

CHAPTER XVIII.  
DISEASES OF THE TEETH.  
SALIVARY CALCULUS.

SALIVARY CALCULUS, or tartar, as it is commonly called, is that limelike material so often seen collected upon the necks of the teeth. Observation elicits the fact that the primary seat of deposit is about the posterior or lingual faces of the inferior incisors and the buccal aspect of the superior molars. As in these situations exist the outlets of the salivary secretions, an inference is that from these secretions comes, in part at least, the deposit.

Analysis of Saliva.  
Water.  
Ptyalin.  
Fat.  
Chloride of sodium.  
Chloride of potassium.  
Phosphate of lime.  
Sulpho-cyanide of potassium.

Analysis of Salivary Calculus.  
Carbonate of lime.  
Phosphate of lime.  
Fat.  
Mucus.  
Accidental matter.

When the salivary secretions are sluggish, the inorganic material, not being held in solution until fairly ejected into the mouth, becomes deposited about the roughened and inviting surfaces of immediately neighboring teeth. A nucleus once formed, aggregation goes on, until serious secondary lesions are apt to result.

The first and most marked effect of salivary calculus is upon the teeth themselves; beginning about one face, it soon involves the whole organ, and, if undisturbed, envelops, sooner or later, in an imperfect sheath, the whole denture. A mouth so filled with tartar is not only disgusting, but necessarily in an unhealthy condition. Salivary calculus soon destroys the integrity of the teeth. It does this by its effects on the secretory crypts about their necks and by compelling a gradual diminution in the periosteal supply; that membrane receding little by little as the foreign body encroaches on it. As a result of such abstraction of nutrition, the tooth soon dies, and is exfoliated like any other sequestrum; tooth after tooth necrosing, and each month or year one or more dropping from its socket.

Not infrequently there may be seen standing, isolated and alone, on some portion of the dental arch,—most frequently, however, either on the anterior portion of the inferior arch, or the posterior portion of the superior,—a yel-

lowish-looking tumor, which might not inaptly be compared to a shellbark covered with inspissated mucus. Sometimes this tumor will be found quite firm in its position, seeming, indeed, as if it might have sprung from the socket of some long-ago-extracted tooth; at other times you will be able to move it quite freely, as if it had a fleshy peduncle. These tumors give to the mouth a most disagreeable appearance, are oftentimes insufferably offensive, and so detrimental to health that five or six grains of their substance, given to a small animal, will not infrequently cause its death. The composition of such collections consists of phosphate and carbonate of lime, epithelial scales, inspissated mucus, and the various detritus of a cavity devoted to mastication. The nucleus of the growth is of course a tooth. The manner of formation is too evident to need description. The author has removed these calculi, where the nucleus had become so encysted, from crown to apex, that no trace of it was to be discovered without dividing the mass. Where, however, the encystment has advanced to this extent, the tumor is about ready to drop from the mouth. A calculus of this kind has been met with where the six lower front teeth were encysted, making as strange a looking tumor as could be well imagined.

Similar calculi develop, as may be inferred, in other parts of the mouth. Thus, just within the orifice of the duct of Steno they are occasionally found; the tumor, in such a case, bulging out from the cheek against the second molar tooth of the upper jaw. The formation of such a tumor in this situation does not necessarily imply the closure of the orifice of the duct; it forms when the gland is sluggish. The secretion not being in sufficient abundance to hold the lime of the saliva in solution until it is ejected from the duct, that substance falls upon the floor of the duct, and, lodging, makes the calculus.

An instance is recalled where a mass of this calcareous matter, fully the size of the largest almond, seemed to be growing from all that portion of the sublingual region anterior to the gland of that name; one-half the tumor looked as if it might be below the level of the floor of the mouth, the mucous membrane enveloping the mass with a ragged and an ulcerated fringe, the condition presenting a strange and threatening look; there was no apparent direct association between the tumor and the neighboring teeth, and it was as firmly fixed as though it might be a growth springing from neighboring bone. Yet this was a salivary calculus and nothing else, the only question being as to its cause and fixedness.

Looking about the mouth, it was perceived that the patient had certain artificial teeth on the left side of the arch; these teeth were all coated with tartar, and so associated thereby with the natural teeth as to be only distinguishable by that difference in the translucency so immediately noticeable by any one experienced in such direction. Knowing well that it is a plan with many dentists to secure such teeth by passing a strong gold wire across the mouth, and which wire not infrequently buries itself within the mucous mem-

brane, thereby occasionally becoming concealed, it was inferred that this would be found the nucleus of the calculus, and accordingly examination was so directed. This was commenced by cutting away the mass from about the artificial teeth, and, as anticipated, a band was revealed; next was sought the concealed attachment of the opposite side, and this being discovered and exposed, the two ends were forced from the teeth which they clasped, and thus the artificial teeth, wire, and calculus were lifted from the mouth in a body.

