

The tonsil clamp did not control the hemorrhage and the house surgeon tried all the usual methods without avail. The next morning I was notified. The patient then had had several intravenous injections of normal saline, the radial pulse was imperceptible and the temperature was in the neighborhood of 102 F. I ligated the external carotid which did not fully control the hemorrhage and later the house surgeon ligated the common carotid with a ligature that had been placed about that vessel to be used if necessary. The mother of the boy was sent for so that a transfusion might be done but he died just before her arrival. She said that the boy bled easily from any slight injury and had become very weak each time he lost one of his first teeth. The autopsy revealed the stomach, small and large intestines distended with blood, but no injuries to the large vessels about the tonsil. This case looks like hemophilia, and certainly death was due to primary hemorrhage.

In conclusion, tonsillectomy is the one operation whenever the tonsils are diseased enough to demand surgical interference, and so far as hemorrhage is concerned it probably involves less risk than tonsillotomy.

15 East Forty-Eighth Street.

REFINEMENTS WHICH RENDER TONSILLECTOMY SAFE, SURGICAL AND SATISFACTORY

M. M. CULLOM, A.B., M.D.

NASHVILLE, TENN.

On account of the situation of the tonsil, the radical operation for its removal is beset with certain difficulties and dangers. It is the purpose of this paper to discuss the best methods of surmounting the difficulties and eliminating the dangers.

The difficulties and dangers may be briefly enumerated as those arising from the anesthetic; the obscuration of field and embarrassment of respiration due to flow of blood and mucus, and the danger of hemorrhage. Another difficulty lies in the adequate exposure and illumination of the field of operation. These difficulties not only add to the danger of the operation, but interfere with the perfection and artistic detail of the work. My ideas may be best shown by description of the instruments used and the method employed in operating. In this operation I use a number of instruments of my own device. The principle running through them all is the economy of space. The maximum amount of room for the surgeon to work in, with the minimum amount of interference with sight and manipulation.

Every step in this direction adds to the safety of the patient, the perfection of the operation and the comfort and satisfaction of the surgeon.

Patients are prepared for operation by administration of a purgative the night before; generally castor oil is given. The time of operation is preferably early in the morning, as children can be more easily tided over the breakfast meal without missing it so acutely.

Half an hour before operation in adults, $\frac{1}{4}$ of a grain of morphin and 1/150 of a grain of atropin are administered hypodermatically. In children, a dose is administered in proportion to their years. In very young children only the atropin is administered. The salutary effect of the morphin is apparent in quieting the patient, allaying fear, and rendering the anesthesia smoother, while the atropin helps to dry up excessive secretion

which often complicates the administration of ether. Then Crile's experiments have shown that the preliminary administration of atropin furnishes an element of safety in operations on the air-passages, by protecting the heart against reflex inhibitory impulses through the superior laryngeal nerve.

The anesthetic used in all cases is ether. Investigations and statistics have convinced me that ether is a safer anesthetic than chloroform and occasions less anxiety in the administration. The sad chapter of accidents in connection with the administration of chloroform in adenoid and tonsil operations makes me feel that chloroform has no place in such operations. For certain reasons gas has been found unsuitable in the tonsil operation.

Gwathmey's experiments and writings have taught us the value of warm vapor in anesthesia, and for the past six months I have used it exclusively. The apparatus I use is the Cain-McDermott, which I have modified to meet my ideas. The apparatus consists of a bellows worked by foot-pressure which vaporizes the ether. The vapor is driven through a coil of pipe enclosed in a metal receptacle containing acetate of soda. This receptacle is immersed in boiling water for fifteen minutes before using and the soda salt will retain the heat for several hours. The vapor driven through the heated coil is delivered warm to the patient.

As sold, the apparatus is fitted only with a metal mouth-piece to be hung in the corner of the mouth. The modifications I have made are the addition of a mask and nasal tubes.

The patient is anesthetized to the point of relaxation by means of the warm vapor delivered through the mask. When the patient is thoroughly relaxed the mask is replaced with nasal tubes and the operation is begun.

I wish to say that my experience with warm vapor has been most satisfactory. The patient is quickly under the anesthetic, the anesthesia is very quiet and in no case has the patient become cyanosed. In using the metal mouth-piece I found that there was too great an admixture of air and it was hard to keep the patient under; then, too, the mouth-piece was in the way, but when I replaced the mouth-piece with nasal tubes there was no such difficulty. The use of the foot-bellows is an advantage, as it allows the anesthetist the use of both hands to steady the head, raise the jaw and render the surgeon any assistance needed. The use of the foot-pump is a great advantage over the hand-bulb of Pynchon which I formerly used. More vapor is delivered by the increased force from the foot. The squeezing of the bulb by hand is very tiresome and becomes real labor when the operation is prolonged. I can only describe this apparatus as a comfort. Even strong men are kept quietly asleep without the least trouble. The surgeon can go calmly and carefully about his work without feeling the least necessity for hurry. Used in this way it solves the problem of anesthesia in surgery of the oropharynx. It is a great advantage to be able to operate uninterruptedly instead of having to remove the gag and wait while the patient is being reanesthetized.

POSITION OF THE PATIENT

The patient having been anesthetized to the point of relaxation of the jaws, and being flat on the back, the head is lowered slightly, not very much, probably at an angle of 20 degrees. At this angle, the patient seems to breathe better and there is less likelihood of blood and mucus interfering with respiration. The patient is flat

on the back so that the assistant standing at the patient's left may be in a position to sponge and render such assistance as may be needed.

