An atlas of dental extractions : with notes on the causes and relief of dental pain designed for the use of medical students and practitioners / by C. Edward Wallis.

AN ATLAS OF DENTAL EXTRACTIONS

C. E. WALLIS

SECOND EDITION

AN ATLAS OF DENTAL EXTRACTIONS

WITH

NOTES ON THE CAUSES AND RELIEF OF DENTAL PAIN

DESIGNED FOR THE USE OF MEDICAL STUDENTS AND PRACTITIONERS.

BY

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PREFACE.

This "atlas" and notes have been designed for the use of *medical* students and practitioners with the object of assisting them to perform such emergency dental operations as may be expected to occur in a country practice or on board ship where the services of a dental surgeon cannot be obtained.

A minimum number of dental appliances has been recommended and various means of improvising a dental chair have been shown.

I have to express my great indebtedness to Professor Underwood, Dr. Harold Austen, Mr. Norman Bennett, and Mr. G. K. Aubrey for many valuable suggestions, and also to Messrs. Allen & Hanburys for the loan of the blocks.

C. EDWARD WALLIS.

June, 1909.

PREFACE TO SECOND EDITION.

A second edition having been called for a complete revision has taken place, which the author hopes may increase its usefulness to the medical practitioner unable to obtain the services of a dental surgeon.

C. EDWARD WALLIS.

13, Queen Anne Street,
London, W. 1.

THE CAUSES AND RELIEF OF DENTAL PAIN.

In considering the causes of toothache one must bear in mind the various structures of which a tooth is composed, and the surrounding tissues with which it is in close relation. A tooth may be regarded as a hard, unyielding box, enclosing a highly sensitive and vascular pulp or "nerve" as it is commonly called.

The portion of tooth which is implanted in the jaw is more or less conical in shape and closely surrounded by its bony socket, which is therefore a hollow cone.

Between the root and the socket is a fibrous membrane known as the "periodontal membrane," in which a capillary network ramifies for the nutrition of the socket and the external surface of the root; and through this membrane pass the blood-vessels that enter the pulp.

Irritation applied to any vascular tissue produces *hyperæmia*, which may be but transitory, or pass into the condition of *inflammation* if the irritant be not speedily removed.

It is important, therefore, to distinguish *two different sources of the pain* of toothache according as the pulp or periodontal membrane is the part primarily affected, for on the correctness of diagnosis will depend the chance of successful treatment.

Inflammation of the pulp.—The hyperæmia of the pulp occurring in this condition leads to swelling that causes a darting, shooting, or throbbing pain in the

tooth, owing to the resistance offered by the unyielding wall of the pulp cavity to the expansion of the pulp tissue.

Heat or a lowered position of the head intensifies the throbbing, since either will still further increase the congestion.

As the periodontal membrane is not involved, pain is not usually felt on the tooth being pressed or bitten into its socket.

Inflammation of the periodontal membrane. — This membrane, on becoming inflamed, is thickened, and therefore raises the tooth in its socket; hence it appears lengthened and is bitten upon before its neighbours when the jaws are closed, pain being produced from the membrane being squeezed between the two unyielding surfaces of tooth and socket.

The pain is of a dull, heavy, not throbbing character, not worse at night, and often relieved by heat and generally in early stages by pressure.

The tooth is tender to the slightest touch, and the gum surrounding it is swollen and feels velvety to the finger.

Irritation of the dental pulp.—If the irritation be long continued and slight, an increased formation of dentine may take place from stimulation of the odontoblasts.

Irritation of the dental pulp may arise from:

(1) Caries with or without the presence of cavities.

(2) Heat and cold, contact of sweet, sour, or acid substances.

(3) Conduction of heat and cold through a metal filling.

(4) Exposure of dentine from any cause producing loss of the enamel, such as friction from bands or dental plates, wearing down of teeth from excessive use or loss of the enamel due to overuse of a hard toothbrush or abrasive tooth-cleaning pastes or powders.

Symptoms.—The symptoms depend upon the amount of hyperæmia; thus slight discomfort may follow on taking hot or cold fluids, the contact of cold air, etc.

The pain, however, is usually of a shooting or darting character and occurring at irregular intervals, sometimes brought on by heat or cold, especially cold, or by the contact of sweet, salt, or sour substances.

The tooth may also be tender to the slightest touch owing to an extension of the hyperæmia to the dental periosteum.

Treatment.—When the pain is due to the presence of a cavity in the tooth it should be thoroughly syringed with warm water, and into the cavity must be inserted a small pellet of cotton-wool that has been dipped in one of the following local anæsthetic substances (it is essential to squeeze the excess from the pellet, as it is undesirable for the medicament to overflow into the mouth):

Oil of cloves.

Eugenol.

Creosote.

Oil of cinnamon.

Strong liquefied carbolic acid.

Warm saturated solution of carbonate of soda.

Oil of peppermint.

Cocaine crystals, especially the crystals dissolved in glycerine 1 in 3.

Carbolised resin is a most convenient preparation for the purpose, as in addition to relieving pain it serves as a temporary stopping for two or three days until a dentist can be seen.

Formula for Carbolised Resin.

Resin	4 parts
Carbolic acid crystals	4 parts
Chloroform	3 parts

In cases in which owing to the loss of the enamel the dentine has become exposed and highly sensitive to heat and cold, relief can be obtained almost immediately by the application of solid nitrate of silver to the sensitive area; the most convenient plan is to fuse a little of the powdered salt on the end of a probe or hair-pin so as to form a bead, which can be readily applied to any part of the mouth.

When there is no visible cavity it is well to treat the pain on general constitutional principles with anti-neuralgic remedies, such as aspirin, phenacetin, chloral hydrate, antipyrin, gelsemium, and so forth. The application of iodine and aconite paint to the gums in the vicinity of the painful tooth frequently affords great relief by the counter-irritation and anodyne effect produced.

Iodine and Aconite Paint.

℞ Liquor iodi fortis } equal parts.
Lin. aconiti }

To be applied to the gums on a small swab of cotton-wool not more than twice daily.

In severe and urgent cases it may be necessary to administer morphine hypodermically. In all cases, however, in which no cavity can be seen, the patient should be advised to consult a dentist, who may be able to find a dental cause not discoverable without the use of special dental appliances.

Acute inflammation of the pulp is usually the result of its exposure or infection by the advance of caries; it may, however, be produced by the fracture of a tooth due to a blow, the application of arsenious acid for destroying the pulp, or as an extension of inflammation from the peri-odontal membrane.

If a section be made through a tooth the pulp of which is in a state of acute inflammation, the pulp tissue will be

seen to be bright red, whereas a healthy dental pulp is of a very pale pink colour.

Symptoms.—Pain, usually of a shooting character, brought on by food pressing against the exposed surface or by the application of heat or cold, and in its early stages characteristically intermittent.

The pain is *worse at night*, when the patient lies down and becomes warm in bed, increased congestion being thus produced; the pulp is squeezed against the hard, unyielding walls of the pulp cavity.

The pain may or may not be referred by the patient to the tooth really affected, a lower tooth being frequently indicated by the patient as the one in fault when the real source of pain is an upper one.

Referred dental pain, however, never crosses the median line.

Examples of referred pain.—Earache is frequently due to a carious molar tooth. Pain in the bicuspid or canine region may also be due to a carious wisdom tooth on the same side of the mouth.

Course.—If the acute inflammation of the pulp be allowed to run its course untreated, the pulp usually becomes strangulated at the apical foramen and its death results; death of the pulp, however, may not occur until a second or third attack.

Treatment.—The first indication is the relief of pain, and this may be accomplished by the same means as for the pain due to irritation of the pulp, namely, the insertion of a pellet of cotton-wool dipped in one of the following:

Oil of cloves, eugenol, creosote, oil of cinnamon, pure carbolic acid, oil of peppermint, a warm saturated solution of carbonate of soda, or crystals of cocaine; carbolised resin[1] is also useful for this purpose, and has the

[1] See "Formula for Carbolised Resin" on p. 3.

additional advantage of serving as a temporary stopping for three or four days.

