POST-OPERATIVE HEMORRHAGE FOLLOWING THE REMOVAL OF THE PHARYNGEAL TONSIL.

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Excessive hemorrhage following the removal of the pharyngeal tonsil, or so-called adenoid, has not been accorded the deep consideration it really deserves from writers of textbooks. A brief allusion to its remote possibility, and the subject is dismissed. We are thus lulled into a fancied security, from which we might be rudely awakened by the tragic event of an unexpected death from a surgical procedure apparently so simple and innocuous that the unskillful and overzealous rush in where the most experienced and specially-equipped surgeons should tread lightly.

A brisk hemorrhage some hours after adenectomy, in the writer's practice, which left his patient extremely prostrated, roused his attention and stimulated an investigation of this subject. An extensive search into the literature covering a period of thirty-five years, up to the first of December, 1905, has resulted in the collation of thirty-eight cases of alarming hemorrhage following adenectomy, with eleven fatalities. A few cases have been personally reported to the author. For a proper appreciation of these figures, which for obvious reasons only approximate the whole truth, we must remember that adenectomy has been practiced generally only since 1871.

Compared to the great number of adenectomies performed, the fatal results appear to be few, but this, in all probability, is due more to our inherent weakness of not heralding failures than to their non-occurrence. If death can occur from adenectomy, it is incumbent on those who are daily performing it to place the operation on the highest plane of safety. A deep appreciation of our large responsibilities forbids any but the specially trained surgeon to attempt its performance. There is a growing and dangerous tendency to underestimate the technical difficulties of this operation, which is in every sense a major one, fraught with good or ill to the patient in direct proportion to the skill of the operator.

A brief record of the fatal cases cannot fail to impress a healthy lesson:

CASE 1. Preble, with forceps and fingers, removed a moderate growth of adenoids in a girl of eleven years. During and immedi-

ately following the operation the bleeding was not severe. On the seventh day after the operation, while out for a walk, a hemorrhage occurred; it ceased under cold syringing. She was then taken to a hospital, where the bleeding recurred, but yielded to post-nasal plugging. On the eighth day after the operation there was another recurrence, which ended life before the house officer could reach her. No mention of hemophilia.

CASE 2. Kenefick performed adenectomy on a boy of four years. Two hours after the operation profuse bleeding occurred, which ceased under post-nasal packing. The bleeding recurred at various intervals during forty-eight hours. Vigorous local and constitutional measures were instituted, which failed in warding off the fatal issue. Subsequently a clear personal and family history of hemophilia was obtained.

CASE 3. Schmiegelow reports a case in which adenotomy was immediately followed by a gush of blood, the patient dying before any assistance could be rendered. Post-mortem examination showed the internal carotid to have been pushed from its normal position by an enlarged lymphatic gland and occupying the naso-pharynx; in this region it was penetrated by the curette.

CASE 4. Soch operated upon a male child, aged ten, in whom fatal bleeding occurred on the fourth day. Inquiry after the operation elicited a clear personal and family history of hemophilia.

CASE 5. Bliss performed adenectomy on a boy aged 7, who, while anemic, appeared otherwise well nourished. The operation completed, the mother casually referred to the bleeding of her older son. Further questioning brought out the fact that a hemorrhagic diathesis existed on the mother's side. The very patient operated had suffered from swellings of the joints and extensive ecchymoses following contusions. The first visible bleeding appeared the following morning after the operation. Post-nasal packing, ergot, saline transfusion, proved insufficient to arrest the constant oozing, which caused death four days after the operation.

CASE 6. Newcomb operated upon an anemic boy, aged three. Not the slightest evidence of personal or parental hemophilia existed. The bleeding was brisk and ceased quickly. Four hours subsequent to the operation, hemorrhage set in and oozing continued steadily for twelve hours, after which the mother decided to call in the physician. His efforts were of no avail. The child had simply been left to bleed to death.

CASE 7. Delavan reports the case of a boy, aged two years. Adenoids were removed under ether, with forceps and finger-nail.

Only slight bleeding occurred at time of operation. Eight hours after there was profuse bleeding from the nose. This subsided, and when seen next day by the family physician the child seemed in excellent condition. At 12:30 of the same day bleeding occurred. When seen by the operator at 3:30 p. m., the patient was moribund and beyond remedial measures. Investigation before operation disclosed no hemophilic tendency. Afterwards the parents admitted that the boy's maternal grandmother and other relatives on that side were undoubted bleeders.

