REFRESHER COURSE FOR GENERAL PRACTITIONERS

ORTHODONTICS: DENTAL DEVELOPMENT IN CHILDREN

BY

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Orthodontics has been defined as "the study of the growth and development of the jaws and face particularly, and the body generally, as influencing the position of the teeth; the study of the action and reaction of internal and external influences on this development; and the prevention and correction of arrested and perverted development."

Normal Development

The relation of the upper to the lower jaw is changing from an early stage of foetal life. It has been shown that an initial projection of the lower jaw gradually decreases and is succeeded at fourteen weeks by a projection of the upper jaw. At birth the gum pads are in approximately the same relation to each other as the teeth will be later. Malrelation or malformation of the jaws can often be seen in the newborn.

As the teeth erupt they should occlude in a definite cusp-and-groove relationship; and, as the teeth must erupt where the bone is, the occlusion will be abnormal if the jaws have not grown normally. Growth is at its maximum in the early stages of development, and the foetus grows more rapidly in the month before birth than at any other period. During this month the foetus increases its weight by 1% each day. During the first year of post-natal life the baby grows rapidly, and H. A. Harris has called this the first "springing-up" period. From 1 to 5 years the child grows more slowly and more steadily. This is the first "filling-out" period. From 5 to 7 there is a second springing-up period. It is at this stage that the child increases rapidly in height, begins to lose his temporary dentition and to cut his permanent teeth, becomes thin and long in the leg, and exchanges the chubbiness of babyhood for the characteristic family countenance.

Between 7 and 11 or 12 the second filling-out period occurs, with steady growth as its characteristic, to be followed by the third springing-up period at puberty. The changes associated with the rapid growth of puberty give place to the third and last filling-out period as puberty is succeeded by the period of adolescence.

Factors Affecting Normal Development

The provision of a favourable environment is of great importance in preventing maldevelopment of the jaws, and this is necessary before the child has any teeth and many years before he is seen by a dental surgeon. Breast-feeding aids the normal development of the jaws. Therefore when an infant is bottle-fed it is important that the teat should be such that the child can obtain the milk only by a pushing and munching movement of the mandible, similar to that of breast-feeding. Whether the child is breast-fed or bottle-fed he should be suckled sitting upright; if a child is held horizontally the weight of the breast or bottle presses back the chin and prevents the normal forward growth of the mandible. Thumb- or finger-sucking or the use of a dummy can have the same

effect, and if there is a tendency to malformation of the jaws the maximum damage is likely to occur from these habits.

Premature Loss of Deciduous Teeth.—It is most important that the deciduous teeth should not be lost prematurely. The deciduous molars are not replaced by their permanent successors until the age of 9 or 10, and their early loss can be a serious matter from the point of view of mastication and nutrition. In addition, their premature loss inhibits the growth of the surrounding bone and allows the posterior teeth to drift forward, thus closing the spaces for the permanent teeth, which are therefore unable to erupt into their normal positions. Early conservative treatment of the deciduous teeth is essential if they are to be preserved; these teeth have a larger pulp chamber and a correspondingly thinner layer of enamel and dentine to protect the pulp than the permanent teeth. A small cavity exposes the pulp; therefore the teeth must be treated when the first sign of decay is observed. Unfortunately the teeth are often neglected until the child is 5 or 6 or is suffering pain. By then there may be no alternative but to extract the painful tooth. But only teeth which are painful or the seat of an abscess should be extracted. Treatment with silver nitrate will help to harden caries and prevent pain in many teeth in which the decay has extended too far for the insertion of a filling. Black and discoloured teeth may be quite healthy; they will masticate food and direct the growth of their permanent successors quite as well as those of normal colour.

