

## **Extraction of the teeth / by J.F. Colyer.**

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# EXTRACTION OF THE TEETH.

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*COLYER.*





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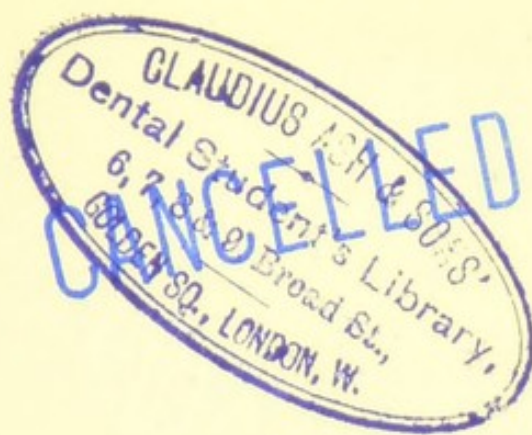
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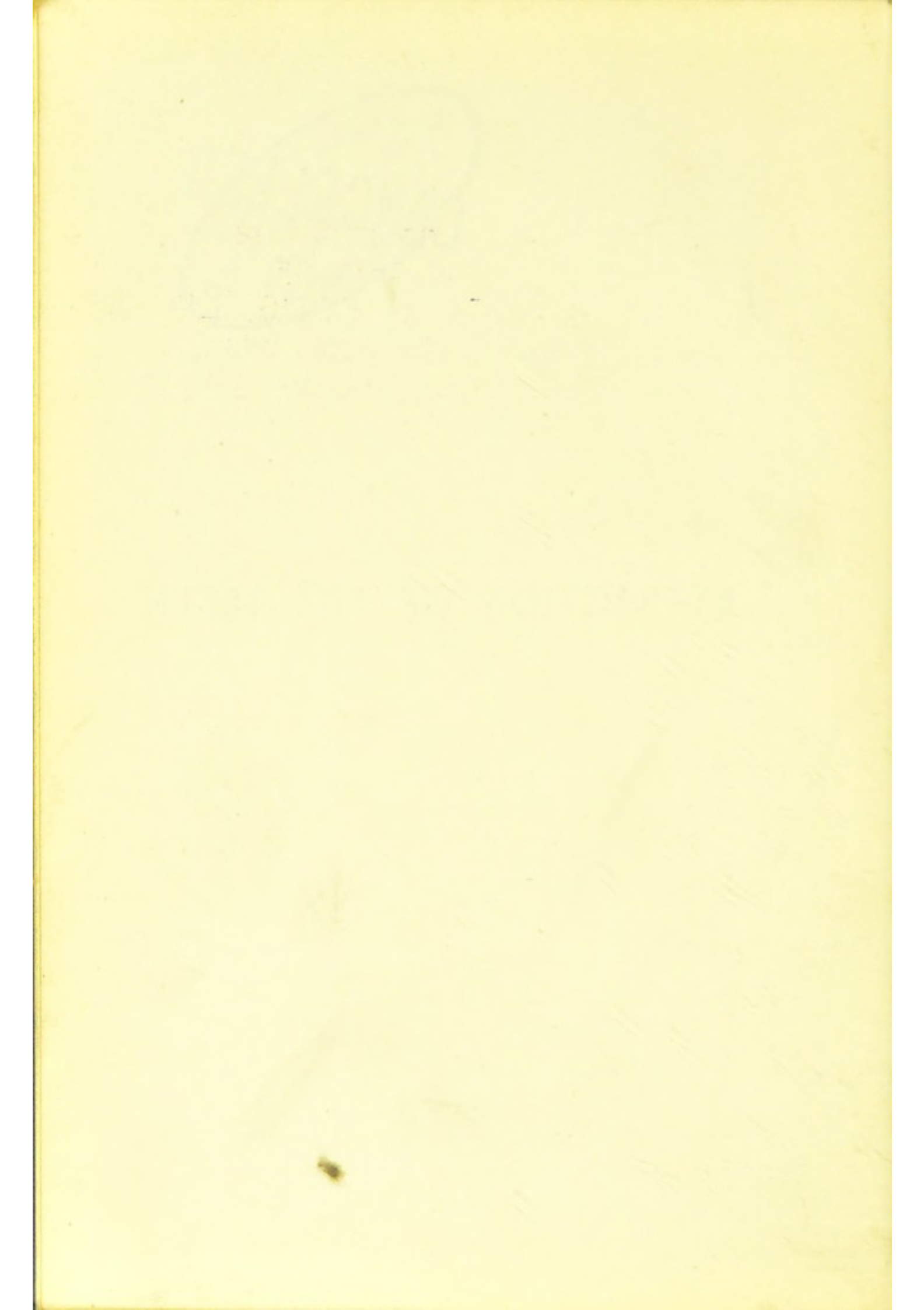


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## EXTRACTION OF THE TEETH



# EXTRACTION OF THE TEETH

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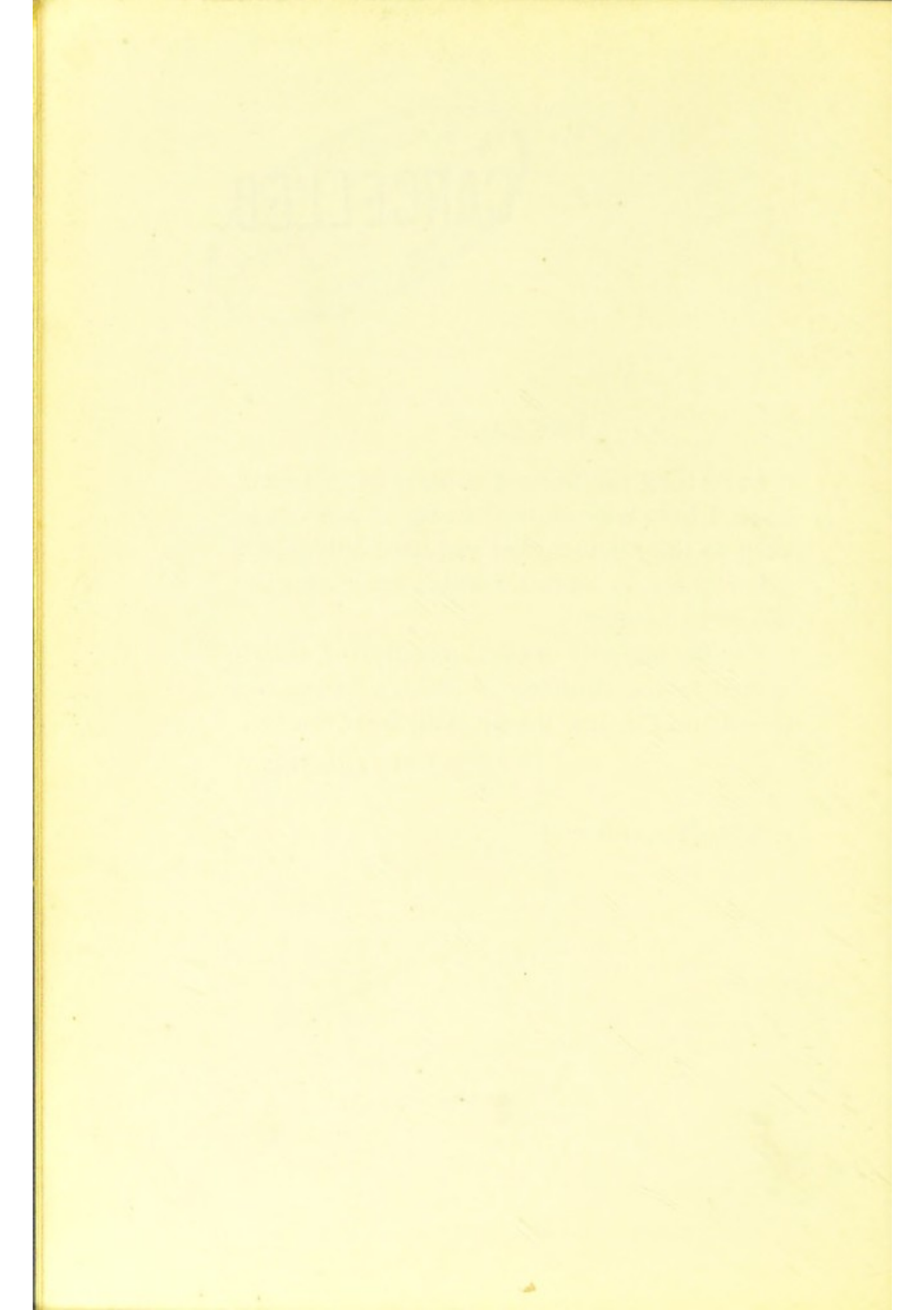
## PREFACE.

In revising the Second Edition of this small book, I have endeavoured as far as possible to keep to the original plan and have only added a few notes on methods which experience has shown to be useful.

For the majority of the illustrations I am indebted to the kindness of Messrs. Longmans Green and Co. and Messrs. Ash, Sons and Co.

J. F. COLYER.

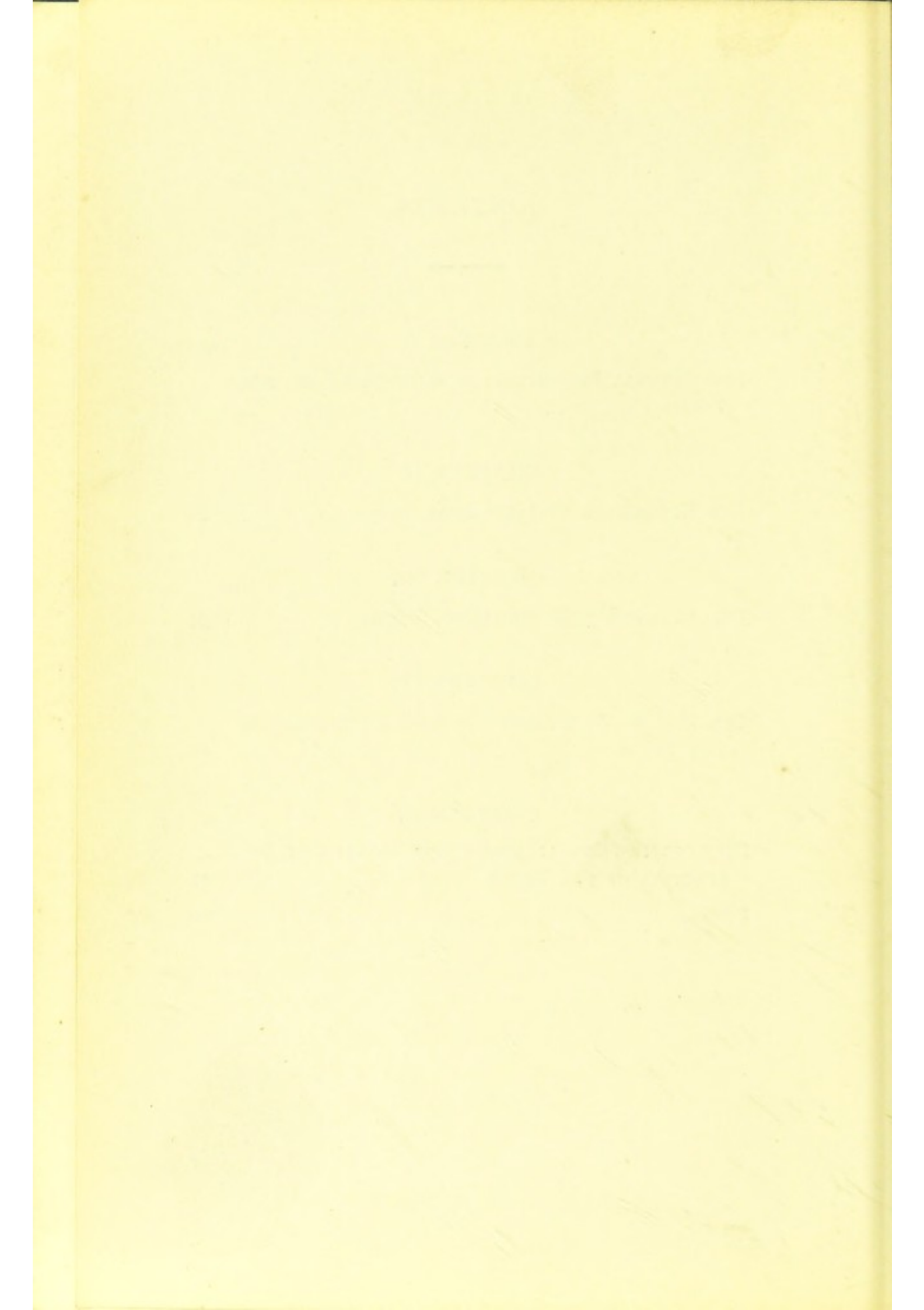
*September, 1912.*



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# EXTRACTION OF THE TEETH.

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## CHAPTER I.

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### The General Principles of Extraction of the Teeth.

THE operation of extraction is one which requires skill, judgment, experience, and an accurate knowledge of the parts involved. As with all other manipulative proceedings, success can only be obtained by actual practice.

The tooth to be removed should be carefully examined, in order that the operator may form some idea of the amount of sound tissue present and the degree of force which will be needful for the dislodgment of the tooth. In the case of roots, the edges must be defined, and for this purpose a blunt probe, similar in pattern to that shown in fig. 1, will be found useful.

**Instruments.**—The instruments in general use for the removal of teeth are forceps and elevators. **The Forceps** is an amplified pair of pincers or pliers. It is made up of three parts,

namely, the blades or portions beyond the joint which are applied to the tooth, the joint itself, and the handles. Forceps should be made of fine steel, and should be light and yet strong enough to withstand, without bending, any strain that may be put upon them.<sup>1</sup> The blades should be shaped to fit the tooth they are

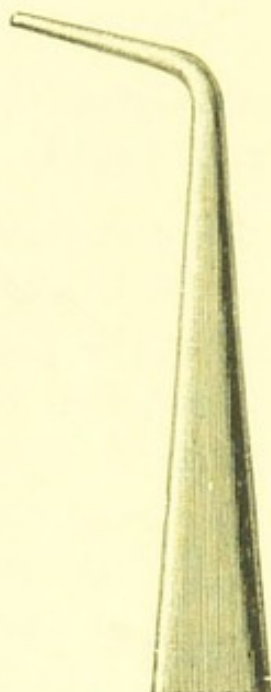


FIG. 1.

intended to remove, and they should be clear of the crown when applied. On longitudinal section a blade should present a thin wedge-shaped appearance. Three kinds of joints are met with—the box joint, the screw joint, and

---

<sup>1</sup> A description of the different instruments in general use for the removal of the various teeth will be found in Chapter II.

the pin joint. In the box joint one half of the forceps passes through a slot in the other, the two being held together by a rivet which passes through the centre. In the screw joint (fig. 2) the two halves are held together side by side by a screw which takes the entire strain. Fig. 3 clearly illustrates the pin joint. Most forceps of English manufacture are made either with screw or pin joint, each of which has the



FIG. 2.



FIG. 3.

advantage of permitting the instrument to be easily cleaned; they also allow a slight lateral movement of the two halves—a point of some practical importance. It is urged against both these joints that they are weak; in practice, however, this is not found to be the case.

The handles should be of a size and shape to lie comfortably in the palm of the hand, and should be in such relation to the blades that

when the latter are applied in the direction of the long axis of the teeth the handles clear the lips.

As a general rule, in forceps designed for the removal of the anterior teeth in the maxilla, the

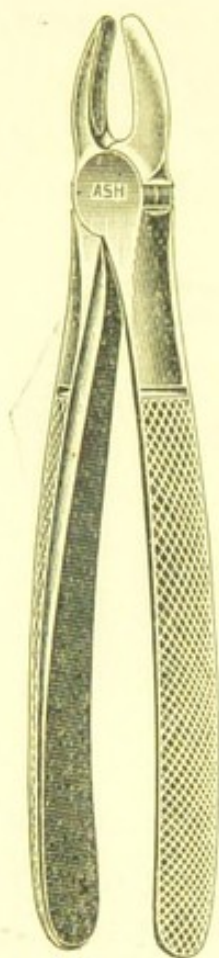


FIG. 4.

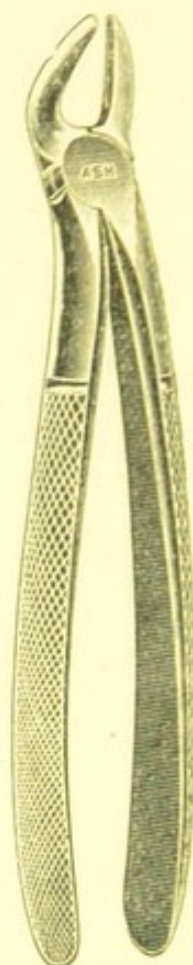


FIG. 5.

blades and handles are in the same line (fig. 4), while for the maxillary back teeth the handles form a curve of greater or less extent with the blades (fig. 5). In forceps for the mandibular

teeth the blades are bent down from the handles to an angle of nearly ninety degrees. In one class, namely, the hawk's-bill, when the blades are applied to the tooth the handles are at right

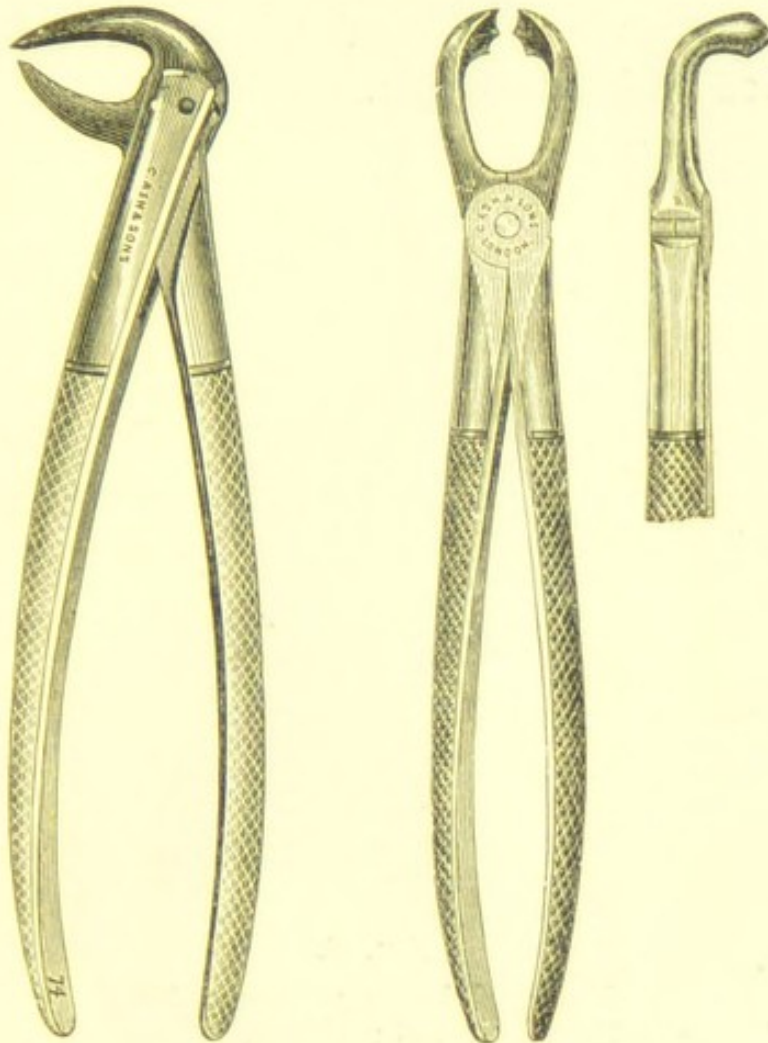


FIG. 6.

