Surgical.

TONSILLECTOMY.

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DEFINITION.

THE complete removal of the palatine tonsils. As in many other instances, however, a word, though originally coined to illustrate one definite and limited meaning has, thanks to modification of conception, gradually come to embrace a more elastic interpretation, so that we may say that tonsillectomy has been performed when the physiological functions and the pathological powers of the tonsils have been removed, without complete anatomical excision. Under these circumstances, tonsillar diathermy and cauterization may reasonably, I think, be included in this paper.

ANATOMICAL NOTES.

I think that there are three especially important facts to remember :—

(a) That the tonsil itself is supplied by two or more arteries, whilst others proceed no further than the tonsillar bed and faucial pillars. As to the exact distribution of these vessels, there is some difference of opinion and space will not allow me to discuss these in detail, but I should like to point out that in a personal experience of tonsil operations extending over twenty-nine years I have found that, in the very vast majority of cases, hæmorrhage proceeds from the upper polar region and ceases when a ligature be applied there.

(b) That an important venous plexus lies in the lower portion of the tonsillar bed draining into the lingual vein and pharyngeal venous plexus.

(c) That the superior constrictor muscle supporting the tonsillar bed is pierced by several of the tonsillar blood-vessels, so that trauma of this muscle may cause serious and most troublesome bleeding.

(d) It must also be remembered that, in rare instances, abnormal positions and shapes of such important arteries as the internal carotid, facial and ascending pharyngeal may be present.

INDICATIONS FOR TONSILLECTOMY.

Local Lesions.

Tonsillar.—Tonsillitis, in its various forms ; peri-tonsillar abscess (quinsy) ; Vincent's angina ; tonsillar tuberculosis ; tonsillar keratosis (pharyngo-mycosis) ; tonsillar actinomycosis ; tonsillar calculi, &c. ; tonsillar neoplasms, innocent and malignant, especially papilloma and lympho-sarcoma, &c.

Nasal.—Turbinal swellings (of various types), lesions causing epistaxis, post-nasal catarrh, sinusitis, &c.

Ocular.—Conjunctivitis, corneal ulceration, iritis, &c.

Aural.—External meatal, infections, tympanic infections, tympanico-mastoid suppurations, labyrinthitis, &c.

Note.—Quite a large number of cases of vertigo and tinnitus are cured by tonsillectomy *per se*.

Laryngeal.—Epiglottitis, œdematous, &c. ; many lesions causing aphonia ; many types of laryngitis, chondritis tuberosa (singers' nodes) ; some cases of papillomata, &c.

General Lesions.

Circulatory.—Myocarditis, endocarditis, pericarditis, arteriosclerosis, hyperpiesia, phlebitis, &c.

Respiratory.—Asthma, bronchitis, bronchiectasis, tuberculosis, &c.

Lymphatic.—Adenitis, inflammatory, tubercular ; retro-pharyngeal abscess, in some cases ; lymphangiectasis (nasal), &c.

Alimentary.—Gastritis, appendicitis, colitis, &c.

Dermatological.—Herpes, &c.

Muscular and Subcutaneous.—"Rheumatism," cellulitis, fibrositis, myositis, &c.

Osseous.—Periostitis, arthritis, osteomyelitis, &c.

Nervous.—Neuritis, meningitis, encephalitis, aprosexia, neurasthenia, chorea, certain cerebral psychoses, &c.

Urino-genital.—Nephritis ; diabetes, in some types ; dysmenorrhea, &c.

NOTE.—I have recently performed tonsillectomy on a young woman who had for several years suffered from dysmenorrhea and irregular menstruation, which conditions entirely disappeared very soon after the operation.

Endocrinal.—Some types of goitre, &c.

Miscellaneous.—The common "cold," scarlet fever, diphtheria, ? cerebrospinal fever, many types of toxæmia and septicæmia.

BRIEF HISTORICAL SURVEY.

The operation was frequently performed before A.D. 10. Writers who describe this operation include Celsus, A.D. 10, who advised "Loosening and tearing out of the tonsil with the finger," or "seizing the tonsil with a hook and excising it with a scalpel."

Actius, A.D. 490, who advocated partial removal.

