Section of Surgery.

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Demonstration of Cases and Radiographs illustrating the Technique employed and Results obtained in the Repair of Fractured Mandible by means of the Free Autogenous Bone-graft.[1]

By GILBERT CHUBB, F.R.C.S.

THE men I have shown this evening are from a series of ninety-five cases in which I have bone-grafted the mandible during the past two years. These cases were all operated upon at the Queen's Hospital for Facial Injuries, Sidcup. Some of them have come direct from hospital for examination and are, therefore, comparatively recent cases. The others have come from their homes, and periods varying from one to two years have elapsed since their operation.

In addition I have brought for your inspection a large number of radiograms, some of them stereoscopic, showing the pre-operative condition and post-operative appearances at various stages. Patients present have demonstrated their dental occlusion, efficient gape and lack of lateral deviation. The majority of them have claimed to be able to deal satisfactorily with any ordinary food.

In a previous publication[2] I have given a complete analysis of the first sixty cases; bony union being obtained in 93 per cent. Of the thirty-five more recent cases, four have failed to unite. Of the remainder, twenty-four up to date show firm bony union and the rest appear to be consolidating satisfactorily.

In every case the graft was obtained from the iliac crest of the same patient, and each graft was wired into the gap with as accurate an apposition as sound carpentering could obtain. The apposition was invariably an end-to-end one, the jaw fragments being trimmed so as to present plane surfaces of vascular bone tissue as far as possible facing one another.

Various factors tended to prevent this simple relationship of the facets to one another. The posterior fragment was almost invariably toothless and as a rule occupied an extremely elevated position; a deformity frequently accompanied by inward deviation and rotation, so that in addition it occupied a deeper plane to that of the anterior fragment. In the case of the latter, where the loss extended forwards to the canine region, or beyond this, it was obviously impossible to get a facet facing backwards. The sclerosis of the anterior fragment, always considerable, is usually most marked along the lower border. The removal of this region resulted in the facet facing downwards as well as outwards. The very complicated relationships in space which

[1] At a meeting of the Section, held February 2, 1921.

[2] *Lancet*, 1920, ii, p. 9.

the facets on the two jaw fragments thus come to present to one another, necessitate a somewhat elaborate technique in order to obtain the accurate "carpentering" upon which I am convinced success depends.

Models have been shown illustrating the method by which the graft is cut from the crest with terminal facets in correct relative position for immediate apposition to those of the jaw fragments. Essentially, the method consisted in obtaining a record of the positions relative to one another of the terminal facets of the jaw fragments by means of a strip of stout lead sheeting, rapidly cut and twisted so that each end lay along the long diameter of the corresponding jaw facet while its surface approached this at right angles to the place of the facet. A second strip of lead cut and twisted so that its ends approach those of the first "template"[1] gives a replica of all the essential features of the gap to be filled. The models illustrate the method by which these "templates" are employed.

In all but a few cases loss of bone extended beyond the standing teeth, and in many the ascending ramus was also involved. Cases are shown on the screen in which the loss involved the whole of the premolar and molar region and the lower two-thirds or more of the ascending ramus. In each case firm bony union was obtained at both ends, with good function. Two of the cases shown had had one bone-graft and the third case two bone-grafts, all of which had failed before the patients came under my care.

Radiograms are shown of cases which were clinically firm at the end of the third to fifth week after operation. At this period the line of apposition is still distinctly visible, but crossed by fine striæ. Radiograms of the same cases three months or more after operation showed a complete disappearance of this line. When these radiograms were viewed stereoscopically the continuity of the bone tissue across the union was readily determined.

