

CHAPTER LII.

NECROSIS.

NECROSIS, signifying death of bone, while a disease common to both the superior and inferior maxillæ, exhibits decided preference for the latter, attacking it, as the author is led to infer from the experience of his own practice, in twenty cases to five of the former. The lesion presents a twofold primary expression. It commences as a general osteitis: stasis of the circulation quickly antagonizing nutrition, thus killing the bone outright; or, as commonly witnessed, it arises out of periosteal disease, the membrane affected being the periosteum proper, or, as recognized in a great majority of instances in which the condition is met with, the alveolo-dental tissue,—periodontium. In such primary membranous associations, either the tissue, as it reacts on the bone life, is found dead, or it is seen separated from the bone by a degenerating plastic exudate.* In such inflammations and separations, it is to be inferred that the layer of bone immediately adjacent the membrane would be the first affected; this is so truly the case that timely incisions and the combating of the inflammation are most influential in the limitation of the disease,—this being markedly exhibited in periodontal inflammation. The superior jaw, however, is much more liable to take on a general inflammation than the inferior; but the higher vascularity and resistive force of that part seem to enable it to resist the destructive action and to limit the part overwhelmed.†

* In necrosis confined to part of a bone, the increase in the vascularity of the parts is apt, especially in young persons, to result in hypertrophy of the remainder.

† Necrosis signifies death, and, as the human body at large is concerned, death relieves the surgeon of his duties. Partial death, because of the relation of a lifeless to vital parts, and because the changes of separating the dead from the living differ as to the situation and circumstances of parts, demands a close and very practical consideration on the part of a practitioner.

A particular portion of bone being deprived of its nutrition, attempt at separation and exfoliation is an immediate consequence. The phenomenal expression of throwing off a portion of dead bone and as well the destroying of an offending part is found in the inflammatory act. Circumvallation is the rule as to slough and sequestrum. To appreciate the process, it is only necessary to consider the blood supply to a part interrupted by an effusion of lymph, which lymph proceeds to coagulation, and which consolidation compresses little by little the vessels, until finally obliterating them. In traumatic sequestrum, *i.e.* where a piece of bone is broken from its bed, the signification is the same, the clinical difference being that in this latter case the nutritive interference is by reason of laceration of the vessels. Purulency is an associate of exfoliation. To appreciate this consists in a

Inflammation of the jaws, whether osteal or periosteal, is primarily to be treated on general principles. If acute in character, we may first try the effect of the hot pediluvia and saline cathartics. These failing, the parts are to be well scarified, or leeches may be applied, or blood taken from the arm. Diaphoresis can be employed. In short, antiphlogistics of any and every nature, promising control of the excitement, may be pressed into service. If all, however, fail, and pus form, vent cannot too soon be given that fluid. When, on the contrary, an inflammation is chronic and asthenic in character,

recognition of a mass of circumferential exudate unable to do more than partially organize itself, falling back quickly into a degeneration expressive of pus, pus being nothing else than abortions of granulation-corpuscles. Purulency is the act of floating. A dead part is lifted or floated by means of pus. Pus continues to form so long as a dead part remains in contact with a living seat.

A pyogenic membrane is a sheet of granular lymph making effort to organize itself. A pyogenic membrane ceases to be the moment sufficient power accomplishes the act of organization. A pyogenic membrane does not secrete. Pus is not a secretion, but a degeneration.

Demarcation is a line expressive of a surface of separation; all in front of this surface is the sequestrum; all back of it is vital.

To demark a part is an act related with varying time and systemic energy. The process may extend over months or it may accomplish its end in a very few weeks. Nine months is the ordinary time required for exfoliating a lower jaw.

A sequestrum prevented by the circumstances of situation from being thrown off becomes enveloped by a case of new bone. This is found markedly with the instance of the inferior maxilla, it being, as a rule, necessary to break through a case in order to get at the dead part.

Osteophytes are expressive of attempts at ossification. As a rule, osteophyte after osteophyte dies before sufficiency of force is found to complete organization. At a certain stage in the processes of exfoliation and repair osteophytes are to be met with irregularly interspersed throughout the affected region, and too often are found converted into loosened sequestra, which require to be removed.