Paulus Aegineta, A.D. 750, who advised that the tonsil be drawn outwards by a tenaculum, and then cut out by the roots, the tongue being pressed down with a spatula, and the head held by another assistant (this latter manœuvre being most important, I should think).

Space will not permit discussion of the various phases of thought and practice through which this operation passed, interesting details of which will be found in "The Tonsils and Adenoids and their Diseases," by Irwin Moore. Several points, however, are worth recalling, viz. :—

Ambroise Paré, the great French surgeon of the sixteenth century, advocated that tracheotomy be performed when tonsils were seriously enlarged, to be followed by their strangulation by ligature.

The first tonsil guillotine, or tonsillotome, was invented in 1827 by an American doctor, named Physick.

The guillotine, considerably modified by various specialists, is still used, especially

in the case of children and young adults, but a great many of us have entirely discarded it for the dissection method.

Reading through the historical evidence, it seems obvious that the fear of hæmorrhage ebbed and flowed with various periods, though it was ever present in the minds of the operators from the earliest times. The question of complete or incomplete removal found many protagonists and antagonists.

Most, however, seem to have agreed that removal should not be undertaken during the stage of acute inflammation.

Nor were tonsils merely to be removed because they were large (unless, I suppose, their size caused mechanical obstruction to swallowing, breathing or talking), but only when definitely diseased.

CONTRA-INDICATIONS TO TONSILLECTOMY.

These specially embrace those conditions that tend to increase the likelihood of hæmorrhage.

Menstruation.—I believe that the dangerous period is the immediate pre-menstrual one, but that in two to three days after the onset there is very little risk. Undoubtedly however, it is best to allow for a week's interval after the determination.

Menopause.—Never a very good time for any procedure of severity.

Pregnancy.—Still more forcibly does the last sentence apply.

Acute Tonsillar Inflammation, or, for that matter, during any acute inflammatory process in the body. I once, however, had the privilege of curing a very severe case of acute septicæmia, that had defied all efforts, by performing tonsillectomy.

Hæmophilia.—True hæmophilia is a very rare disease, and is displayed, not only by the coagulation tests but also by the multiple hæmorrhages that occur, in the male sex, anywhere, and under very slight provocation.

Purpura.

Leukæmia.

Pernicious Anæmia.

Lymphadenoma.

Cardiac diseases (certain types of).

Arteriosclerosis.

PREPARATION FOR TONSILLECTOMY.

Tonsillectomy, by dissection, should always be regarded as a major operation and under no method treated lightly.

It should be a rule never to perform any operation on the body, unless very urgent, until all diseased teeth have been removed or rendered healthy; unfortunately, this is not yet adopted universally, even by specialists. In every case of tonsillectomy a tooth-brush and mouth-wash are indispensable. Ideally speaking, all these patients should have their bloods examined, to eliminate any coagulation deficiency, or any disease likely to cause troublesome hæmorrhage. Unfortunately, this would prove a herculean task in hospital, but, at any rate, every case can be carefully examined and only sent to the pathological laboratory when any suspicion of necessity arises. [For this routine examination the reader is referred to my paper on "Tinnitus," published in the *Post-Graduate Medical Journal* of April, 1931.]

Aperient.—Preferably castor oil, to be given thirty-six hours prior to operation. An enema should be avoided, if possible, as it sometimes causes serious collapse.

Diet.—Light, with the minimum amount of milk.

Glucose.—In the form of barley sugar should be given for twenty-four hours, prior to operation, to all patients unless contra-indicated.

Calcium Lactate.—In doses of 15 gr. for adults and proportionate doses for children, should be given thus: One dose in the afternoon beforehand; one dose in the evening beforehand; one dose two hours beforehand.

Time of Operation.—The best time is early in the morning.

Complete mental and physical rest in bed should be enjoined for twenty-four hours immediately preceding operation.

This rest enormously diminishes the risks and renders the task of the anæsthetist a much lighter one. It is highly dangerous and, in my opinion, completely wrong for a surgeon to allow his patient to enter a nursing home or hospital the night before, straight from his usual occupation with all its accompanying indiscretions, and then to operate on him at an early hour the next morning.

