

drug, but this rapidly subsides and leaves a sense of comfort. It has been my custom to dress the ear daily, or not later than every other day, and in no instance of chronic suppurative otitis media have I had any but the most gratifying results in its use. In acute suppurative otitis media I have found that in any strength it seems to aggravate the disease. The greatest objection raised to the use of the drug comes from the patient, who complains of its odor. Even weak solutions of the drug unquestionably give rise to an all-pervading and pungent smell that is more penetrating than that of iodoform. This objection, particularly in the application of the drug to the ear, may readily be overcome by closing the external meatus with a small piece of absorbent cotton. In conclusion then, I have no hesitation in recommending the further clinic use of ortho-chloro-phenol in the belief that it will prove a valuable addition to the pharmacopeia of the rhinologist and aurist, and prove itself worthy of the fullest confidence, especially in those cases where the commonly resorted to medicaments have not only failed to relieve the patient, but have disappointed the expectations of the surgeon.

THE ELECTRO-CAUTERY SNARE AS AN EXCISING AGENT IN DIS- EASES OF THE NOSE AND THROAT.

Read in the Section on Laryngology and Otology at the Forty-seventh Annual Meeting of the American Medical Association held at Atlanta, Ga., May 5-8, 1896.

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It is only a natural sequence which impels one who has given the electro-cautery snare a trial for the treatment of one of the various conditions for which it is recommended, to extend its application, to find new uses and to confirm those whose work has forced them to admit its growing utility. Especially is this to be expected in view of the recent improvements in electric appliances.

At the meeting of the AMERICAN MEDICAL ASSOCIATION at Detroit in 1892, I presented an electric snare which I had devised, and stated its indications and uses in nose and throat diseases. Since that time I have, by greater opportunity, enlarged its sphere of usefulness and fixed my own views in favor of a wider range of application of the electro-cautery snare in nose and throat affections. From its very nature it is adapted for amputation or excision. Any organ or growth or portion thereof which can be engaged within the snare may be removed, without danger of hemorrhage, for not only will there be less hemorrhage than when a knife or cold snare is used, but absolutely no bleeding in the vast majority of cases.

The snare, which was exhibited before this body four years ago, I again present though it is unmodified, except, that in order to accommodate the increasing field of application, it has been made in two sizes. By reason of its ready separation, its simple construction and its constituents, it is easily cleaned. Being covered with hard rubber it is not open to the objection which the old time snares received on account of their lack of cleanliness.

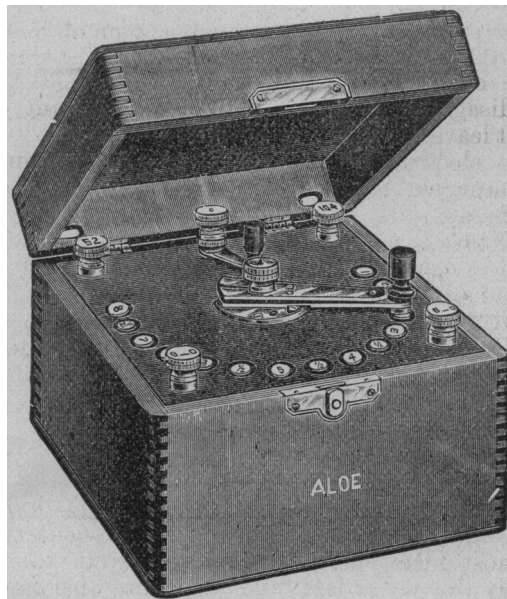
Until over three years ago, I relied upon the ordi-

nary galvanic and storage batteries, without complete satisfaction; constant attention was required to keep them in order and even when the greatest care was observed the battery would often fail at the critical moment.

In December, 1892, I began to use the Aloe converter and since that time I have never been subjected to any annoyance on the part of the appliance supplying the current. The converter is applicable only to the alternating current and is similar in its design and purpose to the transformers which are now used to reduce electricity of high electro-motive force to a lower tension.

