tance of making a correct differential diagnosis cannot be overestimated; for while it is bad to fail to treat rheumatic cases with potential carditis by rest, it is equally bad to treat children with growing pains by making invalids of them, by depriving them of their freedom, and by curtailing their instruction at school. Most cases of so-called growing pains can be treated effectively in accordance with the cause of the pain as found on clinical examination. The following clinical features serve to distinguish the two conditions.

1. The site, nature, and intensity of pain are different. Rheumatism affects joints and is usually accompanied by tenderness on pressure and movement. There may be redness, swelling, or effusion. In growing pains, muscles, ligaments, and tendons are usually the site of the pain; tenderness is rare, and there is no swelling, effusion, or redness. The pain is subjectively different in the two diseases, and is more nagging and more likely to cause crying in the non-rheumatic case.

2. In growing pains a cause of the pain is often found in postural or orthopaedic defect. Tiredness and vague ill-health are common to both diseases, but patients with growing pains are usually sulky and unsociable; this, in the author's experience, is uncommon in rheumatism.

3. Nodules do not occur except in rheumatism.

4. There is no significant change in the temperature in cases of growing pains (Seham and Hilbert, 1933). There is also no tachycardia.

5. Cases of growing pains as a rule show no anaemia; rheumatic cases frequently do.

6. Cases of growing pains have no antecedent sore throat (Sheldon, 1936).

7. Cases of growing pains show no lengthening of the P-R interval on electrocardiography.

8. Evidence is brought forward to show that the incidence of carditis subsequent to growing pains is not greater than would be expected to occur in the child population generally.

Summary

The meaning of the term "growing pains" is discussed.

The incidence of the pains in children and adolescents is surveyed.

The nature of growing pains and the possibility of their relationship to rheumatism are discussed.

The clinical features that distinguish these two conditions are recorded.

I am very grateful to the physicians of the Hospital for Sick Children for permission to examine and follow up their cases, also to Dr. Nabarro for permission to carry out the pathological tests done in 1934 in his laboratories. I am also indebted to the physicians of the Birmingham Children's Hospital for allowing me access to their cases. I have received much help from the lady almoner's department at the Hospital for Sick Children, particularly Miss Salmon, Miss Adams, and Miss Lewis. Dr. Sheldon very kindly gave me access to unpublished results, which I have quoted more fully in another paper (Hawksley, 1938). The investigations at the Hospital for Sick Children in 1934 were carried out whilst under tenure of the Sebag-Montefiore Research Fellowship, and the medical unit of University College Hospital has defrayed the expenses of the follow-up of sixty-four cases.

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CONGENITAL OCCLUSION OF THE POSTERIOR NASAL CHOANAE

BY

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Congenital occlusion or atresia of the posterior nasal choanae was at one time considered to be a relatively rare anomaly. From a search of the literature Fraser (1910) could gather records of only 115 cases. During the past few years, however, more cases have been reported, due no doubt to the fact that not only rhinologists but also obstetricians and practitioners are on the look out for the condition. This form of nasal obstruction really deserves even wider recognition, for the symptoms in a baby are sometimes alarming, and their cause can be a source of puzzlement to the physician. A newborn infant with bilateral choanal atresia suffers from considerable difficulty in breathing. Its instinctive attempts to breathe through the nose result in severe dyspnoea and even cyanosis, which is relieved only when the mouth is opened to cry. A cycle of attacks of dyspnoea alternating with fits of crying and relief of symptoms is thus established, and forms a typical clinical picture. Sucking, and consequently nutrition, are also interfered with.

Unilateral cases are rarely recognized early in life. It is only when the patient is old enough to realize that one nasal passage is blocked, and there is a troublesome discharge of mucus, that relief is sought. Mistakes in diagnosis are not infrequent, the obstruction and discharge being ascribed to sinusitis or adenoids. Operations for the relief of these conditions have been performed without the real state of affairs being recognized.

The obstruction is caused by a failure of absorption of the bucco-nasal membrane. It may be unilateral or bilateral; in structure membranous, bony, or partly membranous and partly bony. Onodi has recorded the only known instance in which cartilage entered into the construction. Females are affected more often than males.

The Cause of Choanal Atresia

Before the embryology of the nose was fully understood, several theories as to the cause of choanal atresia were put forward. It may be of interest to mention briefly the chief of these. Luschka (1860) maintained that the obstruction was due to an upward and backward growth of the horizontal plate of the palatine bone. Kundrat, on the other hand, considered that it was the vertical plates of the palatine bone which extended inwards to meet the inner wall of the choanal orifice (vomer). An original view, taken by Bitot, was that the occlusion consisted of a separate independent bone. The occasional presence of sutures in the bone was put forward in support of his theory.

It is now generally accepted, however, that the obstruction is due to the persistence of a vestigial epithelial structure—the bucco-nasal membrane. This is a partition between the mouth and the nose, closing the posterior end of each olfactory pit in the embryo. It is formed by the apposition of nasal and stomodaeal epithelium, and ruptures about the fifth week, thus establishing the primitive choanae, or openings between the olfactory pits and the stomodaeum. In cases of posterior choanal occlusion this membrane fails to absorb, and the extent of

mesenchyme resorption between the two epithelial layers determines whether the obstruction is membranous or osseous. The completeness or otherwise of the atresia is largely governed by the degree of dorsal expansion or growth of the nasal fossae, and also by the amount of absorption which takes place in the floor of the secondary nasal fossa dorsal to the primitive choanae (Schaeffer, 1934).