Sucking Habits.—Habits in children are a potential cause of deformities of the jaws, as has already been mentioned. It is best to discourage the starting of habits. But when thumb- or finger-sucking is established, and particularly when there is a tendency to malformation, it is desirable from the orthodontic point of view to stop the habit. It is usually not difficult; a friendly talk from the doctor explaining the reasons why the habit is harmful is in many cases all that is necessary and is far more effective than constant reminders from parents. A co-operative child who is trying to stop the habit but who finds the thumb goes into the mouth during sleep can be helped by a collar slipped up over the elbow at night. The child should make the collar (corrugated cardboard stuck with sticky paper is all that is necessary) and he should put it on himself. Children should not be forced to stop these habits but should be given all possible help to do so. It is also possible to construct plates which make sucking habits uncomfortable; but if a plate is worn it is important that the child should not know that it is there to stop the habit; it will be tolerated more readily if it is worn to "straighten the teeth," as indeed it is.

Faulty Lip Posture.—A child whose lips are apart at rest should do exercises to alter their static position. If there is no nasal obstruction a mouth-screen worn at night outside the teeth and under the lips and cheeks

makes mouth breathing impossible and is very effective in correcting faulty lip posture.

Arrested Bone Growth.—Harris has shown that there is arrest of growth in the long bones at times of ill-health in childhood; even the specific fevers can leave traces in the long bones, which can be seen as lines of arrested growth in radiographs. The general health of the child has a considerable effect on bone growth. This is particularly important in the case of the jaws, which are the only bones in the body to contain pegs of predetermined size: the teeth can fit into their correct positions only if the bones of the jaw have reached their full dimensions. If the jaws are abnormally small the teeth will be crowded.

Types of Deformity

Orthodontic malformations are of three main types: first, subnormal jaws in which the alveolar bones are too small to accommodate the teeth correctly but in which the jaws are in normal relation to each other; secondly, a posterior relation of the mandible to the maxilla; and, thirdly, an anterior relation of the mandible to the maxilla. It is also possible to find cases in which the maxilla is either anterior or posterior to the normal, but these occur less frequently. The commonest malformation in this country is a posterior position of the mandible (Fig. 1); this is very often congenital, but it can be produced by thumb-, finger-, or lip-sucking, or by any interference with the normal forward growth of the bone. If forward growth does not occur a horizontal space develops between the upper and lower incisors; soon the lower lip occupies this space and the pressure exerted by it tilts the upper incisors forward, resulting in the typical "rabbity" mouth. The initial fault is in the mandible, and this must be corrected if a permanent improvement is to be obtained. An abnormal relation of the jaws may be complicated by having either alveolus subnormal in size: for instance, it is usual to find a very

small maxilla associated with an anterior position of the mandible, as in the Hapsburg family.

When to Inspect

The teeth should be examined from the age of 3 years, and if any sign of decay is observed fillings should be advised. It is often found that after an illness the tendency to caries increases. This may be because of a general lowering of resistance, but it can be due to inadequate oral hygiene during the illness. Any obvious malrelation of the dental arches should be noted. At 5 years of age there should be spacing between the deciduous teeth. During the second springing-up period, between the ages of 5 and 7, malrelation of the jaws can be recognized from an examination of the facial contours and profile. It is not necessary to look into the child's mouth to discover the malformation; it can be seen in the shape and position of the jaws. As the child gets older the condition gets worse, because normal function is interfered with. The lips lie in abnormal positions, and this again may add to the abnormal pressure on the bone.

Prevention of Deformity

The care of the general health is the most important factor. Local factors, such as normal suckling, the stopping of harmful habits, and the care of the deciduous teeth, aid in preventing deformities. Although the only definite knowledge of the aetiology of malformations is in those cases in which the cause has been purely local, there is little doubt that in most cases the causative factors begin to affect development either before birth or within the first two years of life.

Treatment of Established Deformity

Indications for Active Treatment.—Treatment is indicated if there is a malformation which interferes with the facial appearance, mastication, breathing and lip-function, or the health of the dental tissues. The first of these is given priority of place because it is the most obvious, but many factors must be taken into consideration before deciding whether or not a particular case shall be treated. The occlusion of the teeth, the condition of the teeth and gums, the appearance, the general health and physique of the patient, and the ultimate prognosis without treatment must all be considered.