Treatment.—If pain of a severe throbbing character has lasted for some time destruction of the dental pulp is usually advisable; this is effected by the application of some preparation containing not more than gr. $\frac{1}{16}$ arsenious acid to the exposed pulp, the preparation being carefully retained in position by gutta-percha or wool soaked in sandarac or mastic varnish. Arsenic should not as a general rule be applied to temporary teeth.

The process of "killing the pulp" should be in most cases a painless one; in the cases in which much pain ensues the cause is usually the application of too tight a dressing, which does not allow of the expansion of the pulp due to the congestion produced by the arsenic. The application of arsenic for this purpose should not be undertaken by anyone without special training, as it is frequently a matter of considerable difficulty, and may cause sloughing of the gums and necrosis of the alveolus if carelessly performed.

Chronic suppurative inflammation of the pulp usually arises from infection of the dental pulp that has been exposed by caries.

Symptoms.—Pain coming on at irregular intervals of a wandering neuralgic character, which the patient may not refer to a tooth at all; the presence of throbbing is not infrequent, and may assist in locating the source of the pain.

A paroxysm is often brought on by the sudden application of heat or cold, sweet or salt substances. The characteristic symptom of suppurative inflammation of the pulp is the production of great increase of pain on the application of heat.

The *tooth is not tender* unless the periodontal membrane is involved and the *gum is not swollen.*

Treatment.—The application of local anæsthetics and sedatives on cotton-wool as for irritation of dental pulp; opening the pulp chamber usually gives immediate relief, but is a procedure that can only be carried out with special dental instruments. General constitutional treatment must therefore be used to supplement local palliative applications until skilled dental treatment can be obtained.

Polypus of the pulp.—Sprouting granulation of the exposed surface of a chronically inflamed pulp may take place, the granulations growing till the carious cavity is completely filled by them, constituting what is known as *polypus of the pulp;* a polypus of this kind is not usually very sensitive.

Treatment.—The polypus must be cut away and the pulp destroyed by arsenious acid.

Periodontitis (*dental periostitis, pericementitis*).—Inflammation of the fibrous and vascular membrane which lines the socket of a tooth and covers and nourishes the cementum is called variously "dental periostitis," "periodontitis," and "pericementitis."

It may be general, involving the periodontal membrane of all the teeth, or local, being in that case confined to the socket of one tooth only; like inflammation elsewhere, it may be *acute* or *chronic.*

General inflammation of the periodontal membrane is dependent on some constitutional condition, such as rheumatism, gout, tuberculosis, syphilis, or may be associated with one of the exanthematous fevers, the inhalation of the fumes of phosphorus as in match-makers, the administration of mercury.

Localised periodontitis may be acute, frequently running on to *alveolar abscess,* or chronic, in which suppuration either does not occur at all or is restricted to the periodontal membrane *near the margin of the socket.*

Acute localised periodontitis.—Causes: (1) Inflammation spreading from a living inflamed pulp, through the apical foramen to the periodontal membrane immediately surrounding it.

(2) Direct absorption by the periodontal membrane of septic material from a putrefying pulp.

(3) Stopping an imperfectly sterilised tooth from which septic material is unable to escape, except through the apical foramen.

(4) Injury caused by a blow upon the tooth, injuring and perhaps leading to infection of the periodontal membrane.

(5) The escape of arsenic from a dressing applied for the destruction of a dental pulp.

(6) Exposure and infection of the periodontal membrane supervening in the condition known as pyorrhœa alveolaris (Riggs' disease).

Symptoms.—In the early stages the tooth or teeth may be merely tender and uncomfortable; later, however, owing to the swelling of the periodontal membrane, the affected teeth become raised, as well as loose and tender to the slightest touch.

The gums also become involved, since the periodontal membrane is reflected outwards at the margin of the alveolus, and become swollen and deeply congested, presenting a velvety feeling when touched by the finger.

Sudden changes of temperature or weather will often bring on or accentuate an attack of periodontitis in those subject to this affection.

When periodontitis is produced by mercury or phosphorus, there is tenderness and loosening of the teeth, extreme congestion of the gums, which become spongy and readily bleed, together with great oral fœtor.

Ulceration with sloughing of the gums and necrosis of the jaw may ensue.

Ptyalism is especially marked in mercurial poisoning.

General treatment.—Constitutional: Remove the cause if possible, as in the case of mercury and phosphorus poisoning.

Treat general condition if gouty, rheumatic, tuberculous, or syphilitic.

Local.—Render the mouth as aseptic as possible by the use of mouth washes, of which sanitas combined with chlorate of potash lotion (gr. x to the ounce) is one of the best.

In cases in which one or more teeth are involved, counter-irritation applied by first drying a large area of the gums near the affected teeth and then painting it with *iodine and aconite paint* gives great relief.

Formula.

℞ Liquor iodi fortis } equal parts.
Lin. aconiti }

This should not be applied more than twice or three times daily, as it tends to make the mucous membrane so sore that further applications become impossible.

The application of a capsicum plaster, which is a sort of diminutive mustard leaf, to the previously dried gum also gives great relief; it should be held over the root of the affected tooth with the finger until it adheres, and then allowed to remain until it falls off.

Chronic localised periodontitis.—This condition must be treated in the same way as the above, by general constitutional treatment and by the application of the iodine and aconite paint night and morning, or if more convenient by the application of capsicum plasters.

Chronic suppurative periodontitis—pyorrhœa alveolaris (*Riggs' disease*).—The pathology of this condition is very obscure; it is apparently due to a pyogenic infection,

though in many cases the pneumococcus and *Micrococcus catarrhalis* may be found.

Symptoms.—Those of suppuration of the periodontal membrane, plus inflammation of the gums (gingivitis), accompanied by the formation of deep pockets, from which pus exudes round the necks of the teeth, leading to destruction of the periodontal membrane, absorption of the alveolus, and loosening of the teeth.

Treatment.—The treatment of this condition is exceedingly unsatisfactory; at the same time efforts must be made to minimise the suppuration by the use of antiseptic mouth-washes, such as chlorate of potash in combination with sanitas, permanganate of potash, etc.

In cases of suppurative gingivitis due to dental neglect, which is often mistaken for pyorrhœa alveolaris, much benefit is to be derived from a vigorous massaging of the gums with ordinary sodium chloride applied on a pledget of lint twice daily for a week at least; arrangements should also be made for a thorough scaling of the teeth by a dental surgeon at the earliest opportunity.

In cases of genuine pyorrhœa alveolaris zinc ionisation accompanied with the use of an autogenous vaccine is sometimes of great benefit, though, as before, a thorough scaling of the teeth is an essential preliminary.

Alveolar abscess.—An abscess arising from a tooth is known as an alveolar abscess or "gum-boil"; it is usually situated at the end of the root of a tooth.

Causes.—Extension of septic infection from the pulp or periosteum of a tooth.

Symptoms.—Those of periodontitis much intensified, *e. g.* the tooth is raised and tender; the gums are swollen, deeply congested; pus frequently wells up at side of tooth.

Sulcus between cheek and tooth instead of being hollow is filled up by a globular or diffuse swelling.

Sometimes diffuse cellulitis of the face occurs, the whole cheek becoming swollen, tense, shining, very painful, and the eye closed if the abscess is connected with an upper tooth. The pus from an upper tooth may burrow into the antrum in the case of upper bicuspids (or molars), or be directed towards the palate (upper lateral incisor) either between the periosteum and the bone, when there will be great pain, or between the periosteum and the mucous membrane, when there will be but little pain, since the tissue in that situation is somewhat lax and therefore yields readily.

When an abscess it situated at the root of a lower molar, particularly a lower wisdom tooth, *trismus* may occur from:

(1) Spasm of the masseter, which symptom will disappear under an anæsthetic.