FIG. 7.

angles to the line of the arch (fig. 6), while in other classes the handles are in line with the arch (fig. 7).

The manner of holding forceps is shown in figs. 8, 9, 10. The handles should rest comfortably on the palmar surface of the hand, and in such a manner that the end of one handle rests between the thenar and hypothenar eminences—a portion of the hand where force can be applied with advantage.

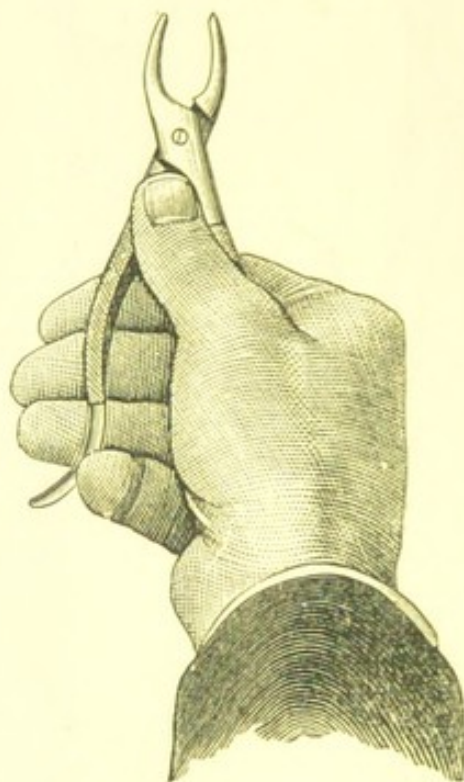


FIG. 8.

Mode of holding forceps for the removal of maxillary teeth.

The thumb placed between the handles acts as a regulator to control the amount of pressure of the blades upon the tooth. As a precaution it is well to have the ball of the thumb well be-

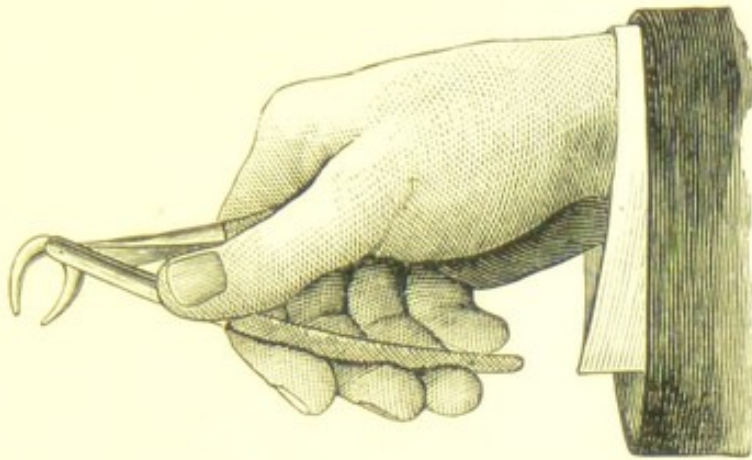


FIG. 9.

Mode of holding "hawk's bill" pattern forceps.

tween the handles, so that the pressure is counteracted not only by the soft tissues, but also by the terminal bony phalanx of the thumb.

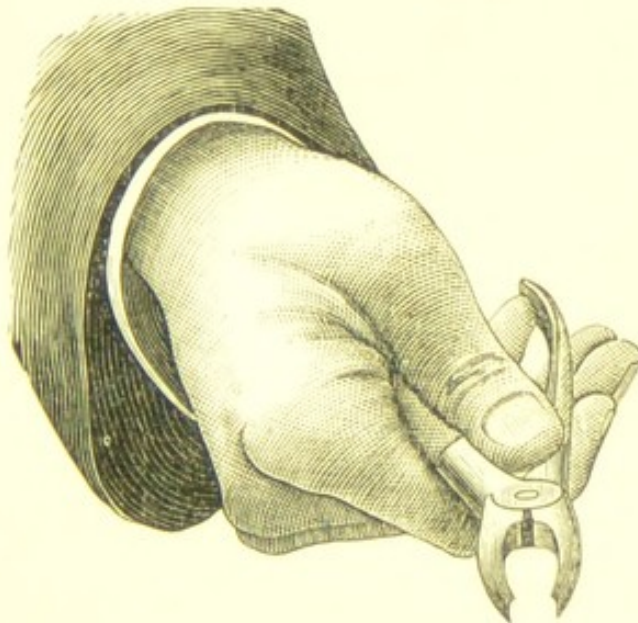


FIG. 10.

Mode of holding forceps of pattern shown in fig. 7.

If this precaution be not observed, any sudden crushing of the tooth may be accompanied by a severe and very painful contusion of the operator's thumb.

**The Elevator** consists of two parts—the handle and the blade. The handle is about 4 in. in length and of a shape suitable to allow a firm grip being obtained of it by the hand. The blade is made of fine steel, and is about 2 in. long. Elevators are of two varieties, straight and curved. In the first form the blade is thin, about one-fifth of an inch in breadth, one surface being made convex and the other flat. The point of the blade may be rounded as shown in fig. 11, or spear-shaped, as shown in fig. 12.

In the curved variety, the terminal half inch of the steel portion of the instrument is bent at an angle with the shaft of the instrument (fig. 51). The edge of the blade of an elevator should always be kept sharp.

The method of holding an elevator is shown in fig. 13. The handle should rest comfortably in the palm of the hand, the first finger lying along the blade and being brought near the point so as to act as a stop should the instrument slip. When using the elevator for the removal of teeth on the right side of the mandible, the finger should lie along the curved

side of the blade, and on the flat side when extracting teeth on the left side.



FIG. 11.



FIG. 12.

**The Screw** (fig. 14) is an instrument which on rare occasions is useful for the removal of deep-seated roots.

After being used, instruments of every kind should be freed from all foreign matter by rinsing in cold water and then sterilized by boiling for half an hour. Before being used the instruments should again be sterilized.

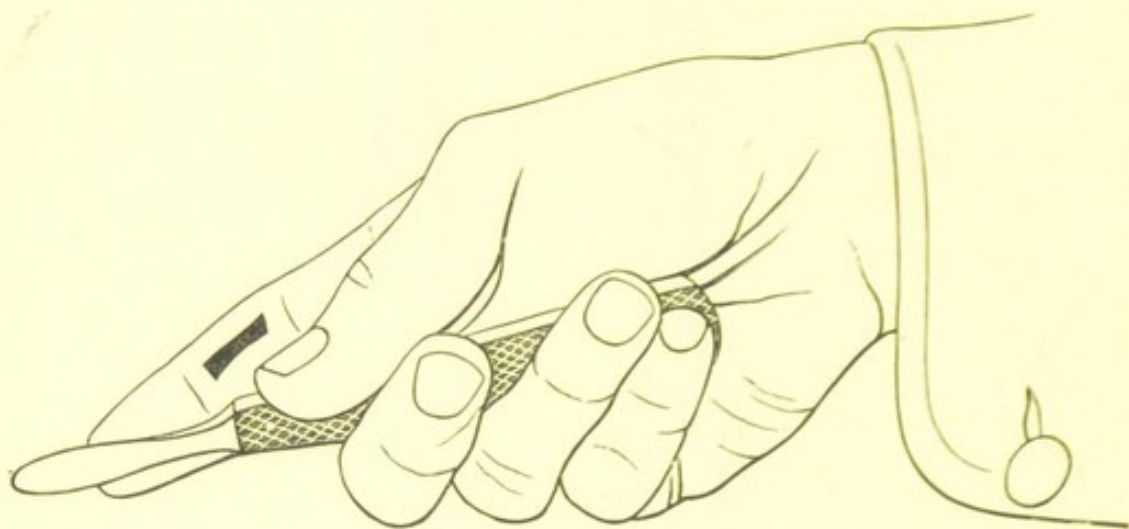


FIG. 13.

The next point which demands attention is the **position of the operator and patient**. The chair should be placed before a good light, and



FIG. 14.

if a proper dental chair is not to hand an ordinary armchair may be utilized; failing this, two ordinary chairs may be placed back to back, on one of which the left leg of the operator should be raised to form a rest for the

patient's head. The patient should be placed in such an unconstrained position as will allow the operator to exert all necessary movements with freedom.

The operator should place himself so as to use his force to the greatest advantage. His left arm may be utilized, if necessary, for steadying the movements of the patient's head, while the fingers of the left hand can be employed—

(1) To keep the cheek and other soft parts away, so as to obtain a clear view of the tooth to be extracted and its immediate neighbours;

(2) To support the mandible;

(3) To grasp the alveolar process and so allow some idea to be gained of the effect of the force employed.

The special positions for the removal of different teeth will be described in chapter ii.

It may be advantageous, before describing the steps of the operation of extraction, to refer briefly to a few **points in the anatomy of the teeth and jaws** which have a direct bearing upon the technique of tooth extraction.

If the teeth be examined it will be noticed that they are capable of division into—

(1) Teeth with single, somewhat rounded, tapering roots;

(2) Teeth with single roots more or less irregularly flattened or curved:

(3) Teeth with multiple roots.

Under (1) are included the maxillary incisors (deciduous and permanent) and the mandibular premolars; (2) the mandibular incisors and canines (deciduous and permanent) and also the maxillary canines and premolars; (3) the maxillary and mandibular molars (deciduous and permanent) and frequently the maxillary first premolars.<sup>1</sup>

The shape of the roots, as we shall subsequently find, has an important bearing upon the manner in which force is to be applied when severing them from their attachments.

A correct acquaintance with the disposition of the alveoli of the teeth is of importance for skilful and successful operating. Fig. 15 gives a general idea of the appearance of the alveoli, but it is needless to say that a full knowledge can only be really gained by a careful study of the bones themselves; by this means, too, some idea of the strength of different portions of the alveolar borders can be obtained—a matter of some moment when applying force in the pro-

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<sup>1</sup> A description of the form of each tooth, with respect to its bearing upon the construction of forceps and its removal, will be found in chapter ii.

cess of removing a tooth from its socket. The points to be specially noted in the maxilla are

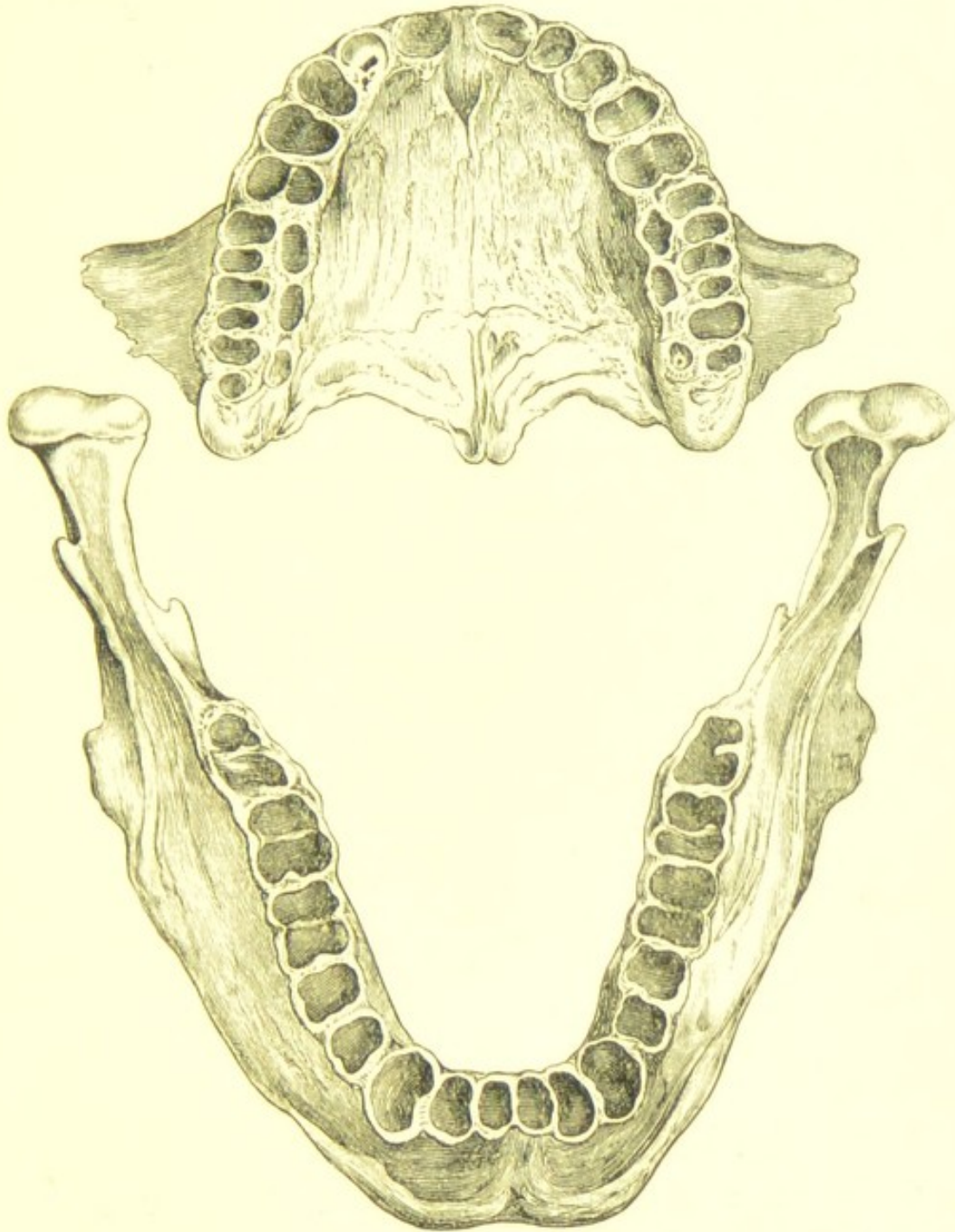


FIG. 15.  
(After Carabelli.)

the thinness of the outer alveolar wall as compared with the inner, the prominence of the canine socket, and the cancellous character of the bone in the region of the third molar. In the mandible the outer alveolar border will be seen to be thinner than the inner, with the exception of that portion in the region of the third, and often of the second molar; another fact worthy of attention is that at the posterior portion of the socket of the third molar the bone is moderately dense.

**When performed with forceps the operation of tooth extraction may be divided into three stages :—**

- (1) Adaptation of the forceps to the tooth.
- (2) Destruction of its membranous connections with, and dilatation of, the socket.
- (3) Removal of the tooth from the socket.

In the initial stage the **first step** is the application of the blades, and, in this connection, care must be taken to see that the edges pass between the gum and the tooth, and also that the blades are applied parallel with the long axis of the root. As a rule, it is best to apply one blade first on the side of the tooth most obscured from view, and then lightly to close the other upon the opposite side. The blades should then be forcibly pressed upwards or

downwards, as the case may be, in the direction of the apex of the root; a slight rotary or wriggling motion will often be found of assistance in the process. This "pressing" movement should be continued until a firm hold of the root has been obtained—a point of great importance, as upon it the successful removal of the tooth in a large measure depends. The handles should next be firmly closed, so as to give the blades a good grip, and the amount of pressure applied should be such that when movement has commenced the blades do not ride upon the surface of the root. The amount of pressure to be applied must naturally vary according to the character of the tooth to be removed, and the resistance offered by the alveolar process. The thumb placed between the handles of the forceps, as previously pointed out, should counteract the pressure applied to the root and prevent crushing, which, should it occur, may make the subsequent removal very difficult.

The **second stage**—the destruction of the membranous attachments and dilatation of the socket—is accomplished by employing force in either a rotary or a lateral direction. The movement to be employed depends upon the form of the root or roots to be removed and the

resisting strength of the surrounding hard structures, and at this point it need only be remarked that rotary motion is alone admissible in the case of teeth which possess a single conical root.

The **final stage** is carried out by exerting extractive force in the direction of the long axis of the tooth, and also in that of least resistance; the latter is determined by a knowledge of the anatomy of the alveolar border, and by the sensation conveyed to the hand through the forceps.

The **removal of a tooth with a straight elevator** is accomplished in the following manner: The blade, with the flattened surface towards the tooth to be removed, is inserted between the root and the alveolar process, the instrument being kept as far as possible parallel with the anterior surface of the crown. The blade is then forced downwards so as to reach the root at as low a point as possible; the handle of the elevator is then rotated away from the direction in which the tooth is to be removed. This has the effect of both raising the tooth in its socket and displacing it in the required direction. One such movement of the instrument rarely suffices for the removal of a tooth, a second, and sometimes a third grip, each time

nearer to the apex of the root, having to be obtained.

The method of using a curved elevator will be described in dealing with the removal of the roots of mandibular molars.

**The Screw.**—This instrument is occasionally useful for the removal of deep-seated roots. The tissues which cover the root must be carefully pressed aside until a clear view of the root is obtained. The screw is then worked into the pulp-canal in the root, and when sufficient hold has been obtained the necessary extractive force is applied.

**The Preparation of the mouth previous to extraction** does not always receive sufficient attention. The mouth should be thoroughly rinsed with an active antiseptic wash and the tooth to be extracted freed as far as possible from foreign matter. The gums around the tooth should then be swabbed with hydrogen peroxide (vol. xv). In cases where extensive extractions are to be carried out, it is a good plan to have the pockets around the teeth irrigated two or three times a day for one week with hydrogen peroxide. By the removal of the sepsis in the mouth, the local resistance of the tissues is raised and they react more readily to the injury caused by the extraction of the teeth.