EXPOSURE OF THE FIELD

The mouth-gag is next inserted, and I wish to say that a great part of the confidence I feel in this operation is due to the assistance given by the gag. For some time I made use of the Brandt-Stubbs self-retaining gag and I wish here to acknowledge my indebtedness to it. It has many splendid features but experience has shown defects which I have tried to eliminate. The Brandt-Stubbs gag, which is the best of its type, has a tongue-depressor attached which is a very valuable feature. The depressor practically takes the place of an assistant. With the ordinary mouth-gag it is necessary for an assistant to depress the tongue. With the surgeon working in the mouth it is difficult for the assistant to see just where to place the depressor and consequently that instrument slips first to one side of the tongue and then to the other, irritating the surgeon and making the

ing is between the teeth. This gives all the working space possible. The bite-blocks fit into each other so that it is exceedingly easy to insert. The tongue-depressor is adjustable having a lateral as well as a vertical adjustment. This allows first one tonsil to be exposed and then the other. The depressor can be attached or detached instantly. This gag gives a perfect exposure of the field with all the working space possible. Instead of crowding the tongue down on the larynx it exerts a lifting force on the base of the tongue and assists respiration.

ILLUMINATION OF THE FIELD

One of the points on which I insist and on which I lay great stress is the proper illumination of the field. I insist on the field being thoroughly exposed and at the same time thoroughly illuminated. This is accomplished by wearing an electric headlight on the forehead.

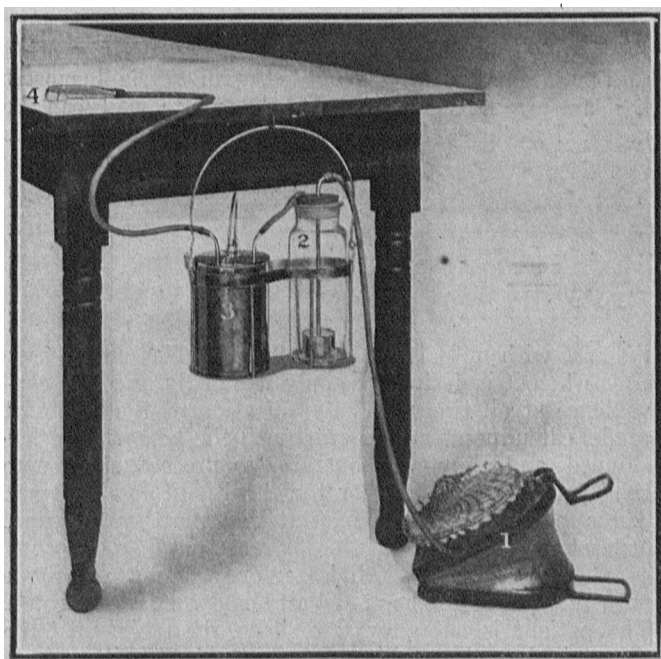


Fig. 1.—Cain-McDermott warm-vapor ether apparatus. (1) Foot-bellows; (2) ether-container; (3) metal receptacle containing acetate of soda; (4) mouth-tube which writer has replaced with a mask to begin anesthesia and nasal tubes to continue the anesthetic after the operation is begun.

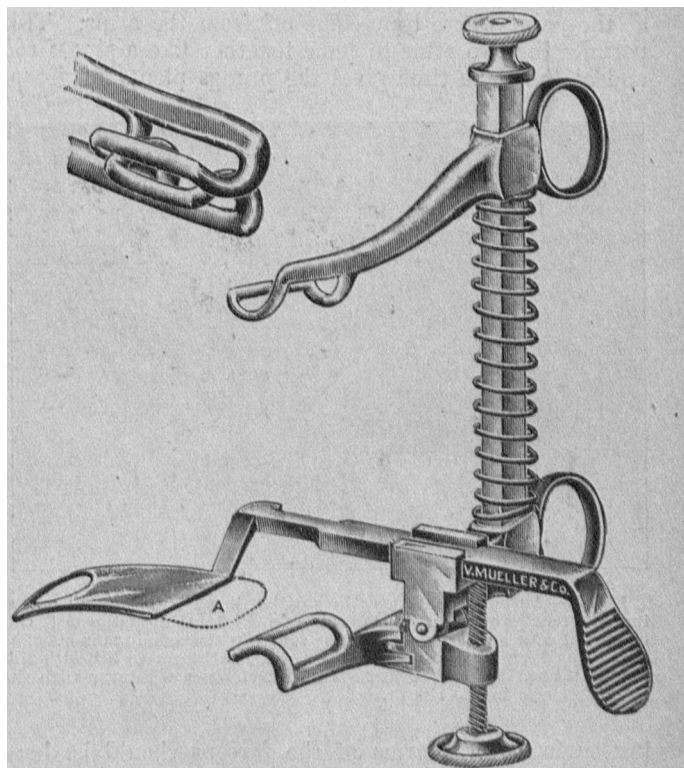


Fig. 2.—Author's mouth-gag.

ASSISTANTS

Two assistants in addition to the anesthetist are required. One stands at the left of the patient on a line with the surgeon, and has charge of four sponge-forceps. The other stands just back of the first on the same side. This assistant, usually a nurse, has an adequate supply of gauze sponges and it is her duty to receive the forceps containing the soiled sponges from the first assistant and replace them with fresh ones as fast as they may be needed.

GRASPING THE TONSIL

The tonsil on the right side is seized with tonsil-forceps and lifted from its bed and its contour and attachments noted. Often it will be seen that the superior margin of the tonsil is high above the junction of the pillars. Traction will cause the outline of the tonsil to appear beneath the mucous membrane and will serve as a guide to the dissection.