(2) Inflammatory infiltration of the masseter, in which case the administration of an anæsthetic will simply enable the operator to apply the necessary force to open the jaw with a screw wedge or Mason's gag.

An abscess from a lower wisdom tooth sometimes points beneath the angle of the jaw, and an abscess connected with any lower tooth may burst either through the cheek or beneath the margin of the mandible.

The submaxillary lymphatic glands may become infected, in which case they will be swollen and tender.

The submaxillary lymphatic glands in children are sometimes infected with tubercle, probably conveyed to the glands by carious teeth with exposed pulps.

Treatment of alveolar abscess.—When an alveolar abscess has already formed, great relief will usually be obtained by incising the abscess in the mouth.

In cases in which the abscess is very large and is threatening to burst outside the cheek, it is wise to apply

a piece of gauze with flexible collodion over the thinned area of skin, and thus to minimise the danger of or prevent the occurrence of an external opening; at the same time efforts must be made to make the abscess point in the mouth, and this is best done by the application of a roasted dried fig or a dried fig squeezed dry from boiling water and held in the mouth over the abscess; it is often necessary to apply a succession of these fig poultices.

Poppy-head fomentation, made by boiling two ounces of bruised poppy-heads for ten minutes in a pint of water and held in the mouth, often gives great relief and may shorten the course of the affection.

In severe cases of alveolar abscess extraction of the tooth is the only course open to the medical practitioner, and the sooner it is done the better for the patient; the old idea that it is necessary to wait till the inflammation has subsided is often disastrous, as it may lead to the formation of an external opening in the cheek and permanent scarring of the face.

An abscess arising from a lower wisdom tooth usually necessitates its extraction; this is often a matter of great difficulty, and can only be accomplished by using the elevator; it sometimes happens that it is impossible to reach the wisdom tooth, in which case it may be necessary to remove the second lower molar before dealing with the offending wisdom tooth.

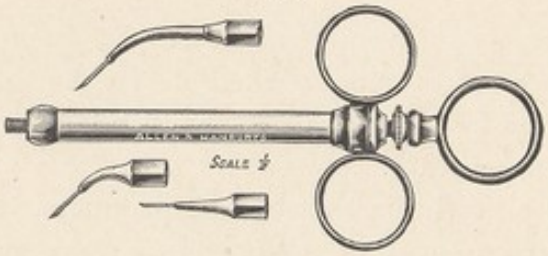
Local anæsthesia in the extraction of teeth.—The hypodermic injection of certain anæsthetic solutions is in a considerable proportion of cases successful in enabling the extraction of teeth to be performed painlessly. At the same time it is essential for the operator to know exactly what he is injecting and the exact amount and purity of the active ingredient contained in his injection.

Nothing can be more dangerous than the injection of the much advertised proprietary local anæsthetics, many of which contain an indefinite amount of cocaine, and which within the writer's knowledge have over and over again produced serious results.

The most widely used preparation for dental local anæsthesia is probably novocaine combined with adrenalin; special dental tablets are made for this purpose, and when boiled in a test-tube with 1 c.c. of normal saline provide an admirable local anæsthetic for dental use.

A very satisfactory syringe is that designed by Dr. Dawson, of Dublin, as it is readily sterilisable, and more-

FIG. 1.



over, by reason of its "finger-rings," affords a perfect command over the barrel and piston.

The special "washerless" syringe sold by the Dental Mfg. Co. of London is specially suitable for dental local anæsthesia.

Procedure. — (1) The patient's mouth should be thoroughly rinsed with sanitas and water or a permanganate of potash mouth-wash.

(2) The syringe and needle are next sterilised with 1 in 20 carbolic lotion.

(3) If novocaine is used the syringe should then be filled with 17 minims (1 c.c.) of the solution, and then an injection made of about 12 minims on the external and 4 minims on the internal side of the alveolus, the

aim of the operator being to surround the tooth with a zone of anæsthesia, and for this purpose at least two punctures are necessary. The point of the syringe should be inserted about 3 mm. from the free edge of the gum adjacent to the tooth to be removed; the needle should be inserted quickly and the injection made very slowly, the syringe being held in position for some seconds after the requisite quantity has been injected. When the gum becomes blanched, and not till then, the anæsthesia may be regarded as complete.

Hypodermic injections into the gums should not be made—

(1) In inflammatory or suppurative conditions of the mouth.

(2) In cases of alveolar abscess. In such cases the application of cotton-wool soaked in 10 per cent. novocaine for some five minutes will much alleviate the pain of a dental extraction.

The local anæsthesia that can be produced by freezing the gums with a spray of *ethyl chloride* is frequently very useful in the case of temporary teeth and readily accessible single-rooted permanent teeth, but it must be borne in mind that it has a great tendency to cause the teeth to become brittle owing apparently to the freezing of their "organic" matter, with the result that they may be very readily broken during the attempt at extraction and thus lead to much difficulty.

GENERAL NOTES ON EXTRACTION OF TEETH.

THE minimum number of forceps that can be expected to deal with any ordinary case of extraction is five, and this number combined with a "fish-tail" elevator will be sufficient for practically every tooth. In Figs. 2 and 3 the patterns suggested are shown together with a pair of "conveying forceps" such as are very useful for applying medicaments on cotton-wool for the relief of pain, and also a dental probe for ascertaining the exact position and extent of carious cavities.

The use of so-called "straight" forceps for lower molar and bicuspid teeth is not recommended, as they are exceedingly difficult to use and do not provide nearly as much leverage as those of the so-called "hawksbill" pattern as shown here. The blades of all dental forceps must be *bevelled* so that they grasp the teeth on a flat and not a sharp edge, as is frequently the case with ill-designed forceps, which simply break the teeth instead of grasping them.

The "straight" elevator is not recommended, as not only is it difficult to use but is an exceedingly dangerous instrument in the hands of one unaccustomed to its use.

It is of the utmost importance that all instruments used for extracting teeth should be efficiently sterilised, either by boiling or else by prolonged soaking in a solution of carbolic acid (1 in 20) or lysol; it is also essential that the forceps should be clean in the ordinary sense of the word before being placed in the antiseptic lotion.

Inasmuch as few medical practitioners possess the luxury of a dental operating chair, a convenient substitute