Periosteum, as well as bone itself, constitute the osteogenetic agencies. Both are no sooner relieved of the incubus of a dead part than evidences of repair are exhibited. Both exude and organize bone pabulum, both enter the work as repairers of damage.

The student familiar with the processes of exfoliation and repair, as flesh lesions are considered, has nothing different to learn as concerns bone surgery. There is first, as the result of injury, extravasation into the cellular structure, into the cortical substance perhaps, and certainly beneath the periosteum. As a result of such extravasation, nutrition is entirely cut off from the lymph-surrounded island. The death of the island following, the most immediate layers of lymph degenerate, thus affording pus, which is the eliminating or rather the extruding agent. Repair of bone and of soft parts are the same, save as difference of tissue is concerned.

Granulation material, incapable of organization, needs assistance in the shape of stimulation. Cleanliness is an essential, and dead osteophytes are to be picked or washed away as soon as discovered.

As an injection acting peculiarly happily where osteophyte degeneration exists, no agent known to the writer acts so happily as aromatic sulphuric acid, the strength used varying with the indications; equal parts of the acid and water is an ordinary injection, or the medicine may be used on cotton, a cavity being loosely stuffed.

A second stimulant and antiseptic of most satisfactory response is found in a combination of capsicum and myrrh (the tinctura capsici et myrrhæ of the Pharmacopœia). This is used diluted with water, the proper strength being expressed by a bluish-white color.

as marked in the puffy, debased character of the parts exhibited in the dyscrasia, with the necessity for free scarification will exist a demand for local stimulating douches and the administration of tonics. Of the supporting medicines applicable to these cases, the very best is found in the union of sulphate of quinia with the muriated tincture of iron. A combination very frequently employed is as follows:

R.—Tincturæ ferri chloridi, ℥j;
Quiniæ sulphatis, ℥j. M.

Sig.—Fifteen drops in water four times a day for an adult.

Ostitis, as a primary expression, exhibits its most intractable cases in the periods connected with dentition, whether first or second; the irritability being increased and kept up by the excitability associated with this process. Hence the care necessary to guard against any increase in the vascularity natural to such age. The trouble aroused, nothing can be done, however, beyond using such treatment as applies to ordinary cases: except, indeed, it will be found that there exists a greater necessity for the use of sedative medicaments.

In directing treatment to a condition of ostitis or periostitis, as relation is had with necrosis, an indication of principal signification lies in the discovery, and removal when possible, of the exciting cause or causes. That such causes may have proper and definite signification, we proceed to the division and study of the subject as clinically it presents its diversified phases and aspects.

In the order of frequency in which maxillary necrosis is met with, the following table may be accepted and studied:

1. Dental necrosis.
2. Alveolar necrosis.
3. From lack of room for eruption of wisdom-tooth.
4. Syphilitic necrosis.
5. Mercurial necrosis.
6. Necrosis from injuries.
7. Exanthematous necrosis.
8. Phosphor-necrosis.

Dental Necrosis.—Dental necrosis—death of a tooth or teeth—may claim a first attention as being the most common of all the troubles of the ossa corporis.

A tooth has a threefold source of vitality,—an internal, or tubular, secured from its pulp; a middle related with the vessels of the tunica propria; and an external arising out of its periodontum. The destruction of the internal circulation, through the killing of the pulp and filling the root-canal with metal, is so common an occurrence as to be familiar to almost every one.

By the majority of teeth, if properly treated, such destruction of one source of the nutritional supply seems to be sustained without much apparent

inconvenience. The treatment consists, as we have learned, in extracting from the cavity every particle of dead pulp, and so filling the chamber with gold or other material as to prevent the introduction of more irritating matter. (See *Treatment of Pulp-Cavity*.) Where teeth, however, are not properly treated, or where there is great susceptibility in the system to vascular perversion, the destruction of the pulp results in an extension of irritative action to the periodontal membrane, yielding the lesion known as periodontitis; this, if not aborted, terminates in the death of the tooth.