The wound resulting from the removal of a tooth is a lacerated one, and heals by "granulation." The socket immediately after the operation becomes filled with coagulated blood, which is eventually replaced by granulation tissue, followed at a later period by the formation of loose cancellous bone.

A varying amount of absorption of the alveolar border always follows the removal of a tooth, the continuity in the surface of the gum being restored by ordinary cicatricial fibrous tissue.

The wound is best treated by keeping the parts carefully cleansed as far as possible from all foreign matter, and for this purpose an antiseptic mouth-wash<sup>1</sup> should be used several times a day. From the wound resulting from the extraction of a maxillary tooth the discharge drains away in a natural manner, owing to the orifice being the most dependent part. From the wound caused by the removal of a mandibular tooth such is not the case, and should suppuration take place the socket must be

<sup>1</sup> The following is a useful formula :—

R	Liquoris potassæ	...	...	...	5iv
	Acidi carbolici glacialis	...	...	...	5iv
	Aquæ	...	...	...	ad. 5iv

M. One teaspoonful to be used in half a tumblerful of warm water as a mouth-wash.

frequently syringed with some antiseptic solution.

**Local and general disturbances** following the extraction of teeth are rare, but they do occur.

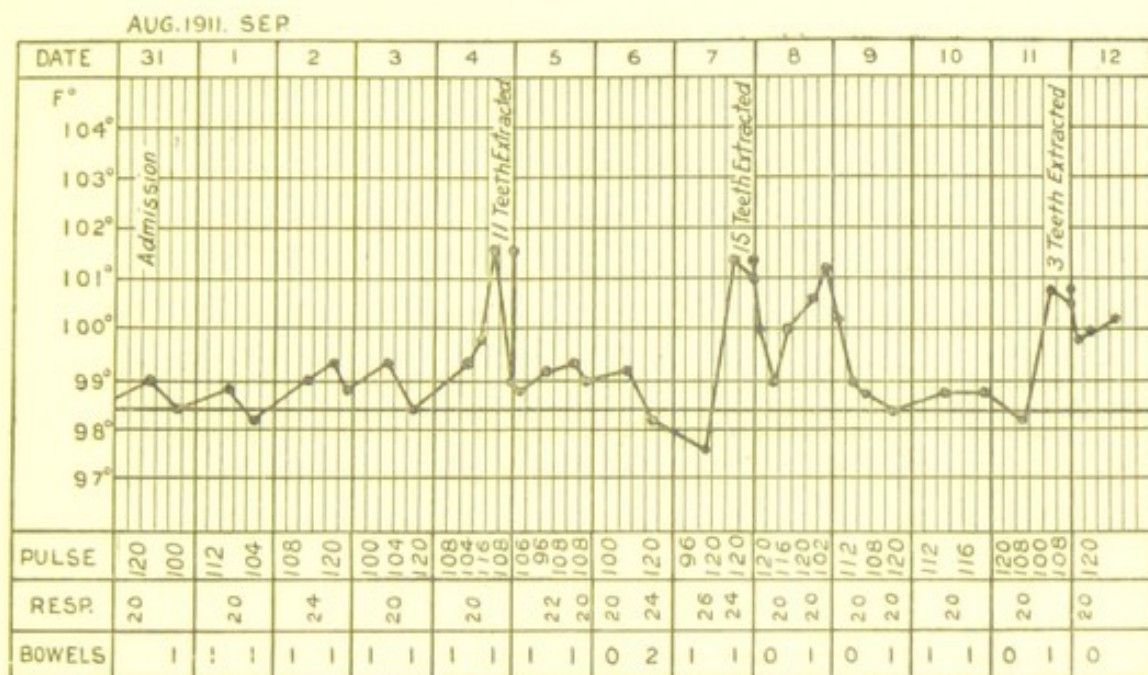


FIG. 16.

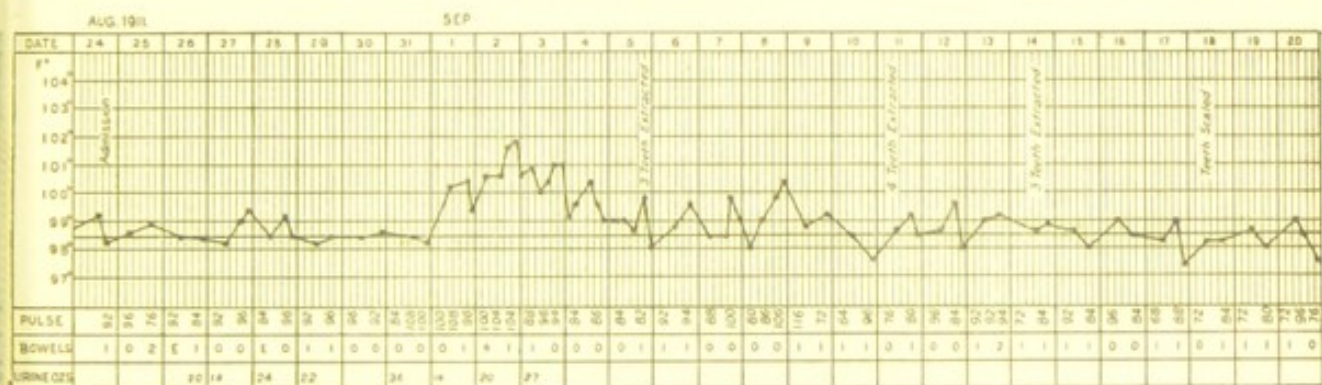


FIG. 17.

The chart depicted in fig. 16 was from a case of oral sepsis associated with a severe corneal ulcer. The removal of each batch of teeth was accompanied by a definite rise in temperature. As a contrast, the chart shown in fig. 17 is interesting. This was a case of suspected renal calculus, associated with marked oral sepsis. Here the temperature was unaffected by the extractions.

**The Extraction of the Deciduous Teeth.—**

Although the actual details of the extraction of the deciduous teeth do not differ from those of the permanent teeth, there are, nevertheless, one or two points to which attention may with advantage be directed. First and foremost, a child should not be deceived, and if it is necessary to extract a tooth, the child should be told, and not taken unawares. When, too, a child resists having a tooth removed, the operation must not be forcibly carried out, for by a little patience and moral suasion on the part of the operator, the better side of a child's nature can generally be gained. It should also be remembered that anæsthetics are quite as needful for the extraction of the deciduous as of the permanent teeth, the pain to be borne by a child being quite as great as that to be endured by an adult.

CHAPTER II.

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**The Extraction of Individual Teeth.**

(1) **MAXILLARY TEETH.** — For the removal of teeth in the maxilla the patient should be placed at such a level that the arm of the operator can, if necessary, embrace the head of the patient with comfort. The operator should stand at the right side of the patient, and slightly in front, the first finger and thumb being placed on either side of the alveolar process (fig. 18). In the event of the patient becoming restless, the arm should be shifted so as to encircle the head and hold it firmly.

(a) **Maxillary Incisors.**—The roots of both the maxillary central and lateral incisors are usually cone-shaped, the anterior surface being the arc of a greater circle than that of the posterior. Forceps for the removal of these teeth ought therefore to have the blades made in a corresponding manner (see fig. 19). The lateral incisor is smaller than the central, and has at times a root somewhat flattened. In

removing maxillary incisors the posterior blade is applied first, care being taken to see that the edge of the instrument passes between the gum and the tooth. To dislodge these teeth a firm inward movement should be made in a



FIG. 18.

direction towards the palate, this movement being followed by one in an outward direction. If this fails to dislodge the tooth from its attachments, a firm rotary motion, first to the

right and then to the left, may be tried (the amount of rotation necessary being only about an eighth of the circle represented by the circumference of the root). Rotation is

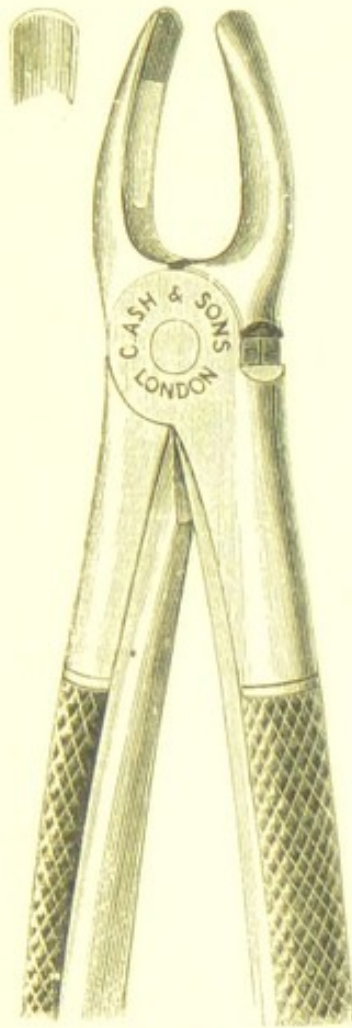


FIG. 19.

generally recommended in the first instance for the extraction of these teeth, but the inward movement is better, the teeth yielding

more readily and with less laceration of the soft tissues than under rotation.

The extraction of the roots of these teeth does not as a rule present much difficulty. When moderately sound the instrument shown in fig. 19 may be used, but in those instances where the root is very fragile, and lies well below the gum margin, a rather finer pair will be found more serviceable. The manner of removal is similar to that used when the crown is standing.

(b) **Maxillary Canines.**—These teeth, like the incisors, are single rooted, but the difference between the curve of the anterior and posterior surfaces is greater. The roots, too, are much longer, more firmly implanted, and hence require more force in their removal. Forceps similar in pattern to those used for incisors may be used, the severance of the tooth from its attachments being brought about by force applied in an inward, followed by an outward, direction. The root being more or less three-sided, rotation cannot well be adopted.

The roots of canine teeth are to be removed in the same manner as that adopted for the whole tooth.

(c) **Maxillary Premolars.**—The first premolar has usually one root flattened and more or less

---

longitudinally grooved on its mesial and distal surfaces. If this grooving is much marked, it results in a greater or less division of the root into two slender terminations. Whether such bifurcation exists or not can seldom be determined before operation and would not modify the method to be adopted, but the tendency to this variation should be borne in mind and the lateral movement be very gently applied. The internal and external surfaces of the root are for all practical purposes of equal curvature.

The second premolar has usually only one root, which is not so flattened in the antero-posterior diameter as the first. There is also not the same tendency to grooving or bifurcation of the root as there is in the first premolar.

The blades of forceps for the premolars should be equal segments of the same circle; they should also be bent at an angle with the handles, so that the latter may clear the lower lip. The forceps shown in fig. 20 is a useful pattern. In removing a maxillary premolar the inner blade of the forceps should be applied first. For severing the tooth from its attachments a slight inward movement should first be made, followed by an outward one. If this fails to cause the socket to yield, the inward

movement may again be made, followed by an outward one, and repeated if necessary. The removal of the tooth from its socket is to be carried out by force applied in a down-

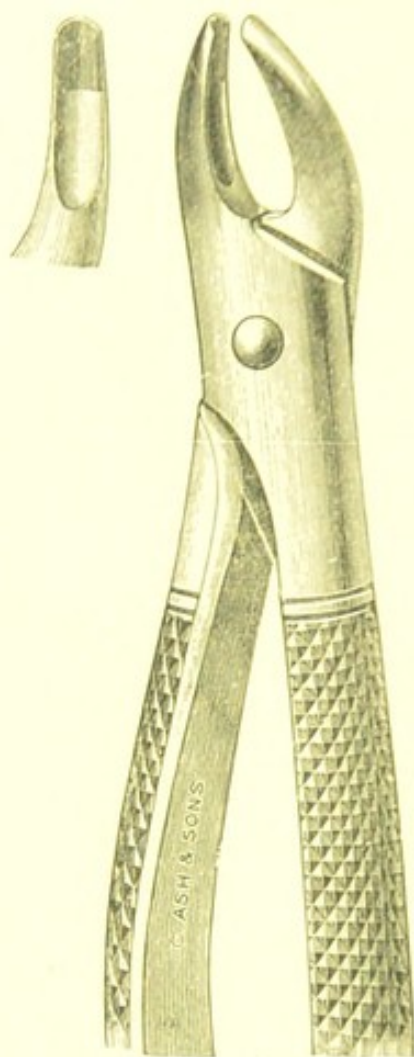


FIG. 20.

ward and outward direction. The removal of premolar roots is carried out in a manner similar to that for the whole tooth.

(d) **Maxillary Molars.**—The first maxillary molar has three roots, one internal towards the palate (palatine), and two external (buccal); of the three the palatine is the largest, sub-

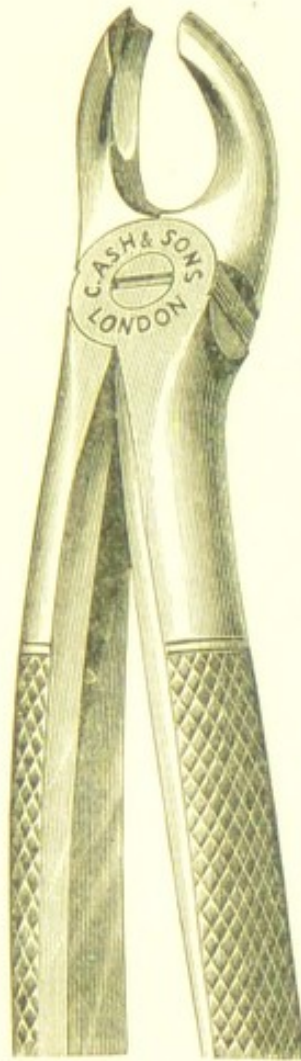


FIG. 21.

cylindrical in form, and often curved. The two buccal roots are placed in an anterior and posterior position, the latter being in a plane

internal to the anterior one; both these roots are somewhat flattened, and of the two the anterior is the larger. The roots of the second molar are similar in shape to those of the first, but are usually smaller. The third molar, when normal, has three roots, but very frequently these are all fused together so as to form an abrupt tapering cone, the point of which is often curved.

Owing to the disposition of the roots different forceps will be required for the removal of maxillary molars on the right and left sides. Of the blades, the outer or buccal should possess two grooves, the anterior being the broader and placed in a more external plane. This blade should also have a slight projection between the grooved surfaces to adapt itself to the space between the buccal roots. The inner or palatal blade should possess only one groove. A well-made pair of maxillary molar forceps should fit the neck of a first maxillary permanent molar accurately. The blades should be bent at an angle with the handles, so that when in use the latter may clear the lower lip (fig. 21). The palatine blade should be applied first, and in bringing the outer blade into place the point should be kept over the groove on the buccal side of the

tooth, as this groove is a guide to the space between the outer roots. To sever these teeth from their attachments force must be applied first slightly inwards and then outwards, the

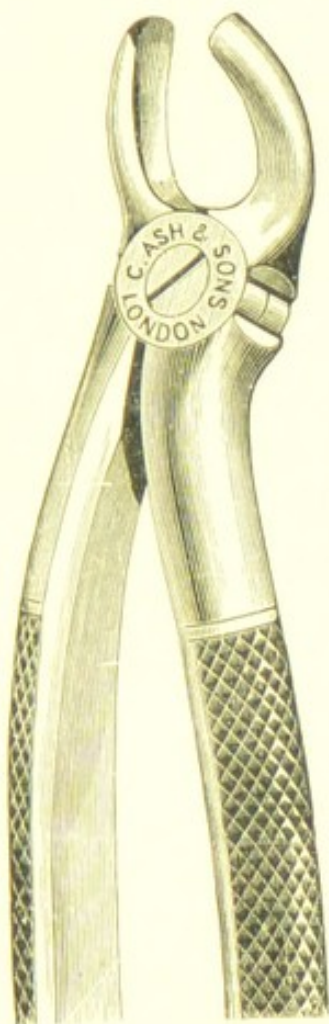


FIG. 22.

movements being repeated if necessary, the removal of the tooth from the socket being carried out by exerting force in a downward and outward direction. Too much outward

movement leads to undue bending or fracture of the external alveolar plate.

In removing the third molars it is not advisable to have the patient's mouth opened to the fullest extent, as the tension of the tissues of the cheek will thereby be lessened and a clearer view of the outer side of the tooth thus gained. The application of the forceps is of the utmost importance, as one is liable, unless care is taken, to include some of the



FIG. 23.

- (a) Normal maxillary first permanent molar.
- (b) Oblique-rooted maxillary first permanent molar.
- (c) Normal maxillary second permanent molar.
- (d) Oblique-rooted maxillary second permanent molar.

soft tissues between the blades and the tooth and so cause a painful laceration. Force applied inwards and then outwards is generally sufficient to loosen these teeth, their removal being carried out by a downward and then slightly outward upward movement.

Forceps similar to those shown in fig. 21 may be used for the removal of the third

molars, but many operators use patterns the blades of which are similar segments of the same circle (fig. 22).

There is an **abnormality of the maxillary molars** which may with advantage be mentioned here. In this deformity the posterior buccal root is situated in a plane much internal to the anterior—in other words, it is an exaggeration of the normal arrangement. Such teeth have been termed by Mr. Booth Pearsall "**oblique-rooted**" (fig. 23). The abnormality is met with most frequently in the third molar, sometimes in the second, rarely in the first. The difficulty encountered in extracting these teeth is that the outer blade of the forceps tends to slip round. Oblique-rooted teeth can at times be diagnosed by noting an undue prominence of the alveolar process over the anterior buccal root, and are best removed with forceps similar to that shown in fig. 22.

**In cases where a portion of the crown remains and the decay extends well below the gum** on either the palatal or buccal side, ordinary molar forceps should be discarded and root forceps employed; useful patterns are shown in figs. 20, 24 and 25. The removal of teeth in this condition is carried out as follows, and for the sake of description it will be supposed that the

decay extends deeply on the palatine side. One blade of the forceps should be first applied to the buccal side of the tooth and to the root

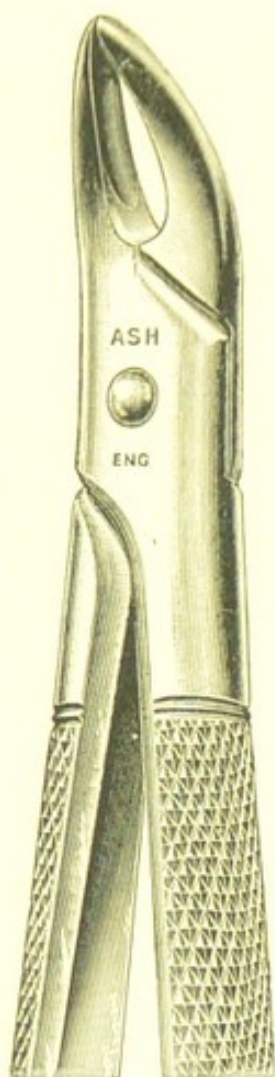


FIG. 24.