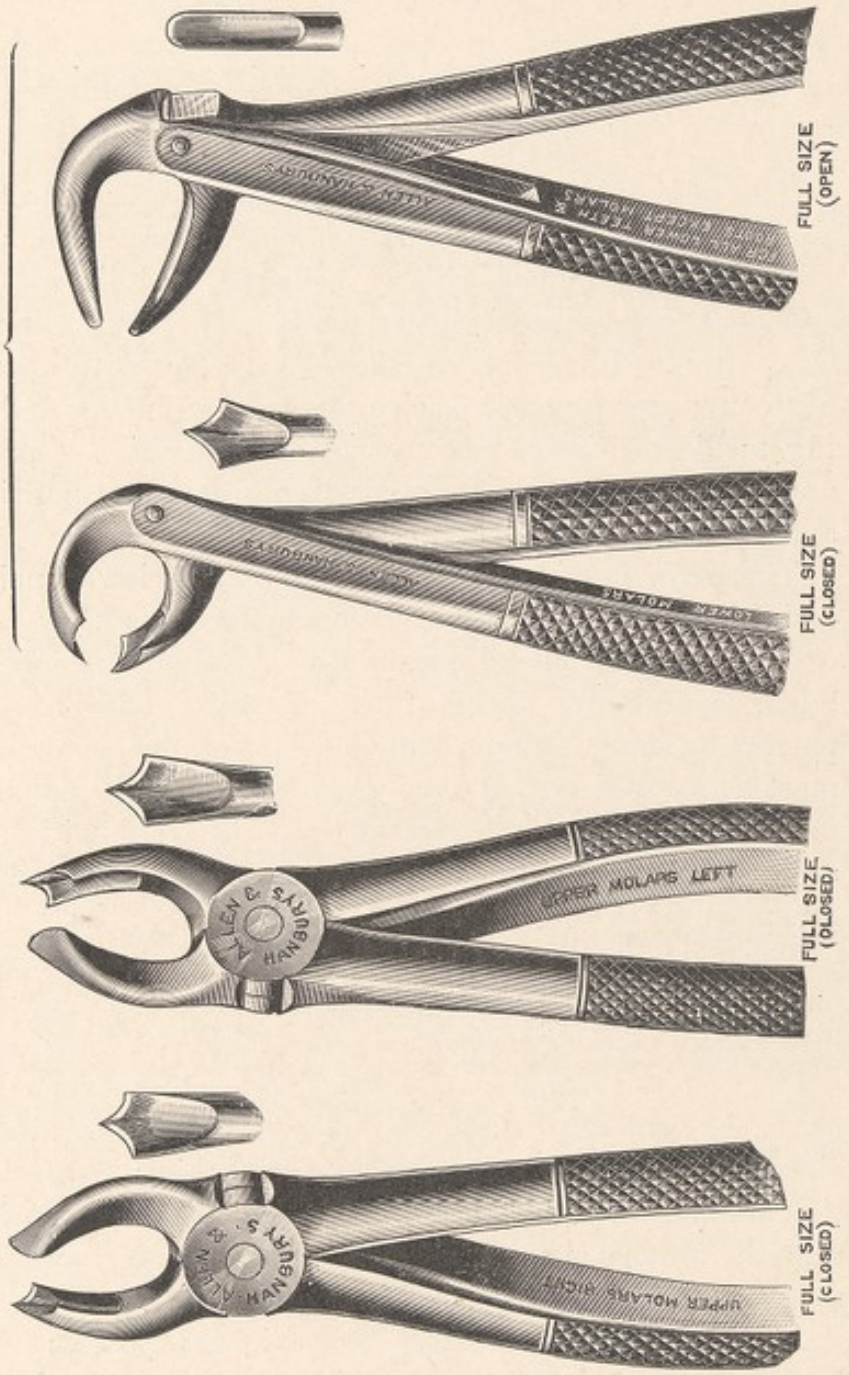

"Hawksbill" forceps.
FULL SIZE (OPEN)
FULL SIZE (CLOSED)
FULL SIZE (CLOSED)
FULL SIZE (CLOSED)
ALLEN & HANBURYS
LOWER MOLARS LEFT
UPPER MOLARS RIGHT

FIG. 2.

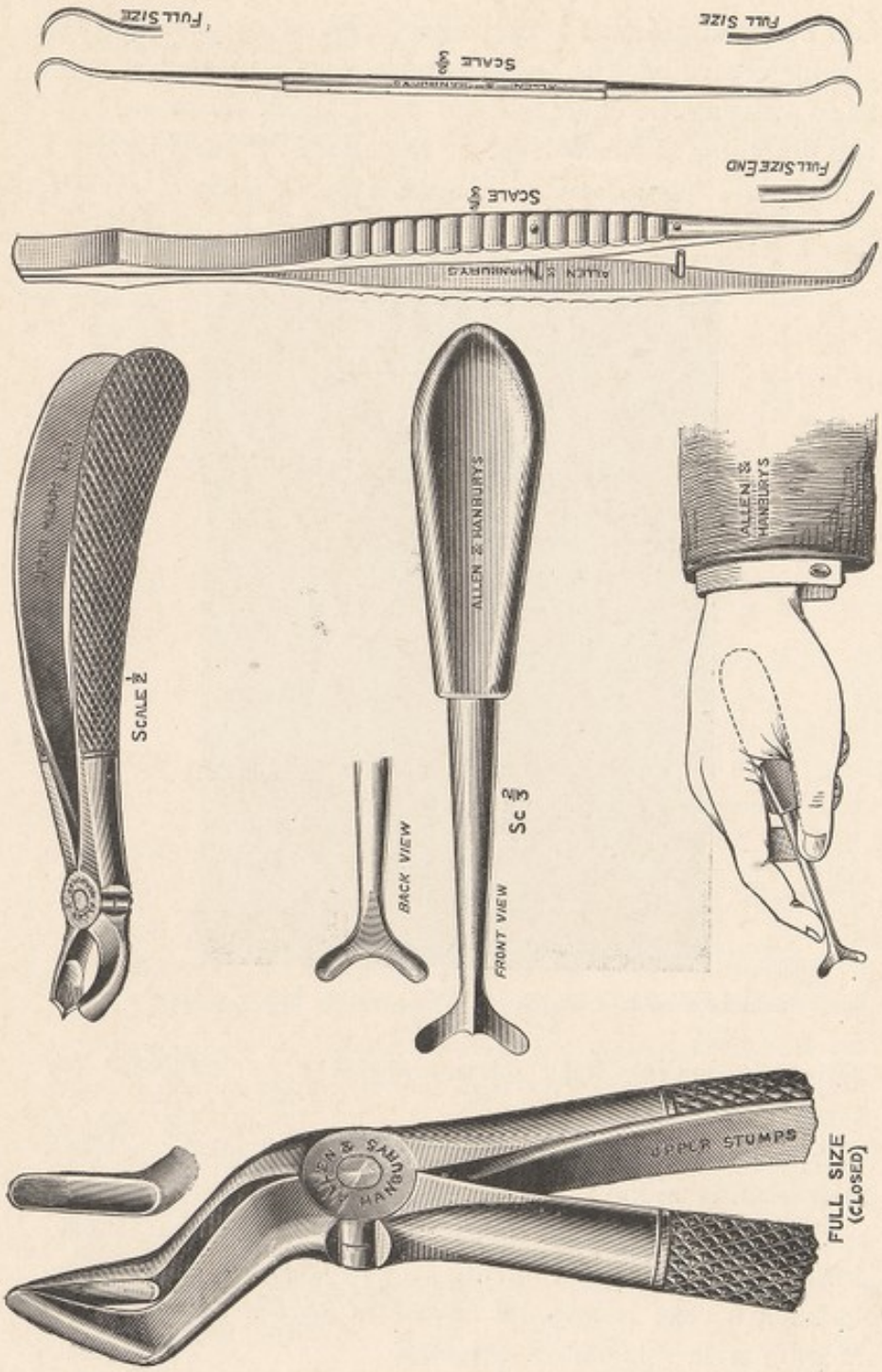

FULL SIZE
FULL SIZE
SCALE ⅔
FULL SIZE END
SCALE ⅔
ALLEN & HANBURYS
SCALE ½
ALLEN & HANBURYS
BACK VIEW
FRONT VIEW
SCALE ⅔
ALLEN & HANBURYS
UPPER STUMPS
FULL SIZE
(CLOSED)

FIG. 3.

can be readily devised as shown in Fig. 4 by placing two strong chairs back to back against a wall in such a way as to prevent the chair in front being tilted backwards by the flinching of the patient or the efforts of the operator. This plan, combined with such other positions as are

FIG. 4.

A. Cushion on back of chairs. B. Chair resting firmly against a wall.

shown in dealing with particular teeth, is sufficient for every case.

Special care must be taken when extracting a tooth that stands alone; it frequently happens that the gum is firmly adherent to a tooth of this kind and may therefore be seriously torn during the process of extraction; in such a case it may be necessary to cut away the tag of gum with a lancet or scissors.

THE EXTRACTION OF TEMPORARY TEETH.

ALL the temporary teeth except the molars have *one* root.

There are *no* bicuspids in the temporary dentition.

The position of the temporary molars is occupied by the bicuspids in the permanent dentition.

The *bicuspids* erupt between the roots of the "temporary molars," and therefore occupy their position when they are lost.

In extracting the temporary teeth the patient should be

FIG. 5.

The temporary teeth.

placed in the same position as for the corresponding permanent teeth.

General principles.—Grasp the crown of the tooth firmly in the forceps.

