

No. 3 represents exostosis of a root. A fang so enlarged will not pass through the process unless the bone be very open in its structure. Such a tooth may be made quite loose, but, while it moves freely enough in its socket, it is felt to be held by something abnormal. To free such a root it is only necessary to use the cutting forceps, or, what is preferable, to take the ordinary small surgical chisel or engine-drill and cut away sufficient of the process to admit of the passage. This little operation is easy of accomplishment, and must prove adequate to the end.

No. 4 represents a form of twin teeth. The two must be removed together, which may be difficult or the reverse according to the character of the process. It is well, before making the effort to extract, to free the process from the teeth as thoroughly as possible: this is done by a sharp and flat elevator or by use of the chisel or drill.

No. 5 represents a second form of twin growth, the result of original germ union. If the offshooting bulb be situated within and covered by the process, it is to be treated as if it were a case of exostosis of the fang. These germ unions are exceedingly rare, and one might not be met with in a lifetime.

Among other curious examples of anomalous teeth to be seen in the Museum of the Philadelphia Dental College is one exhibited by Fig. 314. A

FIG. 314.

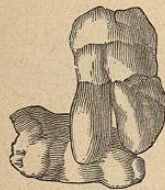


FIG. 315.



practical feature in the anomaly concerns the *extraction*. This was effected with less trouble than might be supposed. In the attempt to remove the one standing upright, it soon appeared that there was something wrong, and the effort to extract was suspended, and a thorough examination made. In the second attempt, the force was very cautiously applied, in order to find what direction the tooth would take. It yielded most to an inward motion, and by a continued effort in that direction the removal was secured with only a slight fracture of the lingual border of the alveolus.

The second specimen (Fig. 315) is a union of three of the anterior teeth.

An anomaly is, of course, a condition outside of rule. A practitioner familiar with normal tooth anatomy will find little difficulty in dealing with the exceptions; the plan is to feel one's way to a result.

CHAPTER XXVIII.

GENERAL REMARKS ON EXTRACTION.

THE relationship of the teeth with the jaws is through the medium of a cellular process known as the alveolar. Each tooth is lodged in an alveolus or alveoli corresponding to the number and character of its roots: thus, the central and lateral incisors, the cuspidati, and the bicuspidati, having each but one root, have each but one alveolus.*

The molar teeth of the superior jaw have three roots, consequently a three-fold relation to the alveolar process.

The molar teeth of the inferior jaw have two roots and two alveoli.

The wisdom-teeth, as a rule, have a single short curved and stumpy root, consequently a similar alveolus.

The association of the teeth with their alveoli is through the medium of a fibro-cellular tissue; this membrane is coarse and resisting about the free edge of the bone, loose and cellular as it gets deeper. A properly-shaped lancet may be made to excise the coarse fibres; consequently, the operation of extraction is always to be preceded by that of thorough lancing. In this way much of the strength of the relationship of a tooth with its socket is to be overcome.

A tooth extracts with difficulty or easily as influenced by the character of its periodontium, and the loose or firm structure of its alveolus.

A limited fracture of the alveolar process is not generally found to be a matter of much consequence. If an extensive fracture should associate with an extraction, the tooth and bone may be laid carefully back in place, and treated as any common fracture; or, if this do not seem desirable, the fractured piece may be dissected from the soft parts, and the wound treated on general principles. Sometimes, when too much force is injudiciously used, a fracture may occur, including several teeth. In such accidents the circumstances of each particular case are to direct the practitioner; they are ugly and generally unnecessary troubles, and not apt to occur where proper care is exercised. Meeting with such an accident, effort is to be made to reunite the parts; failing in this, there is no resource but to dissect away the piece, or otherwise wait on nature for a process of expulsion; dissecting it away is the preferable plan.

Laceration of the gum is an accident frequently associated with the careless extraction of teeth. Such laceration may be trifling or it may be serious;

* The student will here turn to the chapter on the "Surgical Anatomy of the Mouth and Face" and make himself acquainted with the nature and meaning of the alveolar process.

it is always to be guarded against by attention to proper lancing. A small piece of gum torn by a tooth as it comes away had best be removed; left in the mouth, it is a source of annoyance, and reflects, in the mind of the patient, on the practitioner. Large strips are to be carefully laid back in place, and secured by one or more stitches, or other convenient means of retention.

Hæmorrhage.—Hæmorrhage after extraction is influenced by two circumstances: the state of the parts, and the predisposition of the patient. An ordinary tooth extraction is followed by hæmorrhage lasting but a very few minutes. In extraction for periodontal trouble the bleeding is more profuse. Such hæmorrhage, however, if at all reasonable, is not to be interfered with; it expedites the cure of the case wonderfully, relieving, as it does, the general congestion of the parts.

