

with a simple mechanical contrivance, the teeth being retained in position until after the second permanent molars have erupted.

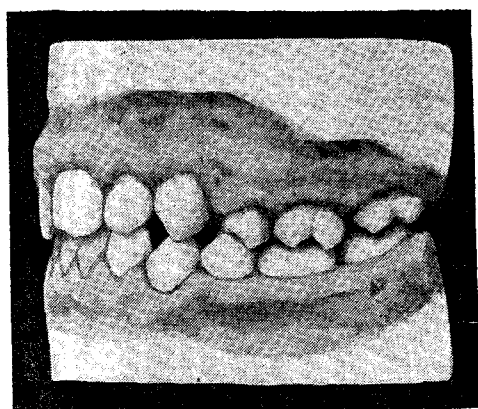
With regard to the treatment of the lower teeth, one is guided by the condition existing. If crowding is present then the first premolars are removed, but the time for

FIG. 3.



Case 2. Before treatment.

FIG. 4.



Case 2. After treatment.

removing them is left until the commencement of eruption of the canines. But little is gained by removing the mandibular premolars at quite an early age, as is the case in the maxilla.

Cases of superior protrusion treated in the way suggested do extremely well; there is no tendency to recur, the amount of mechanical treatment is very little, and the occlusion of the premolars and molars is good. In the figures are shown the models of two cases before, and the same cases after, treatment.

Much has been said about the tendency of this type of irregularity when treated to relapse. There will be little if any tendency to relapse if we can: (1) insure that the lower lip in occlusion passes in front of the upper incisors; (2) insure that the lower incisors do not press unduly upon the backs of the upper incisors; and (3) prevent crowding of the upper incisors and canines. The less we are unable to overcome these difficulties the greater will be the tendency to relapse.

## THE TREATMENT OF MALOCCLUSION (ORTHODONTIA).

By H. C. HIGHTON, L.D.S. R.C.S. ENG., D.D.S. PENN.

THE fundamental principle of orthodontia is that we have a thorough understanding of normal occlusion and all that the term implies. It is necessary to appreciate the normal relationship of the teeth of the mandible with those of the maxilla, how each individual tooth is dependent not only upon its fellows mesially and distally but upon the opposing teeth and all the teeth collectively to maintain harmony, and then only is it possible to understand thoroughly any of the various types or deviations from the normal. From a study of skulls of past and present races normally the mesio-buccal cusp of the upper first molar occludes between and buccally to the mesio- and disto-buccal cusps of the lower first molar. The mesial incline of the upper canine occludes with the distal incline of the lower canine, the other teeth if regular being then normally related; it is quite necessary

for the first molars and the canines to be correctly related, otherwise malocclusion and alteration of the facial lines must result.

**Classification.**—The classification of *malocclusion* as suggested by Dr. E. H. Angle<sup>1</sup> is based upon the variation from the harmonious relationship known as normal occlusion, three great classes being represented, the first having normal mesio-distal relation of the arches, the second having the lower arch distal to normal in its relation to the upper either unilaterally or bilaterally, and the third having the lower arch mesial to normal in relation to the upper either unilaterally or bilaterally. The great majority of cases of malocclusion belong to the first class, the second class comprising a small percentage, and the third a still smaller percentage of the various existing cases of malocclusion. In the first class the teeth may be in any possible position of malocclusion which would be consistent with a normal antero-posterior relationship between the arches of the teeth. For example, any of the incisors and canines may be in labial or lingual occlusion, the bicusps or molars in buccal or lingual occlusion. There may be protrusion of the anterior part of the upper arch or retrusion of the anterior part of the lower arch without disturbing the normal antero-posterior relationship.

The treatment in all cases of malocclusion is therefore simply the placing in harmony of the inclined planes of the teeth and establishing of normal occlusion. The principle underlying this treatment, which is advocated in "orthodontia," is expansion of the arch as opposed to extraction and the consequent narrowing of the arch and alteration of the facial lines. Many people come under our observation with mutilated mouths and abnormal facial expressions that have been brought about by extraction of the teeth, often to prevent some developing form of malocclusion. The ideal to be kept in view is the attainment of normal occlusion which presupposes the full complement of teeth.