In the case of a temporary molar it is important to avoid pressing the forceps upwards or downwards to any appreciable extent for fear of removing the crown of an on-coming bicuspid which lies between its roots ready to take its place.

For *upper incisors or canines* use "straight" or bayonet *root* forceps.

For *upper molars* use right or left upper molar forceps or bayonet root forceps in cases where the crown is much broken down.

For *lower incisors and canines* use lower hawksbill root forceps; the same forceps can be used on either side of the mouth.

For *lower temporary molars* use lower hawksbill molar forceps or lower hawksbill root forceps.

Broken-down temporary teeth and roots can either be extracted with root forceps or prised out with the "fish tail" elevator, making use of an adjacent tooth as a fulcrum.

It is quite *unnecessary* to have special forceps for temporary teeth.

It is important to avoid extracting prematurely a *second temporary molar*; loss of this tooth may lead to a moving forward of the adjacent first permanent molar and consequent crowding and irregularity of the bicuspid teeth.

The *temporary canines* should also be retained until their permanent successors show signs of erupting; premature extraction of the temporary canines allows the bicuspid teeth to move forward and thus may lead to the deformity of projecting canine teeth.

Undue retention of the temporary teeth may, on the other hand, lead to irregularity of the permanent successors; in cases of doubt it may be well to postpone extraction until the advice of a dental surgeon can be obtained.

Dentition Table.

The following table shows the order in which the milk teeth and permanent teeth appear, and the average age at their eruption. There are wide variations as to time, and great irregularity in the order of their appearance.

Milk teeth.—The first dentition begins at the sixth or

seventh month, and is completed by about the second year.

Central incisors .	(1) lower, 6th month; (2) upper, 7th month.
Lateral incisors .	(1) upper, 9th month; (2) lower, 10th month.
First molars .	12th month.
Canines . .	18th month.
Second molars .	2nd year (often later).

The full primary dentition is 20 teeth; 10 in each jaw.

Permanent teeth:

First molars . . .	6½ years
Lower central incisors .	7 „
Upper central incisors .	8 „
Lateral incisors . .	9 „
First bicuspid . .	10 „
Second bicuspid . .	11 „
Canines	12 „
Second molars . .	13 „
Third molars (wisdom) .	17 to 25 years, or at any later period.

The full permanent dentition is 32 teeth; 16 in each jaw.

HÆMORRHAGE AFTER EXTRACTION: TREATMENT.

Local.—In slight cases it is sufficient for the patient to sit quiet with cold or iced water in his mouth; where ice cannot be obtained holding *very* hot water in the same way is often successful, especially if alum be dissolved therein.

It is not infrequent, however, that blood will continue to well up from the socket from which the tooth has

been removed; in such a case it is necessary to syringe the socket with ice-cold or very hot water or boric lotion, and then to apply pressure to the bleeding point by firmly plugging the socket with cotton-wool or lint soaked in fresh adrenalin or other supra-renal gland preparation; the application of tannin, either as glycerin of tannin or on wool soaked in hazeline and powdered with tannin, answers in many cases. Perchloride of iron is a most unsatisfactory remedy, and should only be used as a last resource when nothing else is obtainable.

Constitutional.—It is not uncommon for an operator to be warned by the patient that excessive bleeding has previously followed the infliction of a cut or the extraction of a tooth. It has been shown that a large proportion of these cases are due to insufficient coagulability of the blood owing to an insufficiency of calcium salts; it is therefore wise in such cases to administer one of the drugs which are known to rapidly increase the coagulability of the blood.

Calcium lactate, calcium chloride, and magnesium carbonate have all been shown to produce this effect in a marked degree within the space of an hour or so; the salt selected should be administered in a single dose of 3j the night before the proposed operation.

The best and most pleasant to take is calcium lactate, which may be administered in compressed tablets or in a draught such as the following:

℞	Calcii lactatis	3j.
	Syrup	q.s.
	Aq. ad.	℥j.

Fiat haustus.—To be taken as a draught the night before the dental extraction takes place.

The effect of these salts appears to last about three to four days, so that in the event of dental extractions being performed on successive days a second dose is not called for.

PAIN AFTER EXTRACTION.

Pain after the extraction of a tooth may be due to the lateral displacement of the alveolus which is brought about by the application of the forceps; this can be minimised by applying firmly a finger and thumb after the tooth has been removed and so restoring the alveolus to its former position.

Besides this, owing to the socket becoming septic either from the operator making use of unsterilised instruments or else operating in a mouth that is very foul, pain may continue in a tooth socket for a considerable time.

To avoid this every mouth, before operation, should be made as clean as possible by the use of tooth powder and sanitas and permanganate of potassium mouth-washes, and after the extraction has taken place every effort must be made to keep the socket free from the remains of food and other decomposable matter. If, two or three days after the extraction, the patient complains of pain in the socket, the treatment is to keep it syringed out with sanitas and water or weak permanganate lotion.

A pledget of cotton-wool soaked in liquor potassæ and pure carbolic acid, equal parts, usually affords immediate relief from pain after the socket has been syringed out in this way.

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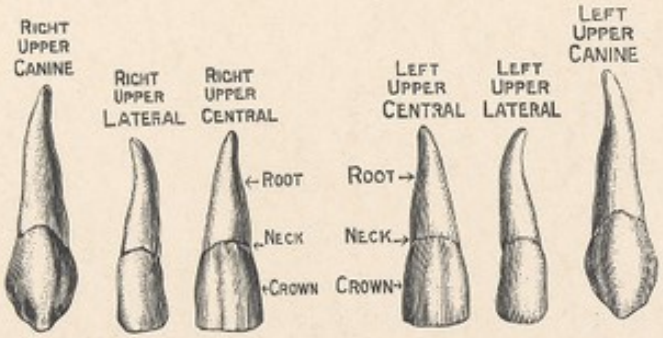
LIST OF PLATES.

PLATE 1.

Extraction of Upper Incisors and Canines.

PLATE 1.

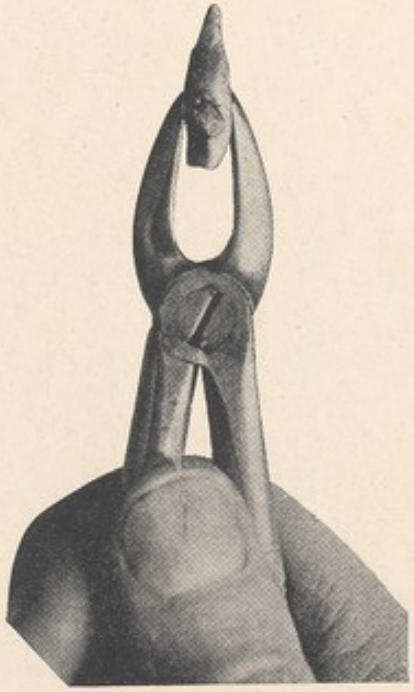
Extraction of Upper Incisors and Canines.



Incisor teeth have one root only.

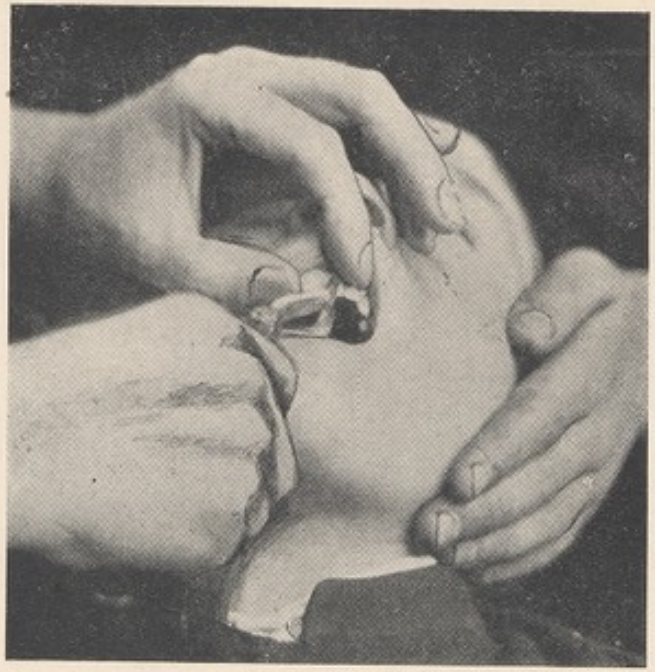
Forceps to be used, either { Bayonet upper root forceps, or Straight upper root forceps.