The forceps used is of my own device and carries out the idea running through all my instruments, namely,

exposure of the field unsatisfactory. This depressor being attached to the mouth-gag holds the tongue at a fixed point, and exposes the entire field clearly to the view of the operator. There is, too, one less assistant in the way of the surgeon.

The serious drawback to this gag is that the tongue-depressor is attached in the center and takes up a large amount of very valuable room. The slot for the depressor interferes with the free sweep of the adenoid curet necessitating the removal of the gag and the substitution of another gag when removing adenoids. The depressor being in the center crowds the tongue down on the larynx and sometimes causes interference with respiration. A gag of this kind is hard to insert because the bite-blocks do not come close together. It is necessary to open the teeth an inch before this gag can be inserted. The gag which I use has the tongue-depressor attached at the side. The bite-blocks are fenestrated so that noth-

to interfere as little with sight and manipulation as possible. The first essential in a good grasping-forceps is that they should take firm hold of the tonsil and not tear out with traction. In order to do this it is necessary that they should have prongs instead of teeth. Any toothed instrument will tear out of a friable tonsil. Having the necessary firmness of grasp, the next essential is that they should occupy as little space and be as little in the way of eye and hand as possible. In order to do this, it is necessary that the arms should be as slender as is consistent with strength, and when closed the two arms should present the appearance of a single arm. Carter recognized this principle when he devised his tonsil-screw, and I wish to express my admiration and appreciation of it. For a firm tonsil it is an ideal instrument but we must have something that will not tear out of a friable tonsil. In order to give necessary grasping area the prongs take the form of a semicircle at the point where they come off from the arms. This permits the two arms to come together like a single rod and at the same time gives the prongs plenty of grasp-

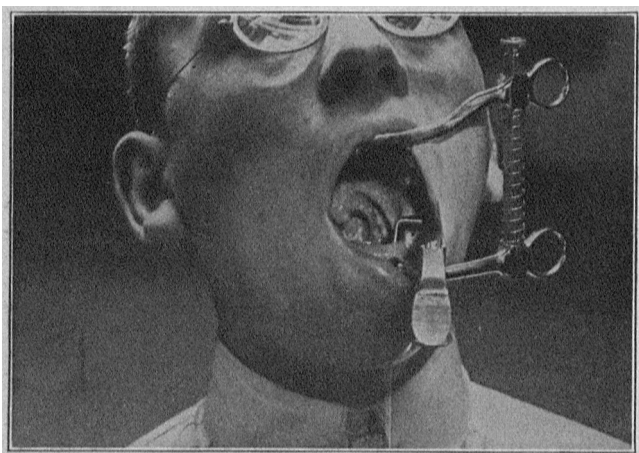


Fig. 3.—Author's mouth-gag in position in patient's mouth exposing left tonsillar region. By means of its lateral adjustment it can be moved over and expose the right tonsil in the same manner. The tonsil has been enucleated and the fossa has begun to fill with follicular tissue. Note that there is no interference whatever with the working space in the mouth.

ing surface. The arms of the forceps should be long enough to permit the hand grasping it to be out of the way. The forceps takes the form of a pair of calipers. This is an additional factor in space-saving, as the hinge joint is at the end instead of in the middle.

DISSECTION

The dissection is started at the anterior superior junction of the tonsil and the pillar. The instrument used is the right-angled knife which I have devised from the Leland knife. There are essential differences. The blade is shorter. I often found that the Leland knife was difficult to manipulate in the throat of a small child on account of the length of the blade. The blade has a rounding sharp point instead of a sharp or probe point. A great convenience is having both blades on one handle, thus doing away with the necessity of laying down one instrument to pick up another and allowing the surgeon to keep his eye on the field; it also does away with the necessity of searching among the other instruments for the one wanted. The dissection is for the most part a semisharp dissection. The side of the blade is used as a blunt dissector when blunt dissection can be accomplished without too much force and traumatism. When much force is necessary, I believe that sharp dissection

is preferable. As the attachments are severed it will be noticed that the tonsil gradually rises from its bed.

When the dissection is complete the tonsil can be lifted from its position between the pillars and is attached only to the constrictor. I have learned that the dissection is not complete until the tonsil can be dislocated in this manner. Any attempt to remove it before this stage is reached will result in only a partial removal and will require a second effort. The anterior pillar is first separated, then the supratonsillar attachments and lastly the posterior pillar. During the progress of the dissection the blood is sponged up by an assistant as fast as it appears and the field of operation is kept clean. Good exposure, good illumination and good sponging make every stroke of the knife visible and add greatly to our sense of safety and security. When the right tonsil is freed from its attachment to the pillars and only remains adherent to the constrictor it is grasped with the forceps put on the stretch and severed with the cold wire snare. As soon as the tonsil is removed the assistant thrusts a sponge on a sponge-forceps into the cavity and makes pressure till the first rush of blood is over.

My tonsil hemostat is then applied and the dissection of the other tonsil is proceeded with. The hemostat has an arrangement whereby the gauze pad can be adjusted instantly instead of having to be tied on as is

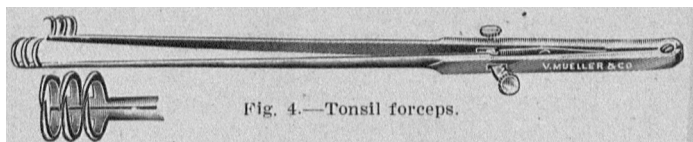


Fig. 4.—Tonsil forceps.

the case with most hemostats. This enables one to save time when it is desired to apply it quickly and is a convenience at all times. The application of the hemostat renders it unnecessary to wait until the hemorrhage has stopped, and allows the operator to proceed at once to the dissection of the other tonsil without loss of time. The application of the hemostat shortens the operation, at least, five minutes.