Undue hæmorrhage, of local signification, is found to depend either on non-contraction in the foraminal and circumferential vessels, or on excessive vascularity in the alveolar walls. Where the bleeding is from an artery, it is more or less *per saltem*; where venous or capillary, it is continuous. Hæmorrhage of constitutional expression is associated with the defibrinating condition, or with hereditary predisposition. Anæmia as a cause is perhaps the most common of the systemic vices; next to this may be ranked a typhoid state; after this, purpura. Plethora conjoined with laxity of the tissues is another of the constitutional causes. Vicarious relationship is a condition met with sometimes.

In cases where a hæmorrhagic diathesis exists, alveolar hæmorrhage is not infrequently of profuse character, making necessary energetic treatment for its cure. Two cases, occurring with the author in the persons of a father and son, may illustrate such direction of practice.

Mr. B., aged 19, applied to his dentist for the removal of the second superior molar of the right side. The operation over, the bleeding seemed not excessive, and the patient was dismissed as usual. On the same day, in the latter part of the afternoon, bleeding recommenced; Monsel's solution of the persulphate of iron was employed, and the patient dismissed.

During the night hæmorrhage recurred, and the family physician was sent for; the solution of iron was re-employed, and a temporary arrest again secured. The next day the bleeding reappeared, and nitrate of silver was applied in the alveolus. This controlled the hæmorrhage until the succeeding day, when it again appeared: and so off and on over a period of eight days. At this time the case was first seen, in consultation, the patient being unable to swallow any other than liquid food, owing to the swelling of the fauces and of the œsophagus, from the effects of an over-free use of the silver nitrate.

In examining the case, the cavity was found filled with a half-coagulated clot, which was taken away, thus discovering that the bleeding came not alone from the socket of the tooth, but from about the margins which had been ulcerated and degraded by the various applications. Hæmorrhage was entirely capillary.

In a treatment which resulted in the immediate control of this case, the following course was pursued. First, an impression in wax was taken of the roof of the mouth, inclusive of the bleeding part. From this impression a model was made, to which was struck a silver plate. This accomplished, which consumed about two hours, the bleeding cavity was packed with alum-saturated lint, the lint projecting and overlying the ulcerated margin. Over and upon this was now placed the accurately fitting and compressing plate. Upon the plate, raised to the common level of the adjacent teeth, was laid a fold of linen: the lower jaw was next closed upon this compress and kept in position by a bandage. Tincture of erigeron canadensis was administered, and the feet of the patient were placed in hot water. Hæmorrhage ceased entirely in the course of an hour, and did not recur.

Mr. B., the father of this young gentleman, aged perhaps 50, suffered five days from hæmorrhage, under the following circumstances: A wisdom-tooth of the left upper jaw troubling him because of its great looseness, he applied to his dentist for its removal. Not deeming it necessary or desirable to wound the gum, the practitioner extracted the tooth without the preliminary step of lancing, and in the act was so unfortunate as to tear away a small strip. Hæmorrhage was immediate, and more or less continuous. Monsel's solution being prescribed by his physician, it was employed, but with somewhat the same result as in the son's case. On the evening of the fifth day the case was first seen by the writer. The patient was much weakened from the excessive discharge, and was exceedingly frightened and nervous. The clots washed away, it was discovered that the blood oozed from the torn gum, and not at all from the tooth-socket. Erigeron in drop doses, repeated every minute, was directed, and a tuft of alum-saturated cotton was ligated against the wound. The hæmorrhage ceased entirely within ten minutes, and did not recur. As an assurance, wine of iron was prescribed, which the patient continued to take to the amount of four ounces.

Tincture of erigeron canadensis, in cases of this character, seems to be a reasonably reliable hæmostatic; not entirely so, however, as it is frequently prescribed where it fails to exert the slightest influence.

Hæmorrhage dependent on the typhoid condition is to be treated with most success by conjoining with the local medication the internal administration of acids, than which none seem to answer so good and reliable a purpose as the dilute hydrochloric, in doses of fifteen drops in a wineglass of water, repeated each four hours. Purpura, as a predisposition, demands its own peculiar class of remedies. Anæmia is best treated for immediate ends with the tincture of the chloride of iron. Vicarious hæmorrhage requires an attention which shall dispose to the restoration of the lost harmony. Whatever the systemic vice, appreciation of the requirements and the meeting of the indications constitute an important direction in the treatment.