A dead tooth is not, however, fortunately, treated in all cases by the system, or even in the majority of cases, in so summary a manner as a piece of dead bone. As a rule, there exists a wonderful forbearance on the part of nature to its presence, and the organ may be retained in its cavity and made to serve useful purpose for a long time. True, it is discolored, and, provided there be no decomposing pulp in the canal, in proportion to this discoloration may the degree of degeneration be judged. A tooth lowers in the scale of vitality in degrees. It may be deteriorated as the death of part of its pulp is concerned, or as the death of all of it is implied,—or as regards the whole or any part of its enveloping membranes. When both pulp and membranes are dead, the tooth, of necessity, must be dead with them; and in proportion to their destruction, so is its destruction.

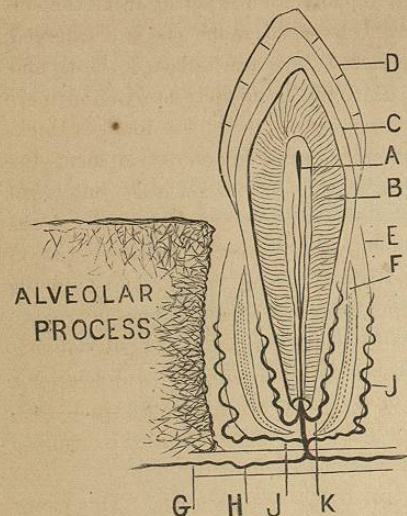
Fig. 503 is introduced with a view of exhibiting the refinements in tooth-nutrition, and the possibility of a retention of vitality on the part of an organ, its pulp and periodontum being dead. Glancing at the diagram, it will be seen that the dental artery gives off three branches, the first passing through the apical foramen to be distributed to the pulp, the second going to the tunica propria, the third supplying the periodontum. (See *Tunica Reflexa*.) It seems quite possible that one or two of these branches might be obliterated, the third remaining intact, and, accepting this third as the vessel distributed to the tunica propria, it can be understood that, though seemingly deprived of nutrition, the tooth-structure is yet not without pabulum.

Some systems are so irritable that any amount of skill fails to make the mouth retain a tooth in which simply the pulp is dead. Others, on the contrary, are so unimpressible that half the teeth in an arch might be utterly necrosed, and yet no complaint be made. The author once, as an experiment, replaced in the mouth a central incisor tooth which had been extracted twelve hours before, and although it had been carried in the pocket, enveloped in the usual collection of dust, tobacco, keys, knife, etc., the whole intervening time, it was kept in its socket until the parts became reconciled. Many years have since passed, and it seemed, when last seen, as useful as in its palmiest days. The repetition of this experiment is now common. (See chapter on *Replantation*.)

The irritation, inflammation, and death of a tooth are generally the result of caries which exposes its pulp. The first stage in the destructive process

is the death of this part;* here it may end, the pulp sloughing off at the foramen, the periodontum and middle membrane assuming the full duties of nutrition. If this be not the case, the membranes become involved; if these too die, the tooth is dead.

Fig. 503.



A, dental pulp and its artery; B, dentine; C, tunica propria; D, enamel; E, periodontum; F, cementum; G, canal in lower jaw; H, dental artery; J, branch of dental artery supplying periodontum; K, branch of dental artery supplying tunica propria.

life, yet, as a principle of nutrition is concerned, it assuredly would have a chance, and perhaps the agency we consider is of greater consequence than a first thought would incline to give it. Because an artery entering a foramen is occluded, it does not at all follow that an immediately adjoining one meet with the same fate. A glance at the diagram shows that the vessel of the tunica propria has nothing to do with another, or others, intended for the periodontum. The spiral lines represent the vessels or their equivalents.

The diagram shows another feature in tooth nutrition. Referring to, and considering the vascularity of, the alveolar process, it is not difficult to appreciate that a tooth can be nourished, even though the maxillary artery itself be dead. Vessels pass from the process into the periodontum, and this blood can be passed in turn through the Haversian system of the cementum into the tunica propria, and from this tunic dentine and enamel may be fed.

A dead tooth is not, however, necessarily associated with caries. Inflammation, resulting in its destruction, may be induced by atmospheric changes,

* The pulp of a tooth is composed of most delicate connective tissue, in which ramify the vessels and nerve. (See Figs. 41 and 42.)

by blows, etc. This is to be recognized, so that by reason of the absence of decay a diagnosis be not obscured.