Age for Treatment.—If a deformity occurs in the deciduous dentition which will prevent the normal eruption of the permanent teeth it should be corrected at this stage. For instance, the upper incisors may become locked behind the lower ones (Fig. 2). The upper incisors can be moved forward before their roots are absorbed, and the permanent teeth will move with them and erupt in their correct positions. In cases with subnormal dental arches expansion should be carried out before the roots of the deciduous molars are absorbed, as these roots will carry

FIG. 1.—"Rabbit mouth": posterior position of mandible. (a) Before treatment; (b) same case two years after removal of appliance.

FIG. 2.—Upper deciduous incisors locked behind lower incisors. (a) Before treatment; (b) after treatment.

the permanent teeth with them (Fig. 3). Therefore 7 years of age is the best time to start treatment. Abnormal relation of the upper to the lower jaw can usually be corrected if the treatment is started early. Although good results can be obtained even in the treatment of adults, the prognosis is better and the wearing of appliances much less troublesome in young patients.

Methods of Treatment.—It is often very difficult to decide whether teeth should be removed to make space where the arches are subnormal. In young patients the contour of the face is the best guide. A face which is already thin and peaky may be permanently ruined by the interference with bone growth after removal of teeth. In older patients extraction may be the only method of obtaining space for overcrowded teeth.

FIG. 3.—Expansion of maxillary arch in a patient with a cleft palate: before, during, and after treatment. (Published by permission of the *British Dental Journal*.)

Use of Appliances

Appliances are divided into two groups: (1) fixed—not removable by the patient and not under his control except to a very limited extent; and (2) removable—that is, removable by the patient and more or less under his control. Removability or not of an appliance is a point on which as a rule little weight should be placed in making a choice; efficiency is of far greater importance. However, some children cannot be relied on to wear a removable appliance, although they

FIG. 4.—Fixed appliance used to correct deformity shown in Fig. 2.

will wear a fixed one without the slightest thought of interfering with it.

The essential requirement of an appliance is that the pressure used to move the teeth should be so weak that no permanent damage is done to the teeth or the sur-

FIG. 5.—Appliances used to correct deformity shown in Fig. 3.

rounding tissues. Fixed appliances have an advantage in that weaker springs can be used, as they are protected from stress and strain by the main arch or framework of the appliance; if the appliance is fixed to the teeth the child is unlikely to fiddle with it. Efficient springs of steel wire 0.15 to 0.35 mm. in diameter can be used on these appliances; the framework of 1-mm. wire is attached to molar rings cemented to the teeth (see appliances shown in Figs. 4 and 5). The springs are adjusted before the appliance is fixed and can be left without further adjustment until the teeth have moved into the required positions.

The design of springs on removable plates is similar to that on fixed appliances, but the range is more limited and as a rule a stronger wire must be used. The framework of plates is usually an acrylic base. Some plates can be worn at night only; this has obvious advantages, but their use is limited chiefly to

altering arch relationship, and many forms of mal-occlusion cannot be corrected by them.

With most children few practical difficulties occur during the wearing of appliances in the home, particularly with fixed appliances, which two days after insertion are often forgotten. When appliances are worn extra care must be given to tooth cleaning, and this will need supervision until a satisfactory routine is established.

AN EXPERIMENT IN SOCIAL REHABILITATION

BY

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In the last decade "rehabilitation" and "physical medicine" have rightly taken their place among the means advocated for the restoration of the sick to full health, but there is a danger that their recent prominence is fostering an outlook which lays undue emphasis on the restoration of physical fitness only and too little on the restoration of moral or mental fitness. Many rehabilitation centres attached to hospitals differ only in degree from the physiotherapy department from which the patient has graduated to them. Except for an increase of his physical fitness they add nothing to the effort to restore him to a normal life.