The site of the calculus, as may be inferred, presented a cup-shaped ulcerated depression, and was quite angry-looking.

The only after-treatment consisted in the use of an astringent wash. The ulceration healed kindly in a very few days.

It is to be suggested that the existence of such calculi is not an infrequent cause of dyspeptic and other alimentary troubles. The writer has in mind the memory of a case of dyspeptic consumption very illustrative.

In her mouth, the patient, a lady, had but a single tooth, and this for years had been so imbedded in salivary calculus as much more to resemble a half-rotted shellbark than a tooth,—her breath was made insufferable by it. The offensive mass was removed, and the recovery of the patient was really magical in its rapidity.

Such calculi are to be removed in any convenient manner: they may be pulled away, broken in pieces, or, when loose, may be cut from the gum; the operation being entirely a mechanical one, and of course very simple.

Calculi situated in the salivary ducts are to be removed, either by enlarging the orifices and crushing the stones, or by cutting down upon them at the most convenient point. When so cut upon, the wound does not commonly require any after-attention.

The existence of salivary concretions in the ducts, particularly the Whartonian, is not at all infrequent; indeed, they are occasionally to be met with in the substance of the glands themselves. A specimen, extracted from the submaxillary gland, had its diagnosis in a continuous issue of pus from the tubal outlet. A second instance is on record where the glands of either side were found stuffed with calculi. When situated in the ducts, the sense of touch, exhibiting the hardness and irregularity of the body, will not infrequently afford recognition of the condition. Where, however, the enveloping tissues have become infiltrated and thickened, a diagnosis by such means is rendered obscure, and is perhaps to be secured only by passing into the tumor the blade of a delicate bistoury, or the point of an exploring needle.

In the case of a calculus in the substance of the submaxillary gland, met with by the author, a happy cure was effected by working the stone to a presentation upon the floor of the mouth, the purpose being accomplished by depressing the chin upon the neck and thrusting the gland from without upward. Knowledge of the exact position thus secured, a single cut, passing through the mucous membrane and mylo-hyoideus muscle into the substance of the gland, reached the body, which, with some little trouble, was secured

in the grasp of the forceps and removed. In size this calculus was about the circumference of a hazel-nut. The wound made healed completely after a week, and the patient had no future trouble. It is a feature to be added that in this case the facial artery had been obliterated as a result of the long-continued pressure.

An interesting and most suggestive case in this direction has the following record:

Mrs. B., a lady, sixty-nine years of age, residing in West Philadelphia, applied to the author, being directed by some unknown professional friend, concerning a tumor of the mouth, from an inflamed condition of which she was at the time enduring much suffering.

Ocular inspection revealed the following condition: a tumor, very scirrhus-like, hard, lobulated, and angry-looking, occupied all that portion of the floor of the mouth to the right of the mesial line; general inflammation of the whole oral cavity, to such extent as to make mastication too painful to be practised, and to render deglutition very difficult. All the teeth in the neighborhood loose, and occupying irregular positions,—the result evidently of a hyperplastic condition of the alveolo-dental membranes. The superficial cervical glands, especially those of the submaxillary region, sympathizing to a considerable extent; while the submaxillary gland itself was so enlarged as to render it sufficiently prominent to be easily mapped out.

The patient seeming unable to talk of anything except her present great pain, which she described as cutting, tearing, burning, the case was dismissed for the day, after prescribing for the immediate discomfort,—namely, the ordering of leeches, aperients combined with Dover's powder, astringent local applications, etc.

Two days after, the patient was again seen. The general inflammation was resolving very rapidly, while the mental equilibrium was quite restored.

This disease had been pronounced cancer by several gentlemen, and advice given that no application of any kind be made; that the patient should not even permit the tumor to be handled for any further examination. Under such impression as to its character, the lady had given up all hope of permanent relief.

The history of the case is as follows:

Eighteen years before, while engaged in milking an intractable cow, a kick was received under the chin, so severe in character as to compel a confinement to bed for over two weeks. This trouble gotten through, the parts soon recovered their natural tone, and seemed as well as ever.