When the second tonsil is removed pressure is made with the sponge forceps until all hemorrhage is arrested. The patient is not allowed to leave the table until the throat is dry. The pillars are drawn back with retractors and carefully inspected for bleeding points, and to see if any tonsillar tissue has been left. If any remains, it is removed with the snare. If after removal there is an apparent difference in the size of the two tonsils, it is well to search carefully, for it is my experience that after removal the tonsils are approximately the same size, however different they may appear while in the throat.

I consider this operation safe for the reason that every stroke of the knife is made under the guidance of the eye. The patient is under the anesthetic, absolutely quiet, the field is fully exposed and every stroke of the knife can be taken with the most painstaking care. The thing most to be feared is hemorrhage. If troublesome hemorrhage should arise we are in the very best position to cope with it. The bleeding points can be located by sight and if it is an artery it can be grasped and ligated if necessary, or if it is a vein direct pressure can be applied.

WHY GIVE AN ANESTHETIC?

I believe that a general anesthetic should be administered in the first place for the mental and physical comfort of the patient. It is repulsive to most people

to have any kind of manipulation in the mouth. It generally provokes retching and gagging, which is unpleasant. Then the mental effect of the cutting is terrorizing even if local anesthesia abolishes the real suffering. This is from the standpoint of the patient. From the standpoint of the surgeon the gagging and retching keep the tonsils and pillars in constant motion and increase the difficulty of grasping them and placing the incisions properly. This is also an element of danger. The necessity of spitting out the blood causes constant interruption. In comparison with these difficulties the great ease with which one does his work with the patient completely under anesthesia imparts a sense of security and satisfaction that is comforting. The surgeon can proceed calmly and carefully to his work undisturbed by these annoyances. The blood can be mopped up and the hemorrhage limited by pressure with the sponges. After removal, pressure can be maintained until the hemorrhage is stopped and the throat rendered

tomy has been raised to the dignity of a surgical operation, demanding care, skill, judgment and experience. The operation as formerly practiced was practically a leap in the dark. The instrument was introduced, the tonsil amputated and luck trusted to to stop the hemorrhage. If the hemorrhage did not stop the operator was at a great disadvantage. With the patient gagging and retching the bleeding point was difficult to locate and still more difficult to grasp or compress.

The operation as I perform it requires from fifteen minutes to an hour. The tendency to hemorrhage and the amount of dissection required is what prolongs the operation. There has always been an idea prevalent among the laity that removal of the tonsil has a bad effect on the voice. No effect was observed in this series of cases other than beneficial.

In an interesting article on the results of enucleation in fifty-three cases, J. H. H. Pearson¹ of the Royal Edinburgh Infirmary reports an astonishing number of

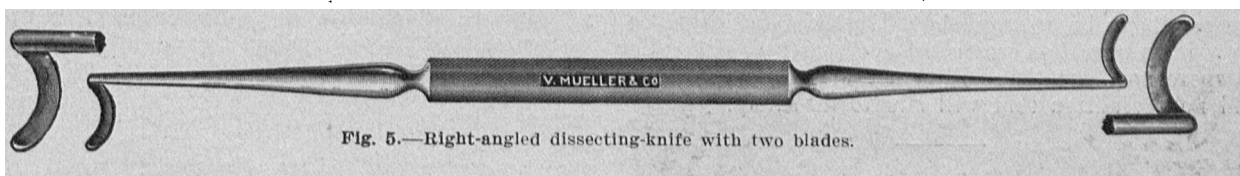


Fig. 5.—Right-angled dissecting-knife with two blades.

clean and dry before the patient leaves the table. Searching for a bleeding point in a pharynx that is moving rhythmically back and forth, accompanied by vomiting and spitting of blood, is very different from a pharynx that is absolutely at rest. Pressure can be applied, bleeding points seized, twisted or ligated, or the pillars sutured with ease. Then again why should we withhold the blessings of general anesthesia from patients requiring this operation, when we extend it in so many operations requiring less time and having fewer unpleasant features?

HEMORRHAGE

In more than six hundred tonsils removed in this manner covering a period of two years only two cases of slight secondary hemorrhage have occurred. I cannot attribute this entirely to good fortune, as with the guillotone operation there were always several cases of hemorrhage each year. A further argument against the good luck theory is that this series of cases contained a large proportion of adults in whom we are taught to expect a much greater tendency to hemorrhage. I attribute this freedom from hemorrhage in the first place to careful dissection in a fully exposed and illuminated field, unobstructed by blood or mucus; in the second place, I attribute it to the careful checking of hemorrhage by sponge pressure, grasping of bleeding vessels, and the invariable rule of having the hemorrhage completely arrested before allowing the patient to leave the table or come out from under the anesthetic. This is not done in a perfunctory way but the pillars are drawn back with retractors and the cavity carefully inspected.

ADAPTABILITY

I claim for this operation that it has the great advantage of being applicable to any type of tonsil and it is an advantage to have a single technic. Any tonsil that can be removed at all can be removed in its entirety by this method and there will be no necessity of changing from one method to another after beginning the operation.