The instrument which I have, reduces the voltage from 104 to 1, 1½, 2, 3, 4, 5, 6, 7, or 8 volts, and is therefore suitable for the cautery or the light.

In construction, it consists of iron core with a large primary coil of fine wire and a smaller secondary coil. The ratio of turns of the wire in the primary and secondary coil will depend upon the transformation required. Thus when the voltage of the house current is 104 to secure one volt the primary would have 416 turns to 4 of the secondary; for 2 volts the ratio



would be 416 to 8, for 4 volts, 416 to 16; for 8 volts 416 to 32. From 4½ to 6 amperes are required for the proper action of the snare with No. 5 piano wire (⅓ mm. in diameter).

Lichtwitz² describes a fairly elaborate instrument which he uses and which he presents as one by means of which the quantity of electricity may be measured. He finds that ten amperes are necessary for ordinary tonsils and twelve for the larger, when the wire used is ⅓ m.m. in diameter.

There are several very good appliances in use for utilizing the constant current which alone is available in some cities.

It therefore follows that at the present time no one need deny himself the use of the electro-cautery snare on account of electricity producing apparatus; for, whether the current be alternating or direct the supply will be reliable and precise. For some years a valid objection was entertained to the platinum wire on account of its lack of firmness. Since iron or steel wire has replaced it however, the same degree of stiffness of the loop is obtained whether the cold or hot snare be used.

The electro-cautery snare is from the very nature of things of but recent use. So far as I can learn Middledorf³ was the first to employ it in the removal of tonsils.

According to Kijewski and Wroblewski⁴ the galvano-cautery snare was used by Koehler and Korzeniowski⁵ to remove a large polypus which filled the entire nasal cavity. Voltolini,⁶ in his great treatise upon the galvano-cautery considered the value of the snare lessened by reason of the insufficiency and inconstancy of current.

Since the publication of this work and especially since the introduction of an apparatus which provides for the regular and certain supply of electricity, this and the somewhat similar objection of Beverly Robinson⁷ are answered. So satisfactory has been this answer that the advocates of the electro-cautery snare have increased immensely, until they include many who are willing to replace by it many operative procedures which legend and practice had almost established forever. In fact the most enthusiastic advocates are those who have had most experience with it and its greatest opponents are generally those who have used it infrequently or not at all.

Thus Sendziak⁸ complains that Jurasz, after employing the electro-cautery snare in only two cases, came to the conclusion that it was inconvenient, painful and disagreeable to the patient on account of the odor it leaves.

The electro-cautery snare has been recommended and employed in the following diseases of the nose and throat:

1. Nose: *a*, anterior and posterior turbinal hypertrophies; *b*, polypi and other benign growths; *c*, malignant neoplasms; *d*, spurs.

2. Rhino-pharynx: *a*, polypi; *b*, fibromata.

3. Pharynx: *a*, hypertrophied tonsils; *b*, tonsillar neoplasms; *c*, palatal neoplasms; *d*, elongated uvula; *e*, hypertrophied lingual tonsils.

4. Larynx: *a*, neoplasms.

I. NOSE.

1. *Anterior and posterior turbinal hypertrophies.*—In these conditions the electro-cautery snare is almost ideal, permitting the operator to remove quickly the redundant and hypertrophied tissue by means of an operation which is bloodless notwithstanding the great vascularity. It is quite as easy to engage the hot as the cold snare and the celerity, the painlessness and freedom from hemorrhage should commend the former over the tedious cold snare.

Sajous⁹ prefers the electro-cautery snare for posterior turbinate hypertrophies, stating that it is necessary to use a rhinoscopic mirror in order to see the seat of operation. I consider that this is not only unnecessary, but awkward. A far better plan is to place the finger in the rhino-pharynx and thus guide the loop over the hypertrophied tissue.