The accurate apposition of the bones leads to rapid union. It has the additional advantage that efficient control of the posterior edentulous fragment is established. The practice has been adopted in the later cases of opening the splints two weeks after operation. The early use of the jaw results in a speedy consolidation of the primary union. Almost invariably the whole depth of the mandible is utilized in forming the facet for the graft, and the latter is fashioned of the same depth. Several cases have been shown in which the facet for articulation with the posterior fragment was 1 in. to 1¼ in. in vertical extent. In such cases two wires were frequently employed, one above the other, thus still further reducing the possibility of the accurate apposition obtained at the time of the operation being disturbed in the subsequent early use of the jaw.

The only trouble encountered from the use of the wire has been in a few cases in which skin only was available for covering the graft. In these cases the pressure of the twisted wires caused atrophy of the overlying skin many months after union had occurred. The wires were then removed. It occasionally happened that the wire was so firmly gripped where it passed through the bone that only the superficial portion could be removed. The radiograms likewise fail to show any rarefaction round the wires.

[1] This use of the term "template" has been criticized, I think quite rightly. A "template" is a pattern, while both the lead strips described are "gauges" recording accurately the relative positions of the planes of apposition to one another, but in no cases recording the form either of the graft or of the jaw fragments. In the early cases, however, the piece of lead was actually used as a "template" of the graft, and the term was carried on while the pattern developed into the form described.

In three cases it has been possible to examine the nature of the union and to obtain sections across this region. The first section was cut in celloidin from the decalcified bone six months after operation, and has been described and figured in a previous paper.[1] The other two sections were obtained fifteen and eighteen months, respectively, after operation. These were not decalcified, but were prepared by grinding upon the finger a thin slice of bone removed with a saw. These sections, when ground sufficiently thin for mounting, could not be made to bend at the line of union, and when viewed under the microscope the latter region was seen to be composed of dense bone, the laminæ and lacunæ of which were clearly visible. The sections, moreover, were stained with Mallory's stain, which picks out fibrous tissue and stains it deep red. There was a complete absence of stain in the zone of union, while the superficial periosteal tissue in the sections was deeply stained. One of these sections was obtained owing to the necessity for resecting the posterior union in order to open the jaw; the jaw fragment being so firmly fixed by fibrous tissue as to defy movement by less drastic measures. Both in this case and in the one previously described, it could be readily determined at the time of resection that the character of the surface of the graft and its vascularity in no way differed from that of the adjacent jaw tissue. The third section was obtained post mortem, and showed the same appearances as those described in the previous section.

In all these cases the rounding off of the upper border as a result of the architectural changes in the bone accompanying use was recognized. This change in the architectural structure of the graft is also demonstrated in successive radiograms of the same case.

Meckel's Diverticulum as a Cause of Intestinal Obstruction.

By G. H. EDINGTON, D.Sc., C.M.

THE following notes illustrate the part which Meckel's diverticulum may play in the ætiology of intestinal obstruction.

Case I: Diverticulum attached to Umbilicus and ensnaring a Distal Loop of Ileum; History of Previous Attacks of Obstruction; Death from Paralytic Ileus within forty-eight hours after Operation.—M. K., aged 17, seen September 4, 1911. Two days previously seized with umbilical pain; bowels moved an hour or so later, and vomiting about same time. Repeated enemata failed to procure further evacuation. History of three previous attacks which responded favourably to enemata. Tenderness was not marked; but dullness over lower abdomen and both flanks. Median subumbilical laparotomy showed condition in fig. 1. Cæcum empty, and from it ileum traced upwards for a few inches, at which spot a thick rounded cord passed downwards and outwards across front of bowel. Externally, cord originated from gut: internally, it passed upwards and inwards behind some distended coils to the umbilicus, to which it was adherent. This vertical portion was much distended. Whole of diverticulum excised, together with adherent umbilicus. Death on second day from paralytic ileus, confirmed by post-mortem. The diverticulum arose from side of ileum to left of antemesenteric border, about 16 in. (40·6 cm.) above ileocæcal junction. Blood-supply was from mesenteric vessels and was contained in a fold which sprang from under surface of ileum some distance

[1] *Lancet*, 1920, ii, p. 9.