There are, briefly, at least three important reasons for the expansion of the dental arch. First, to permit malposed teeth to assume their correct alignment; second, to improve the facial lines; third, to endeavour to broaden the nasal chambers and so increase the capacity for nasal breathing. The latter is naturally a very important consideration, as it concerns the future health and welfare of the patient. Expansion of the dental arch to be most effective should be done as early in life as possible; gradual force exerted while the patient is young encourages the natural development of these parts. In treatment it is also necessary to rotate the teeth, move them labially or lingually, mesially or distally, any of which movements are most easily accomplished by means of the clamp band, expansion arch, and wire ligatures. As the ultimate success of the treatment naturally depends upon the ease of retention of the teeth in the corrected position—viz., in normal occlusion—it will readily be understood how essential it is to retain the full number of the teeth, since only by that means can the inclined planes of the teeth be placed in correct normal relationship which if accomplished will simplify to a very great extent the method and length of time of the retention. Extraction, therefore, should always be avoided if possible, as not only does it destroy the possibility of obtaining an ideal result but also renders more difficult the final retention.

We find that in the majority of the cases of malocclusion the arch is narrow, the teeth crowded together, overlapping, and malposed to a greater or less degree, and the forces which acted in bringing about this malformation are equally powerful in maintaining and exaggerating this condition when once it has been established. Orthodontia aims at placing every tooth in its normal position in relation with its fellows and those of the opposite arch and retaining them in that position until the muscles, alveolus, and tissues of the neighbouring region have accommodated themselves to the altered conditions. The means usually employed to bring about this result is a fixed appliance which is arranged as follows: clamp bands are secured to the first upper and lower molar teeth; these consist of a band with a horizontal tube on the buccal side and a nut and screw on the lingual side to tighten the band to the required size. The ends of an elastic wire arch, the expansion arch, are inserted into the buccal tubes and the arch is ligated to the teeth by means of fine wire ligatures, the expansion being brought about by the arch having an outward spring, while the ligatures can be occasionally tightened. The teeth may

be also rotated by means of the ligatures, bands and spurs being attached to the individual teeth in the position necessary to bring about the required movement. There is no mere speculation as to the correct position of the teeth and the size of the arch and the amount of expansion desired, as means have been devised of measuring the teeth and from the measurement obtained the size of the arch and position in which to place the teeth can be almost accurately calculated and varies according to the size of the teeth in each individual case. The geometrical principles on which the movements of the jaws are based have also been studied and a fairly accurate basis for the discovery of the correct size of the arch in any case, with the teeth in position, can be obtained, and measures in a straight line from the distal buccal cusp of the right six year molar to the distal buccal cusp of the left six year molar from about  $2\frac{1}{10}$ ths— $1\frac{8}{10}$ ths of an inch in the upper jaw, and from  $1\frac{8}{10}$ ths— $2\frac{2}{10}$ ths of an inch in the lower jaw. The expansion arch if intelligently employed is wonderfully efficient in enlarging the arch in any direction and in the control of the teeth moved individually or collectively. It furnishes the most natural appliance to secure normal occlusion, for by it we can regulate the entire dental apparatus—something impossible in the use of the innumerable appliances that have been devised for the correction of symptoms only without regard for the laws of occlusion.

In treatment of cases of the second class where the lower arch is distal to normal the expansion arches and clamp bands are inserted as described. The force is then exerted from one or more small rubber ligatures which engage on sheath-hooks attached to the upper expansion arch in the canine region and over the ends of the tubes on the clamp bands on the lower molars. The force is reciprocal, acting directly on the molars, the result being to move the lower molars mesially and the upper molars distally. As the lower first molars are carried forward the bicuspid and canines are pushed in advance of them; the lower incisors are also carried forward, being ligated with wire ligatures to the anterior part of the expansion arch. After the upper molars have been moved distally into full normal occlusion it will be found that a space exists between the molars and second bicuspid. The clamp bands on the upper first molars are then removed and smaller clamp bands placed on the second bicuspid. The force of the rubber ligatures is again exerted in order to carry distally the bicuspid. A wire is made to engage the upper first and second bicuspid in order to effect their movement at the same time. Whilst moving the upper molars and bicuspid the arch is kept free from the incisors so as to allow the full force to come upon the former. When the teeth are well back into correct mesio-distal relations with the lower the arch is gradually adjusted to allow the force to be received by the upper incisors and canines, which in turn are soon moved into correct relation with their antagonists. The arch in both upper and lower jaw is usually inserted with a correct amount of outward spring to effect at the same time the required expansion. For the treatment of cases of the third class the above order with regard to the rubber ligatures and clamp bands is reversed.