McBride¹⁰ says it should be used whenever the tissue can be engaged and Greville MacDonald¹¹ prefers the electro-cautery snare for the removal of large pieces of the turbinated in spite of the objection that it induces considerable inflammation in the neighborhood from the generation of steam and that the cicatrization is delayed. I can not permit this objection to go unchallenged for at least in my own cases it has not been revealed. Among the laryngologists who consider the cold snare as superior for anterior and posterior hypertrophies, may be mentioned Onodi,¹²

Zwilling¹³, Polyak,¹⁴ Eaton,¹⁵ Hack,¹⁶ while Baumgarten¹⁷, Schmidt¹⁸ and others commend the hot snare.

2. *Polypi and other benign growths.*—The essential advantage of the electro-cautery snare in the removal of polypi is the fact that so many may be removed at one sitting; whereas it requires considerable time to dispose of a number by means of the cold snare; with the hot snare it is only the question of a few minutes. The smaller instrument which I have devised is quite as convenient and easy of application as any cold snare, and one needs only inquire of a patient who has had both methods applied, to learn that the hot snare is far more agreeable, less painful, more rapid, less bloody and more preventive of recurrence. So far as the inflammatory and infective sequelæ are concerned after a thorough trial of more than four years, I am convinced that they are no greater in one than in the other. In one single case, an acute otitis media followed the separation, doubtless influenced by the unwarrantable exposure to which the patient subjected himself. The operation was performed in the morning and before night the patient had permitted himself to be drenched by rain several times. He failed to report at my office until the fourth day after the operation. I feel therefore that the hot snare may be held blameless of this result. Surely the lessened time of operation should make infection less apt to occur than with the cold snare with which too often no aseptic and antiseptic precautions are taken.

McBride¹⁰ in this connection makes the assertion that it is better to use the electro-cautery snare, when it is desired to remove all the polypi at one sitting. Ingals¹⁹ uses the electro-cautery snare but prefers the cold, while Greville MacDonald¹¹ claims that there is no advantage over the cold snare, while there is the greater disadvantage of inflammatory action induced by heat and steam generated by the hot wire.

In answer to this, it may be stated that the heat and steam which MacDonald and others claim are generated will not produce any bad results if the snare is properly applied and used. If the wire is drawn tight the tissue which is influenced by the heat will be so constricted and the time of its application so insignificant, that it can have but little influence in this regard. It is often difficult, sometimes impossible, to observe the cauterized stump, demonstrating that at least in many cases the effect of the heat and steam is *nil*.

Schmidt¹⁸ states that after using the cold snare for three years he returned to the electro-cautery. This, I am sure, will be done by many if they give the latter a fair trial. I am inclined to agree with Ball²⁰ and others that cauterization of the base resulting from the galvano-cautery ablation of polypi is productive of good results. In keeping with the progress of rhinology, I do not believe that mere cauterization of the base will prevent recurrence. Indeed my common practice now is to remove all larger polypi with the hot snare, and if the bone is found affected the smaller polypi with the diseased bone are then removed.

The electro-cautery snare is also available for the removal of other benign growths in the nose, and I have used it with good effect in fibroma, adenoma and papilloma. In one case of fibroma which projected from the rhino-pharynx, the vascularity was very great, the growth bleeding upon the slightest provocation; yet, the electro-cautery snare caused the loss of but a few

drops of blood. In the case of adenoma I first used this instrument but in the later recurrences abandoned it, since on account of the softness of the tissue and slight amount of blood which was lost, I could operate quite as well with forceps.

Zarniko²¹ inclines to the cold snare for removal of inflammatory fibroma, claiming that if it is applied as he suggests, the loss of blood will be inconsiderable.

3. *Malignant tumors*.—The electro-cautery snare has in this class but a limited range, which is in the direction of securing a portion of the growth for microscopic examination.