Nembutal.—For very apprehensive patients this drug, given by mouth about an hour before operation, or in two small doses, one on the night before and the other an hour before operation, provides an excellent mental calm that is so essential. This drug is probably preferable, when operating under local anæsthesia, to an injection of morphine, atropine and scopolamine.

Atropine Sulphate, $\frac{1}{100}$ gr. for adults, $\frac{1}{150}$ gr. for children under 10 years, should be administered hypodermically three-quarters of an hour before operation.

Most of the above suggestions in this paragraph apply equally to cases with local and general anæsthesia.

Anæsthesia.—(A) *Local*: only applicable, in my opinion, to a very limited number of cases, for the following reasons:—

- (i) The greater likelihood of post-operative hæmorrhage.
- (ii) A definite risk of introducing infection into the surrounding tissues with the injection needles.
- (iii) Blood and infected material has more chances of being inhaled owing to partial anæsthesia of the larynx. This latter is easily produced by applying cocaine to the posterior third of the tongue, due to similar nerve-supply.
- (iv) The operation is more difficult to perform.
- (v) The mental attitude of the patient.

Procedure.—Swab the tonsils and soft palate and posterior third of tongue with the following solution, two to three times, at intervals of three to five minutes, viz.:—

Cocaine hydrochlorid....	...	...	...	3
1 in 1,000 adrenalin hydrochlorid.	...	...	...	5
2 per cent. solution potassium sulphate ...	...	...	...	25
0.5 per cent. solution acid carbolic	...	ad	...	100

This solution provides a 20 per cent. anæsthetic value with a very small dose of cocaine, whilst the adrenaline largely prevents general absorption by producing local vascular constriction. In my opinion, cocaine should never be injected, for even surface applications may cause serious faintness, though very rarely indeed with this solution.

Inject hypothesine (Parke, Davies and Co.) between the tonsillar capsule and its bed, inserting the needle under the annular plica, and using a straight needle for the four anterior punctures from above downwards, and an angular one for the three posterior punctures. Thus the whole tonsillar area becomes infiltrated.

Wait for five to ten minutes.

Position of Patient.—Dorsi-recumbent with extended head, this being, I think, the safest and best.

Instruments.—[*Vide infra.*]

In the following description of the operation under general anæsthesia, it will, of course, be realized that all of it does not apply to that under local anæsthesia. Thus, no stitch is put through the tongue. Again, a sucker is more useful here.

(B) *General.*—In the vast majority of cases ether-oxygen anæsthesia, preceded by induction with ethyl chloride, is the most satisfactory, both for children and adults. It is generally administered by the “open” method. But it must never be forgotten that for cases with a tendency to bronchitis and its allies, ether is dangerous and should be replaced by chloroform. The ethyl chloride should be given to produce very rapid unconsciousness, as slow induction is torture to many people and, as its smell is most unpleasant, it should be scented with eau de Cologne, &c.

As I, personally, do not advocate any other method of tonsillectomy than by dissection, even for the youngest children, all the other anæsthetic combinations, such as nitrous-oxide-oxygen, are not advised, seeing that they provide too short and light an anæsthesia. In tonsillar dissection deep anæsthesia is absolutely necessary, even the abolition of the palatal, faucial and, barely, the laryngeal reflexes, and this requires very skilled and experienced anæsthetist.

I would warn my readers about the great need for caution when operating on cases of pronounced neurasthenia, whose blood-pressure is generally very low.

THE OPERATION.

(1) *Dissection Method.*—The operation of choice for all cases.

Advantages.—(a) The surgeon and anæsthetist have complete vision and control of every change in the patient, there is no unseemly rush to “have the tonsils out” before the patient begins to “gag” and cough; operating against time should never be undertaken, unless to save a patient’s life. (b) All bleeding-points can be secured and ligatured; I think that, on the whole, there is less hæmorrhage than by the guillotine method. (c) The prolongation of the palatine tonsil on to the tongue can be conveniently removed; the guillotine cannot effect this. If this prolongation be left, it often grows up into the tonsillar fossa and then hypertrophies, displaying a “second” tonsil that itself becomes infected, to the dismay of the patient and the disgrace of the surgeon. (d) There is the minimum amount of trauma to the faucial pillars and soft palate.