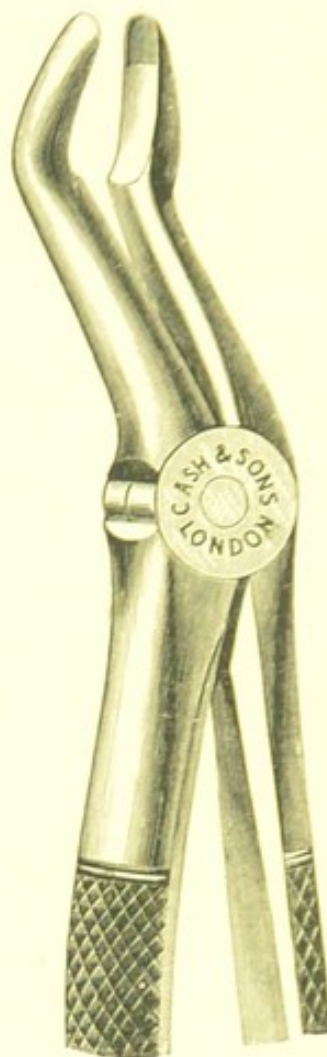


FIG. 25.

For the removal of roots towards the back of the mouth.

which is considered the stronger; the inner blade should then be applied to the palatine root, care being taken to insinuate it between

the alveolar process and the root. The forceps should then be pushed well upwards until a firm hold of the root is obtained. A firm inward movement should then be made, as this will allow the inner blade to pass still higher up the palatine root and insure steadiness should the blades tend to ride upon the surface of the roots. An outward movement should next be made, but to nothing like so great a degree as that used in extracting molars with the whole of the crown standing. This inward and outward movement is to be repeated until the tooth is freed, the force being principally applied in the inward direction.

When the more extensive decay has taken place on the buccal side the order of proceeding is slightly different. The first blade to be applied should be the palatine, the outer blade being closed upon whichever of the buccal roots is considered the stronger.

The extractive force should be applied first outwards and then inwards, these movements being repeated if necessary, the principal force being outwards, as the object in view is to prevent the instrument slipping off the more decayed side.

**When a molar is so decayed that but little of**

the crown remains, but all the roots are still united, root forceps are indicated. In such a case the inner blade is to be applied to the palatine root first, the outer blade being closed upon the stronger of the buccal roots. Inward followed by outward movement should be employed, the point to bear in mind being to use force towards the side of the tooth which is considered the weaker. In the majority of such cases the three roots come away together, but even if this does not happen, one or perhaps two will be removed, the remainder being subsequently removed with but little difficulty.

**In cases where the resistance presented by the roots is very great** and an unsuccessful attempt has been made with ordinary root forceps, an instrument with a buccal blade similar to that shown in fig. 26 may be used. The inner blade is first applied, the outer one being brought so as to come, if possible, into the space between the buccal roots. A firm hold of the roots having been gained, an attempt to extract should be made by force applied in an inward and outward direction; this failing, sufficient pressure should be put upon the handles to split the roots asunder. The sharp outer blade of the forceps will then pass between the divided buccal roots on to the palatine root,

which can thus readily be brought away. A pair of ordinary maxillary root forceps should be employed for removing the buccal roots.

**If all the three roots of a molar are separate,**

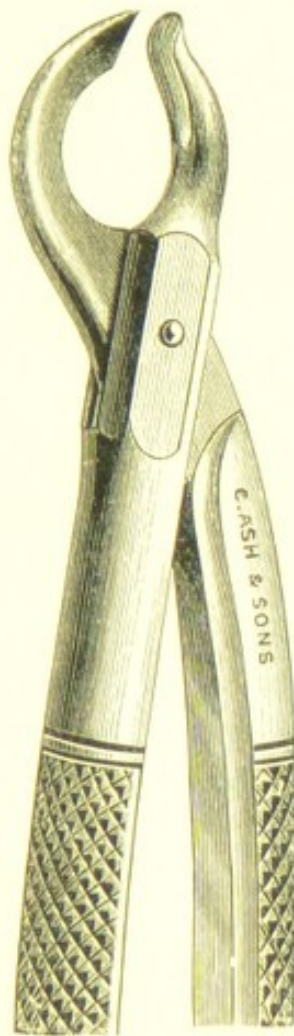


FIG. 26.

their extraction presents but little difficulty, a slight rotary movement generally sufficing.

In all cases where there is a fear of a molar fracturing, root in preference to ordinary forceps should be used.

(2) **MANDIBULAR TEETH.**—For the removal of mandibular teeth the patient should be placed on a low level, the head being kept a little forward and the chin depressed. The position of the operator will naturally differ



FIG. 27.

with the tooth to be removed and also with the instrument to be used. With teeth on the right side, when hawk's-bill pattern forceps or elevators are used, the operator should stand behind and to the right of the patient,

the left arm being brought round the patient's head. The thumb of the left hand should be placed on the inner side and the first finger



FIG. 28.

on the outer side of the alveolar process of the tooth to be removed, and the three remaining fingers under and supporting the chin.

In placing the fingers in the mouth, care should be taken to keep the wrist well down so as not to impede the entrance of light (fig. 27).

When removing the anterior teeth or those on the left side of the mouth, the operator should stand on the right side and slightly in front of the patient. The left hand should be placed as follows: The second finger on the lingual side, and the first on the labial side of the alveolar process of the tooth to be extracted, the thumb being placed under the chin (fig. 28).

When employing forceps of the straight pattern, shown in fig. 32, the operator should stand as shown in fig. 28, but it will be found difficult to place the fingers of the left hand on either side of the alveolar process; indeed, they can only well be used for retracting the cheek and supporting the mandible.

In removing teeth from the mandible, the operator should be careful, in raising the tooth from the socket, to guard against a sudden separation of the tooth from its attachments which might result in damage to the maxillary teeth.

(a) **Mandibular Incisors.** — Each of these teeth has a single root which is much flattened laterally. For their removal, forceps similar to those shown in fig. 29 should be used, the

blades being equal segments of the same circle. The lingual blade should be applied first, the loosening movement being made by taking the tooth slightly inwards and then outwards, the

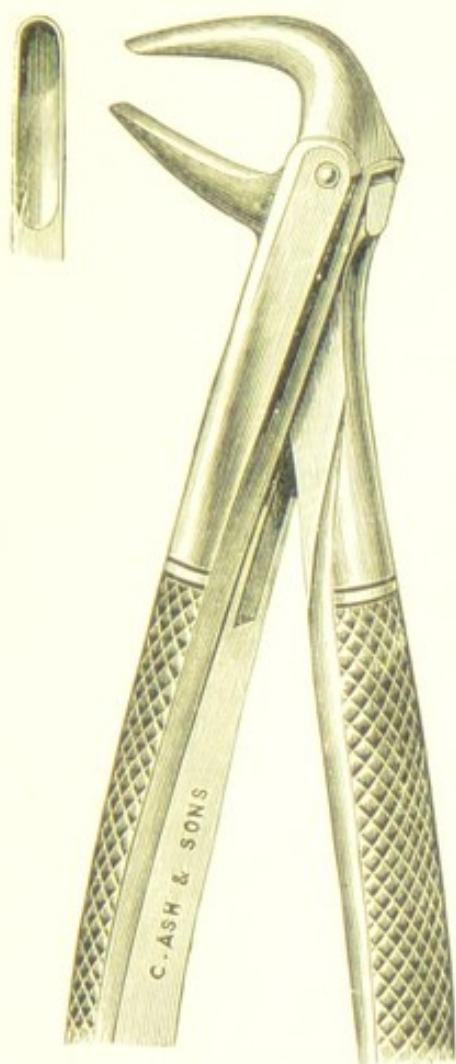


FIG. 29.

final extractive force being upwards and outwards.

The removal of mandibular incisor roots is carried out in a similar manner.

(b) **Mandibular Canines.** — The mandibular canines have normally one root, which is flattened laterally. In comparison with the incisors, the root is stronger and longer. The removal of a mandibular canine is carried out in a manner similar to that employed for a mandibular incisor, but as the tooth presents more resistance, a greater amount of force is usually required.

(c) **Mandibular Premolars.**—The mandibular premolars have normally one root which is conical in shape. In the first premolar the conical shape of the root is not so marked as in the second, the outer aspect being the arc of rather a larger circle than the posterior. Forceps similar to those shown in fig. 29 may be used, the blades for all practical purposes being equal in size and shape. The lingual blade of the instrument should be applied first, the severing of the tooth from its attachments being carried out by a slight rotary movement around the long axis of the tooth first in one direction and then in the other; should this not succeed, a slight inward followed by an outward movement may be tried, the tooth being raised from its socket by force applied in an upward and slightly outward direction.

The roots of mandibular premolars are to

be removed in a manner similar to that required for the extraction of a whole tooth. When the root lies much below the level of the gum the extraction is often troublesome owing to the difficulty in gaining a hold with the blades of the forceps.

(d) **Mandibular Molars.**—Mandibular molars have two roots, placed anteriorly and posteriorly. The roots are much flattened and have a tendency to curve backwards, this being well marked in the second and especially so in



FIG. 30.

the third molar; a fusion of the two roots is at times met with in the second and frequently in the third molar. A section of a mandibular molar at the neck shows both the buccal and lingual aspects to be composed of two segments of a circle which touch each other at one extremity; the anterior segments being slightly the larger (fig. 30). Each blade of the forceps used for these teeth should possess two grooves, separated by a projection which fits into the division between the anterior and

posterior roots; for all practical purposes the blades may be made of the same size, so that one instrument will suffice for right and left sides. The instrument best adapted for the



FIG. 31.

FIG. 32.

removal of these teeth is shown in fig. 31, though some operators prefer the shape illustrated in fig. 32. The advantages of the former over the latter may be briefly summed up as follows:—

(1) A clear view of the tooth and its surroundings can be obtained during the whole period of removal.

(2) Force can be applied with greater advantage.

(3) The alveolar process can be easily embraced by the fingers, or by the finger and thumb of the left hand.

(4) In removing the tooth from the socket a slight backward movement can be employed.

One disadvantage of shape fig. 31 is that it is difficult to employ much inward movement, and therefore, for teeth lying inwards, namely, with the crown directed towards the tongue, hawk's-bill-shaped forceps cannot easily be used.

Another disadvantage is that the extent of inward movement is limited by the proximity of the maxillary teeth, and in case of "trismus" it is often better to use straight forceps (fig. 32). In cases which are accompanied by much swelling and rigidity of the cheek the straight forceps cause less inconvenience to the patient than the hawk's-bill.

In removing mandibular molars with forceps, the inner blade should be first applied and then the outer, care being taken to get the points of the blades between the interspace of the

---

roots. For severing these teeth from their attachments, a slight inward movement should be first made, followed by one well outwards, these inward and outward movements being repeated if necessary. The removal of the tooth from its socket is carried out by force used in an upward and outward direction. The upward force exerted upon mandibular teeth should always be well under control, as not infrequently the resistance is very suddenly overcome, and, if such precaution be not taken, there is danger of striking the maxillary teeth with considerable force.

As previously pointed out, the roots of these teeth are at times curved a little backwards, so that it is often needful in removing the teeth from their sockets to twist the forceps in a curved direction backwards.

In the removal of the second molar too much outward movement is not permissible, as the outer part of the alveolar process is often very dense.

The third molar is best removed with a straight elevator. A glance at the illustration of this tooth (fig. 33) will show that the roots have a well-marked curve backwards, in addition to which the bone forming the socket of this tooth is stronger than is the case with the anterior molars. The removal of the third molar has therefore to be accomplished by

using force in a direction upwards and backwards, in other words, in a curve similar to the arc of the circle formed by the roots. This movement cannot well be carried out with forceps, but is easily accomplished with the

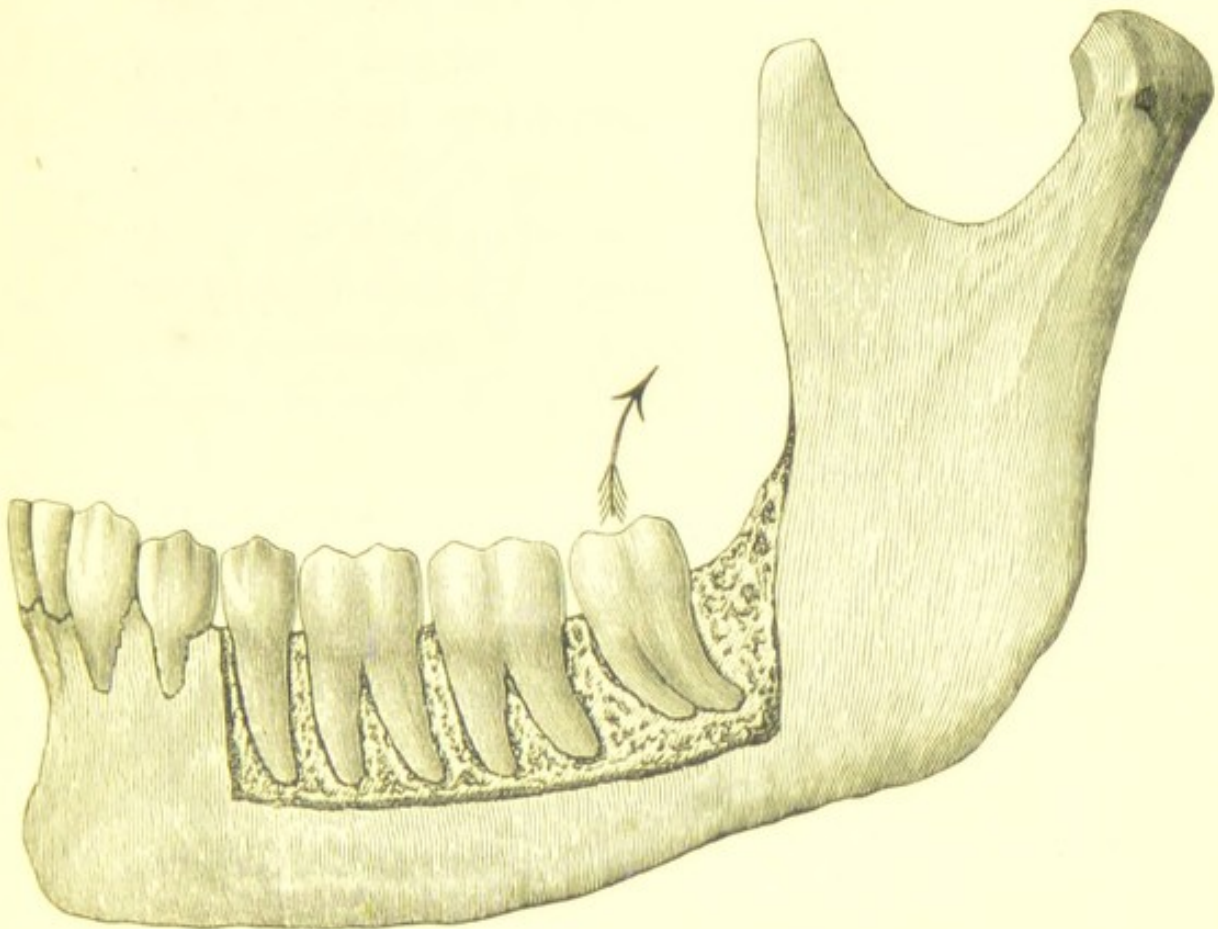


FIG. 33.

elevator as follows (it being assumed that the second molar is in place): Hold the elevator as shown in fig. 13, and insert the blade between the anterior surface of the root and the alveolar process, keeping the flattened side

of the instrument as far as possible parallel with the root surface. Then force the blade downwards in the direction towards the apex of the root; following this, rotate the handle away from the direction in which the tooth is to be moved. This has the effect of both raising the tooth in its socket and displacing it backward. The edge of the elevator which is to be brought into contact with the surface of the root should be sharp so as to cut somewhat into the cementum. Should this prove insufficient the handle should again be raised and the flattened surface of the instrument brought parallel with the anterior surface of the root and the extractive movement repeated until the tooth is completely raised from its socket.

In using the elevator, especial care must be taken to protect the tongue with the fingers or thumb of the left hand, so as to prevent a slip, which might result in puncture of the tongue, or of the operator's finger.

With the mandibular third molar there is a tendency for the gum to adhere tenaciously to the posterior part of the neck of the tooth. When this happens it is best simply to raise the tooth from its socket with the elevator or forceps, as the case may be, and then to cut

the gum away with a pair of curved scissors. By this method a severe laceration of the gum may at times be avoided.

When the third molar is isolated owing to the absence of the second molar, the elevator may still be employed for its removal, on the right side the first finger being used as the fulcrum, and on the left side the thumb of the left hand. In such cases, however, many operators prefer to use ordinary lower molar forceps.

At times the isolated third molar may be situated with a distinct tilt forward and inwards. Extraction under these conditions is best carried out with forceps of the pattern illustrated in fig. 20. The operator stands in front of the patient, the forceps being held in the hand as shown in fig. 10. The blades are applied as nearly as possible parallel to the long axis of the root, the tooth being loosened by slight inward and outward movements. If the tilt forward is very marked, an instrument of the pattern shown in fig. 19 may with advantage be employed.

**The removal of mandibular molars when a portion of the crown is standing, but the decay has progressed below the gum on either the**

buccal or the lingual aspect, is carried out with root forceps of shape shown in fig. 29. A condition similar to this in maxillary molars, with the method indicated for their removal, is referred to on page 31. The principles enumerated there apply equally to the removal of mandibular molars, so that it is not necessary to repeat them. The main points to bear in mind are, to apply the blades of the forceps to the stronger root, and to use the principal force in the direction of the weaker wall.

**Where the roots of molars are still united,** root forceps should be used, the blade being first applied to the lingual surface of the stronger root. A firm hold having been obtained, the root may be removed by employing force in a manner similar to that employed with ordinary molar forceps. In this way both roots will usually come away together. If, however, only one root is extracted, the remaining one can easily be removed, either with the same forceps or a curved elevator. The curved elevator (fig. 51) may be employed either by placing it against the root, and so forcing it into the socket of the root already removed, or by placing the blade in the socket of the extracted root, forcing the point of the

instrument through the intervening bone, and then elevating the remaining root.