From a haphazard carelessly executed procedure which any novice felt fully competent to undertake, tonsillec-

cases of deformity of the soft palate and pillars. In only eighteen cases were the palate and pillars left without deformity. There was marked asymmetry of the palate with deviation of the uvula from the middle line in nineteen cases; lowering of the soft palate on one or both sides in thirty-four cases.

No such results as these were observed in my case. In one case, a portion of one posterior pillar was removed and in another the uvula was amputated, but in no case was there observed any asymmetry of the palate. I attribute this to the exceeding care with which the dissection is carried out, the tonsil being hugged closely at all times and every effort being made to spare the surrounding structures.

There seems to be no way of preventing the fusion of the anterior and posterior pillars in the process of healing. If we can find some way to carry out the suggestion of Hudson Makuen, to leave the capsule intact, even this may be accomplished.

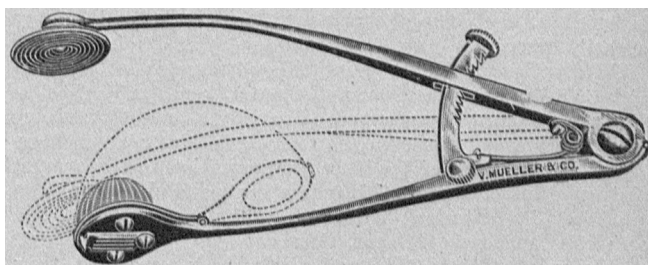


Fig. 6.—Tonsil hemostat.

The oldest patient operated on was 55 years of age. There was a large proportion of adults in the series. It was not noticed that there was any greater tendency to hemorrhage in adults than in children.

In the case of one adult I was notified two hours after the operation that some bleeding was taking place. I returned to the hospital and found some venous hemorrhage from the supratonsillar fossa on the left side. I applied the tonsil clamp, which stopped it at once. There was no recurrence of the bleeding.

1. Jour. Laryng., Otol. and Rhinol., May, 1912.

In the case of a frail boy of 14, I was notified the next day that he had been spitting up blood. I went to see him and found evidence of bleeding from the right tonsil, but no hemorrhage was taking place at the time. I advised immediate removal to the hospital but the mother was averse and promised to send him at once should the bleeding recur. They reported next day that he spat up blood at intervals till 5 a. m., when it ceased absolutely. He passed a quantity of dark blood by bowel and I am satisfied that he swallowed considerable blood. It was noticed by all at the operation that the blood caught in the basin when the adenoids were removed showed absolutely no tendency to clot. It ran around the basin like so much water and at no time gave any indication of congealing.

This paper is not an attempt to exploit any particular method of dissection. It is a plea for the surgeon to place himself under the most favorable conditions possible for performing the operation. Judging by the dangers to be met, the difficulties to be overcome and the results to be accomplished, I believe that tonsillectomy is an operation worthy of our very best skill. Let us spare no effort that will contribute to its perfection and no precaution that will add to its safety.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRs. CULLOM AND HURD

DR. T. C. WORTHINGTON, Baltimore: The complete extirpation of the faucial tonsil is now a well-recognized therapeutic measure, and deservedly so. I feel sure both from observation and from personal experience that the operation can be rendered one of comparative safety. To accomplish this, the refinements of technic must be strictly adhered to in every case. Safety requires constant caution. My patients are never given morphin and atropin until on the operating-table, and then only if there is reason to think that the ether will be resisted. I do not administer these drugs to children. The anesthetic is always in charge of a specialist in anesthesia or one well trained in this work. Anesthesia is begun with nitrous oxid gas and oxygen, followed by warm ether vapor. The instruments used are a special mouth-gag which when in position rests on the anterior molars and which has a metal tube attached for the administration of the ether vapor; a tonsil-knife slightly curved on the flat and very sharp (*THE JOURNAL*, May 25, 1907, p. 1671); a slightly sharpened dissector, a special grasping and artery forceps, a pillar-retractor and a tongue-retractor. Notwithstanding the use of an electric head-light, the room is not darkened, so that the color and breathing of the patient may be easily observed.

The functions of the posterior pillars are much more important than are the functions of the anterior pillars, and when they are wounded or torn there is usually a loss of symmetry in the pharyngopalatine arch. This may result in impaired hearing or in alteration of the voice, in proportion to the amount of damage inflicted. For this reason the tonsil should be separated from its posterior pillar and from the supratonsillar fossa with care, and without force. It should not be torn from its attachments. Before the tonsil is entirely separated from above, the artery passing down from the supratonsillar fossa and along the posterior pillar is clamped and later tied. The other vessels are smaller and more easily controlled if the dissection includes only the tonsil with its enveloping capsular membrane; but this is not always possible. There is usually very slight loss of blood during this operation, and there should be none afterward. The after-treatment consists of rest in bed for a few days, with the use of all the ice or water which will be taken. This is begun as soon as the patient regains consciousness. The time consumed by a complete tonsillar excision, including the anesthetic and the control of all bleeding and oozing, is from thirty minutes to perhaps an hour. This difference of time is unimportant, because during the later stages of the operation, the patient is getting almost no ether.

DR. JAMES T. GWATHMEY, New York: The safest and best time at which to operate is about one hour before the patient is expected to awake, especially for nervous children who are afraid of the operation. It requires no special technic to put a child that is already asleep under the anesthetic; merely a sponge on an artery forceps, a few drops of chloroform, as needed, and ether when automatic respiration occurs. This method is also good for weak children.