A dead tooth is thrown off in one of two ways: either by chronic or by acute action. When by acute means, violent inflammation is set up in all the surrounding parts, the tooth is elongated and loosened, much pus is discharged, and eventually the organ drops from its socket; this accomplished, the trouble commonly subsides. In chronic exfoliation, the parts indurate, one or more sinuses form as in ordinary abscess, all the region about the tooth is thickened and rough, as if some ugly disease were in process of development, the enamel grows dark, perhaps black. The tooth does not get loose, but is apt to frighten into its removal. If such extraction be not resorted to, the lesion involves the bone, and tooth and alveolus become eventually cast off as a common sequestrum. Another, and more chronic form, consists in the gradual absorption from about the roots of a dead tooth of its alveolar process. This is most frequent with old persons, although not by any means so confined. This form of exfoliation is usually very slow in its progress, extending over a period sometimes of several years. Cases, however, frequently present—confined to young persons—where several teeth are cast off in this manner within a few months.

Teeth sometimes die as the result of structural consolidation. This never occurs but in what are recognized as dense teeth, and is seldom found associated with caries. Such teeth loosen day by day, and finally—it may be after a period of years—drop from their cavities. The condition is seen seldom but in old persons, or in those beyond middle age. To arrest this trouble seems impossible. No treatment appears to do any good.

Alveolar Necrosis.—The membrane enveloping the root of a tooth is associated, as a nutritional vehicle, with its alveolus; hence it is commonly termed “alveolo-dental membrane.” As the result of such relationship of structure, an inflammation originating in a tooth extends to the surrounding bone, and, according to its severity, affects the parts involved; hence portions of alveolus, overwhelmed, as it were, by the force of an attack, sometimes die and sequester. This form of necrosis, while very common, would perhaps, with proper treatment, seldom occur. (See Fig. 503.)

The dentist, for the purpose of destroying a pulp, applies an arsenical mixture. This is placed in a cavity of decay, and covered with cotton or wax. It happens, however, occasionally, that from carelessness in application, or out of difficulty in retention, the paste oozes around the neck of the tooth, and thus acts on parts not intended. In this way alveolar necrosis is sometimes induced; the portion destroyed is seldom, however, very considerable, and generally exfoliates in from two to four weeks. The local application of the sesquioxide of iron has been thought by some to exert a happy effect, applied immediately on the discovery of the accident. Repeated syringings are not to be neglected. A case, occurring in the person of a physician, has, at this date of writing, been treated by the author, where arsenic had been

sealed in a tooth-canal having a drill-hole through it communicating with the alveolus. As a result, all the bone forming the envelope of the tooth was destroyed and came away.

Alveolar necrosis is sometimes induced by the application of chloride of zinc (used as an obtunder of dentinal sensibility, and also for the purpose of controlling the slight hemorrhages caused by the slipping of instruments in the operation of filling). The first result of contact is of course on the gum, inflaming and engorging it, the effect upon the bone being secondary. Nothing better than the ordinary antiphlogistic applications can be employed. The action here is much more tardy than in the destruction induced by arsenic; the sequestrum is seldom very considerable, the alveolus perhaps of a single tooth. The action of nature in the separation is always to be awaited.

Cases which, for want of classification, may be termed anomalous, sometimes occur. An instance will illustrate. I. B., an Irish laborer, consulted for pain in the two inferior incisor teeth. No caries, no periosteal inflammation, nothing indicating disease, was observable. The pain increased day by day, until at the end of the second week the two teeth and their alveoli had become detached, and were dissected from the gum. This case is one of a very few of the kind that have been met with, and may well be termed anomalous. The pulps of such teeth are not found dead if examined at the time, as under ordinary circumstances one would expect to see them. There is no soreness on pressure, and, strangest of all, the absence of every phenomenon of inflammation. The practitioner in these cases is to be guided by such indications as he may be able to seize on.

Reference is here to be made to the fact of entire destruction of the thickness of the jaw, arising out of ill directed dental performances. In a case just dismissed, an operator in drilling out a root had allowed the instrument to pass, not only out of the apical foramen, but to enter the dental canal, where both nerve and artery had been wounded. As a result osteitis set up, which eventuated in a sequestrum one and a half inches in length, involving the entire continuity of the bone.

Two cases now under treatment are making sequestra implicating the continuity, cause in both instances lying with diseased teeth.