4. *Spurs*.—Although advocated by a number of laryngologists, I have never taken kindly to this form of treatment. The saw, drill and curette are eminently more satisfactory. The electro-cautery snare is by no means as free from objection in operations upon bone and cartilage as upon softer tissues.

II. RHINO-PHARYNX.

1. *Polypi and fibromata*.—These may well be considered together as the terms are used interchangeably by many. In appropriate cases the belief seems to be fairly general that the hot snare is of greatest service, although the electrolytic treatment seems destined to overshadow all other forms, except where a more serious operation is indicated. However, many still maintain the superior value of snaring where this is possible. Thus Michelson²², Lincoln²³, and Schmidt²⁴ report cases of rhino-pharyngeal fibroma treated in this way. I have used the electro-cautery snare in two cases of rhino-pharyngeal polypi with success and without return. In a case of rhino-pharyngeal fibroma with projections into the nasal cavity I snared off as much as was possible to reach with the instrument. On the whole the efficiency of the electro-cautery snare in rhino-pharyngeal tumors depends upon the possibility of engaging the growth in the loop and its extent and attachment.

III. PHARYNX.

1. *Hypertrophied tonsils*.—In the removal of hypertrophied tonsils, the electro-cautery snare has received greater attention than in any other affection. After this method was introduced, according to Lichtwitz² the operation lost caste but was revived through the writings of Knight, Loeb, Garel, Schmidt, Heryng and Sendziak. All of these continue to favor the electro-cautery snare except Knight, who writes²⁴, after a complete résumé upon the subject of hemorrhage following tonsillotomy that he favors the guillotine.

Flatau²⁵ intimates that those who have experienced serious hemorrhage after tonsillotomy are much inclined to replace the tonsillotome with the electro-cautery or electro-cautery snare and McBride¹⁰ states that its use is only justifiable in preventing hemorrhage, which he states is a rare contingency. Bresgen²⁶ dismisses its consideration with the remark that there is no reason for its use as it does not prevent hemorrhage. Bosworth²⁷ objects to the procedure on the ground that it requires ten to fifteen minutes and Potter²⁸ advised that the snare be not adjusted too deeply on account of the sloughing beyond the seat of cauterization.

Ingals¹⁹ favors the cold snare. On the other hand there is a great array of experienced advocates of electro-cautery tonsillotomy. Lichtwitz² is strong in his preference. Yerwant²⁹ states that it is more prudent to use the electro-cautery snare in adults so as to obviate hemorrhage. Heryng³⁰ has given his evidence

in its favor for hard fibrous tonsils, extensive hypertrophy and hemophilia. Sendziak¹⁸ advocates it forcibly and conclusively, stating that any one without prejudice will be entirely satisfied with this method. Schmidt¹⁸ favors the electro-cautery snare beyond all other tonsillotomy instruments. He denies that it requires a longer time than the operation with the tonsillotome and insists that it is to be preferred on account of the certainty that hemorrhage will not occur. Huguenin³¹ advises the use of the electro-cautery snare whenever tonsils are pedunculated and Helot³² also prefers this instrument. There is to my mind no question as to the safety of galvano-cautery tonsillotomy so far as hemorrhage is concerned. A few cases of hemorrhage following this operation have been reported, but never a serious one. They could all probably be explained upon a satisfactory basis. In more than 300 tonsillotomies with the electro-cautery snare I have never observed a loss of more than a few drops of blood. In only one case was there a secondary hemorrhage, which doubtless resulted from a lack of attention on the part of the patient. I think this will compare favorably with the experience of those who use the knife or tonsillotome. In fact the proof is stronger when it is considered that the hemorrhage would be far greater if the advocates of the knife would remove as much as is ordinarily removed with the galvano-cautery snare.