By statistics of over 26,000 administrations, gathered from all over the United States, it is shown that one of the safest methods, safer than the gas-ether sequence is the chloroform-ether sequence. This was a surprise to me and will no doubt be to you. These statistics were not doctored but were sent in by the different hospitals. Of course, in my own work I vary the technic according to the wishes of the different surgeons for whom I give the anesthetic. When allowed to use my own preference, I start with some perfume, generally with one or two drops of the essence of orange, then chloroform, then change to ether. It is the only odor stronger than that of ether. Even if you do not want the chloroform-ether sequence, you may start with the essence of orange. In this way a quiet form of anesthesia is produced, which may then be continued with any special apparatus such as Dr. Cullom's. Dr. Grayson has reported 3,800 chloroform anesthetics without a death. I have had one experience, which though it did not terminate fatally, was alarming, and will last me a life-time in chloroform anesthesia for a tonsil operation. The chloroform-ether sequence is, I think, very safe. The gas-ether sequence produces an engorgement and more hemorrhage than the chloroform-ether method.

No deaths have been reported with the essence of orange-chloroform-ether sequence nor have any deaths been reported from chloroform-ether sequence in children. The fatalities in early chloroform anesthesia have all been in adults and usually strong, robust men. It is not necessary to hold a child that is reasonable in administering the essence of orange-chloroform-ether sequence. The change to ether should be very gradual, as rapidity produces swallowing or convulsive movements. If the warmed ether vapor as recommended by Dr. Cullom produces no coughing or unpleasant sensations it is not necessary, as a rule, to hold the child, but warmed vapor should be used continuously.

The principle of operating under a continuous narcosis and with a bloodless field cannot be too strongly insisted on. No man can do his best work hastily and with the field of vision cut off by blood. The continuous narcosis also allows a last look to see whether or not there are any bleeding points.

DR. HOMER DUPUY, New Orleans: For three years both in private practice and in my work at the Charity Hospital I have been employing heated ether in my operations; I commend the efficiency of this method. In the first place, it produces absolute narcosis, uninterrupted by the usual gagging when the simple cone is used, and it notably shortens the time of operation. As I am sponsor for the Caine-McDermott apparatus, I must praise it. In a four years' experience during which I was occupied in devising an apparatus of this nature, I must concede that the one shown by Dr. Cullom meets every indication. Dr. Cullom failed to make the point that we must first begin anesthesia with the cone and after securing profound narcosis the apparatus is put into play. This reduces the irritation that comes from direct contact of so concentrated a form of ether with the throat. In hundreds of experiences we have found that while the nasal attachment assisted materially when operating on adults, it is not so reliable in producing uninterrupted narcosis as that obtained by the mouthpiece. I believe that this method of heated vaporized ether anesthesia greatly shortens the period of operation, reduces shock, and allows more time for the application of the delicate technic incidental to throat surgery.

DR. GEORGE L. RICHARDS, Fall River, Mass.: When I sent out requests all over the world a few years ago concerning this subject, 90 per cent. of the replies said that there was only one procedure in the way of treatment, and that was surgical. I am glad to see less radical measures suggested for use in suitable cases. The American Laryngological Association has begun an inquiry into this subject, the report to be made

after three years, with the hope of arriving at something definite. The subject of the physiology and pathology of the tonsil has been neglected by text-books and investigators. It deserves attention.

DR. F. VICTOR LAURENT, Pittsburgh: Tonsillectomy may cause a decided change in the voice. It will create a new condition of acoustics in the throat, and may change the quality and range of the voice. It may make the voice larger and deeper but that is not necessarily an improvement. Most people think the vocal cords are the only thing concerned in voice production; the position of the larynx is also of great importance—being low for the chest register, in a middle position for the medium register, and high for the upper register. After a tonsil operation there is sometimes a slight constriction of the pharyngeal muscles concerned in the elevation of the thyroid cartilage. This interferes with the motility of the larynx, marring the flexibility of the voice and making it more difficult to sing the tones of the upper register.

DR. B. D. SHEEDY, New York: I have seen several cases in which the voice has been decidedly injured following careful enucleation of the tonsils. I would advise our profession to be very careful about doing tonsil enucleations on singers. One patient who came under my care after a tonsil enucleation reported that she had lost her means of making a living through the change in her voice following the operation. Many patients have a slight nasal intonation of the speaking voice due to the contractions of the cicatricial tissue narrowing the opening into the nasopharynx.

DR. J. H. ABRAHAM, New York: In 1900 I presented a paper before the Alabama Association on the subject of acute and chronic infections in which I contended that we were dealing with a septic condition requiring surgical treatment—slitting of the tonsils and removal of the caseous infectious material. The difficulty was in getting down to the depth of its capsule. In 1906 I did my first enucleation, a finger operation; since then I have been greatly interested in the radical operation and have presented several instruments before this Section; about four years ago I presented a grasping-forceps and artery forceps which have been greatly modified since. The forceps I prefer has no teeth, but simply fenestrated blades.

As to anesthesia, the other day I operated on a child, 5½ years old, it was the fourth operation he had had for adenoids and the third for tonsils. Chloroform was administered in all of the above operations and it required one hour of hard work to revive the child in the last operation. I prefer ether. I always operate with the patient in the prone position. I have for several years discarded intranasal administration of ether. It may set up inflammation of the nasal accessory cavities, and I therefore prefer to give it through the mouth. After the child is completely anesthetized, a curved cannula with proper connections is all that is required. I have had several accidents with Dr. Hurd's instrument for retracting the pillars and separating them, and am glad to see that he has modified it.