"Bayonet" root forceps applied to an upper incisor tooth.



"Straight" upper root forceps.

Patient seated on a firm chair; operator standing behind and to the right, with left side against a wall in order to avoid being pushed backwards.



Assistant standing behind with back against a wall, and supporting patient's head with his hands.

Application of Forceps:

Apply blades as in photos.
Press forcibly upwards between neck of tooth and surrounding gum.
Rock gently in order to loosen, and at the same time rotate forceps on the tooth in order to free it from its attachment.
When quite loose then withdraw the tooth.
After extraction press the alveolus together antero-posteriorly with a finger and thumb.
It is specially important in the case of front teeth not to fracture the alveolus.

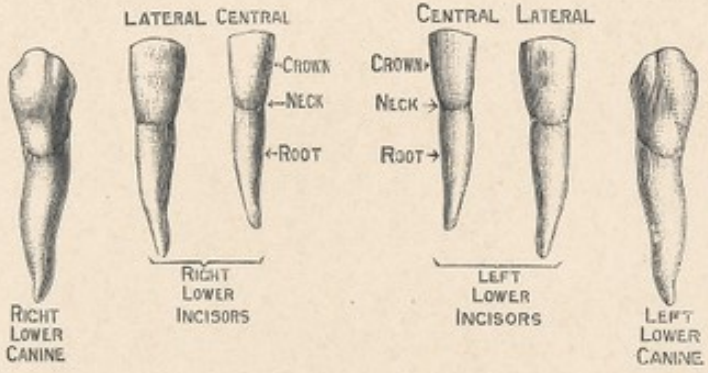
PLATE 2.

Extraction of Lower Canines, all Lower Incisors, and Incisor and Canine Roots.

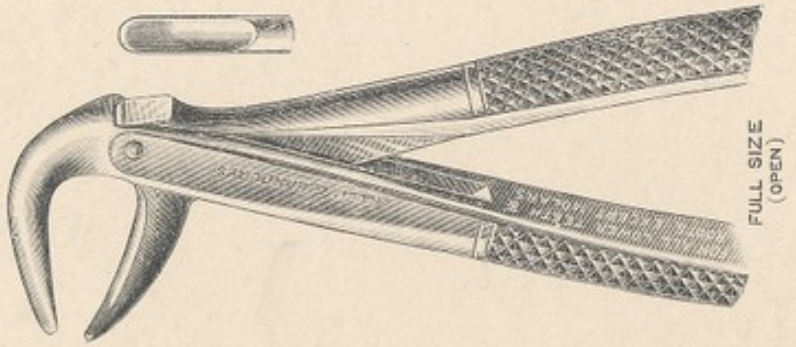
PLATE 2.

Extraction of Lower Canines, all Lower Incisors, and Incisor and Canine Roots.

N.B.—All lower incisors and canines are single-rooted teeth.



Forceps to be used, Lower "hawksbill" root forceps; the same pair is used for both sides of the mouth.



Forceps grasping tooth.

Operator standing behind with back against a wall.

Patient's head in a corner.

Head resting in corner.

Application of Forceps:

Apply forceps carefully between the neck of the tooth and the surrounding gum.
Press down forcibly, rocking the tooth slightly inwards and outwards at the same time.
When *quite loose* withdraw the tooth from its socket.
After extraction press the alveolus together with a finger and thumb.

PLATE 3.

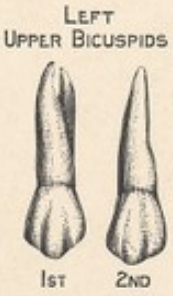
Extraction of Right and Left Upper Bicuspids.

PLATE 3.

Extraction of Right and Left Upper Bicuspids.

FULL SIZE
(CLOSED)

Forceps to be used, Bayonet root forceps; the same pair are used for both sides of the mouth.



The first upper bicuspid has frequently a bifurcated root as seen here; it is therefore important to use as little lateral movement as possible in extraction in order to avoid fracture.

Bayonet root forceps applied to upper bicuspid tooth.

Patient's head resting on cushion placed over back of two chairs. Operator standing in front and to the right of patient.

Improvised dental chair.

Patient's head in corner of room.

Application of Forceps:

Apply blade carefully as in the photos.
Press forcibly upwards between the neck of the tooth and the surrounding gums.
Rock gently in order to loosen the tooth from its attachments, especially in an outward direction, owing to the outer alveolar plate being thinner than the inner.
When *quite loose* then withdraw the tooth.
After extraction press the walls of the alveolus together.

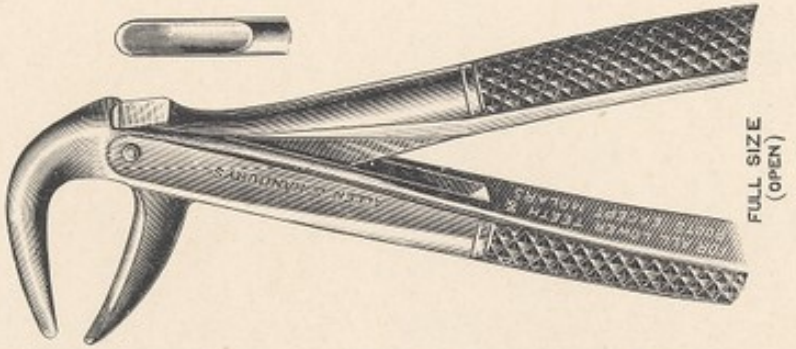
PLATE 4.

Extraction of Right Lower Bicuspids and Lower Roots on the Right Side of the Mouth.

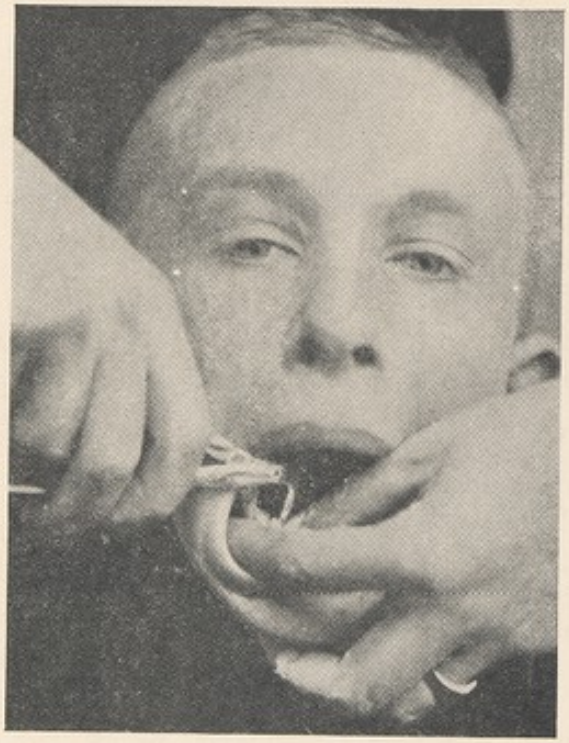
PLATE 4.

Extraction of Right Lower Bicuspids and Lower Roots on the Right Side of the Mouth.

Forceps holding a lower right bicuspid, showing the importance of thoroughly pressing down the blades between the neck of the tooth and the surrounding gum in order to grasp as much of the tooth as possible.



Forceps to be used, Lower "hawksbill" root forceps; the same pair are used for both sides of the mouth.



Operator standing behind with back against a wall.

Operator standing with his back against a wall.