Case History

B. M., aged 20, a lady clerk, was seen on April 12, 1935, complaining of complete left-sided nasal obstruction, which had been present since birth. A discharge of mucus from the affected nostril was troublesome, resulting in excoriation of the skin of the upper lip. She was quite unable to blow the passage clear.

On examination the left nostril appeared narrow and undeveloped. There was definite asymmetry of the face, the left side being rather expressionless and not so full as the right. No difference in development of the two sides of the chest (as is sometimes present in these cases) could be made out. Anterior rhinoscopy showed the right side of the nose to be normal, the septum being fairly central. On the left side the mucosa appeared pale and sodden, and much thick glairy mucus had to be removed with a suction pump before a view could be obtained. The inferior turbinate was then seen to be smaller than that on the right side. After the application of cocaine and adrenaline, an obstructing wall was apparent far back which prevented the passage of a probe into the nasopharynx. The septum and nasal floor did not meet this wall at an angle, but gradually merged into it. Palpation with the probe proved it to be bony in nature. Inspection of the mouth revealed asymmetry of the hard palate, which was definitely higher and more arched on the left side. Posterior rhinoscopy showed the left choana to be completely occluded by a partition or diaphragm, covered with apparently normal mucosa, and having a dimple or recess near its centre.

On April 19 the left side of the nose was filled with lipiodol and x-ray photographs were taken in the hanging-head position. Inspection of the radiographs revealed some interesting points. Normally the lower border of each choana is formed by the posterior edge of the horizontal part of the palatine bone which abuts on the maxilla. This edge lies just behind the plane of the third molar tooth in the fully developed adult skull. On reference to the photographs, it was seen that the lower border of the bony occlusion was considerably anterior to this—namely, opposite the first molar. In this region lies the palato-maxillary suture. The reason for this forward position of the occlusion is explained by the fact that the primitive choanae do not correspond in position to the permanent posterior nares. The latter are placed much further back, and are established only in the third month when the permanent palate has been developed. From below, the partition passed upwards and backwards in a sloping direction until it reached the choanal roof, where the medial pterygoid lamina of the sphenoid articulates with the palatine bone. The plate taken in the occipito-mental position showed considerable asymmetry of the nasopharynx, which was encroached upon by the bony partition on the left side, extending backwards as well as laterally from the posterior edge of the septum.

Operation.—The left side of the nose was packed with gauze moistened with 10 per cent. cocaine and adrenaline. Half an hour later a general anaesthetic was administered and continued through an intratracheal catheter. By means of a long fine chisel passed through the left nostril an opening was made in the bony partition. This was quite thin near its centre, but in its lower and lateral aspects became very much thicker, causing some difficulty in making a satisfactory aperture. The edges were trimmed with a sphenoidal punch, and finally a portion of the posterior edge of the septum was removed with adenoid forceps. A rubber drainage tube was then passed via the nostril through the ostium into the nasopharynx, but this was not tolerated by the patient for more than twenty-four hours. There was slight subsequent narrowing of the opening, as occurs with all artificial ostia in the nose, but up to date

(September, 1938, three years after the operation) the patient is still able to breathe freely through the affected nostril.

Notes on Operative Technique

Various operations for the relief of choanal occlusion have been described in the textbooks, but sufficient emphasis is never laid on the great thickness of bone with which the surgeon may have to contend. Although the centre of the obstructing plate is often thin and easily pierced with a trocar, the lateral aspects are usually thick enough to demand a chisel and mallet for their removal. An electrically driven burr or saw is of value in dealing with very thick bone, but the operator must be skilled in the use of such instruments.

The operation leaves a circular wound with rough, irregular edges. This results in a ring of granulation tissue which gradually contracts. The consequent early closure of the artificial opening is therefore a problem in the after-treatment. A drainage tube inserted through the ostium and projecting into the nasopharynx is, as already stated, badly tolerated. An attempt to overcome the difficulty is described by Brady (1918). Ribbon gauze is passed down one nostril into the nasopharynx. The end is seized by dressing forceps passed through the other nostril, drawn forwards, and a knot tied in front of the columella. A fresh strip may be drawn into position by sewing it to that already in place. The process is, however, rather uncomfortable for the patient.

An attempt to cover the raw area with flaps of mucous membrane is made by Marschik (1938). He elevates and preserves the mucosa over the anterior aspect of the bony occlusion, and holds the flaps thus formed in position by means of packing. Donnelly (1938) describes a case in which he maintained patency by means of a full-thickness skin graft. This was trimmed to fit round a No. 18 French catheter, which was then passed into the nose so that the raw surface of the graft lay in contact with the denuded area in the choana. The graft took well and the nose remained patent. Cemach (1938) inserted a small metal tube (4 mm. long and 8 mm. diameter) in the artificial choana. This became covered with tissue and preserved an excellent airway. In one of his cases it had to be removed at a later date on account of headache. An unusual method of operating on these cases of occlusion is described by Precechtel (1938). He employs a transpalatal route of approach to the choanae.

In the case here reported no graft or special means of plugging was employed. The ostium still remains patent for respiration three years after operation.

Summary

A case of congenital occlusion of the left posterior naris is described. The symptoms and aetiology are briefly discussed.

Attention is drawn to the difficulty of keeping patent the artificial ostium made in the occluding bony plate, and operative measures devised to overcome this problem are reviewed.

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