Depressing the action of the heart is, under almost all circumstances, a valuable means for the arrest of hæmorrhage. To this end the tincture of

veratrum viride is always given with satisfaction; the dose is five drops for an adult, given in a tablespoonful of water. Conjoined with this, and indeed in many instances quite capable of taking its place, is the hot foot-bath,—the impression to be continued until the patient shall either grow faint or break out into profuse perspiration.

Lead and opium prescribed in conjunction form a reliable hæmostatic; two grains of the first to one of the latter may be given every two or four hours, according to the urgency of the case.

Rest is a reliable means of cure. A patient is to be kept quiet, both as motion and anxiety are concerned.

Local treatment of dental hemorrhage has the threefold signification of mechanical, vital, and chemical. The first considers means which, through compression or clot, shall confine the blood to its vessels; plugging the alveolus is a common practice in this direction; the plug to be of almost any convenient material, as raw cotton, or shreds of lint made by scraping linen. When hemorrhage is *per saltem*, a splint of soft pine wood, shaved to a point corresponding with the apex of the alveolus, being carried and retained in place, will almost of a certainty control the hemorrhage. Plates of metal or of gutta-percha, so moulded as accurately to close the cavity, thus favoring the formation of a clot, are frequently employed with success. Spider-web as a clot-holder is another means, the web being packed into the cavity and there retained. Compressed sponge is still another of the mechanical means. This last, when thoroughly coated with wax and of delicate point, is to be carried to the very apex of a cavity, and, when forced into itself and maintained in position by an overlying compress, constitutes one of the most reliable of this character of agents. Preference, however, is to be given to a delicate strip of old and soft linen packed into a bleeding alveolus after full saturation with phénol sodique; such packing, when tightly done and the pledget kept firmly in place by means of a compressing pad, has never failed in the hands of the writer.

Of the medicinal agents having the signification of forming a clot, preference is to be given tannic acid. The persulphate of iron, a preparation much used in general practice, is to be denied application in the mouth. Without doubt a clot is to be formed more speedily and solidly with this agent than with the tannin, but the danger from secondary hemorrhage overbalances all its virtues. A tannin clot is not soluble by the blood, and needs but support to possess all required attributes.

Of the astringents and stimulants, acting by exciting responsive force in the tissues to which they are applied, and controlling hemorrhage through contractility, we have alum, zinc, lead, capsicum, iodine, turpentine, and most of the dilute mineral acids; of these preference is to be given to a dilute tincture of capsicum.

Alum, in full saturation with water, is a reliable hæmostatic, and, when properly supported by a mechanical adjunct, is seldom found to fail; it

is injurious to enamel, on which account it is not to be used without care.

Of agents acting chemically to the control of hemorrhage, mention is to be made of catechu and kino among the vegetables, and nitrate of silver among the metals; the latter, however, is an objectionable preparation, because of the destruction of tissue so common to its employment, except when used in dilution.

All ordinary means failing for the arrest of an alveolar hemorrhage, the actual cautery may be applied. A control thus secured, however, is to be seconded by anti-hemorrhagics of internal expression, as it is frequently found to be the case that separation of the slough made by this means re-excites the original trouble.

Compression made to a bleeding alveolus is to be moderate, not severe; and when made, and the hemorrhage controlled thereby, the packing is not to be too hastily removed; a good rule is to wait for expression of suppuration.

Luxation of the Inferior Maxilla.—Occasionally, in efforts at tooth extraction, as a result of sudden movement, or an abnormal laxity of the ligaments of the temporo-maxillary articulation, the condyloid process falls forward over its glenoid boundary. The patient is thus rendered unable to close the mouth, and is said to labor under luxation. (See chapter on *Luxation*.)

Local Anæsthetics in the Extraction of Teeth.—The employment of various local agents to secure exemption from pain in the operation of extraction has of late commanded so much attention that no chapter treating of the subject would be complete without reference to them.

The most simple and elementary application in this direction consists in enclosing in a piece of bladder, or other convenient skin, a small portion of pounded ice and salt, and enveloping, for a few moments, the part to be operated on. To secure most conveniently the effect of such a process of refrigeration, various instruments have been devised, but none, so far as the application of the ice and salt is concerned, have been found to answer any better purpose than the bladder or skin enclosure. Such skins should consist of two little bags, one to rest upon the outer, the other upon the inner side of the gum. To prevent pain from the application of the cold, the bags should be brought gradually in contact with the gums; or, what answers a similar purpose, the application may be preceded by ice-cold water held in the mouth for a few moments.