**With roots of mandibular molars which present great resistance, forceps with cutting**

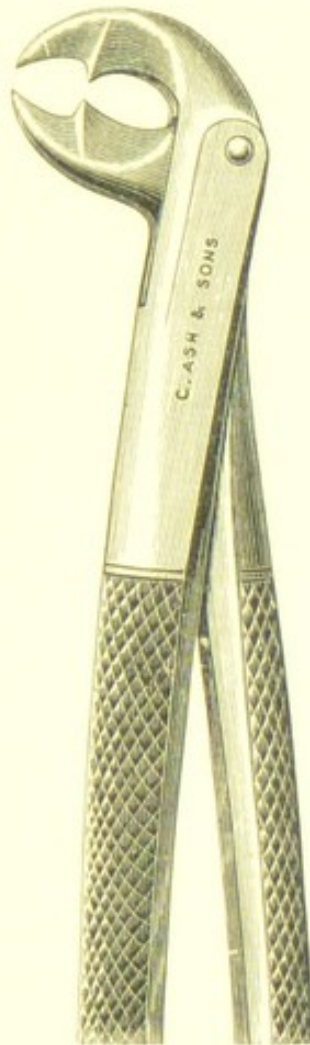


FIG. 34.

blades may be used (fig. 34). The blades are inserted on the lingual and buccal aspects of the arch in such a manner that the points pass into the space between the roots. The handles

are then closed and an attempt is made to remove the roots in the ordinary way, but should this prove unsuccessful the handles must be forcibly closed, so as to divide the roots, which can then, as a rule, be removed with ordinary root forceps.

The value of splitting roots in a case similar to that shown in fig. 35 is apparent, for, as will

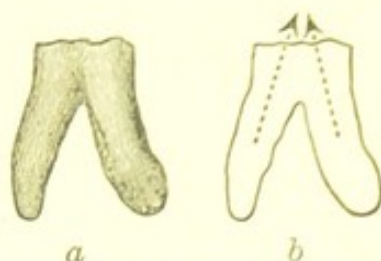


FIG. 35.

(a) Mandibular molar with divergent roots. (b) The dotted lines show the direction in which the roots can be removed if the tooth is divided as suggested in the text.

be seen, it allows each root to be removed in the line of its inclination.

**In those cases where the roots are separated** their removal is carried out with root forceps, an inward and outward movement being usually sufficient.

The roots of third molars are best removed with a straight elevator. The *modus operandi* is similar to that used in extracting the whole tooth.

*At times the mandibular molar teeth are much*

*tilted in such a way that the crown surface stands towards the tongue.* Under such conditions their removal is best carried out with instruments of the pattern shown in fig. 32, since the handles of forceps of the hawk's-bill pattern when applied would come in contact with the maxillary teeth, and thus impede the inward movement which is so necessary for the removal of teeth in this position.

**The Deciduous Teeth.** —For the removal of maxillary incisors and canines, a small pair of straight forceps of the pattern shown in fig. 36 should be used. The first maxillary deciduous molars are best removed with a pair of forceps like fig. 37.

The mandibular incisors and canines require a small pair of hawk's-bill forceps similar to the shape shown in fig. 29. For the mandibular deciduous molars a small pair of forceps similar to that illustrated in fig. 31 should be used.

In removing the deciduous teeth, care must be taken not to drive the blades of the forceps too deep, for fear of injuring the permanent teeth; this is more especially to be noted in connection with the deciduous molars, as the roots of these teeth practically embrace the crowns of the premolars.

Roots in the condition shown in fig. 38 are

best removed with an elevator as follows: The thumb of the right hand being placed on an

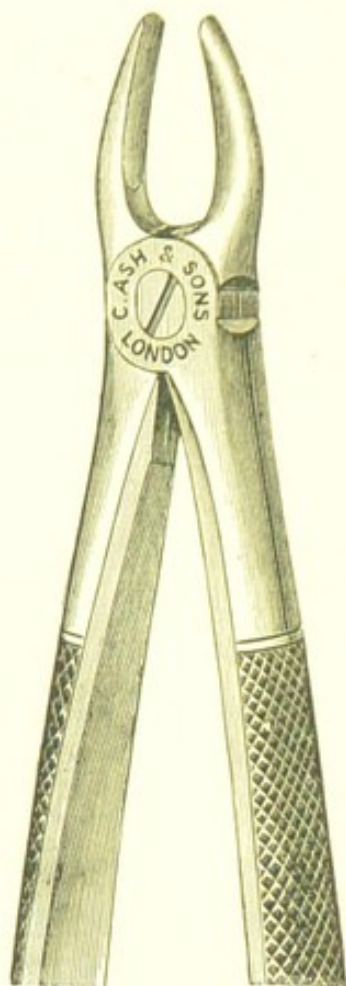


FIG. 36.

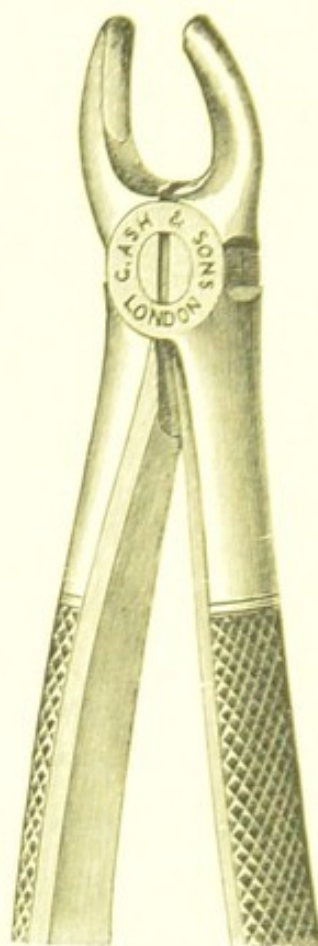


FIG. 37.

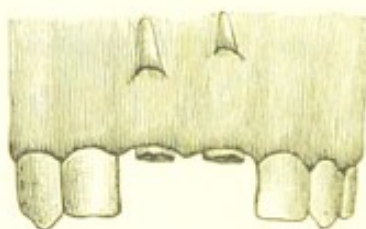


FIG. 38. (After Coleman.)

adjacent tooth so as to gain a hold, the point of the elevator should be placed below the end

of the root and force applied. In a few cases it may be necessary to cut the gum with a lancet before using the elevator.

Small pieces of the deciduous teeth which persist and become wedged in between the permanent teeth can be best removed with an excavator or a similar suitable instrument.

CHAPTER III.

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**The Extraction of Misplaced Teeth.**

NOTHING, perhaps, tests the skill of a good operator more than the extraction of a misplaced or impacted tooth, and although it is

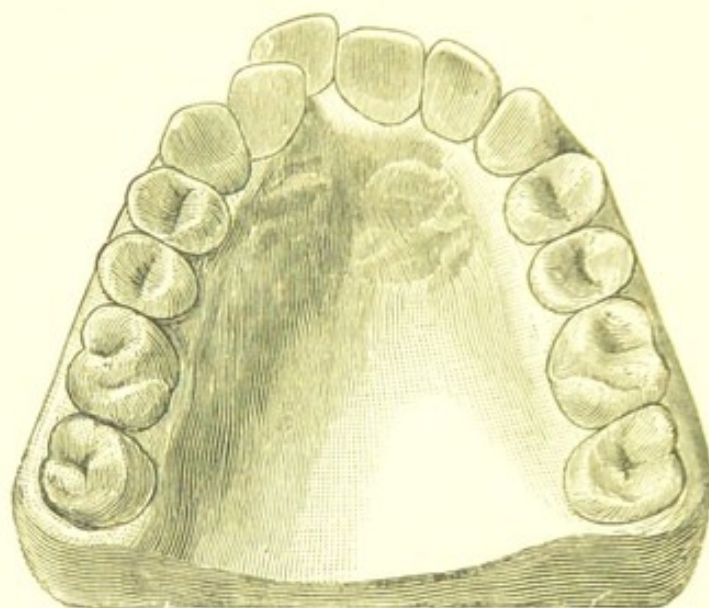


FIG. 39.

impossible to give anything like a complete list of the various malpositions met with, those most commonly seen will be mentioned, and the usual method for removing such teeth indicated.

(a) **Maxillary Central Incisors.**—The extraction of an irregularly placed incisor as shown in fig. 39 is best carried out with an instrument similar to that shown in fig. 40, the

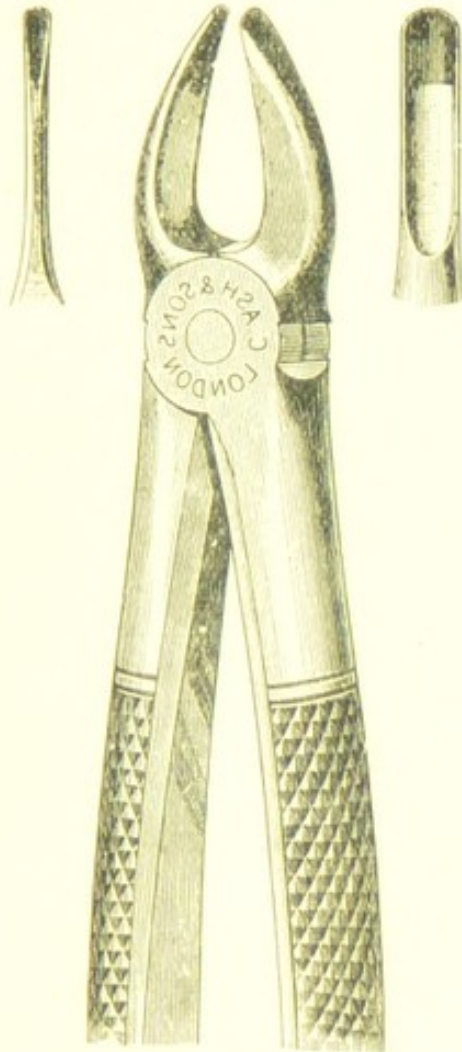


FIG. 40.

fine inner blade being applied on the palatal side and the broad blade on the labial. Extractive force should be applied principally in the outward direction, and if this is not

sufficient, slight rotary movement should be tried. In cases where there is less room between the approximal teeth, the projecting tooth may be removed with a pair of straight forceps (fig. 19), the blades being applied to the mesial and distal aspects of the root. The blades should not be driven very far up, and the loosening of the tooth should be accomplished

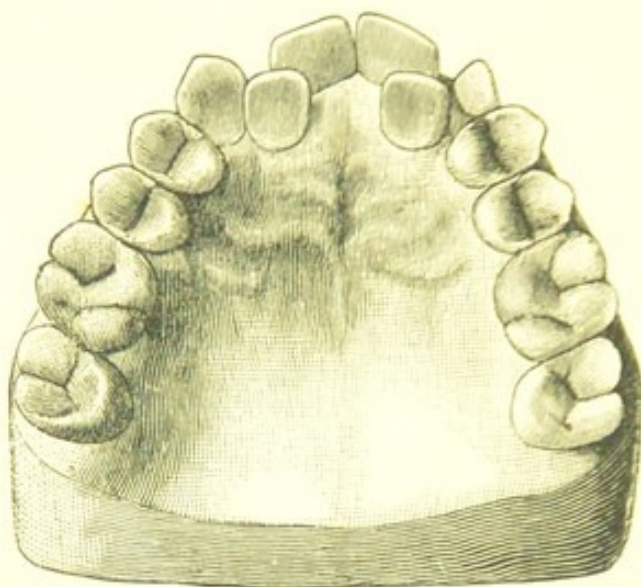


FIG. 41.

by slight rotary motion, in using which care should be taken to avoid loosening the approximal teeth.

(b) **Maxillary Lateral Incisors** which lie internal to the arch, as shown in fig. 41, can be removed with the forceps shown in fig. 40 by placing the fine blade on the labial and the broad blade on the palatal side of the tooth.

Extractive movement should be made inwards, followed by very slight outward movement; this failing, rotation should be tried, but, as pointed out on a previous page, this form of movement is not so suitable for lateral incisors as for central incisors.

(c) **Maxillary Canines** placed high in the arch, as shown in fig. 42, may be extracted

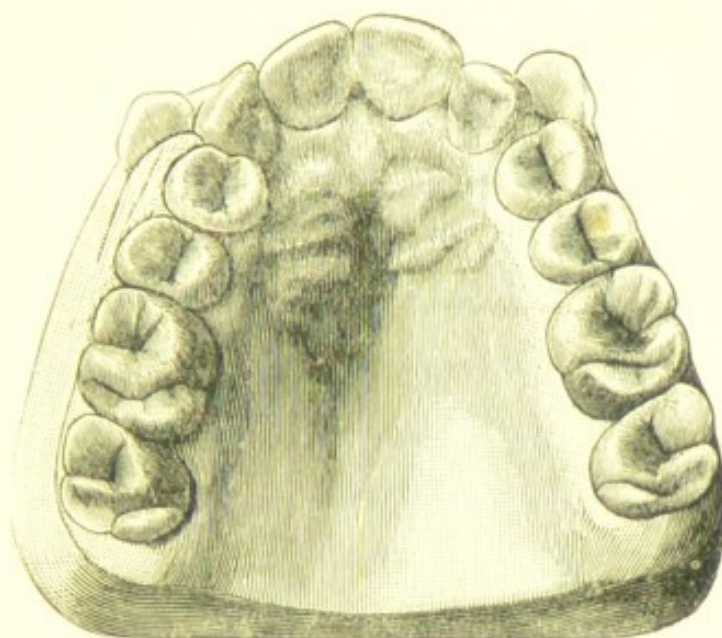


FIG. 42.

with a straight pair of forceps (fig. 19), the blades being placed on the mesial and labial aspects of the root. Extraction of such teeth is very difficult. Slight but firm rotation may first be tried; should this fail to loosen the tooth, slight lateral movement may be attempted, the force being applied towards and then away from the median line of the mouth.

(d) **Maxillary Premolars** misplaced, as shown in fig. 43, can be removed with forceps, as shown in figs. 20 and 24, the blades being applied to the anterior and posterior aspects of the tooth. Force should be applied in a backward and forward direction, the movements being repeated and persevered with until the tooth is loosened in its socket.



FIG. 43.

A premolar placed as shown in fig. 44 can be removed with forceps similar in form to those depicted in figs. 20 and 24, with the outer blade strong but narrow. The extractive movement should be made mainly in an inward direction.

(e) **Mandibular Central Incisors** placed similarly to that shown in fig. 45 may be removed

with ordinary lower root forceps (hawk's-bill pattern), the blades being placed on the mesial and distal surfaces of the root, and movement

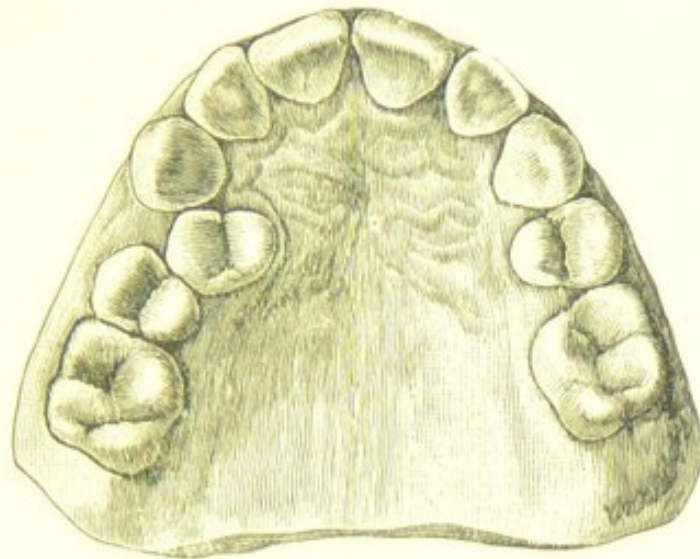


FIG. 44.

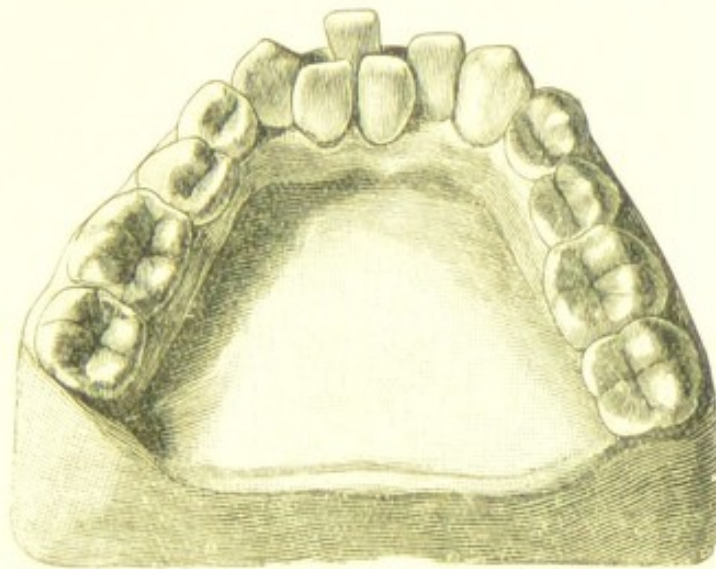


FIG. 45.

applied in a direction to and away from the median line of the mouth. When the crowding

is not so extreme as shown in fig. 46, forceps of the hawk's-bill pattern with a strong but narrow inner blade should be used (fig. 47), and the principal extractive movement made in an outward direction. For an incisor placed as shown in fig. 49, the narrow blade should be the outer one (fig. 48), and the principal force should be applied in an inward direction.

(f) **Mandibular Premolars** placed as in fig. 50 are most difficult teeth to remove. One of the

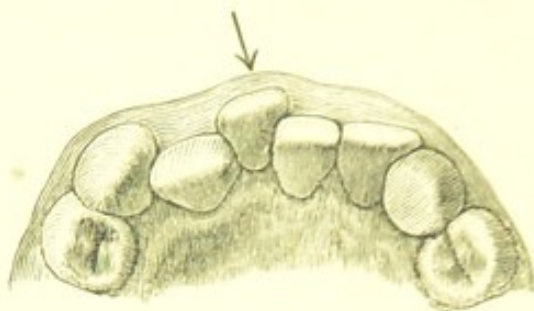


FIG. 46.

most useful instruments for their extraction is a pair of upper root forceps (Read's pattern, fig. 24), which should be held so that the curve of the blades is downwards. The blades should grasp the root on its anterior and posterior surfaces. Slight rotary movement may first be attempted, followed by lateral motion. These movements may be persevered with until the tooth is found to yield. Too much haste may lead to a fracture, which would be extremely difficult to deal with.