Principles of treatment consider, outside of medication as commonly directed to such cases, the relation of the extremities after separation of the sequestrum. To insure preservation, or restoration, of continuity, cotton is to be worked between periosteum and bone, and the part kept cleansed and stimulated by free use of the *tinctura capsici et myrrhae*.* As a rule an arch of bone extending externally over the dead part and associating the living parts is to be secured. The author has had a number of happy experiences in the direction.

* A teaspoonful to a wineglass of water; stronger if indicated.

Necrosis from Lack of Room for Eruption of Wisdom-Tooth.—

This is found most commonly associated with the lower jaw. The close relationship of the second molar with the ramus frequently makes the egress of the advancing wisdom-tooth an impossibility; hence an irritation resulting in inflammation. The serious extension of the trouble to the bone is always, however, preceded by more or less trismus and difficulty in deglutition: thus every chance is given for an anticipating surgical relief. This form of necrosis is to be looked for between the seventeenth and twenty-fifth years. The extraction of the second molar allows the wisdom-tooth to fall forward; thus remedying the irritation and effecting a cure. These cases, if rightly treated, are as simple and harmless as they are found severe and prostrating if left to chance or if improperly managed. Extract the second molar tooth, and do not attempt the removal of the offending one,—that is, if such extraction threaten difficulty.*

* "The advent of the wisdom-teeth is very often accompanied by painful and distressing symptoms, that may be protracted through many months, or it may be even years, unless relieved by surgical interference. These circumstances arise from the position occupied by these organs, so close to the joint of the lower jaw, where the mucous membrane is reflected from the gum to the cheek and fauces, combined with the very common condition that the jaw is not sufficiently elongated backward to allow them to range in the horizontal series with the other teeth. This mechanical difficulty not only prevents the proper evolution of the teeth, holding them back in their bony bed, but it often perverts their direction of growth, and dislocates them. Annoying and very painful as are often the symptoms attendant on difficult cutting and misplacement of the upper wisdom-teeth, they are trivial in comparison with those which occur in similar conditions of the lower."—*Salter*.

Necrosis arising out of impaction of a wisdom-tooth is associated as a rule with inflammatory phenomena and with false ankylosis of severe type. The trouble begins commonly with a sense of stiffness about the articulation, which is quickly accompanied by swelling and pain. Enlargement of the face is in the sense of induration, the hardness being sometimes scarcely less than that of a board. Diagnosis associates with the age of the patient and with relation of the second molar tooth to the ramus of the jaw. The *dens sapientiae* erupt at a varying period between the seventeenth and twenty-fifth year. A second molar jammed directly against the ramus leaves no room for a succeeding eruption. Examining a mouth in which this trouble exists, it is not unlikely that a pearly point be seen back of the developed denture, no room at all existing for accommodation of the rest of the crown. Unrelieved, such a case is almost certain to develop an osteitis of a grade in severity that shall quickly advance to the suppurative stage, which result implies death of parts, small or great in extent.

Condition of mal-eruption in the wisdom-teeth is another cause of necrosis. It occasionally happens that the long axis is in horizontal relation with the body of the bone, and hence eruption may not take place, while pressure exerted against the immediately neighboring tooth excites an irritative condition of all the teeth of the side.

Burrowing of pus in connection with imprisoned wisdom-teeth is a familiar condition. An inflammation sets up, and lymph becomes deposited sub- and supra-periosteally, not unlikely as well in the cellular structure of the cheek. Degeneration following, pus burrows and makes openings, which are a source of much distress and not unlikely of deforming scars.

Cases of this kind demand, primarily and imperatively, that room be made in the deficient arch, and to secure this it is seldom the case that anything else is to be done than

Exfoliations of laminae of bone are very common after the operation of extraction of teeth. Such scales vary in size from the dimension of a pin-head to that of a finger-nail. They seldom require particular attention, coming away, generally without pain or trouble, of themselves.

Syphilitic Necrosis.—The hard palate, the turbinated bones, and the external plate of the cranial vault seem particularly liable to suffer from attacks of this specific disease, the venereal ulcer of the overlying soft parts, as of the structure of the soft palate, being observed as among the most common of the constitutional affections. That these ulcers are, however, strictly venereal, one is oftentimes led to doubt; certain it is they appear and exist with greatest virulence where mercury has been used with unnecessary freedom. Venereal ulcers of the mouth are of two kinds: the superficial, and the ordinary ulcer of necrosis. The superficial ulcer may be found both upon the hard and soft palates, but is much more common to the latter. These ulcers

FIG. 504.