An apparatus designed and manufactured by Messrs. Horne & Thornwaite, of London, is said to answer a very good purpose, and is thus described:

A required amount of water is cooled down, by means of ice and salt, to about zero, in a vessel called a refrigerator. To this vessel is attached another, called a graduator, containing warm water at about 100°, and so constructed as to allow the slow admixture of its contents with the chilled water in the refrigerator, and thus produce a gradual diminishing tempera-

ture, for the purpose of preventing sudden shock and pain to the teeth, which a direct application of cold would inevitably cause. A tube conveys this graduated current into a terminal portion constructed of very fine membrane, which adapts itself to the form of the gums, and wholly surrounds the tooth to be extracted. The fluid then passes away through an exit tube. In this manner a constant current of cold, at a decreasing temperature, is made to pass over the part, abstracting therefrom all heat, and consequently all feeling.

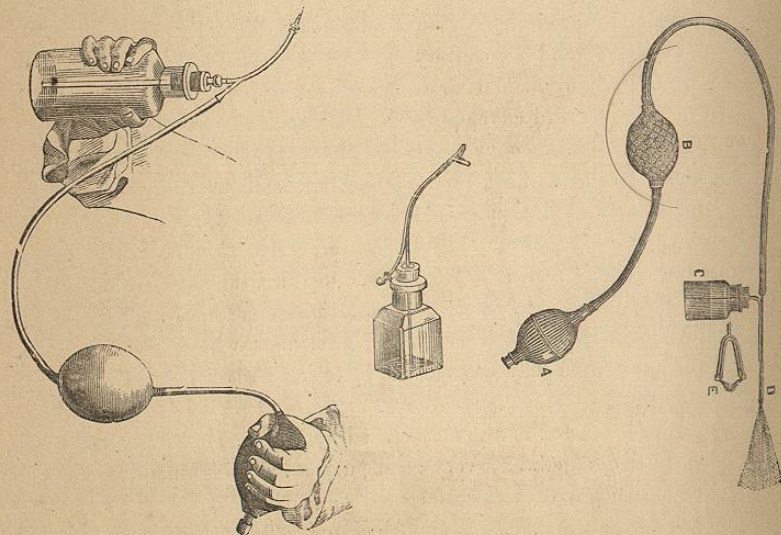
The concentrated tincture of aconite is a useful local anæsthetic, but one that is to be used with a great degree of caution. If a portion of this tincture be applied to one-half the lip, sensibility is likely to be found so interfered with that a goblet placed to the part feels as if broken.

A mixture of chloroform and laudanum in equal parts is lauded by some. To apply this, it is only necessary to saturate a tuft of cotton and lay it against the tooth to be extracted.

Another means, serving to attract the attention of the patient from the operation, consists in painting the gum heavily with tincture of iodine. After such painting, people are often heard to say that the pain has been much ameliorated.

Electro-galvanism claimed at one time a large share of attention. The application of this consists in attaching one pole of a battery to the forceps,

FIG. 316.—SPRAY APPARATUS—HAND-INSTRUMENT.

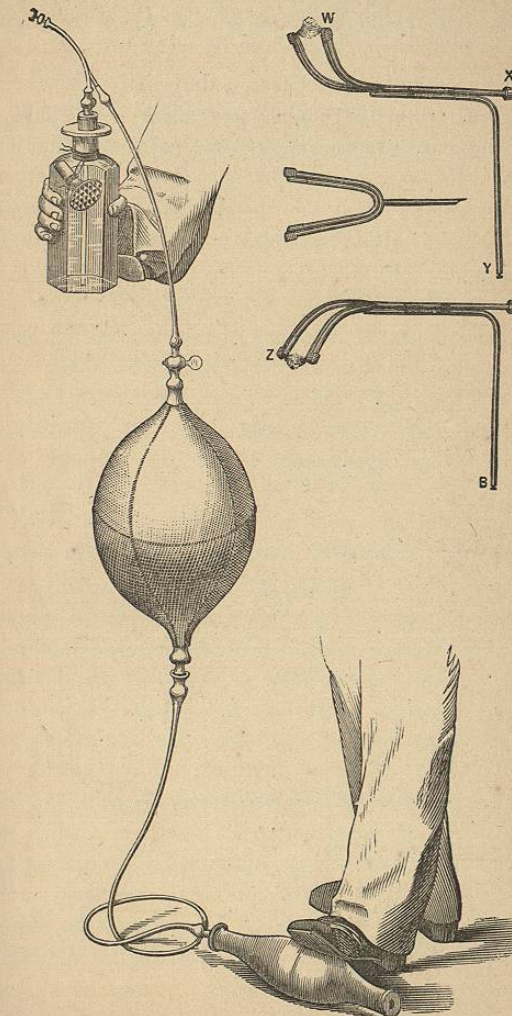


while the other is held in the hand of the patient; a gentle current is next let on, during the passage of which the tooth is extracted. This mode of effect-

ing local anæsthesia is still practised by many; but the writer has to say that in his hands and in the hands of experienced friends it has proved a failure. Not that it is to be denied that in certain cases it does seem somewhat to obtund sensibility, but in the majority of instances it either does no good at all, or adds the discomfort of shock to the pain of the operation.