To retain the teeth again the best device is probably a fixed apparatus. The simplest retainer for a single tooth is made by soldering a round wire to the labial or lingual surface of a band and cementing the band on the teeth. Several bands may be united for the same purpose to retain more than one tooth. An expanded arch can be retained by a stiff wire along the lingual sides of the teeth and soldered to a band on the first bicuspid and first molar teeth on each side. The incisors which have been moved forward or retracted are retained by a similar wire running along the lingual or labial surface of the teeth and soldered to bands on the first bicuspid teeth. The period of retention varies according to the amount of movement brought about and also upon the age of the patient, and may be any length of time between nine and 18 months. The nearer the attainment of normal occlusion in the correction of any case of malocclusion the less need there is for retention, the normal influence of the inclined planes as well as the other forces governing normal occlusion acting to preserve the positions obtained. With normal relations of the arches established, the jaws, the muscles of mastication, the cheeks and lips, and the facial lines will be in best harmony with the type peculiar to the individual, as a perfect profile requires normal occlusal relations.

Upper Wimpole-street, W.

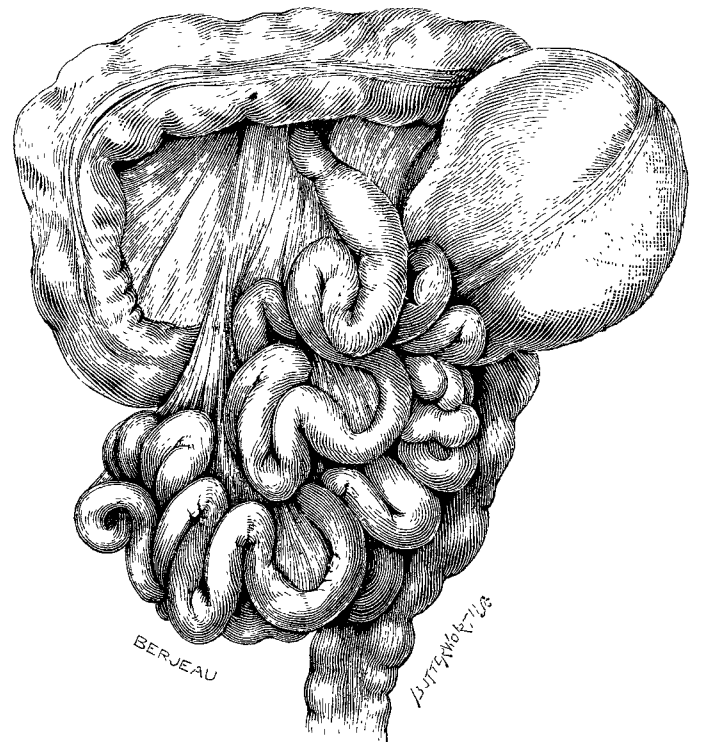
## ON A CASE OF MIGRATION OF THE CÆCUM PRODUCING OBSTRUCTION OF THE ASCENDING COLON.

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(From Notes by the Surgical Registrar to the Middlesex Hospital, SOMERVILLE HASTINGS, F.R.C.S. Eng.)

WHEN the cæcum is provided with a long meso-cæcum it may lie in any region of the abdomen; perhaps the most unusual situation for a displaced cæcum to occupy is the left kidney pouch, behind the mesentery. When a cæcum migrates in this way it gives rise to a puzzling set of symptoms, as the following case will serve to illustrate.

A poorly nourished man, 48 years of age, came under my care in the Middlesex Hospital for abdominal pain and vomiting. A week before admission he had been seized suddenly with griping pains in the abdomen, particularly on the right side; these were sufficiently severe to confine him to bed and were followed by anorexia and vomiting. The vomit was bile-stained and watery. On admission the abdomen was somewhat distended, but moved evenly on respiration; no tumour could be felt and there was not much tenderness. The temperature ranged about  $100^{\circ}$  F. As these signs indicated the existence of intestinal obstruction, cœliotomy was performed. On making a free median incision several ounces of purulent fluid escaped and the intestines appeared inflamed and moderately distended. Attention was first directed to the right iliac fossa, but the cæcum and appendix were not there. A tense band of gut extended from the right extremity of the mesentery upwards and to the left, overlapped by mesentery and coils of small intestine; when traced upwards it led to the ileo-cæcal junction in the left kidney pouch. A loop, consisting of the last few inches of the ileum and the ascending colon with the cæcum and appendix, had been twisted on its own axis through half a circle and displaced upwards and to the left. The cæcum had become adherent in its new situation and when drawn down a large necrotic area with two perforations was seen, through which liquid fæces issued. The necrotic area was excised and the edges of the hole thus made in the gut were approximated with sutures. The free fluid in the abdomen was swabbed out, a large rubber tube was introduced into the pelvis, and the incision was closed with silk sutures. The man died 16 hours after the operation.



A diagram to represent the position of a cæcum which had undergone torsion and after passing behind the mesentery occupied a position in front of the left kidney.

The patient whose clinical history and fate I have described came under my observation in October, 1906. I was interested and much puzzled by the condition found at