In cases where the crowding is not so great, and the tooth is more in the normal line of the arch, a forceps with a narrow outer blade will suffice (fig. 48). Extractive force should be

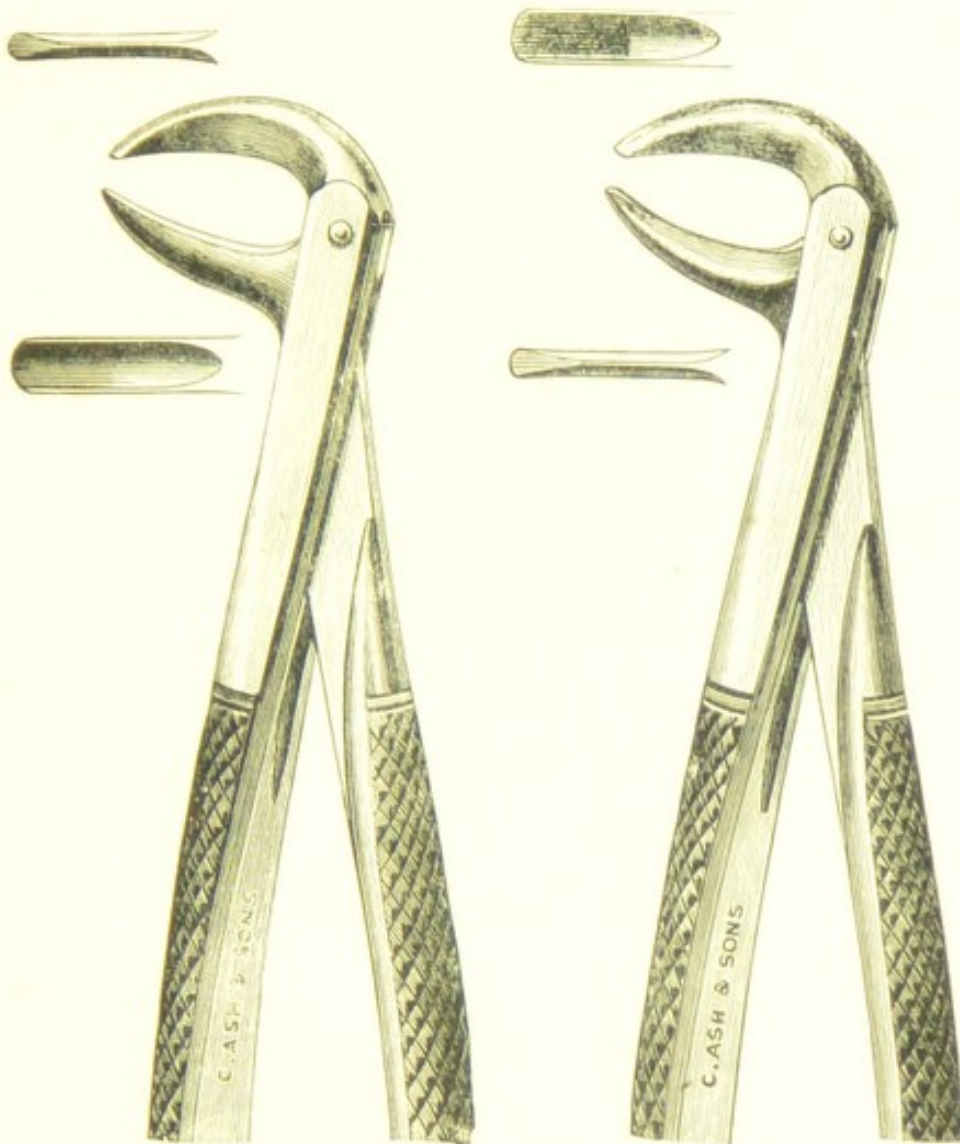


FIG. 47.

FIG. 48.

used principally towards the median line of the mouth, and this may be combined with slight rotary movement.

(g) **Mandibular Third Molars.**—For the successful removal of misplaced third molars a thorough knowledge of the position of the tooth and its relations to the surrounding parts

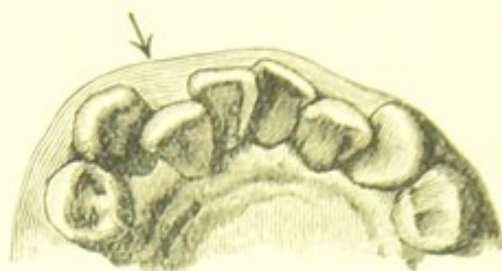


FIG. 49.

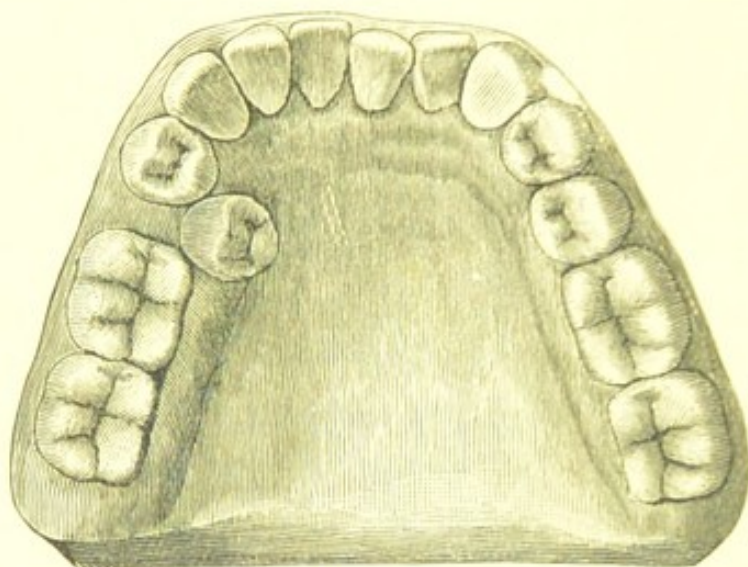


FIG. 50.

is necessary. The misplaced tooth may only present a slight tilt forward, as shown in fig. 52, or it may be placed almost horizontally (see fig. 53). In other instances the tooth may be so placed that the occluding surface looks downwards and inwards (see fig. 54), or the

tooth may have travelled into the ascending ramus. If the specimen shown in fig. 53 is

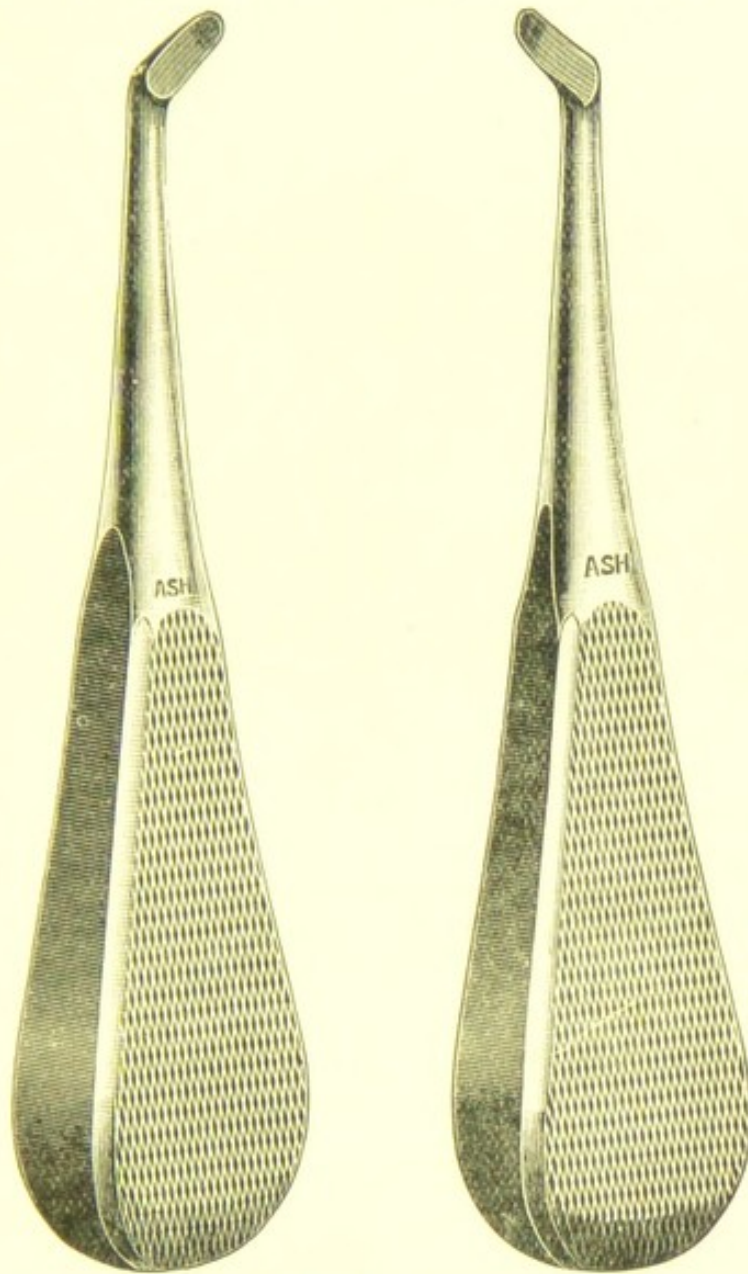


FIG. 51.

examined, three points are noticeable:—

(1) The root of the third molar is to a

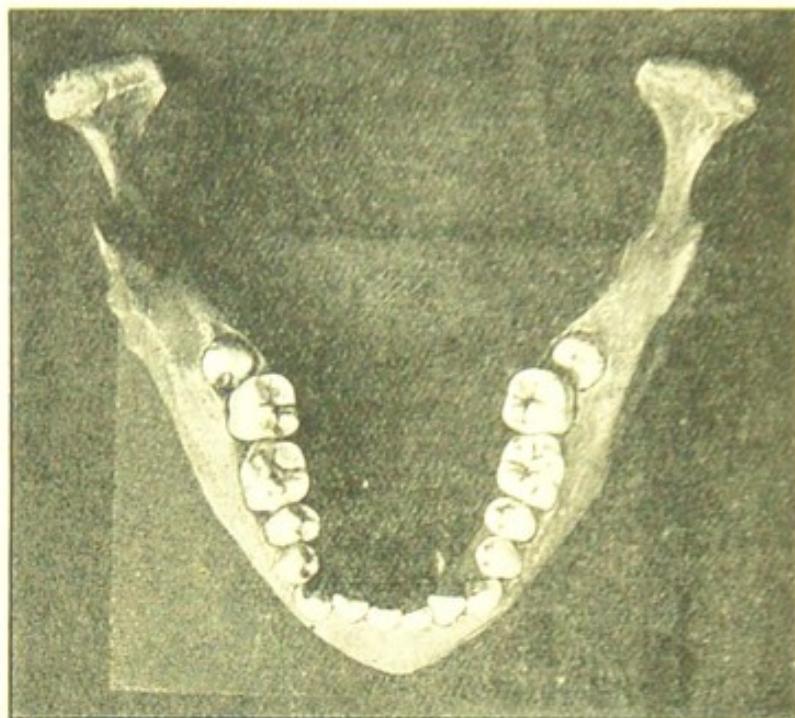


FIG. 52.

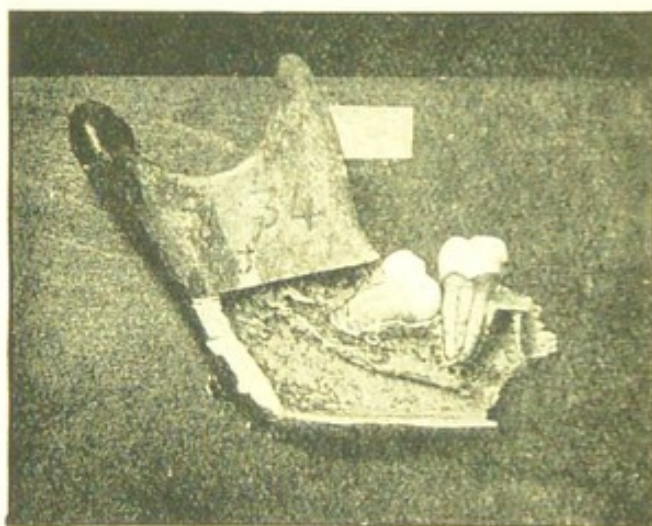


FIG. 53.

greater or lesser extent covered by the ascending ramus;

(2) The root of the tooth is in close proximity to the mandibular canal;

(3) The small amount of bone which is present at the posterior aspect of the second molar.

In cases in which there is the slightest uncertainty of the position of the misplaced tooth a radiograph should be obtained. If the case to

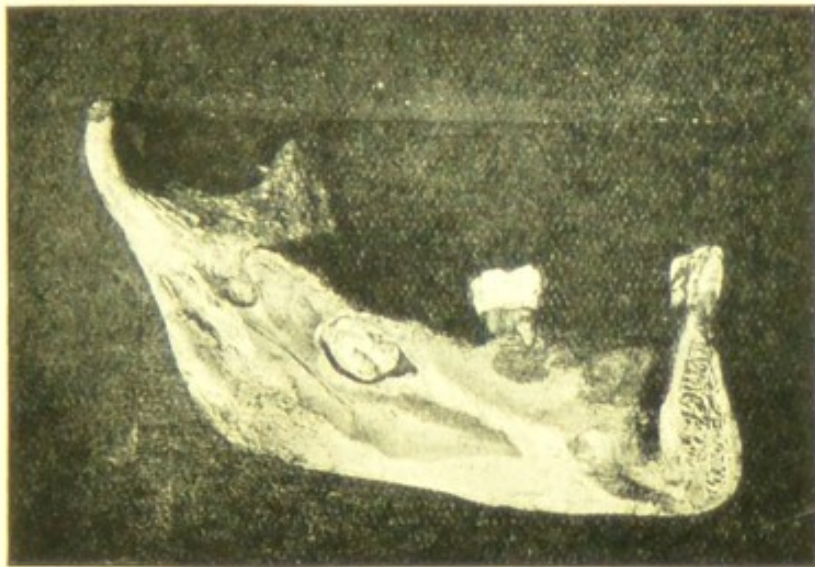


FIG. 54.

be dealt with is one where the tooth is only slightly tilted, the removal may be carried out with a curved elevator, the blade of the instrument being inserted under the crown and the tooth gradually prised up. Where the tooth is embedded in the bone, as shown in fig. 52,

and it is considered advisable to attempt its removal rather than that of the second molar, the following procedure should be adopted. A general anæsthetic should be given. The muco-periosteum which covers the bone must then be raised and the bone surrounding the tooth cut away with suitable instruments. The tooth, when freely exposed, should be removed with

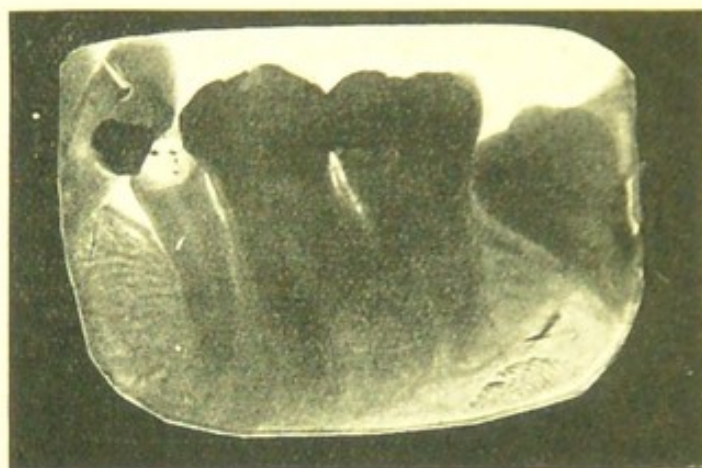


FIG. 55.

an elevator or forceps. The wound resulting from the operation must be packed with a suitable gauze and syringed regularly several times a day.

**Embedded Roots.**—Roots occasionally become embedded and impacted. A good sample of this is shown in fig. 55. The radiograph depicts a mandibular second premolar impacted between the first premolar and the first molar.

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In cases of this character it is always advisable to obtain a radiograph, and a careful study of it will often be of considerable assistance in deciding upon the method to pursue in attempting the removal of these roots. For example, the radiograph seen in fig. 55 shows that the embedded root lies close to the first molar and is separated by a considerable space from the first premolar. The best instrument for the removal of these roots is a straight elevator; the roots should be forced in the direction of least resistance. In the case illustrated above, the elevator should be inserted between the root and the first molar, and the root raised towards the first premolar.

Roots which lie well below the surface of the bone can often be quite easily removed by means of the screw (fig. 14). The overlying soft tissues should be forced away by "packing," the screw worked into the pulp-canal of the root until a secure hold is obtained, and then extractive movements applied.

CHAPTER IV.

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## The Use of Anæsthetics during Extraction of the Teeth.

THE anæsthetics used during the extraction of teeth may be divided into two classes, viz., general and local. It is not proposed to make any allusion to the methods of administering general anæsthetics, as they hardly fall within the scope of this volume. There are, however, a few points which the operator should bear in mind when employing them, and which may with advantage be briefly dwelt upon, but before considering these, a word or two may not be out of place with regard to the choice of the anæsthetic. In dental practice four agents are generally used: nitrous oxide alone or in combination with air or oxygen, ethyl chloride, ether and chloroform.

When a short period of anæsthesia is required nitrous oxide should always be used in preference to ethyl chloride, ether or chloroform, as it is much the safest of the four drugs. In addition, the administration of nitrous oxide

occupies a shorter period than ether or chloroform, and the recovery is rapid and complete. The combinations of nitrous oxide with oxygen and with air, introduced by Sir Frederic Hewitt and Mr. Rowell respectively, possess certain advantages over nitrous oxide used alone.

**The advantages of nitrous oxide with oxygen over nitrous oxide alone are these :—**

- (1) The anæsthesia is quieter;
- (2) The mucous membranes of the mouth do not swell to the same extent, and the operator therefore gains a clearer view of the tooth.
- (3) The period of anæsthesia is lengthened, perhaps by only a few seconds, but the quieter condition of the patient assists indirectly in prolonging the period for operating.

The administration of nitrous oxide with oxygen requires considerable practice, a satisfactory result depending to a great extent upon the percentage of oxygen used in each individual case. The recovery is slower than when nitrous oxide alone is used, and there is a greater liability to after-sickness. Should too much oxygen be used, the patient may experience a considerable amount of "distress" during recovery.

**The advantages of nitrous oxide with air over nitrous oxide alone** are somewhat similar to

those of nitrous oxide and oxygen, though less marked.

Within recent years the administration of nitrous oxide through the nose has gained considerable favour, because by this means the anæsthesia can be prolonged indefinitely. Considerable experience and skill are, however, required in administering nitrous oxide by this method, and unless care is taken an asphyxial rather than a true anæsthetic state is produced.