A little more than nine months had passed, however, when the patient was made conscious of occasional slight inflammatory attacks about the region of the sublingual gland. These attacks continued to grow in frequency and extent, terminating, to use her own language, "by a something which looked like a whitish worm, coming from somewheres, into her mouth." This worm, she said, "was always the assurance of immediate relief."

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The trouble continued to recur for over a year, when a tumor began to develop in the parts. The inflammatory attacks now decreased in number, but increased in severity,—the patient noticing that after each inflammation the size of the original tumor was augmented.

The case ran on after this manner for a period of several years. It was remarked, however, nearly ten years back, that the tumor had ceased to enlarge from the inflammatory attacks, having at that time gained the size of a pullet's egg, and neither increasing nor decreasing up to the time of examination. Reference is made, of course, to the tumor in a quiescent state, for each succeeding inflammation swelled all the parts, tumor included, temporarily, more than the one which had preceded it.

The patient's general health was quite good; there was no constitutional evidence to be perceived of a cachexia.

Now, while the history of this tumor, in its local features, was in many points the history of cancer, yet, considering the affection of the gland duct, which, as indicated by the story of the worm, evidently had association with the tumor; considering the inflammatory attacks to which the parts had been so frequently subjected, and which had resolved harmlessly; considering the length of time the tumor had existed, without passing or tending to pass to the ulcerative stage, it seemed necessarily decided that the tumor was of local signification, certainly not a cancer.

What then was it? The trouble commenced evidently as inspissated ranula. A conviction, founded on the history, was, that it was still a ranula. Not ranula, as derivatively we understand the meaning of that word, but ranula, as pathologically the term has association with the salivary ducts. What the contents of such cyst, if cyst there was, might be, the writer did not feel prepared absolutely to decide.

Acting on the strength of this conclusion, it was suggested to the patient that a bistoury be exploratively passed through the parts. This, however, met with a most decided negative,—the refusal not being, perhaps, at all strange, considering the assurance that Mrs. B. had so often received, that any attempt to operate would be her death-warrant.

Failing in several other attempts at persuasion, the case was later dismissed.

About a month after, prompted by curiosity, Mrs. B. was visited. There was now not the slightest evidence of inflammation about the parts. The tumor was about the size of a pullet's egg, hard almost as stone, and distinctly divisible into three lobes. The patient stated that, with the exception of an occasional sharp pain, she felt at the time little or no inconvenience.

At this visit, more than ever satisfied in a diagnosis, an exploration was re-urged, but was refused as before.

On a Saturday morning was called to see the patient. She was suffering from another of the inflammatory attacks; the most severe yet experienced.

Examination discovered the tumor swollen to such an extent as to throw the tongue over into the left cheek. Mastication had been impossible for three

or four days, while the ability to swallow was being very rapidly lost; yet, with all this inflammation, there seemed no tendency to the formation of abscess.

Placing the old lady in an arm-chair, before the window, the mouth was got under control, and, before she was aware of the intention, a bistoury was passed directly through the body of the tumor; the knife grated over a hard substance.

After a time spent in making peace, greatly assisted by the assurance given of the discovery which was to result in her immediate cure, the foreign body was dissected away. This, as anticipated, proved to be a salivary calculus. The specimen was presented to the pathological museum of the Philadelphia Hospital, and is, perhaps, one of the largest, if not the largest of such calculi, on record.

The pathology of such a lesion is at once appreciated: the formation of the calculus in this region was merely secondary to the occlusion of the mouth of a gland duct.

Dr. J. J. Woodward, the eminent microscopist, who made an analysis of a portion of the calculus, informed the writer that he found it composed almost exclusively of the phosphate of lime, only a very small trace of the carbonate being perceptible.

Saw Mrs. B., for the last time, one month later. All induration had so completely disappeared that it would have been difficult for any one who had not seen the case to say which side of the mouth the tumor had been removed from; not the slightest expression of disease being visible.