The use of the spray of ether or of rhigolene is a late and not entirely unreliable means for the production of local anæsthesia; certainly one reasonably

FIG. 317.—SPRAY APPARATUS—FOOT-INSTRUMENT.



acceptable when employed for operations of limited extent about soft parts, but as to an availability in tooth extraction experience has not so fully in-

dorsed it. With these agents as thus locally applied, incisions, in the way of the removal of sebaceous and other superficial tumors, the opening of abscesses, carbuncles, and similar operations, are assuredly to be made with fair satisfaction; but in their application to the teeth the obtunding of the sensibility has not by any means been so marked, and particularly has this been found the case where rhigolene was used.

The process of freezing a part through the known refrigerant power of evaporating ether seems first to have suggested itself to Dr. Richardson, of London. An instrument invented by this gentleman for the accomplishment of such an end is here exhibited, forms of bellows for both hand and foot being represented (Figs. 316 and 317).

For the spraying of any plain surface, a simple straight tube is all that is necessary. For the teeth, the double sprayer, as seen in the drawing, is used; with this instrument a continuous vapor is cast upon both the outer and inner face of the gum, congelation being rapidly induced.

In using the hand-instrument the operator should not himself work the pump. A very few moments' compression of the ball renders the hand shaky and unmanageable.

Upon this instrument of Dr. Richardson's many modifications have already been made. Of these, one by Messrs. Codman & Shurtleff, of Boston, has perhaps attracted most attention. It certainly seems to divide the ether more infinitesimally, thus insuring complete vaporization; but it has a weak point, in that the tube frequently freezes or chokes up,—an accident that does not occur with the Richardson apparatus.

An objection urged to the use of extreme cold, as above induced, is injury done to the soft parts. That such objection is valid seems, however, not to be satisfactorily proven; if anything, parts thus operated upon unite better and with less inflammatory reaction than obtains where the spray is not used.

Rhigolene, or hydrocarbon, manufactured from coal-oil, and much vaunted by some, has not proven so satisfactory as ether. It certainly freezes a part more quickly than this latter agent, but the anæsthesia is not so complete.

CHAPTER XXIX.

PROSTHETIC DENTISTRY.

PROSTHETIC dentistry treats of the replacement of lost natural teeth by artificial ones set upon a plate. It is what is generally known as mechanical dentistry.

A full set of artificial teeth is called a denture. A plate having one or several teeth attached is commonly called a piece.

Preparation of Mouth.—The preparation of a mouth for the reception of a plate implies that the operator consider in the relations of each case the hygienic, mechanical, and artistic considerations therewith necessarily associated: one mouth, the lips being long; the process full, the arch markedly concave, and of some depth; the gums solid and resisting; the submucous structure neither deficient nor excessive; the teeth all absent, or such as may remain having harmonious relation; temperament lymphatic,—such a mouth the merest tyro will accommodate. On the contrary, lips short; process absorbed to a line; arch flat; gums irregularly flaccid and hard; teeth all gone or, where some remain, inharmonious to a common articular relation; temperament nervous,—such a mouth the most skilful will scarcely serve to satisfy.

A mouth before prepared to receive a denture, full or partial, is to be free from all roots which may have association with the parts to be occupied; teeth irregular to the arch, and thus the source of deficient symmetry, or such as may interfere with a successful fitting of the artificial piece, or such as may be diseased and lacking in promise,—these are to receive attention and judgment.

As a rule, a plate is not to rest upon a root, healthy or unhealthy. The retention of an isolated tooth in the dental arch (all the others having been lost), however healthy and symmetrical, except it be in a position where a plate is not to go back of it, will be apt to antagonize the merits of any denture, however perfect its construction. Soft teeth are not to be clasped. A cachectic mucous membrane is to be covered alone with a gold plate which has been alloyed with platinum, the baser materials being irritative. A turgid congested membrane is not capable of affording an impression which will allow a denture to be useful. Scorbutus, ptyalism, all unhealthy conditions are to find correction before an impression is taken. Clasp teeth are to be freed from tartar, and (except when the denture is to be temporary) alveoli are to be absorbed.