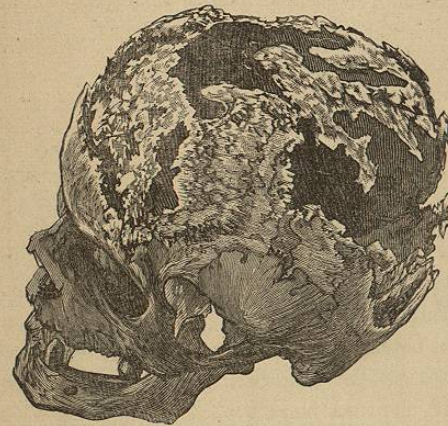


Diagram illustrative of a bone surface broken and in process of being broken up into sequestra. The picture is particularly expressive, it shows appearance of the conditions perfectly.

—as the chancres—vary in size and character, being sometimes very amenable to treatment, at others resisting and phagedenic. Their treatment is to

extract the twelve-year molar. Just here, however, arises a question where the six-year organ is decayed, the other being good. Will extraction of the former meet the indication? If the inflammation be of high grade and threatening, the question is to be answered negatively. If, on the contrary, irritability rather than marked vascular perversion exist, the reply may be affirmative. Where the wisdom-tooth itself can be drawn, such removal is to take precedence as a line of practice.

Cause removed, subsequent steps of treatment in these cases relate with the use of sorbent-facients and the healing of any sinuses that may have formed. (See chapters on *Periodontitis* and on *Alveolo-Dental Abscess*.)

be conducted on general principles; few surgical conditions require nicer general judgment or more attentive care; it is, really, to blow hot to-day and cold to-morrow, and *vice versa*. As a rule, such ulcers are oblong in form, from an eighth of an inch to an inch or more in length; more or less excavated, the cavity being filled with a dirty-white semi-solid paste; the truest practical comprehension of the lesions is found, as the experience of the author leads him to infer, in looking at them as one looks at scorbutus. Met with in the scalp, the history is most likely that of gumma.

Touching locally with the acid nitrate of mercury, with the nitrate of silver, or with a mixture of equal parts of iodine and creasote, not infrequently causes such sores speedily to assume healthy action. A case will seldom be met with where the internal exhibition of a mineral acid does not seem in some degree useful; particularly is this found to be the case where a phagedenic tendency exists. Whatever remedies be employed, the venereal basis of the trouble is always to be kept in mind. Syrup of the pyrophosphate of iron, conjoined with minute doses of corrosive sublimate and iodide of potassium, will, under certain conditions, compel such ulcers to disappear as if by magic; or a combination which may be employed commonly with a happy effect is as follows:

R.—Hydrargyri chloridi corrosivi, gr. ij;
Potassii iodidi, ℥ij;
Syrupi hypophosphitis, ℥ij;
Syrupi sarsaparillae compositae, ℥vi. M.
Sig.—Tablespoonful three times a day.

The ulcer of necrosis, looking like the preceding, differs from it in having the pasty mass, which constitutes the apparent bottom, associated with dead or dying bone beneath. The ulcer in this case is not the trouble to be cured,—indeed, could not be cured while the underlying disease exists. Ulcers of this class, being an attendant condition, are always, of course, situated over the bones, generally about the maxillary and palate sutures; they are always preceded by an engorged and tumid state of the parts in which they are situated, indicative of the osseous trouble beneath. The character of this tumidity is a matter of much concern, as in proportion to its solidity will generally be found the extent of destruction in the soft parts; the variability of such destruction is seldom, however, in proportion to the disease below. The author has seen the whole palatine process die while the indicative ulcer has not been larger than the eighth of an inch in circumference; on the contrary, the smallest sequestrum will sometimes be found attended with the largest ulceration.

Incision into and through this tumid engorgement is always found satisfactory practice. The cuts, however, are to be made, not carelessly, but with judgment; always taking into consideration the vitality of the part. Such incisions, if made through the periosteum, will frequently be found to exercise quite a controlling influence on the ostitis, just as in cases of ordinary