A case of calculus, interesting from its rarity, has been presented to the attention of the French Academy of Sciences, in which a concretion was removed from a sublingual duct of an infant but three weeks old. The history of the case is thus given. On the —, a poor woman called upon Dr. Burdel, complaining that the child could not take the breast, which she attributed to its being tongue-tied. Upon examination, Dr. Burdel did not discover any string or ligament of undue shortness, but found the sublingual gland so excessively developed as to raise the tongue considerably from the cavity in which it lies. He soon discovered, by touching the tumor with his little finger, that it must contain a hard substance. A slight pressure brought to light the extremity of a calculus, ending in a fine point, and, after some unsuccessful attempts, he succeeded in extracting it without an incision. The calculus is described as somewhat of an egg-shape, but ending, as already stated, in a fine point. Its size was that of a grain of wheat, its color yellow, its surface granulous, wrinkled, and formed of a number of minute cones or paps, cemented together at their bases. This is an instance of a salivary calculus formed before the birth, when the saliva, according to Dr. Cloquet, is but little charged with salts. An analysis of the concretion exhibited it as being composed almost exclusively of tribasic phosphate of lime and a small fraction of nitrogenous organic matter, which must have been mucus from the salivary duct.

As seen upon the teeth, tartar varies markedly in color and consistence, being sometimes so hard and closely adherent as to seem almost a part of the organs. In other instances it is found soft, and of such flaky nature that the slightest effort suffices to break it away in bulk. A character of tartar is found allied with the mucoid, or typh condition, being of pasty consistence, having, perhaps, a truer expression of its signification in the term *sordes*, being composed of detritus, combined with inspissated mucus.

In color, tartar varies from a dirty white to black, the shade depending on the temperament of the individual, yet being necessarily much influenced by personal habits. In the sanguineo-bilious, tendency to the deposit of flaky brown tartar is very marked. This deposit is the truest expression of salivary calculus, being composed almost exclusively of the constituents of the saliva.

United with all tartar are fungi. Here, as truly suggested by Herr Schrott, do the infusoria find convenient habitation, remaining the longest time, attaining their highest age, dying, and leaving their limy remnants to interlace with epithelial scales, parasites, remains of food, slime, and secretions of saliva, forming in this manner the tartar of the teeth.

That all tartar is not salivary calculus is made evident enough by minute examination. The deposit about the teeth of the scorbutic is in great part from the mucous glands situated in the mucous membrane enveloping the necks of the organs. Again, in mouths abounding in parasites, microscopic analysis shows plainly enough the analogy with the coral reef. Hence it is that analyses of this supposed common material are found so markedly and decidedly to differ.

The treatment of the ordinary collections of tartar about the teeth is very simple, and is to be made very effectual. Various cutting and scraping instruments, very well understood by glancing at the engravings, Fig. 101, are used in the process of removal. The operation consists simply in scraping away the mass (scaling, it is termed), being careful not to scratch the enamel, and afterward thoroughly polishing the teeth,—using for the purpose, first, pulverized pumice, afterward the ordinary burnishing instruments.\*

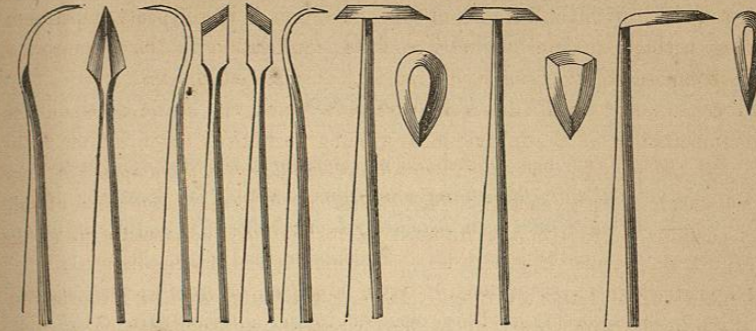
To prevent re-collection, cleanliness is a first requirement: the use of acid washes, carbolie acid soap, or dentifrices, is to be directed, as may seem to the judgment of the practitioner indicated, and the action of the glands is to be increased, by the use either of local or constitutional sialagogues. Or, if in any individual case the advisability of such prescriptions seem debatable, then pumice-stone, finely pulverized, may be used with a good stiff brush; or, what will be found a still better plan, the patient may, every few days, standing before a mirror, use the grit on a piece of soft pine or orange stick.

Salivary calculus, lodged about the teeth, has been thought to produce

\* A set of instruments devised by Dr. Riggs, of Hartford, Conn., has a wide use in the treatment of calculus collections.

caries and necrosis of the alveolar processes. The author does not, however, remember in his own practice ever to have seen such a result. As the

FIG. 101.—INSTRUMENTS EMPLOYED IN REMOVING TARTAR FROM TEETH.



teeth drop out, the calculus falls away with them, and thus its power for evil ends. A spongy and scorbutic character of gum-tissue, and consequent hemorrhage, are, however, very common associations; but the practitioner at once sees that the cure is in his own hands.