In a long illness one must make many mental adjustments to a new life of dependence and passivity. After such an illness readjustment to former activity in normal society does not readily follow even if physical fitness is completely recovered, and the readjustment becomes all the more difficult if there is a permanent residual disability. Restoration of a normal attitude to self and to society must therefore be a major concern in the full rehabilitation of a patient and must take equal place with the restoration of physical fitness. This readjustment to normal society despite physical handicaps may conveniently though perhaps crudely be termed "re-socialization."

Scunthorpe Remedial Recreational Club

This club, which began in 1949, has as its aim the resocialization of the sick or injured by the activities of a club of which they hold temporary membership. Its development has been slow and limited, but I believe its existence and its activities are worth recording both to stress the principle that proper balance should be maintained in rehabilitation between the physical and mental and to show what can be done with the existing facilities of a town to put this principle into practice in a specially effective manner.

The activities of the club are centred on two weekly meetings. On one night of each week there is a two-hours session at the gymnasium of one of the local schools. Here, under the guidance of a subcommittee, pastimes, games, and handicrafts are organized. These include ordinary children's games and other games such as volley ball, deck quoits, and table tennis; "group work"—for example, Greek dancing, choral speaking, and free art; handicrafts—for example, sewing and rug weaving, embroidery, lamp-shade making, and Barbola work. Sometimes a film is shown. There is no regi-

mentation. It is essential that the atmosphere should be that of a "club" and not that of an "institution." The organization and teaching of the different games, pastimes, and handicrafts are carried out by voluntary workers.

For one hour on another night of the week one of the tanks in the local swimming-baths is put at the club's disposal. There is a rota of voluntary helpers from the local swimming club and other local organizations to teach swimming and to help the disabled in the water. Equipment is provided for swimming lessons and water games. Tea and cakes are served after the swim. These swimming sessions constitute, of course, an excellent form of physical rehabilitation for many of the patients, particularly those affected with anterior poliomyelitis. One has only to see the transformation effected in the disposition of some patients who have had many months of physical treatment at the local hospital to believe that the real value of this swimming session lies in its ability to banish the "patient" complex and restore the self-confidence to carry on, even though disabled, in a normal way in normal society.

For both these sessions of the club the local ambulance service provides transport for those who are unable to travel by public transport.

Club Membership

It is the intention that membership of the club should be temporary; that the club should act only as a training ground or bridge between the hospital environment and normal society. Thus, on reaching a certain stage of proficiency, members are transferred from the Remedial Recreation Club to ordinary membership of the local swimming club and cease to attend our swimming sessions. In this way the club achieves its object of resocialization. It would only defeat that aim if membership were allowed to continue indefinitely.

In addition to the two sessions described the activities of the club have included also the organization of outings to the seaside, and to the theatre, pantomime, and ballet, often with the assistance of other local voluntary organizations.

The club is open to all patients who, having been vetted by the committee, are regarded as likely to benefit from its activities. Though most members have orthopaedic disabilities, it is not the intention of the club to confine membership to such cases, nor is membership restricted to hospital patients, but includes any suitable case sent by a general practitioner. The Table shows the cases at present attending the club.

Disability	Children (Under 14 Years)	Adults	Total
Anterior poliomyelitis ..	14	12	26
Congenital deformities ..	5	2	7
Muscular dystrophies ..	2	1	3
Postural deformities ..	3	2	5
Infantile spastic plegia ..	4	—	4
Fractures and amputations ..	1	2	3
Tuberculous arthritis ..	1	—	1
Osteomyelitis ..	—	1	1
Paralysis agitans ..	—	1	1
Disseminated sclerosis ..	—	1	1
Total ..	30	22	52

The success which the club achieves is not something that can be submitted to statistical analysis and demonstrated scientifically. It can be shown only by the changes effected in the individual cases, and these changes are often of an intangible nature.