Numerous instances of hemorrhage after tonsillotomy attest to the possible seriousness of such an occurrence. Heryng³⁰ collected fifty-nine cases of severe and even serious hemorrhage; other cases have been reported by Blairs,³³ Fuller,³⁴ Catuffe,³⁵ Moure,³⁶ Thorne,³⁷ Jessop³⁸, and Lennox Browne.³⁹

Another great advantage which the galvano-cautery snare possesses over the tonsillotome consists in the large amount of tonsillar tissue which it is possible to remove and the precision of the operation which makes it possible to remove just what one desires. With the tonsillotome the amount of tonsil removed is purely accidental. If the instrument possesses a fork or lifting device, the amount will depend upon the pulling power of the fork, which to the surgeon can not be known until after the excision. If there is no fork, the pillars of the palate will limit the removal, and therefore it must be very exceptional to remove the entire tonsil. Quite different is it with the electro-cautery snare. It is my custom to pull the tonsil from its palatal bed by means of a pair of sharp-toothed forceps and then engage the wire so that it is possible to remove the entire tonsil. I have again and again made so complete an excision that not a vestige of tonsil tissue remained. This I do not consider a dangerous practice; at least it has been eminently satisfactory up to the present time. I can corroborate the experience of Schmidt,¹⁸ who states that he has frequently seen enlarged tonsils of which one-fifth only had been removed by previous tonsillotomy.

As to the great length of time which some writers maintain is necessary in operating with electro-cautery snare, the expression is born of inexperience, for no one who undertakes it a number of times can fail to acquire sufficient dexterity to operate with celerity. It never should require more than one minute, providing the apparatus is in proper working order; considering the improvements that have been made, nothing short of this is to be anticipated. On the whole it must be admitted that the electro-cautery

snare is to be commended for the removal of hypertrophied tonsils in that it obviates all danger from hemorrhage and makes the operation one of precision, not one of the purest guess-work.

Even in tonsils which are impacted between the palatal pillars it will be found of service, since in almost every case it will be possible to pull out a portion and engage it in the snare, thereby not only securing the advantage of cauterization, but also the removal of a portion of the hypertrophied tissue.

2. *Tonsillar neoplasms*.—Any tonsillar growth which has not involved and attached itself to neighboring structures is susceptible of excision with the electro-cautery snare. This does not imply that the mere removal with the snare will constitute a cure for such an affection. However, if the growth involves the tonsil alone, and the entire tonsil is removed, the method should offer at least as good a result as any other. In a case of lymphosarcoma of the tonsil I snared off a large piece of the tumor for microscopic examination, without causing any hemorrhage and without influencing the growth of the tumor. Wolfenden⁴⁰ states that he removed a sarcomatous tonsil by means of the electric snare, and I consider it a procedure which should be utilized in the earlier cases.

3. *Palatal neoplasms*.—Tumors of the palate which may be engaged within the loop are suitable for removal with electro-cautery snare. I have used it twice for palatal papillomata.

4. *Elongated uvula*.—In my previous paper¹ I called attention to removal of elongated uvula by means of the electro-cautery snare, which I had practiced for some time. Shortly after this DeBlois⁴¹ in a paper before the American Laryngological Association, took a similar position. Lennox-Browne⁴² states his preference for the galvano-cautery where the uvula is thin, but he does not specify the snare. He operates by pulling the uvula downward and cutting it with the galvano-cautery where he desires. On the other hand Morgan⁴³ and Ingals¹⁹ prefer the cold snare. That hemorrhage is a possibility, one needs only to refer to the paper upon this subject written by Morgan⁴⁴ in which attention is called to a great number of instances of uvular hemorrhage collected from ancient and modern medical literature.

Besides entirely preventing all possibility of hemorrhage the hot snare operation finds an indication in the ease with which the uvula can be engaged, the perfect stump which remains, the smaller amount of pain succeeding the operation as compared with ordinary uvulotomy. It is my practice after the uvula has been properly cocaineized to permit it to fall into the loop and after deciding exactly where the section is to be made, to draw the wire tight and send the current through. So pleasing are the results from this method of operating, that I now use no other plan.