DR. H. W. LOEB, St. Louis: If the physiology of the tonsil is not understood, the therapeutics, other than surgical, is absolutely a page in our work without a mark in the way of knowledge. I have slit tonsils and burned them and made applications and the tonsillar trouble went merrily on. It stopped for a while and then continued; I speak, of course, of the tonsils of adults. It seems to me that Dr. Cullom has presented a nice way of doing the operation, but I fail to see the value of such detail. If I spend fifteen minutes to an hour to remove tonsils, I think it is entirely too long. Whenever possible I commend the new plan of Sluder in which a series of instruments is not necessary. The operation is done with one instrument held in the right hand. Those of you who will give it a trial will find the time of operation greatly lessened and the removal of the tonsils more effectual. Warmed ether vapor may be all right, but there is grave doubt whether it can be warm under the usual method of administration.

DR. W. L. BALLENGER, Chicago: I wish to present in this connection my newer method of doing the Sluder operation.

The instrument is an angiotribe and a tonsillotome combined. It has a dull blade with which the tonsil is clamped; before a drop of blood runs the tonsil is out of its bed and the angiotribe applied. It can be left there any length of time and there will not be a drop of blood in the throat; after two or three minutes to allow clotting, with the screw I force home the sharp blade which cuts off the tonsil. It is free in the throat and taken out. The sharp blade is turned back again, a spring is touched at the side of the instrument and the angiotribe is removed and the operation is complete.

DR. FRANCIS P. EMERSON, Boston: I do not wish to add to the technic of tonsillectomy or its indications in children, but would call attention to that type of tonsil in adults which is the cause of systemic conditions, and which I think we are finding more frequently as we perfect our technic of examination; that type of tonsil which we call the persistent infantile, degenerate or submerged tonsil. As a portal of entry the tonsillar area is becoming more and more important as we study this class of cases in adults, and we want clearly a definite indication when to remove them, as Dr. Hurd has said. If there are systemic conditions in the adult, such as myalgias, joint troubles, endocarditis or adenitis, this area should be very carefully examined. My point is illustrated by the case of a patient, aged 56, who gave a history extending over eight or ten years, of slight sore throat combined with malaise, which he attributed to overwork. In January he had a slight sore throat with soreness in the left shoulder; three weeks later an exacerbation of the throat trouble, with lameness all over the body, which was so marked, that he was in bed three months, unable to dress himself. Two very able throat men had examined him and pronounced the throat negative. His family physician, after a very careful physical examination, including the blood and sputum, still believed that the origin of his trouble was in his throat and advised his coming to Boston. On entering the office he walked like a man with severe lumbago. In the throat examination there was no indication of inflammation of the mucous membrane; the pharynx looked normal, but on retracting the anterior pillar on the left side and introducing an eustachian catheter, there was expressed from a submerged tonsil a half teaspoonful of pure pus. If you examine these cases in this way, retracting the anterior pillar, and expressing the contents of the tonsillar mass, you will be surprised to find how many times what looks to be normal tissue is simply an enclosed abscess; these cases contain a large number of streptococci, which are capable of producing serious systemic conditions.

DR. C. F. WELTY, San Francisco: Tonsillectomy is the only operation that should be done on the tonsil. The indications include hypertrophied tonsils which interfere mechanically, tonsils that have cheesy deposits, buried tonsils, tonsils that are associated with enlarged glands, peritonsillar abscess, recurrent tonsillitis and acute otitis media. In every case of acute otitis media tonsillectomy and adenoidectomy should be performed at the time of the acute infection. It should also be done in cases of acute exacerbations of heart trouble, rheumatism, chorea, all cases of underweight, healthy in other respects.

The mode of examination with the eustachian catheter is one of the best and you will often find indications for tonsil removal in this way which otherwise would not be suspected. Patients who have recovered from acute tuberculosis should have their tonsils removed, because the germs remain in the tonsils as a reinfecting agent. Bromid of ammonia administered by rectum in children under 4 is useful to keep them quiet after operation. It is not necessary to have assistants. All the operator needs is a nurse to hold the tongue-depressor and I think the one I showed at the meeting last year is the best for the purpose.

DR. W. W. CARTER, New York: In the snare operation, the instrument I devised a few years ago, the spiral tenaculum for catching the tonsil, will hold a friable tonsil better than anything else if engaged deep enough. In operating on submerged tonsils, it can be inserted into the small slit between the pillars and by pulling on the tonsil the full outline is shown. I use the Seiler knife for separating the pillars and generally I do not have to cut at all, for by traction with

the spiral tenaculum the tonsil is lifted from its bed. The Seiler knife is then inserted just behind the anterior pillar and the tonsil is pried out. The snare is easily adjusted over the tenaculum (which is a small straight rod) and the tonsil removed with no injury to the pillars.

DR. H. B. LEMERE, Omaha: Many of our patients have submerged tonsils with infectious material deep in the crypts which will make its appearance only on expression. I have found in the last three or four years that the use of Bier's cups on the tonsils is easy and efficacious, both as a diagnostic and therapeutic measure. They are easily applied and in just such cases as Dr. Emerson has referred to the pus can be drawn out and a bacteriologic examination made.

DR. LOUIS OSTROM, Rock Island, Ill.: I have had a good deal of hemorrhage following tonsillectomy. Frequently my patients have had a dry throat when they left the table but as soon as they woke up, cried and struggled they would begin to bleed. I always instruct the nurse—and especially the mother who can be absolutely depended on—to watch the patient carefully as to swallowing and if there is a rate of swallowing faster than five times a minute to let me know at once.