The use of acids, highly commended by some as a conclusion to the operation of scaling, is by no means an objectionable practice. Not only does an acid, judiciously applied, cleanse the teeth thoroughly, but it also destroys infusoria which are themselves, as we have seen, tartar; and it serves as a stimulus to the deteriorated and generally spongy neighboring soft parts. Of acids which may be used for this purpose, none have advantage over the aromatic sulphuric, this being employed pure or diluted, according to the nature of the teeth to which it is applied, and the work proposed to be done with it. Acid is most conveniently used from the end of a pine stick, the detritus left by the scaler being softened and dissolved by it. Ulterior ill effects are neutralized by frequent rinsing with ammoniated water. The objection that an acid will dissolve the lime-salts of the teeth, as well as the offence against which it is directed, has as little weight as that a scaler will cut enamel, or that calomel will salivate.

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## CHAPTER XIX.

### DENUATION.

THIS affection, at once appreciated by referring to the drawings, is, without doubt, one of the most deforming conditions to which the dental organs are subject. It is sometimes seen attacking every individual tooth; at others, confining its ravages to a very few. A common seat of the disease is where the gum festoons. Here may be seen a sulcus, or groove, passing from tooth to tooth, involving all those situated in the anterior part of the arch. Another form of the condition involves the cutting edges alone; while in still other cases the depressions are situated promiscuously over every portion of the teeth.

The disease, commencing as a slight gutter, or break, in the enamel, progresses with a varying degree of rapidity, sometimes moving with such slow

FIGS. 102, 103.—DENUATION.



pace as scarcely to be observed from year to year; in other instances, and these, unfortunately, much the most frequent, making constant attention necessary to the preservation of the organs. Occasionally the process begins at a number of points, and these, enlarging, finally coalesce, to the destruction not infrequently of all the anterior enamel wall.

Concerning the cause or causes inducing this condition, much diversity of opinion exists. The present conviction of the author is that the true explanation is just now, for the first time, enunciated in the electro-chemical experiments made by Mr. Kencely Bridgman (see *Dental Caries*), and that in this direction will be found to lie not alone the cause, but the prophylaxis. As all that may be said on this subject is expressed in the experiments themselves, the careful attention of the reader is directed to them. True it would seem to be that back of the immediately-acting cause must lie a predisposition: here would seem to be the result of impressions made on the enamel at the period of its formation, and which deficiency the nutritive functions have failed to correct. It might, indeed, very well be that such enamel is entirely deficient in vital resistance, and thus subject to be acted on as any inorganic structure; being by electrolytic action simply dissolved. To

combat such a condition, electrolysis must be negated. If the assumptions from the experiments of Mr. Bridgman, here made, and which seem to the author so rational, be accepted, the treatment of denudation is the antagonism of electro-chemical action; this perhaps alone, as devitalized enamel might not be aided by vital defence.

Treatment of denudation has heretofore been confined exclusively to combating by operative means the ravages inflicted, such means consisting in reaming out and filling with metal the cavities, as one after another may threaten from its extent and depth.

### ABRASION OF CUTTING FACES.

Abrasion of the cutting face of the teeth from mechanical causes is a very common affection, and a very unfortunate one. The articulation of the two dentures has much to do with the production of such a condition; indeed, everything, if we except an abnormal softness of enamel as found in certain teeth. Teeth that articulate scissor-fashion, the one set over or in front of the other, seldom suffer from this trouble. It is most markedly an affliction of direct articulation.

Persons having jaws thus articulated find their teeth year by year wearing shorter; and were it not that, as this abrasion goes on, nature offsets the waste by internal repairs, throwing out layer after layer of secondary dentine, the dental pulps would be quickly enough exposed.

The character of food used, while perhaps it would never yield this condition, yet, the predisposition in the articulation existing, without doubt assists in the destruction. Thus, it is remarked that sailors, eating constantly of hard bread, and chewers of tobacco, are most subject to abrasion. This is strictly true, however, only as it applies to such as have the peculiarity of articulation, and with such the progress of abrasion is commonly very rapid.

A means of relief to this condition which, while fairly successful, is associated with more or less discomfort, consists in the adaptation to the posterior teeth of caps of metal. These caps take the strain of mastication, and thus protect the teeth. Another mode, but which is apt to excite inflammation, consists in cutting out cavities from the abrading faces of the teeth, and supplying the place of the removed dentine with plugs of gold. This latter plan has many advocates, and is highly commended by practitioners of experience and judgment.