5. *Hypertrophied lingual tonsil*.—My own experience in this particular affection is confined to one case; however, it seems to offer an inviting field at least. Sendziak⁸ commends it highly.

IV. LARYNX.

1. *Neoplasms*.—Some writers are disposed to favor the electro-cautery snare in these affections, but it seems to me that there are serious objections on the score of inaccessibility, impossibility of keeping the site in perfect view, the danger of inflammatory reaction and the possibility of the excised tumor falling

into the larynx. These are, however, the judgment of opinion rather than of experience.

In conclusion I desire to state that the electro-cautery snare has a possible indication in laryngeal tumors and nasal spurs; an inviting one in hypertrophied lingual tonsils, palatal, tonsillar and rhinopharyngeal growths and a certain one in the removal of hypertrophied tonsils and turbinates, nasal polypi and elongated uvula.

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DISCUSSION.

DR. W. E. CASSELBERRY, Chicago, Ill.—I think the success of treatment by the electro-cautery snare depends very largely upon the perfection of one's apparatus. I think that Dr. Loeb deserves a great deal of credit for having designed an apparatus by which he can gauge and perform these operations with facility. He is fortunate in having his converter and an alternating current. I have been unable to find a satisfactory galvano-cautery rheostat by which to use directly the Edison or continuous current, so I use the storage battery. I use for this purpose the double American cell, keeping it stored constantly by the Edison current in connection with my light so that the flow of the current from the battery seems to be uniform. I am not accustomed to take out nasal polypi with the cautery snare. I formerly did it but have stopped for the reason that it makes the nose sore. I can remove about as many as I care to at one sitting with the cold snare. I remove tonsils in adults sometimes by the cautery snare. It has the advantage of avoidance of hemorrhage and the disadvantage of making a very sore throat. I think, to remove the uvula by the cautery snare, I must make a more painful wound than by the usual method.

DR. HANAU W. LOEB, St. Louis, Mo.—I expected to hear more criticisms than have been made and I think perhaps they

would have been deserved, for I am sure that my love for the electro-cautery snare has made me rather dogmatic. I use a better instrument than those usually employed. Most of the instruments have too large a handle and are too heavy, but I have somewhere in the gray matter of my brain a little handle in view which will greatly obviate this trouble.

I think Dr. Casselberry deserves a great deal of credit for his faithful work with that abominable machine, the winding cautery snare. I use the McIntosh handle, which has a sliding arrangement by which the loop is tightened in a moment.

It is unfortunate that in so many cities the direct current is still used. Since the consolidation, however, of the Edison and Thompson companies, they are not using them so much, and soon the alternating current will be utilized in all of the larger cities. In reference to trouble from cauterizing the adjoining part, if the wire is drawn tight before sending the current through this will be obviated. The trouble with the instruments is that you have to pass the wire through the cannula and then back again. In mine there are two perforated wires which are threaded like a Sajous snare.

There is no question but that in many cases the inflammatory reaction from the electro-cautery is greater than the cold snare, for the reason that the surface is free from all germs; since I have become more familiar with the use of the instrument I have severe inflammatory results less frequently. It is the best in operating upon the uvula because one is not required to pull down the tip in any way. I simply let the uvula fall into the tip and turn on the current. In the scissors operation you are apt to cut off more than is necessary of the mucous membrane, and in addition the inflammatory results are greater. I have presented this paper because there is a scantiness of literature in regard to the cautery snare for operations in the nose and throat. I hope that when we next speak on the subject, I will have more in favor of it.

ON BONY GROWTHS INVADING THE TONSIL.

Read in the Section on Laryngology and Otology, at the Forty-seventh Annual Meeting of the American Medical Association, at Atlanta, Ga., May 5-8, 1896.

BY ALEX. W. STIRLING, M.B., C.M. (EDIN.);

D.P.H. (LOND.)