Operator sitting on firm chair with back against the wall. Patient seated on floor between knees of operator.

Application of Forceps:

Apply forceps carefully between neck of tooth and surrounding gum.
Press down forcibly, rocking the tooth slightly inwards and outwards at the same time.
When quite loose withdraw the tooth from its socket.
After extraction press the walls of the alveolus together.

PLATE 5.

EXTRACTION OF LEFT LOWER INCISORS, BICUSPIDS, AND ALL ROOTS ON LEFT SIDE OF MOUTH.

PLATE 5.

Extraction of Left Lower Incisors, Bicuspids, and all Roots on Left Side of Mouth.

N.B.—Lower incisors being single-rooted are extracted with the same forceps as bicuspids.

Side view of left lower bicuspids.

Showing method of applying forceps to lower bicuspid.

Lower "hawksbill" root forceps; the same pair are used for both sides of the mouth.

Head of patient resting against corner of room with cushion behind head if necessary.

Patient's head resting against a corner or else supported against the chest of an assistant.

Application of Forceps:

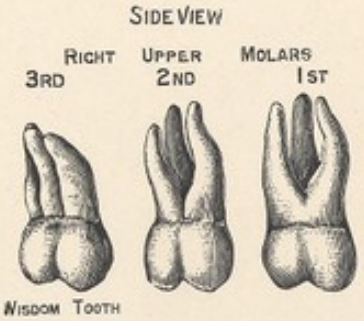
Apply forceps carefully between neck of tooth and the surrounding gum.
Press forcibly downwards, rocking the tooth slightly inwards and outwards at the same time.
When quite loose withdraw the tooth from its socket.
After extraction press the walls of the alveolus together.

PLATE 6.

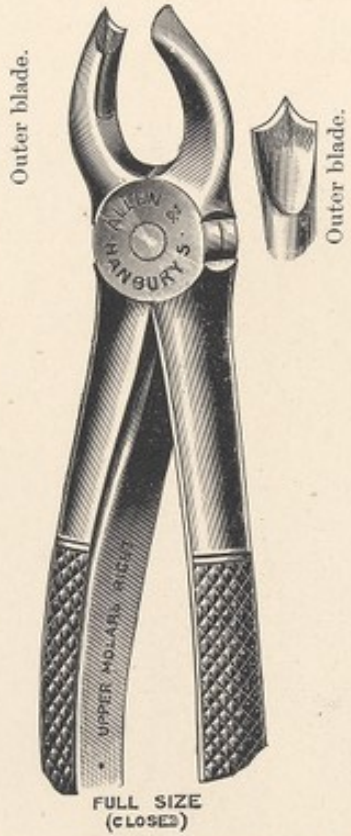
Extraction of Right Upper Molars.

PLATE 6.

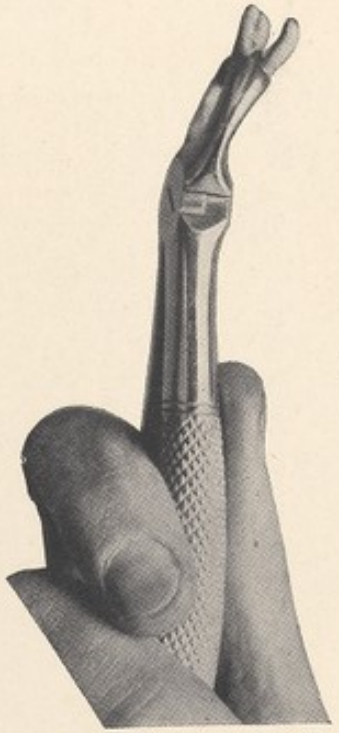
Extraction of Right Upper Molars.



Upper first and second molars have three roots, two external (buccal) and one internal (palatine). The wisdom tooth when normal has three roots like the first and second molars, but frequently these are fused together, and consequently to extract an upper wisdom tooth it is usually best to use upper bayonet root forceps.



Right upper molar forceps; the outer (buccal) blade has two grooves to fit over the two buccal roots; the point fits between the two buccal roots and therefore serves to indicate to which side the forceps belong.



Forceps applied to right upper molar.

side the forceps belong.

Head resting on back of chair. The position of the operator is the same as for right upper bicuspids, viz. in front and to the right of patient.

Improvised dental chair—back chair resting against wall.

Application of Forceps:

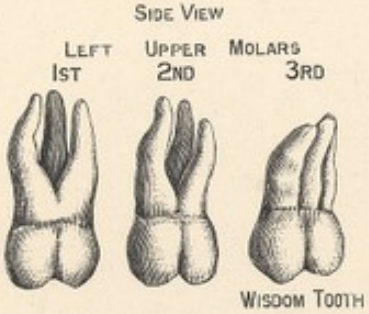
Apply the blades of the forceps carefully so that they can be pressed upwards between the tooth and its surrounding gum.
Press forcibly upwards.
Rock tooth slightly inwards and outwards until loose.
Withdraw in an outward direction, that is to say, in the direction of the large palatine root.
After extraction press the walls of the alveolus together.

PLATE 7.

Extraction of Left Upper Molars.

PLATE 7.

Extraction of Left Upper Molars.



The first and second upper molars have three roots (two buccal, one large palatine); third upper molar (wisdom tooth) has, *when normal*, three roots like the first and second, but frequently these are found irregular in shape or fused together, for which reason it is advisable to extract them with upper bayonet root forceps.

Outer blade.

Forceps to be used. The outer blade has two grooves to fit over the two buccal roots; the point fits between the two buccal roots, and serves to indicate for which side the forceps are to be used.

Mode of grasping a left upper molar.

Position of patient as for *left upper bicuspids*: (1) With head resting against a pillow placed against corner of room; (2) or on a firm chair with high back, against which the head rests on a cushion; (3) seated on one of two chairs placed back to back, the second chair resting against wall, with operator's left foot resting on it to steady it.

Improvised dental chair.

Application of Forceps:

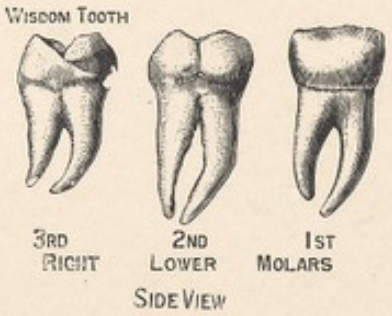
Apply the blades of the forceps carefully so that they can be pressed upwards between the tooth and its surrounding gum.
Press forcibly upwards.
Rock tooth slightly inwards and outwards till loose.
Withdraw in an outward direction, that is to say, in the direction of the large palatine root.
After extraction press the walls of the alveolus together.

PLATE 8.

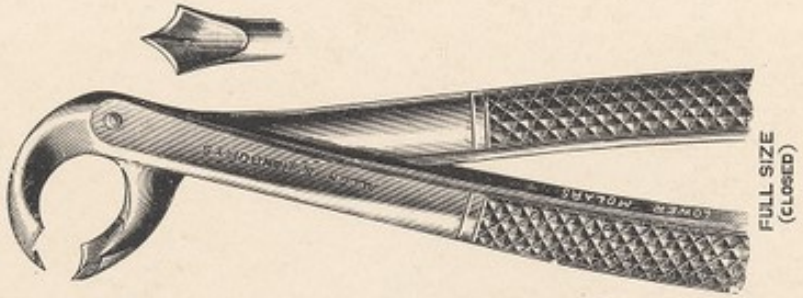
Extraction of Right Lower Molars.

PLATE 8.

Extraction of Right Lower Molars.



Showing method of applying forceps to a right lower molar.



Lower "hawksbill" molar forceps. The same pair are used for both sides of the mouth. Note that each blade has two grooves to fit over the anterior and posterior roots respectively; the point between these grooves fits in between the two roots, as shown in diagram.

Operator standing behind with back against a wall.

Operator's back to rest against a wall.

Back of chair to rest against a wall.