CASE 8. Burger excised the pharyngeal tonsil from a boy aged eleven. A half hour after the operation bleeding occurred from naso-pharynx, necessitating post-nasal tampons. Hemorrhage, however, continued, patient dying a few hours after the operation. Post-mortem examination disclosed marked leukemia. The fatal result was attributed to this blood condition.

CASE 9. Barkan removed both faucial and pharyngeal tonsils from a strumous boy of six. A few hours after the operation he vomited a great deal of blood, presumably swallowed during and immediately after the operation. No trace of actual bleeding could be found after repeated examinations. About 5 p. m. the same day patient cried and coughed considerably, which caused blood to flow both from the nose and throat. The operator was then called and saw a moribund child. Patient rallied under stimulation and saline enemata. Paquelin's cautery was applied over the bleeding surfaces, with apparent success. Blood, however, trickled from the nose. Further examination was followed by a sudden gush of blood. The child gasped and stopped breathing. A clear-cut disposition to hemophilia was not proven, and many possible sources of the bleeding were considered without arriving at a definite conclusion. (The writer includes this case in his collection, even though a double operation was performed. As the bleeding occurred from both regions operated, the adenectomy certainly contributed its share in causing the unfortunate result.)

CASE 10. Under ether, Stewart removed both the faucial and pharyngeal tonsils from a male, aged seven. Bleeding at the time of operation was quite copious. Three hours after, it was found that both sides of the neck and the left cheek were greatly swollen from blood extravasations. These swellings increased, reaching even the sternum and clavicles. No further bleeding observed in the mouth and naso-pharynx. Half a drachm of calcium chloride was administered by enema. Dyspnea developed, coincident with extravasations of blood into the pharyngeal submucous tissues.

Thirty hours after the operation the dyspnea necessitated tracheotomy. General condition did not improve under stimulation and death occurred thirty-two hours after the operation. Post-mortem disclosed no other abnormality, except a large thymus gland. Despite the negative history of hemophilia, the case was regarded as one of hemophilic tendency.

CASE 11. Hooper performed a digital examination of the nasopharynx for diagnostic purposes in a subject, who afterwards proved to be hemophilic. Death resulted. (This case is considered in the nature of a crushing operation.)

Considering the thousands of adenectomies performed without serious hemorrhage, there must exist some special causes which lead to these regrettable accidents. Making the best analysis possible of the collated cases, reinforced by general considerations, the following causes may be enumerated:

(1) HEMOPHILIA: It is generally conceded to be a potent factor in the severe hemorrhages which sometimes follow surgical operations. Hemophilia, however, has not received its deserved attention from those who have recorded untoward results in adenectomy. The majority of the reports do not make the faintest allusion to it. This apparent indifference may receive some justification when we admit how difficult, and almost impossible, a task it is, to obtain definite information relative to hemophilia from the parents of the patient. My tabulated cases present only eight records in which this diathesis was positively established. In most instances a history of the bleeding tendency was obtained *after the operation*. It is important to note that the bleeding in five of these cases terminated fatally.

In the true hemophilic, alarming or disastrous results may follow the slightest injury. That the nasopharynx is not exempt from such accidents is evidenced by Vander Poel's experience (*THE LARYNGOSCOPE*, 1898, p. 255). He removed from a bleeder a mere fragment of adenoid tissue for examination, which was immediately followed by bleeding lasting two days. Hooper (*THE LARYNGOSCOPE*, 1898, p. 253), had a similar accident in a hemophilic, who bled fatally from a simple digital examination of the post-nasal space.

(2) CONSTITUTIONAL CAUSES, NOT HEMOPHILIC: Other dyscrasie, such as struma, lymphadenoma, exophthalmic goitre, and the various forms of anemia, have each, in their turn, been held responsible for severe post-operative hemorrhages.

Burger found every evidence of leukemia at the post-mortem of a girl of eleven, who bled to death after adenotomy. Under con-

stitutional causation may be recorded Roy's case (Table 2, case 20), which bled profusely three hours after the operation. As the menses were due, this was regarded as a vicarious hemorrhage. Cartaz (Table 2, case 2) also cites an instance in which the occurrence of uterine colic, coincident with the post-operative bleeding, suggested the onset of the menstrual period. Revulsive measures proved effective, and the post-nasal hemorrhage ceased on establishing the uterine flow.