ATLANTA, GA.

The cases which I bring before you are interesting, I think, from the points of view of both the anatomist and the practical surgeon.

The first is that of a young lady of excellent personal medical history. Her only complaint had been slight chronic hypertrophic rhinitis, and for a few years some enlargement of the tonsils, especially the right, both of which secreted caseous matter and were at times a little painful. The inferior turbinated bones and the varicose veins of the lingual tonsil had been cauterized by one throat specialist, another had cauterized her right tonsil, and a third had cauterized cysts in both.

When tired she frequently complained of pain which she believed originated in the right tonsil and radiated thence to the mastoid and the right nasal bones, as well as to the right eye and shoulder. When squeezing out secretion she could feel a local tenderness in this tonsil.

On examination with the finger I was able to make out a hard immovable mass coming from behind the tonsil forward underneath it to the level of its anterior surface, but forming practically part of its substance. Its point is rounded, apparently about one-eighth of an inch in diameter, but becoming broader and somewhat flattened laterally as it extends outward, backward, and slightly upward. The finger pressed in front enters an angle formed by it and the inferior maxilla, and when pressed behind it enters another angle formed by its approximation to the right side of the vertebral column. The tenderness felt on pressure appears to be due to the nipping of the tonsillar mucous membrane between the finger and the hard body.

Nothing of the kind can be discovered on the left side.

The second case consulted me on account of large polypi of both nostrils from which she had suffered for years. She is 64 years of age, has asthma and a weak cardiac muscle, but otherwise is in good health. There is nothing of note in her family or personal medical history. On examining her throat I observed a slight protuberance just above and in front of her right tonsil. With the finger I found it to be nearly the same as that described in connection with Case 1, with the following points of difference. In the second case it exists on both sides, though it is not quite so prominent upon the left side; it is also higher, farther forward, perhaps a little thinner, and with a more apparent upward direction.

The growth is quite immovable, and there is no unnatural tenderness on examination. The patient has never had the slightest trouble with her tonsils. I have been able to examine the throat of one of her daughters, but could find nothing unusual there.

The third case is a brother of Case 2, aged 65. He likewise has been free from throat affections or any infirmity which might have a bearing on this subject. On both sides he has the same peculiarity, but differing from the previous cases in that the hard masses are altogether in the posterior part of the tonsils, are much longer, reaching a full finger breadth below the level of the lower tonsillar border, are perhaps rather more slender and, for nearly half an inch of the lower end on either side, cartilaginous to the touch and movable.

The question now arises, what are these substances? They are evidently not tonsillar calculi, because they have none of their characteristics except tenderness. In view of the fact that they have given rise to no symptoms whatever in two cases, and from their formation, position, and immobility, it seems to me certain that they are not the result of disease, but that they are rather congenital peculiarities, having however a distinct interest in cases of disease in their neighborhood.

In endeavoring to come to a decision relative to their origin, let us examine the bony structures from which they might arise, for they can be nothing else than bone. They all arise on the outer side of the throat, and it may be from the lower jaw, the vertebral column, or the base of the skull. If they came from the lower jaw to which they closely approximate, they would move along with it, but not one of them does so. They do not come from the bodies of the vertebrae, because the finger can exclude these. The pterygoid plates are too far forward; the spines on the posterior extremities of the wings of the sphenoids are rather less unlikely, but they too are somewhat too far forward and are distant. It is much more likely that the growths are simply prolongations of natural prominences than entirely new formations; by a process of exclusion we are limited to the transverse processes of the vertebrae and the styloid process.

The tonsil is situated on the level of the upper part of the body of the axis or of the disc between it and the atlas. The transverse process of the axis is small and does not move on rotation of the head. The bones under consideration do move along with the head on rotation, and come into much greater and visible prominence when the head is turned toward the side opposite to that under examination.

We are therefore reduced to the atlas which is as