**Ethyl Chloride** is useful for operations which require about two minutes' anæsthesia. It is especially useful as an anæsthetic for children when it is necessary to remove several teeth. The best results are obtained by administering it in combination with nitrous oxide.

**For operations which require a long anæsthesia, the anæsthetist should commence with nitrous oxide and follow on with ether.** In such cases many anæsthetists prefer to use chloroform, but the regular employment of this agent in dental surgery is to be severely condemned. A most careful inquiry into this important subject has been made by Sir Frederic Hewitt, and the results of his work were communicated in an exhaustive paper published in the *Journal of the British Dental Association* for November, 1895, which is well worthy the

perusal of all those who are in the habit of administering chloroform.

**Whenever a general anæsthetic is given for the removal of teeth, two people should be present,** one to confine his attention solely to the administration of the anæsthetic, the other to the removal of the tooth, as it is impossible for one person to operate and at the same time to observe the condition of the patient during the anæsthetic period. This rule should be strictly adhered to.

For extraction under nitrous oxide, and also to a great extent under ether, the positions of the patients should differ but little, if at all, from those already advocated, with this exception—it is advisable not to have the head too far back. Before the administration of the anæsthetic is commenced, any removable artificial teeth that may be in the mouth should be taken out; the operator should decide exactly what he intends to do; at the same time, it is well that he should not attempt too much, and he should avoid pricking the gum during the examination of any roots that it may be necessary to extract. The prop should be placed on sound firm teeth in such a position that the operator can work without being hindered by it, and a final view of the mouth should

be taken. In cases in which several teeth have to be extracted at one sitting, their order of removal should be decided upon before the operation is commenced, and if any particular tooth is causing pain, it should be extracted first. The order of removal should also, as far as possible, be arranged so that changes of instruments are reduced to a minimum. As a rule, lower teeth should be extracted before upper teeth, because if the latter are removed first, the blood may pass down and so obscure the lower ones. Roots should be removed before whole teeth for the same reason. **Each tooth or root must be cleared from the mouth before any attempt is made to remove another,** except in cases where the gum is thoroughly adherent; under this condition the tooth or root may be left and freed from the gum when the patient has recovered. With teeth which have a liability to slip out from between the blades of the forceps, it is well, as a precaution, to keep a finger of the left hand behind the blades to prevent the tooth passing backwards should it slip out.

### LOCAL ANÆSTHETICS.

(a) **Infiltration Anæsthesia.**—Novocain is the drug in general use for the production of local anæsthesia by infiltration methods. It is a

white, crystalline, odourless powder, freely soluble in distilled water. It possesses the advantage over cocaine of being less toxic and capable of being sterilized by boiling without decomposition.

**Toxic Effects.**—The administration of local anæsthetics, especially if given in large doses, may be followed by well-marked toxic effects of which the following are cited by Sir Frederic Hewitt.<sup>1</sup>

“Headache; vertigo; pallor; a cold, moist skin; a feeble, slow, or rapid pulse, becoming imperceptible in grave cases; incoherence of speech; nausea; vomiting; unconsciousness; trismus and other muscular spasms; epileptiform attacks; dilated or unequal pupils; and disturbances of respiration, culminating in dyspnœa and asphyxia.” Treatment should be directed first to restoring the circulation by the administration of a rapidly acting stimulant, such as sal-volatile, brandy, or the hypodermic injection of ether. The patient should be placed in the horizontal position, and the respiration watched; should this tend to fail, artificial respiration must be immediately resorted to.

**The Technique of Administration.**—The sub-

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<sup>1</sup> “A System of Surgery” (edited by Frederick Treves), vol. i, p. 292.

cutaneous administration of any drug must be carried out with proper aseptic precautions. The mouth should be thoroughly rinsed with an antiseptic mouth-wash, and the parts where the injection is to be made carefully cleansed with peroxide of hydrogen. The syringe used should be sterilized, and the solution injected at the temperature of the body. Dr. Pare,<sup>1</sup> who has had considerable experience with the use of novocain, adopts the following plan:—

“ If the patient is hypersensitive, a pledget of cotton-wool soaked in a 10 per cent. solution of novocain, applied to the gum for about two minutes, may be used to obviate even the inconvenience of the initial prick. The needle should be inserted  $\frac{1}{8}$  in. from the gum margin, and not high up in the sulcus, between the teeth, not over the roots, and at right angles to the plane of the tooth, so that the point of the needle impinges on the alveolar process. It is almost useless when the fluid passes up between the gum and the alveolar process, causing bullæ in the sulcus. If the needle impinges on the bone it should be withdrawn and inserted at another spot. It is curious how short a distance the needle will go into the gum in one

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<sup>1</sup> “ Further Experience with Novocain,” *Dental Record*, July, 1908, p. 353.

spot, whereas in another only  $1/20$  in. distant it will go in up to the nozzle. One injection is first made. The injection is made in two, three, but never more than four places for one tooth. After about 2 or 3 minims of the fluid have passed into the part, a pause is made for half a minute, and when the tissues in the immediate neighbourhood have become anæsthetic, the needle is farther insinuated and another few minims injected, to be followed by a further pause. When the desired position for the injection is attained, the contents of the syringe are allowed to pass slowly into the tissues. The whole procedure should occupy from five to ten minutes. Success, as measured by absence of pain, depends almost entirely upon the slowness with which the injection is performed. As the fluid permeates, the gum becomes blanched, owing to the local constricting action of the suprarenin on the blood-vessels. This phenomenon affords the index to successful injection; it shows that the injected fluid has not escaped through adjoining sockets, nor become unduly diffused; the anæsthetic has been restricted to the desired sphere of action, but if the blanching immediately disappears on the removal of the needle it is a failure."

In cases where the alveolar process is

thin, Dr. Pare passes the needle up between the gum and the bone, keeping as near the latter as possible, and allows ten minutes to elapse before operating. In some cases, where the tooth is loose or the gum detached, the needle (a long one) should be passed between the tooth and the bone. Dr. Pare recommends that a 4 per cent. solution of novocain should be used.

**Local and General Disturbances.** —Local anæsthetics have definite disadvantages, even when used with strict aseptic precautions. The after-pain which attends their use is often distressing, and the wounds caused by the operation do not heal so readily as under normal conditions, due probably to the fact that the drug lowers the resistance of the tissues. In conditions where the periodontal membrane is infected, the act of injecting the drug may break down the natural defence of the tissues, and cause the infection to be disseminated. I have seen some serious cases of diffuse suppuration and necrosis following the thoughtless use of local anæsthetics.

(b) **Freezing Agents.** — The drug usually employed for this purpose is ethyl chloride. Generally speaking, the anæsthesia produced is by no means satisfactory, and to use it to the

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greatest advantage attention must be given to the following points:—

(1) The gums must be well dried, and as far as possible all neighbouring regions, such as the cheeks or tongue, protected by napkins or other suitable material.

(2) The gums must be thoroughly frozen before commencing to operate.

(3) The extraction must be carried out as quickly as is consistent with thoroughness.

(4) If possible, the spray should be continued during the operation.

(5) Too great a jet should not be used.

Freezing agents can be employed much better for front than for back teeth; in fact, it is found at times difficult to freeze the gums at all satisfactorily at the back of the mouth.

## CHAPTER V.

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### Difficulties, Complications and Sequelæ of Extraction of the Teeth.

LIKE all other surgical operations, the extraction of teeth is at times attended with certain difficulties, complications and sequelæ which, for the sake of description, will be considered under the following headings:—

(1) Difficulties, complications and sequelæ connected with the teeth themselves.

(2) Difficulties, complications and sequelæ connected with the jaws.

(3) Difficulties, complications and sequelæ connected with the soft parts.

(4) Difficulties, complications and sequelæ arising during extraction under anæsthetics.

(5) Miscellaneous complications, difficulties and sequelæ.

#### (1) DIFFICULTIES, COMPLICATIONS AND SEQUELÆ CONNECTED WITH THE TEETH THEMSELVES.

(a) **Undue Resistance of the Tooth and Alveolar Process.**—Considerable resistance to

our efforts to remove a tooth at times occurs. This is naturally most often, though by no means always, met with in those of strong physique. Teeth isolated are always firmer than those in series; this is accounted for by a consolidation of the bone around them. Experience will act as a guide, and it is to a certain extent possible, after a little observation, to gather from the general appearance of a tooth if it will give more than normal trouble in removal. Should undue resistance be met with, steady attempts to move the tooth slightly in different directions should be made and persevered with; if this precaution is not taken and too much force is used in any one direction, fracture of the tooth or alveolar process is sure to result. It may, perhaps, be found impossible to remove the tooth; when this is the case, it is best to dismiss the patient and to make a fresh attempt two or three days later; the tooth will then probably be loose, as a result of the inflammation which has been set up by the previous attempt at extraction, and can be easily removed.

The causes of undue resistance are:—

- (i) Abnormal density of the alveolar process.
- (ii) Divergent and twisted roots.
- (iii) Alteration in the shapes of the roots brought about by periodontal inflammation.

(b) **Fracture of the Tooth.**—The principal causes of this accident are:—

(i) The use of badly-fitting forceps.

(ii) The use of unnecessary or wrongly applied force in attempting to loosen the tooth in its socket.

A tooth having been fractured, the patient should be made to rinse the mouth until the bleeding has ceased, the socket should be dried with cotton-wool, and the position and edge of the root defined with a probe before attempting to remove the fractured portion. It is neglect of these steps that so often leads to failure to remove the remaining portion of a fractured root. Too many attempts to remove a fractured root should not be made; if a second endeavour proves fruitless, the patient should be dismissed and a fresh attempt, if necessary, made after a period of one or two days, as the tooth will probably then be looser from inflammatory trouble; moreover, the hæmorrhage having ceased, it will be possible to obtain a clearer view of the root. Before, however, dismissing the patient, an anodyne mouth-wash should be prescribed, and the pulp, if exposed, touched with a suitable drug. The lower third of a root may generally be left without fear of unpleasant consequences; but it

is always well to inform the patient when any portion of a tooth is allowed to remain, as such knowledge may be of assistance should any trouble arise at a subsequent date.

Clinical experience shows that in cases of general periodontal disease (pyorrhœa alveolaris) the teeth are often brittle. This is probably due to reactive processes in the teeth, which result in a partial calcification of the soft contents of the dentinal tubules, cemental lacunæ, &c. The practical point is to remember the fact, and so avoid exaggerated movements in loosening the tooth in its socket.

(c) **Crowded and Irregular Teeth.**—The removal of these has already been referred to in Chapter III.

(d) **The Removal of the Wrong Tooth.**—The removal of the wrong tooth may occur, and is naturally due to carelessness on the part of the operator. Should this accident arise, the tooth must be immediately replaced and, if necessary, secured with a ligature. If the pulp subsequently shows signs of degeneration or inflammation it should be removed and the canal treated and filled.

(e) **Removal of a Neighbouring Tooth.**—This may occur, and is generally due to a crowded arrangement of the teeth. The accident seems

to occur most frequently with the removal of the first permanent mandibular molar, the neighbouring tooth usually involved being the second premolar, which is simultaneously dislocated from its socket. This accident can be avoided by placing the thumb on the tooth which shows a tendency to move, and exerting only as much force in the removal of the tooth which is being extracted as can be controlled by the thumb. If a neighbouring tooth is removed it must be replaced and treated in the same manner as described above.

(f) **Removal of an Unerupted Premolar.**—This may be an avoidable or an unavoidable accident. At times the developing premolar is so firmly embraced by the roots of the deciduous molar that during the extraction of the latter tooth the premolar is removed—such an accident cannot be avoided. It is an avoidable accident when it occurs during the extraction of the roots of a deciduous molar and arises from using too much force.

(g) **Breaking one Tooth in extracting another.**—In the extraction of mandibular teeth with hawk's-bill forceps the maxillary teeth may be fractured. This accident is most likely to occur to the inexperienced, and arises from the tooth leaving its socket suddenly, due frequently to

the extracting force being used in an upward rather than an outward direction. It may, however, occur when a mandibular tooth has been more than normally resistant. In all such cases it is well for the operator to be on guard by keeping the thumb or a finger of the left hand over the joint of the forceps.

## (2) DIFFICULTIES, COMPLICATIONS AND SEQUELÆ CONNECTED WITH THE JAWS.

(a) **Fracture.**—The fracture and removal of a small piece of the alveolar process is not an infrequent accident which is fortunately by no means serious. It is sometimes unavoidable but at other times is due to placing the blades of the forceps on the outer sides of the alveolar process instead of between the bone and the root of the tooth.

Extensive fracture is sometimes seen; for instance, in a case that came under my notice at the Royal Dental Hospital of London an unqualified person, in removing the right mandibular first permanent molar, fractured the bone in a horizontal direction so that the second and first premolars with the canine were completely separated from the body of the bone.

Fracture of the maxillary tuberosity may occur during the removal of the third molar,

and Mr. Nicol<sup>1</sup> records such an accident during the removal of the second molar. In a case recorded by Mr. L. Matheson<sup>2</sup> a transverse fracture of the maxilla occurred in a line between the first and second permanent molars during the removal of the first-named tooth.

Direct transverse fracture of the horizontal ramus of the mandible due to extraction of the teeth has also been recorded<sup>3</sup>.

*Treatment.*—In fracture of small portions of the alveolar process, no special treatment is called for except that all loose fragments should be removed. When the fracture is of a more extensive character, the fragments must be retained in position by a suitable form of splint, a description of which will be found in most works on dental surgery.

(b) **Necrosis** of the alveolar process may result from extraction and is generally the result of undue violence or of some septic process occurring in the wound. The *treatment* to be followed consists of the use of antiseptic and deodorant mouth-washes; the necrosed bone when quite separated from the living tissue should be removed with a pair of suitable forceps.

<sup>1</sup> *Transactions Odontological Society*, vol. xxviii, p. 3.

<sup>2</sup> *Journal British Dental Association*, vol. xiv, p. 727.

<sup>3</sup> *Transactions Odontological Society*, vol. xxxv, p. 229.

(c) **Dislocation of the Mandible.**—The use of too much force in extracting a mandibular tooth and not at the same time counteracting the force by supporting the chin, may lead to unilateral or bilateral dislocation of the mandible. This accident may also be brought about by forcing the mouth open too much with a Mason's gag during the administration of an anæsthetic. It may likewise occur without the employment of undue force in those who have previously met with or are liable to dislocation.

*Reduction* may be brought about by placing the thumbs, carefully wrapped in a napkin, on the molar teeth and the palmar surfaces of the fingers below the chin. If downward pressure is then made with the thumbs, and upward pressure with the fingers, the condyles of the mandible will generally pass back easily into the glenoid cavity. In cases where more difficulty than this is experienced, the patient should be placed in a recumbent position, and corks should be inserted between the back teeth. Upward pressure should then be applied on the under surface of the chin. It is advisable, after reduction, for the patient to wear a four-tailed bandage for about a week.

(d) **Forcing a Root into the Antrum.**—This accident occurs mostly in connection with

the extraction of the root of the second premolar and the buccal roots of the first permanent molar. If a root has been so dislocated into the antral cavity as to still partly remain in its socket, the best course to pursue is to leave it alone and not to attempt removal as the attempt might only result in complete dislocation of the root into the antrum. The socket should be kept quite clean by the continual use of antiseptic washes.

When a root has been forced completely into the antrum, the opening into the latter should be enlarged and the antral cavity thoroughly syringed. For this purpose it is well to use an aural syringe of five or six ounces capacity. The rationale of this form of treatment is that the root may pass out with the return current from the antrum. If this treatment fails, an attempt may be made to remove the root with a little scoop of gutta-percha fixed on to a flexible wire.

In the event of non-success by both these methods the antrum should be opened through the canine fossa and the root removed.

(e) **Trismus.**—Inability to open the mouth naturally renders extraction of the teeth more difficult than usual. When, however, the closure is the result of inflammatory trouble in connec-

tion with the mandibular molars, an anæsthetic should be given and the mouth opened forcibly with a Mason's gag. If the trismus is the result of tonic contraction of the muscles closing the mandible, ether should be used in order to overcome the resistance of the muscles, as nitrous oxide would not have the desired effect.

### (3) DIFFICULTIES, COMPLICATIONS AND SEQUELÆ CONNECTED WITH THE SOFT PARTS.

(a) **Extensive Laceration of the Gum.**—In cases where a tooth has given rise to much trouble in removal, the soft tissues naturally suffer, but apart from this they may be severely lacerated when the gum is more than usually adherent to a tooth. This is most frequently seen in the removal of the mandibular third molar, but it is also sometimes met with in the removal of loose teeth. When the gum is found more than usually adherent the tooth should be left in the socket until the gum attachment has been divided with a pair of scissors or a lancet. Continued attempts to remove the tooth with the forceps before the gum has been divided will only lead to undue laceration.

In all cases where the gums have been badly

lacerated, an anodyne mouth-wash should be prescribed.

(b) **Wounding the Tongue.**—This is most likely to occur under nitrous oxide, as the tongue during anæsthesia is generally swollen, and is, moreover, not under the control of the patient. Wounding the tongue is nearly always due to carelessness, and arises generally in using the elevator. When the tongue is *much lacerated*, the overhanging portions should be trimmed off with scissors and the surface kept clean with antiseptic mouth-washes. If the *tongue is punctured and the wound does not involve a large branch of the lingual artery*, but yet bleeds freely, the tongue should be drawn forward; if this does not prove successful the insertion of a stitch will generally cause the hæmorrhage to cease. *If the tongue is punctured and a large branch of the lingual artery is involved*, the finger should be placed on the back of the tongue and the organ drawn forward; this compresses the lingual artery against the hyoid bone. The bleeding point must then be sought for and, if found, an attempt made to twist the wounded vessel. Should this fail cauterization may be tried, and as a last resource, if cauterization does not stop the bleeding, the lingual artery must be tied.

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(c) **Bruising the Lower Lips.**—This may occur in the removal of the maxillary teeth, and is due to having the mouth insufficiently opened, and using forceps of too straight a pattern.

(d) **Injury of the Mandibular Nerve.**—The mandibular nerve may be injured during the removal of the mandibular molars and premolars. Loss of sensation over the parts supplied by the nerve, with dribbling of saliva, generally follows the accident. Sensation is, however, usually restored, and in cases of laceration the nerve generally unites.

The mandibular nerve occasionally passes through a foramen in the third molar.