Application of Forceps:

Apply forceps carefully between neck of tooth and surrounding gum.
Press forcibly downwards, rocking the tooth slightly inwards and outwards at the same time.
When quite loose withdraw the tooth from its socket.

After extraction press the walls of the alveolus together.

When a lower molar is broken away nearly level with the gum it is frequently necessary to extract it with lower "hawksbill" root forceps applied to each root separately; in this way frequently both roots may be extracted at the same time.

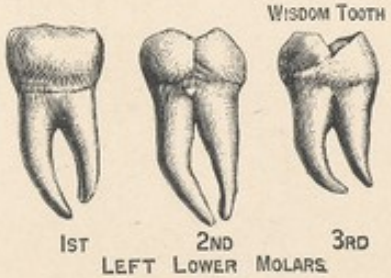
The "fish-tail" elevator is also very useful for extracting lower roots, using an adjacent tooth as a fulcrum (*vide* use of "fish-tail" elevator on plates 10 and 11).

PLATE 9.

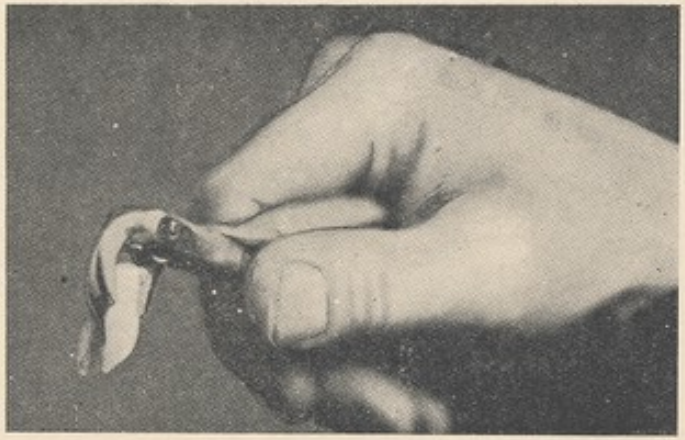
Extraction of Left Lower Molars.

PLATE 9.

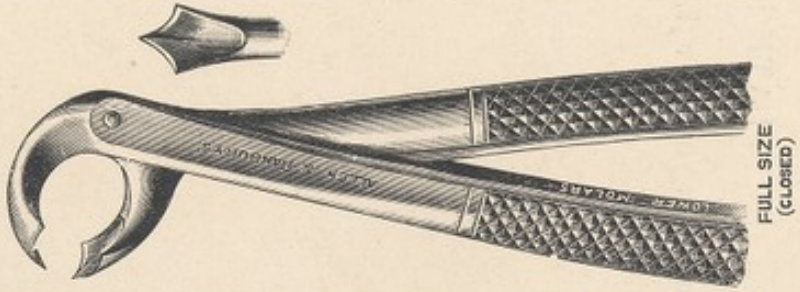
Extraction of Left Lower Molars.



Side view.



Forceps grasping lower molar tooth.



Lower "hawksbill" molar forceps; the same pair is used for both sides of mouth.

Patient's head resting against corner of room.

Patient's head resting against corner of room or firmly supported by an assistant standing behind.

Improvised dental chair.

Application of Forceps:

Apply forceps carefully between neck of tooth and surrounding gum.
Press forcibly downwards, rocking the tooth slightly inwards and outwards at the same time.
When quite loose withdraw the tooth from its socket.

After extraction press the walls of the alveolus together.

When a lower molar is broken away nearly level with the gum it is frequently necessary to extract it with lower "hawksbill" root forceps applied to each root separately; in this way frequently both roots may be removed at the same time.

The "fish-tail" elevator is also very useful for extracting lower roots, making use of tooth in front or behind as a fulcrum. See use of "fish-tail" elevator on plates 10 and 11.

PLATE 10.

Extraction of Upper and Lower Roots and Lower Wisdom Teeth.

PLATE 10.

Extraction of Upper and Lower Roots and Lower Wisdom Teeth.

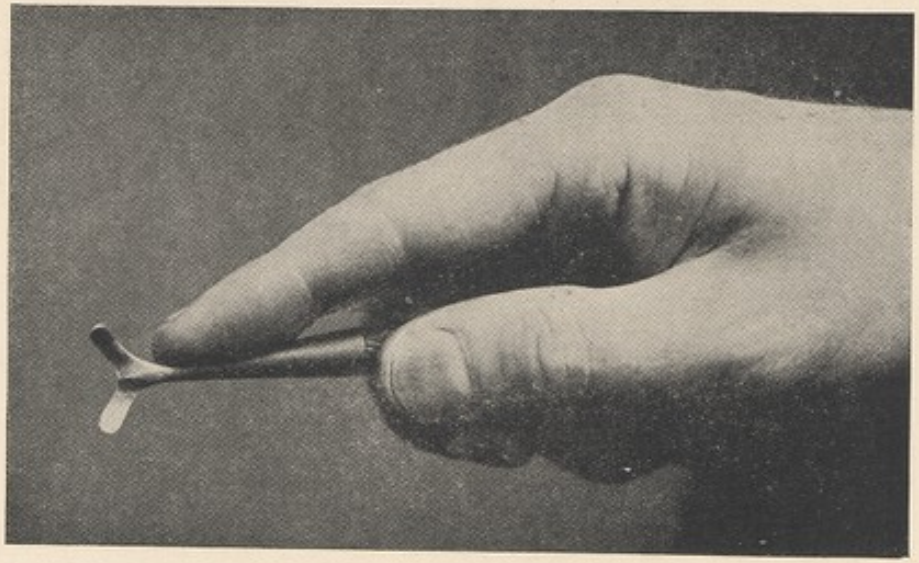
When the crown of a tooth has disappeared and little or nothing remains but its root or roots, it is usual to extract these either by the use of upper bayonet forceps in the case of upper roots or by the use of lower hawksbill forceps in the case of lower roots.

In both the cases the patient is put in the same position as for the extraction of the corresponding complete tooth.

In applying either of these instruments it is essential to open the blades just so far as will embrace the whole circumference of the root and not the mere projecting portion that may show through the gums; the forceps are then pressed forcibly upwards or downwards as the case may be, and the root, being rocked, becomes loose and can be withdrawn. It is useful to bear in mind that the width of the root to be extracted is usually that of its neighbours, though some of it may be covered by overlapping gum.

In extracting roots it is of the utmost importance to see that each root is out of the mouth before proceeding to extract another; most serious results may follow the entrance of a root into the trachea.

The Use of the Elevator.—The instrument here shown, designed by the author, is known as "the fish-tail" elevator, and differs from others of the curved variety in having a double-ended blade, so that it combines the advantages of the ordinary right and left curved elevators as usually made.



Position of Patient.—As for the removal of lower molar teeth, or seated on improvised dental chair as shown on plate 6.

PLATE 11.

The Use of the Elevator for Extracting Lower Stumps and Lower Wisdom Teeth.

PLATE 11.

The Use of the Elevator for Extracting Lower Stumps and Lower Wisdom Teeth.

Operator standing behind with his back against a wall; patient seated on a firm chair.

Assistant standing behind supporting head, with his back against a wall, operator standing in front of patient.

TO USE THE ELEVATOR: GENERAL PRINCIPLES.

Press whichever blade is to be used forcibly downwards and inwards on the outer side of the alveolus between the anterior or posterior edge of the socket and the tooth or root to be extracted, using an adjacent tooth as a fulcrum; it is important in all cases to support the fulcrum with a finger or thumb, as it may happen that the tooth used for this purpose may become loosened instead of the one to be extracted.

LOWER WISDOM TEETH.

As it is frequently difficult to extract lower wisdom teeth with forceps, owing to the backward curve in their root or broken-down condition of the crown, it may become necessary to make use of the elevator, the second lower molar, when present, being used as a fulcrum to enable the remains of the wisdom tooth to be "prised" out, as in above photograph.

ATLAS OF DENTAL EXTRACTIONS—WALLIS