Position of Patient.—Dorsi-recumbent, with the head extended by means of a pillow under the shoulders. Other surgeons prefer the dorsi-lateral posture.

The sitting-up position is dangerous, in that a tonsil or blood may be inhaled with much greater ease, whilst an increased strain is thrown upon the heart.

Position of Surgeon.—Either at the head of the table, or at one side, or changing sides with each tonsil.

Instruments.—Mouth-gag. I use my own modification of Doyen’s (made by Mayer and Phelps), but many surgeons prefer the Boyle-Davis pattern.

Needle-holder.

Small curved cutting-needle.

A piece of silkworm gut.

A pair of ordinary artery-forceps.

A pair of long-handled curved scissors.

A pair of straight scissors.

Doyen's spatula.

Blunt and sharp tonsil volsellæ ; many patterns are in use.

Small scalpel.

Two pairs of blunt-pointed, curved artery-forceps.

Two pairs of long, slender, broad-tipped dissection-forceps (made by Mayer and Phelps).

A pair of tonsil clamp-forceps.

Plain catgut, Nos. 0 and 1.

One dozen sterilized marine sponges, large or small, according to age. These are excellent absorbents and do not injure the mucosa as gauze does, thereby increasing the discomforts of convalescence, unattractive enough already.

Three sterilized overalls and masks.

Two sterilized mackintosh sheets.

Six sterilized towels.

One dozen small sterilized square gauze swabs, 3 in. by 3 in.

Three pairs of sterilized rubber gloves.

The operator and his assistants should perform this operation in as sterile a manner as possible.

Surgeon's photophore and a small portable wet-cell accumulator.

Personally, I am against the use of a mechanical suction apparatus, and for the following reasons :—

- (i) The cannula tends to become blocked with blood-clot when most needed.
- (ii) Its noise.
- (iii) It adds to the amount of apparatus to be used.
- (iv) It is by no means essential.

Procedure.—Insert the gag.

Pass a stitch through the tongue, and give it into the care of the anæsthetist.

Draw the tongue over to the opposite side of the tonsil to be removed.

Seize the tonsil with blunt volsellum-forceps.

Incise the mucosa just medial to the anterior pillar.

Insert the curved scissors and dissect out the tonsil, being careful to keep close to the outer surface of the capsule. Tearing off the lingual prolongation still attached to the tonsil, so that all comes away in one piece, with the sharp volsellum is better than cutting this with scissors, as there is less tendency to hæmorrhage.

Mop up all hæmorrhage with marine sponges and insert a gauze swab into the fossa.

Dissect out the other tonsil in a similar manner.

Remove the first gauze swab and ligature the vessels in this fossa, always in the upper polar region and anywhere else necessary. This should be done in all patients over 10 years of age, and sometimes in the younger ones. Treat the other fossa similarly.

For persistent venous hæmorrhage, especially when the plexus has been damaged,

the best method is to place a bismuth gauze swab in the fossa and anchor it with sutures that also appose the pillars, removing these in never more than twenty-four hours because of sepsis.

I do not think that the application of adrenaline, turpentine and other styptics is of much value, whilst the first-named drug is certainly dangerous, especially when chloroform is being administered, and also because of the later-resulting over dilatation of the vessels and increased risk of hæmorrhage.

Now remove any nasopharyngeal adenoid excess, preventing blood from entering the orbits from the nasal passages, and placing ice over the root of the nose to encourage clotting. It is sometimes advisable—at the end of the operation—to administer a little carbon dioxide, so as to empty the lungs of anæsthetic and stimulate coughing.

(2) *Dissection, completed by a Snare.*

This has, I think, the great disadvantage that it does not remove the lingual prolongation.

(3) *Dissection with Finger and Gauze.*

This traumatizes the tissues to a greater extent, I think, than (1) does.

(4) *Guillotine Method.*

This is, I consider, not so scientific an operation and certainly not so complete as (1); trauma to the pillars is more likely to occur and the lingual prolongation is not removed.