(3) AGE. The question of age is important, and we have every reason to expect more accidents from adenectomies performed on less youthful subjects. After puberty, the pharyngeal tonsil, when it persists, becomes more vascular and is largely enmeshed with fibrous tissue, which might prevent the vessels from contracting when cut through. However, as this procedure is more frequently resorted to in children, they furnish the bulk of reported cases. The statistics give fourteen cases occurring in the first decade, and eighteen in the second; the youngest subject was 2 years old, the oldest 28.

(4) SEX. In the collected cases, twenty-one were males, fourteen females. Transmission of the hemophilic tendency occurs through the female side to the male members of the family. This admitted fact is substantiated by the records, for of the eight instances presenting histories of hemophilia, seven were males. Four of these seven hemophiliacs died from post-operative bleeding. The writer's case (Table 2, case 27), female, did not end fatally.

(5) LOCAL CAUSES: The naso-pharynx presents anatomical features which are certainly contributing factors in these unusual hemorrhages. This cavity, in the first place, receives a rich blood supply, with a final distribution, which terminates in numerous ramifications, anastomoses and plexuses.

Abnormal arterial distribution may render the field of operation more or less unsafe, particularly to the clumsy and inexperienced operator, who not infrequently buttonholes the mucous lining of the walls of the pharynx. An arterial anomaly observed several times by the writer is that of a vessel, probably the ascending pharyngeal, the size of a crow quill, superficially situated and pulsating, coursing along the junction of the posterior and lateral walls of the pharynx. Similar observations are reported by Sanderson (*Brit. Med. & Surg. Jour.*, 1887, vol. 2), and Baber (*Ibid.*, 1887, vol. 1). Schmiegelow's extraordinary case, in which the malposition of the internal carotid led to a fatal issue, is recorded above.

TABLE I.
 CASES OF HEMORRHAGE FOLLOWING ADENECTOMY.—FATAL CASES.

	Operator.	Reference.	Age.	Sex.	Instrument Used.	Time of Bleeding after operation.	Methods used for arresting hemorrhage, and remarks.
1	Preble	Boston Med. & Surg. Jour., Vol. 138, '98.	11	f	Forceps.	7th and 8th day.	Post-nasal packing. No history of hemophilia.
2	Schmiegelow	Centr. Ab. f. Chir., 1897.		m	Curette.	Immediately.	Anomaly in course of internal carotid.
3	Sochs	Jour. Laringol., Rebman, 1900.	10	m	Curette.	Two hours, continuing for 2 days.	Solutions of iron. Packing. Positive history of and family history of hemophilia.
4	Bliss	Trans. Am. Laringol. Ass., 1900.	7	m	Forceps.	12 hours.	Hemophilic history on maternal side. Post-nasal packing. Ergot. Saline transfusion. Post-nasal packing.
5	Kenefick	Laryngoscope, 1898, p. 251.	4	m	Curette and forceps.	8 hours.	Maternal grandmother a hemophilic.
6	Delavan	N. Y. Med. Jour., 1892.	2	m	Forceps.	$\frac{1}{2}$ hour.	Tampon. Post mortem showed leukemia.
7	Burger	La Presse Oto-Laringol., belge, 1903.	11	m		4 hours.	No treatment attempted. Hemophilic history negative.
8	Newcomb	Amer. Jour., Med. Sci., 1898, vol. 2.	3	m	Curette.		
9	Barkan	Occidental Med. Times, 1894.	6	m		Few hours.	No distinct history of hemophilia. Both adenotomy and tonsilotomy performed.
10	Stewart	Lancet, Nov. 15, 1902.	7	m		3 hours.	Tracheotomy and stimulation; in spite of negative history regarded as hemophilic.
11	Hooper	Laryngoscope, 1890.		m	Finger.	Immediately.	Considered as an incomplete operation; hemophilic history.

TABLE II.
CASES OF HEMORRHAGE FOLLOWING ADENECTOMY.—NON-FATAL CASES.