DR. H. F. PYFER, Norristown, Pa.: Methods of tonsil operation have had a slow progressive growth since we have discarded tonsillotomy. Every year that I have been attending the American Medical Association meetings I have gone home with a handful of instruments that the leaders of our meetings have recommended as perfected and needed for a good dissection; but these instruments have in some way failed to do the work. There were still occasional alarming hemorrhages, still retained portions of tonsils, still conditions to meet. Ballenger has shown, in his book, the ideal tonsil dissection with the scalpel, but now he has retrograded to a quicker method, unquestionably safer and more accurate. To my mind it is not the rapidity of the operation but the thoroughness and the care that should be the chief consideration. Searching after many disappointments for an accurate, safe way of removing tonsils I found it when Lee Cohen of Baltimore devised his method of tonsil dissection. With a modified tonsil-knife he carefully dissected the tonsils from the pillars, then retracted the pillars and picked up the numerous little bleeding vessels and tied them off after clamping them with a modified Jackson hemostat. Occasionally I have found it necessary in cases of oozing to suture the pillars with catgut, using McReynolds' needle-holder and needles. I can leave the patient without any fear of a hemorrhage following the operation. The healing is prompt and painless. The suggestion to wait until we have severe hemorrhage and then tie and suture is fallacious, for physicians who wait for this time will discover that they have not sufficient surgical dexterity or developed technic to do the work, and lives will be jeopardized if not lost by their bungling work. Furthermore, no one knows how great the hemorrhage is going to be or how large a blood-vessel is cut. The instruments absolutely necessary for a safe tonsil operation are a half-dozen Jackson hemostatic forceps, any good dissecting knife and McReynolds' needle-holder and needles.

DR. G. F. COTT, Buffalo: As to the employment of the Jackson hemostatic forceps just referred to, I want to say that Jackson does not tie; he catches the vessel and twists it. I have done that a number of times and do not find it necessary to tie. Dr. Hurd states that four of his patients died from status lymphaticus. Status lymphaticus, as an entity, does not exist and so patients cannot die from it. There is a condition of poison which causes the trouble. We must extricate ourselves from the long and well-beaten path of tradition without fact. If you ascertain the cause of so-called status lymphaticus and attack that, your patient has a good chance to recover.

DR. G. W. MACKENZIE, Philadelphia: Apropos of the physiology of the tonsils, I do not know just how many physicians here practice the systematic examination of the lingual tonsil. A year or so ago I had several cases referred to me by general practitioners complaining of spasmodic croup with the request that I remove the tonsils, hoping thus to cure the attacks. I removed them as thoroughly as I knew how

but the croup continued and in some it was increased. I was surprised to find that in a number of these children in which the tonsils had been removed subsequently there was enlargement of the lingual tonsil. We should examine these cases more thoroughly before operation and take into consideration the whole of Waldeyer's ring.

DR. B. R. SHURLY, Detroit: It seems to me that it is necessary that certain definite principles of procedure in the operation should be thoroughly carried out by all of us who are interested in this work. One is, to my mind, the question of anesthesia. I feel that it would be a great mistake to allow the discussion to convey the idea that it is correct to use chloroform anesthesia in any of these operations, at any stage of the operation or at any time. It certainly seems to me to have been definitely decided that we have but one safe anesthetic for this work, that is ether. We talked about that for twenty years and we should stick to our conclusions in the matter.

DR. HOMER DUPUY, New Orleans: This Section can hardly go on record with the statement unchallenged that we cannot produce warm ether vapor. In the Cain-McDermott apparatus we first vaporize the ether and as such it is passed through a heated coil, acetate of soda being used, when it is heated in this last receptacle, from which it is carried warmed to the mouth or to the nose of the patient. It is merely a question of physics and we must admit that ether can be vaporized and heated.

DR. M. M. CULLOM, Nashville, Tenn.: In reply to Dr. Loeb's question the time referred to in the paper means the entire time from the beginning of the anesthesia until hemorrhage is stopped and the patient is removed from the table. I have found by accurate timing that the average time for inducing anesthesia in children with warm ether vapor is four minutes and in adults eight and a half minutes. The anesthetic was not pushed, but the anesthesia induced gradually. If the anesthetic is "crowded" the time can be reduced considerably. The actual time of operation from the insertion of the gag till the removal of the second tonsil averages eighteen minutes. About five minutes more is required to check the hemorrhage from the second tonsil.

DR. LEE M. HURD, New York: Prolonged ether anesthesia seems to increase the liability of hemorrhage. The singing voice will not be injured by tonsillectomy if perfectly done, but a faulty technic with injuries to the structures about the tonsil is more than likely to injure the voice. Rheumatic conditions do not necessarily have to be preceded by an acute inflammation of the tonsil. It can very well be due to a tonsil that would not attract the attention of the unobservant.

I agree with nearly all the indications but it must not be overlooked that acute suppurative otitis media can be due to infected nasal sinuses. In regard to the anesthetic, in two of the cases of death from status lymphaticus ether was used; if chloroform had been the anesthetic it would have been blamed for the result; chloroform may be more poisonous in status lymphaticus but ether is also dangerous.

CHRONIC LARYNGEAL STENOSIS; TREATMENT BY PROLONGED INTUBATION

HOMER DUPUY, A.M., M.D.

NEW ORLEANS

The many difficulties which encompass us when dealing with chronic laryngeal stenosis will test to the utmost the patience, foresight and mechanical ingenuity of the surgeon. Months, and even years, may be required in overcoming the obstruction. My experience confirms that of other observers relative to the greater frequency of this stenosis in children. This one factor adds materially to the problem *per se* for there are also local and regional difficulties which present themselves in the treatment of this condition. The instability of the muscular and nervous mechanism of the larynx, incident