(5) *Diathermy.*

An excellent method for all cases not suitable for (1). The anæsthetic used by myself is the solution already described, no injection being necessary, but merely several applications at intervals of five minutes. Too much removal should not be attempted at one sitting, as sometimes the reaction is rather severe, whilst secondary hæmorrhage, though rare, may occur. One tonsil only should be treated at a sitting. There is very little pain but sometimes slight temporary laryngeal spasm.

(6) <i>Galvanic Cauterization...</i>	...	...	} I consider these methods very inferior to
that of diathermy.
(7) <i>Application of London paste</i>	...	...	
(8) <i>Electrolysis</i>	...	...	
(9) <i>Ionization</i>	...	...	
(10) <i>Radium.</i>			

Rather dangerous when used with septic tissues, as necrosis is liable to follow.

POST-OPERATIVE TREATMENT.

Bed, for several days, in some cases for a week.

Aperient, castor-oil, in thirty-six hours.

Chloretone inhalant, as a very frequent throat spray.

Weak solution of potassium permanganate as a gargle. An aspirin gargle is also very comforting and can be swallowed with benefit.

Heroin, $\frac{1}{12}$ gr., repeated once hypodermically is useful, but must not be given to children.

I do not advise morphia, as it frequently causes vomiting.

The following mixture is useful :—

R	Potass. chlorat.	...	...	...	gr. iv
	Sodii salicylat.	...	...	...	gr. vii
	Sodii bicarb....	...	...	...	gr. x
	Potass. bromid.	...	...	...	gr. x
	Tinct. nux vom.	...	...	...	℥ v
	Tinct. card. co.	...	...	...	℥ xx
	Aq. chlorof. ...	...	...	ad	3 js

Sig. t.d.s. in water

To clean the fossæ and remove the sloughs, beginning in about three days after operation, there is no procedure so efficient as syringing them with a warm solution of sodium bicarbonate, 3i ad Oi, using a Higginson's syringe, the patient's head hanging over the edge of the bed.

The most painful period is from three to five days after operation. Patients should not return to ordinary life until the operation sites are quite healed, and this may sometimes entail a further week's convalescence.

COMPLICATIONS.

(1) *Secondary hæmorrhage* following separation of the sloughs in the presence of sepsis. The treatment is to remove the sloughs and clot, and then attempt to ligature any bleeding-points, if any can be found, though this is often not the case, whilst the tissues are generally too friable for ligaturing. Swabbing the fossa with Whitehead's varnish, &c., and perhaps packing in bismuth gauze that is anchored to the sutured pillars may be effective. At the same time, 2 c.c. of hæmoplastin or other similar agent may be injected hypodermically.

(2) *Œdema of Uvula*.—A very painful condition and due to sepsis.

(3) *Hæmatoma into the Surrounding Tissues*.—Generally subsides without special treatment.

(4) *Erysipelas of Soft Palate*.—I have seen one case, due to lack of complete attention to asepsis. It happily recovered.

In all cases of sepsis the surgeon should consider the advisability of giving injections of sera, either polyvalent anti-streptococcic or anti-scarlet fever.

(5) *Generalized Adenitis*.—Accompanied by very high temperatures, 105° or 106°F., and most severe malaise. I have had three cases, all in children, but none fatal.

(6) *Pneumonia*.—Not unlikely if infected blood has been inhaled.

(7) *Pulmonary Abscess*.—Mainly due to the lodgment of a tonsil in a bronchus.

Presents a forcible argument against operation in the sitting posture, under local or general anæsthesia.

(8) *Paralysis of Soft Palate*.—With consequent regurgitation of fluids, occurring but rarely, in my experience, and disappearing completely in a few weeks.

(9) *Perversions of Taste*.—These occasionally occur as the result of trauma to one or both of the glosso-pharyngeal nerves.

(10) *Aphonia*.—Complete, is not very uncommonly found for the first twenty-four hours after operation, but recovers spontaneously.

(11) The greater the trauma the more severe the complications, so that palatal and faucial scarring may not only cause serious discomfort but result in impaired vocalization and ruin of the singing voice. *Vice-versa*, a well-performed tonsillectomy generally improves the power, tone and register of the singing and speaking voices.

Speaking generally, I should say that there is no operation capable of giving more encouraging results than tonsillectomy.