(e) **Hæmorrhage following tooth extraction** is a most important complication, and one which needs prompt treatment. Hæmorrhage is predisposed to by a diathesis known as hæmophylia. Of its pathology but little seems to be definitely known. Hæmorrhage may occur in people not predisposed to the above-named diathesis; in some instances it is probably due to pathological changes in the artery which supplies the tooth, these changes being frequently induced by inflammation around the apex of the root, and the vessel becoming adherent to its bony surrounding, and thus prevented from contracting. The removal of teeth during the

menstrual period should be avoided. I have had under notice patients for whom teeth have been extracted during this period, and in whom hæmorrhage followed, but ceased at the termination of the period. Teeth had been extracted for these patients on previous occasions without undue hæmorrhage following.

Hæmorrhage is generally divided into three stages, viz.: Primary, intermediate and secondary. In the mouth we often find the primary running into the intermediate. The treatment of primary hæmorrhage, or that occurring at the time of the operation, is not of serious import. If it is at all sharp a useful plan is to give the patient some tincture of hamamelis in the water used for rinsing the mouth. Should the bleeding continue sixty grains of calcium lactate<sup>1</sup> should be given, and the patient ordered to take ten grains every four hours until the hæmorrhage ceases. The socket should also be plugged with cotton-wool dipped in some styptic, such as powdered tannic acid.

Intermediate and secondary hæmorrhage is of a more serious nature, and generally sets in at night. When a case of intermediate hæmorrhage is first seen, these two important points should be ascertained before treating it: First,

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<sup>1</sup> The dose for children should be fifteen grains.

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whether the bleeding is coming from the gums or the socket of the tooth; secondly, whether the blood shows a tendency to coagulation. The latter point will act as a guide in the choice of drugs for internal administration.

In hæmorrhage from the gum search should be made for any small vessels that may be the cause of it, and if found they should be twisted or compressed. If the vessel is only partially divided it should be completely severed, as this will probably allow contraction to take place. If the bleeding is capillary in character, a pad of lint applied with firm pressure is usually sufficient to stop it.

When the bleeding proceeds from the socket the following mode of procedure is adopted: Some small cone-shaped pieces of non-absorbent cotton-wool are prepared (each about  $\frac{1}{3}$  to  $\frac{1}{2}$  in. long and  $\frac{1}{4}$  in. broad at the base), also a pad of lint and a four-tailed bandage; a syringe, a pair of conveying forceps, some cold water and the chosen styptic are likewise placed ready for use. The socket is first freed from clot, then syringed, then dried out with a pledget of cotton-wool, and directly afterwards one of the cone-shaped pieces of cotton-wool dipped in the styptic (a useful one being tannic acid) is placed in the socket and forced

to the apex, with a fair amount of pressure; the hæmorrhage is arrested far more by pressure than by the styptic. More pledgets of cotton-wool are inserted until the socket is quite full; a plug of lint is then placed over all and kept in position by antagonism with the opposing teeth, a four-tailed bandage being used for this purpose. An excellent method of keeping the plug in the socket if the approximal teeth are standing is to wedge a piece of wood between them. Excellent as this plan is, however, if the hæmorrhage is at all sharp it is better to use the four-tailed bandage to make quite certain of retaining the plug in position. The number of pledgets of cotton-wool inserted in the socket should be counted.

The general directions to be given to the patient, though apparently trivial, are most important, and should never be forgotten. He or she should be advised to go home very quietly, to avoid all forms of excitement, to assume the sitting position usual during the day, and to use a high pillow at night. The patient should be fed through a bent tube, and all fluids should be given cold.

In addition to plugging the socket, hæmostatics should be administered internally.

**In cases in which there is no tendency to**

**coagulation** it may be fairly assumed that the cause of the hæmorrhage lies in the blood. In this condition calcium lactate should be administered as advised on page 90. **When the blood shows a marked tendency to coagulate** in the mouth, as often happens, and the bleeding still continues, such drugs as ergot<sup>1</sup> are indicated; in this latter condition it may be assumed that the cause of the hæmorrhage lies in some want of contractility of the vessel wall, and ergot causes contraction of unstriated muscular tissue.

The patient should be seen within twenty-four hours after treatment, and if the bleeding has ceased the plugs may be removed and an antiseptic mouth-wash prescribed. This course is not recommended when the hæmorrhage has been severe; under such circumstances the plugs should be allowed to work themselves out. If the hæmorrhage has not then ceased, the socket should be re-plugged tighter than before with a plug of wood wrapped in non-absorbent cotton-wool. Should this prove of

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<sup>1</sup> R	Ext. ergotæ liquidi	...	...	℥xx.
	Acidi sulphurici diluti	...	...	℥x.
	Aquam rosæ	...	...	ad. ℥j.
	Mitte	℥viij.		

M. Two tablespoonfuls every three hours until the hæmorrhage ceases.

no avail, the actual cautery may be tried; if this fails, and the bleeding is from the mandible, the canal should be trephined and a plug of ivory inserted, so as to compress the artery against the inner plate of the bone. In uncontrollable hæmorrhage from the maxilla digital pressure on the common carotid opposite the transverse process of the sixth cervical vertebra may be tried; should this fail to stop the hæmorrhage, ligature of that vessel must be resorted to.

In one case of hæmorrhage from the region of the third mandibular molar Mr. Boyd<sup>1</sup> divided the lip in the median line and reflected the cheek from the mandible. The mandibular canal was then laid open by excising the outer plate of the bone, and the bleeding was arrested by plugging the mesial and distal ends of the canal.

**In extreme cases, with sign of collapse,** normal saline solution<sup>2</sup> must be infused into the median basilic vein.

**In patients predisposed to hæmorrhage** extraction should be, if possible, avoided; but, if the removal of the tooth be absolutely

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<sup>1</sup> *Dental Record*, vol. xi, p. 425.

<sup>2</sup> Common salt, ʒj., water Oj. at 99° F.

necessary, prophylactic treatment should be pursued for three days previous to the operation by the administration of calcium lactate; calcium salts reverse their effect after three days.

The tooth should be extracted in the early morning, so as to have the whole day for treatment should hæmorrhage occur. Some hæmostatic should be administered at the time of the operation and the socket plugged at once, for it is most important to remember that in these cases it is far easier to prevent the hæmorrhage occurring than to arrest it when once it has commenced. The subsequent treatment will consist in the continued administration of hæmostatic drugs.

**(f) Injury of the Arteries in the Neighbourhood of the Teeth.**—Wounding of the *lingual* artery has been referred to under the heading of injuries to the tongue. Laceration of the *ranine*, *anterior* and *posterior palatine* arteries may also occur. Such accidents are usually the result of the forceps slipping, and are therefore avoidable. Treatment consists in pressure or in twisting or tying the divided vessel. In the case of the *anterior* or *posterior palatine artery* it may be found necessary to plug the foramina which give passage to these vessels.

(g) **Suppuration of the Wound.**—Suppuration of the wound, resulting from extraction, is often due to want of proper precautions in the after-treatment. It may be due to direct infection, either from septic foci in the mouth, or from the inhalation of air laden with infective organisms. Suppuration is liable to occur in those patients whose tissue-resistance has been lowered by such general conditions as diabetes, nephritis, and tuberculosis, or it may be the result of a diminished local resistance of the tissues of the tooth socket from such conditions as chronic periodontitis. Suppuration is most frequently seen after extraction of the mandibular teeth, owing to the fact that drainage is less easily effected than in the maxilla owing to the dependent position of the socket.

Suppuration is best treated by the frequent syringing of the wounds with a mild antiseptic solution. The point to be remembered is that the constant freeing of the wound from stagnant discharge is more important than the use of any special germicide. Attention must also be given to the general health.

In those cases **in which the pus is putrid**, and there is reason to suspect infection, the socket should be thoroughly irrigated with some suit-

able antiseptic, such as hydrogen peroxide; following this the parts should be carefully dried with cotton-wool. A small piece of chloride of zinc should then be introduced and allowed to dissolve in the socket, which must be subsequently kept aseptic by constant irrigation.

Care must be exercised in applying escharotics to sockets to which the nerve may be in close proximity; this is especially necessary in dealing with impacted mandibular third molars.

(*h*) **Pain following Tooth Extraction.**—The causes giving rise to pain following the extraction of a tooth are:—

(1) **Incomplete extraction of the tooth**, more especially when the remaining portion contains an exposed pulp.

(2) **Too Rapid Healing of the Orifice of the Socket.**—It sometimes happens that the margins of the wound left after extraction unite very early, and when this occurs the discharges which naturally come away from the granulating surface at the base of the socket have no exit; the consequence is that they are retained and set up a local traumatic inflammation, which leads to swelling of the surrounding tissue.

(3) **Extensive laceration of the hard and soft tissues** in the neighbourhood of the socket and

(4) **Necrosis of the socket of the tooth** are also fruitful sources of pain following tooth extraction.

(5) **The Presence in the Wound of a Foreign Body**—A curious example of this came under notice a few years ago. A patient applied for the extraction of the left mandibular first permanent molar. During the operation a portion of one of the cusps disappeared; a search was made for it, but, as it was not found, the natural supposition was that it had been removed in rinsing the mouth. The patient for the next three weeks complained of slight pain in the socket, for which remedies were tried, but proved of little use. Eventually the patient discovered the cusp on the top of the granulation tissue which had filled up the socket. In another case of the same character which came under notice, the offending material was a piece of an amalgam filling. A fractured blade of forceps may likewise act as the offending body.

(6) **Injury to the Mandibular Nerve.**—Direct injury to the trunk of the nerve is more likely to occur during extraction of the mandibular third molar than with any other tooth. It is

more than probable that many obscure cases of pain following tooth extraction are due to exposure and irritation of the nerve at the apex of the socket. An interesting case of this character was reported by Mr. Storer Bennett.<sup>1</sup> The patient, a lady aged 23, had had the third maxillary molar dislocated through the use of a Wood's gag, and, as it was considered hopeless to restore the dislocated tooth, it was extracted without difficulty. The socket, in spite of treatment, remained painful for the next twelve days, but in the meanwhile granulated healthily, except at its apex, where by the aid of a mirror and probe a spot about the size of a pin's head was noticed, which caused the greatest agony on being touched. Incision of the nerve produced permanent relief.

**Treatment.**—The treatment of pain following tooth extraction naturally depends very much upon the cause. A thorough examination of the socket should be made with probe and mirror. When due to incomplete extraction, another attempt, if considered advisable, may be made to remove the tooth. This proving unsuccessful, the socket should be swabbed with an anodyne drug, and, if there is an

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<sup>1</sup> *Transactions of the Odontological Society*, vol. xxvii, p. 123.

exposed pulp in the remaining portion of the tooth, the pulp should be touched with strong carbolic acid. The patient should also be advised to use fomentations.

**Where the orifice of the socket heals too rapidly** the freshly-healed surfaces must be separated, the socket syringed out, and a small piece of lint inserted and allowed to remain in for about twelve hours. An antiseptic mouth-wash should also be prescribed.

**In pain due to necrosis of the socket** deodorant antiseptic injections must be used, while in extensive laceration of the soft and hard parts an anodyne mouth-wash may be tried. In all *obscure cases* an application should be made to the socket of some local anodyne, such as cocaine, and a mouth-wash having anodyne properties should at the same time be prescribed.

It cannot be too strongly insisted upon that a very large amount of the pain following tooth extraction depends upon the damage to the bony tissues. It is well in all cases in which the extraction has been troublesome, or where chronic trouble in the bone has been present, to warn the patient of the possibility of after-pain, and to prescribe appropriate remedies.

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**(4) DIFFICULTIES, COMPLICATIONS AND SEQUELÆ ARISING DURING EXTRACTION UNDER ANÆSTHETICS.**

**(a) Tongue Slipping Back.**—During extraction under anæsthetics the tongue, not being under control, may slip over the larynx, or may be forcibly pushed back by the fingers of the operator. Symptoms of difficult breathing or even arrest of respiration, will follow this accident. It is not enough to watch the chest walls, as respiratory movement may continue without air entering the lungs. Treatment consists in pulling the tongue forcibly forward with a suitable instrument and forcibly extending the head on the spinal column.

**(b) Forcing out a Tooth with a Prop or Mouth-opener.**—With a prop this accident may arise from resting it upon teeth which are loose or from placing it in such a way that undue leverage is brought to bear on the teeth. It is an accident most likely to occur when the prop is fixed on the front teeth and the mouth opened to its widest extent. Under such conditions undue leverage at right angles to the long axis of the tooth is brought to bear upon the palatal surfaces of the maxillary teeth, and they are consequently forced outwards. With the mouth-opener the accident is due at times

to clumsiness; great care should therefore be exercised when using this very powerful instrument. If a tooth is forced out, it should, if possible, be immediately replaced.

(c) **Passage of a Foreign Body through the Isthmus of the Fauces.**—A foreign body, such as a tooth, a broken piece of forceps or a prop, passing through the isthmus of the fauces, may become impacted in either the air or food passages.

In the air passages it may lodge (1) over the entrance of the larynx, (2) in the larynx, (3) in the trachea or bronchus.

In the food passages it may lodge (1) in the pharynx, (2) in the œsophagus, (3) at the pyloric opening of the stomach.

**In the air passages.**—Should the foreign body lodge **over the entrance of or in the larynx** the patient will be seized with a violent fit of coughing, which may expel it; but, should this not happen, symptoms of asphyxia will supervene. With regard to treatment, the head should immediately be brought forward and the finger inserted along the side of the mouth into the pharynx, and then given a forward sweeping movement; by this means the foreign body, if lodged at the back of the tongue, will probably be removed. This fail-

ing, the patient must, if possible, be inverted and a forcible slap given on the back. If the foreign body is not dislodged by this method, laryngotomy should be immediately performed. There must be no hesitation about the performance of this operation, and it must be carried out promptly, for the longer it is delayed the less becomes the chance of saving the life of the patient.

**A foreign body in the trachea or bronchus** may give rise to no immediate symptoms, but generally a violent fit of coughing, with signs of impending asphyxia, takes place at the time of the accident. These signs pass away, to be followed at intervals by fresh attacks of coughing, and eventually by symptoms of collapse of the lung or lungs.

There are many records of cases of this character. If there is the slightest suspicion that a tooth has passed into the trachea or bronchus, the patient must be submitted to examination with the X-rays, to be followed by a thorough examination of the chest by auscultation and percussion. If a foreign body is present, steps must be promptly taken to remove it.

**In the food passages.**—A foreign body impacted in the pharynx will give rise to pain,

symptoms of dysphagia and dyspnœa. A hacking cough is generally present.

Should a foreign body be suspected in the pharynx, its presence can usually be ascertained by digital exploration; this failing, the cavity should be examined by the aid of a laryngoscope.

An attempt should first be made to remove the body with the fingers, and if this is unsuccessful pharyngeal forceps must be called into use. In some cases where the impaction is very firm it may be necessary to perform pharyngotomy.

**A foreign body in the œsophagus** will cause dysphagia, and will probably give rise to constant pain; if it is situated in the upper part it will in all probability give rise to dyspnœa. On applying the stethoscope over the region of the œsophagus, a gurgling sound will be heard when the patient swallows fluids. The presence of a foreign body may be definitely ascertained by means of the X-rays.

**If a foreign body becomes impacted at the pyloric opening** of the stomach, it will give rise to gastric dilatation. The treatment of these conditions belongs to the domain of general surgery.

A foreign body going through the isthmus of

the fauces will as a rule pass into the œsophagus, then into the stomach, and will give rise to no trouble.

The necessity of being ready for such emergencies as the above cannot be too fully emphasized, and **all who administer anæsthetics should be provided with the instruments necessary for performing laryngotomy.** These should be kept in a little case, and no anæsthetic should be administered without the case being near at hand. Adherence to this rule is important.

#### (5) MISCELLANEOUS COMPLICATIONS, DIFFICULTIES AND SEQUELÆ.

(a) **Uterine Pain.**—A case is quoted by Mr. Sercombe where extraction of a tooth was followed by paroxysmal uterine pain, followed by the cure of an obstinate leucorrhœa.<sup>1</sup>

(b) **Shock.**—The fact that **tooth extraction is a surgical operation,** and may be followed by shock, is often overlooked. The amount of shock which follows as a rule is practically *nil*, but at times, especially in the weak, it may be well marked. This is not taken sufficiently into account when a question arises as to the number of teeth to be extracted at one sitting, and it should be clearly borne in mind that what a

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<sup>1</sup> *British Journal Dental Science*, vol. iii, p. 221.

strong, able-bodied person, can stand, one of weaker physique cannot bear.

**Syncope at the time of the operation** sometimes occurs. Should it supervene during the extraction of the tooth the operator should immediately desist until recovery ensues. Fainting is best treated by bending the head down towards the knees, at the same time loosening anything tight about the neck and applying ordinary salts of ammonia to the nose. In severe cases the patient should be removed from the chair and laid on the floor, and the chest should be exposed and flipped with a towel dipped in cold water. In more severe cases it may be necessary to inject ether or some other stimulant, such as brandy. Fatal syncope following tooth extraction has occurred, and a case which took place at Marseilles in 1881 is mentioned by Tomes.<sup>1</sup> The patient was a female, and an attempt was made to remove a tooth, but was desisted in owing to alarming syncope. A second attempt was made, or rather about to be made, when fatal syncope ensued. *Post-mortem* examination showed nothing beyond a slight amount of cerebral congestion.

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<sup>1</sup> "A System of Dental Surgery," 3rd edition, p. 626.

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(c) **Epilepsy.**—In those predisposed to epilepsy an attack often commences immediately after the extraction of a tooth. In the event of a fit occurring, the patient should be removed from the chair and placed on the floor, the clothes being at the same time loosened, and a wedge of wood or some suitable material placed between the teeth to prevent injury to the tongue.

(d) **Hysteria.**—Manifestations of this disorder at times follow tooth extraction, but do not call for any special treatment beyond that usually adopted for this disorder.

(e) **Septic and Infective Sequelæ.**—Scattered through dental literature will be found a large number of records of septic and infective diseases which have followed the extraction of teeth. In many of these cases it would be difficult to say that the infection was always the result of the operation; in a number of them the actual cause was due to the neglected condition of the tooth which called for extraction. Infection can, however, at times undoubtedly be traced to the operation, and once again attention cannot be too strongly drawn to the fact that aseptic precautions should be carried out as far as possible.

Suppuration of the socket and its appropriate

treatment has already been dwelt upon. Cases of syphilis having been acquired through the use of infected forceps are recorded, while septicæmia, sapræmia, cellulitis, osteitis, osteomyelitis, periostitis, pyæmia, tetanus, have all been known to follow the removal of a tooth, but the treatment of these conditions hardly lies within the scope of this book.

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