been impossible to remove the coin by any other means than those employed. Without the *x* rays it might have been possible to lay hold of the coin, but the force employed was so great that one would have hesitated to employ it without actual demonstration that the coin, and nothing but the coin, was within the blades of the forceps, again, it was so tightly impacted that coin-catchers and probangs must have utterly failed to dislodge it, even with the help of the screen.

THE CAUSATION OF DEATH DURING THE ADMINISTRATION OF CHLOROFORM.

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(Continued from page 893.)

III.—THE CAUSE OF THE FALL OF BLOOD PRESSURE FROM THE ADMINISTRATION OF CHLOROFORM.

ALL previous investigators agree in finding that chloroform causes a gradual fall of blood pressure, but they mostly disagree in their conclusions as to the cause.

Some of these conclusions are summarized in the following scheme:

The Hyderabad Commission maintains that the fall of blood pressure is due to vasomotor paresis alone.

Wood,⁶ Hill,¹ Hare and Thornton,⁹ MacWilliam,¹⁶ Duplay and Hallion,¹⁷ conclude that it is due to vasomotor and heart paralysis combined.

Gaskell and Shore,¹² Richet,¹³ conclude that the fall of blood pressure is due to impairment of cardiac muscle alone.

The possible causes of this gradual fall of blood pressure are:

1. Diminution in the heart's output per second.
2. Increase in the outflow from the arterioles, either from:
 - a. Loss of central vasomotor control, spinal and medullary.
 - b. Diminished efficacy of the muscular fibres of the arterioles themselves.
3. Increase in the bed of the circulation by relaxation of arteries and veins.

Excepting Gaskell and Shore, the other investigators do not appear to have sufficiently considered the possibility of chloroform directly influencing the muscle tissue in the walls of the vessels themselves, as it does cardiac muscle.

Lister,¹² experimenting upon the web of a frog's foot, found that the application of chloroform or of chloroform vapour caused hyperaemia of the part. This suggested a local paralytic effect upon the muscle of the arterioles.

1. Changes in the Force of Cardiac Contractions.

It has been shown above that paralysis of the heart occurs from chloroform in the blood circulating through it, corresponding in vapour tension with small percentages of chloroform vapour in the inspired air. When the circulating blood reaches a vapour tension of chloroform the same as that of 0.3 per cent. vapour in the inspired air, the heart steadily becomes paralysed, and the blood pressure falls.

2. Changes in the Rate of Cardiac Contractions.

That vagus slowing of the heart may be a factor of considerable importance in depressing the circulation is readily seen in those blood-pressure tracings of morphinized dogs in which the percentage strength of chloroform vapour in the air inhaled has been enough to raise the irritability of vagi to the stage of slowing the heart, but not to that of stopping it.