	Operator.	Reference.	Age.	Sex.	Instrument Used.	Time of Bleeding after operation.	Methods used for arresting hemorrhage, and remarks.
1	Gelle	Revue hebdomadaire de Laryngol. (etc.), Paris, 1890.	9	f	Forceps.	2 hours. Recurrence next day.	No mention of hemophilia.
2	Cartaz	Ibid.	17	f	Forceps.	15 hours.	Menses due at time of operation. Bleeding ceased spontaneously.
3	Renner	Ibid.	17	f		2 hours.	Post-tampon large fibrous adenoid.
4	Segon	Ibid.	16	f	Forceps.	8 days.	Ceased spontaneously.
5	Lacoarret	Ibid., 1895.	14	m	Curette.	5th day.	Ceased spontaneously.
6	Beausoleil	Boston Med. & Surg. Jour., 1898, p. 467.	15	m	Curette.	5th day. Recurrences 7th, 8th, and 9th days.	Slight bleeding at time of operation.
7	Kahn	Ibid.	5	f	Curette.	Immediately.	Perchloride of iron applications. Fibrous adenoid with large vessels in tissue.
8	Heelsmortel	Ibid.	9	f	Curette.	5th day.	Thin layer of bone removed with tonsil. Posterior plugging.
9	Heelsmortel	Boston Med. & Surg. Jour., 1898, p. 467.	6	f	Curette.	5th day.	Ergot. Ice-cold drinks.
10	Rualt	Rev. de Laryngol., (etc.), Paris, 1890.	28	m	Forceps.	Immediately. Four recurrences in 24 hours.	No mention of hemophilia.
11	Rualt	Ibid.	18	m	Forceps.	20 hours.	Syncope. Anemia, lasting 3 mos. after operation.
12	Hermet	Rev. internat. de Laryngol. et Rhinol., May, 1892.	11	m		4 hours.	Syncope. Cold and hot irrigations. Tampons. Repeated post-nasal plugging.
13	Capart	Ibid.	adult	m	Curette.	Immediately. continuing several hours.	Tampon. Syncope, after which hemorrhage ceased.
14	Rousseau	Ibid.	9	m	Curette.	Immediately.	
15	Hall	N. Y. Med. Jour., Oct. 12, '89.	19	m		Immediately.	Syncope.
16	Richards	Ibid.		m		Immediately.	Syncope, after which no more bleeding.

17	Martin	Laryngoscope, 1899, vol. 7.	16	f	Curette.	1 hour.	Post-nasal packing.
18	Martin	Laryngoscope, vol. 7, 1899.	7	f	Curette.	4 days.	Ceased spontaneously.
19	Martin	Ibid.	6	f	Curette.	9 days.	Applications suparenal
20	D. Roy	Ibid.	18	f	Curette.	3 hours.	extract. Menses due at
21	Vander Poel	Ibid., 1898, p. 256.	4	m		4 hours.	time of operation. Hem-
22	Delavan	N. Y. Med. Jour., Oct.	4	m		recurrences dur-	Post-nasal packing. Hem-
23	Gordon King	12, 1889. Reported to the writer.	7	f	Curette.	ing 36 hours. Immediately.	ophilic history, personal
24	Gordon King	Ibid.	10	m		5 hours.	Effects of operation felt
25	Gordon King	Ibid.	15	f	Curette.		for two months.
26	Plaget	Rev. hebdomadaire de Laryngol. (etc.) Paris, 1898, No. 45.	14	f	Forceps and cur- ette.	Primary. 4 hours. Bleeding continued for 3 hours. 1 hour.	Anemic before operation. Adrenalin solution sprayed in naso-phar- ynx.
27	Dupuy	Writer's case.	14	f	Curette.	4 hours.	Hemophilia established after operation. Adrenalin locally.
							History of hemophilia. Antipyrin, peroxide, tampons, saline infus- ions. Spray of peroxide of hy- drogen. Mother a bleeder.

Undue prominence of the pharyngeal orifices of the Eustachian tubes, the turbinated bones, extending beyond the posterior nares, the posterior border of the vomer projecting far back into the post-nasal space, are anatomical variations which render these parts vulnerable.

That traumatism itself is sometimes responsible is well exemplified in a case reported by Kahn, (Table 2, case 7), who removed the pharyngeal tonsil with a Gottstein curette, a thin layer of bone being detached at the same time from the vault of the pharynx. Profuse bleeding resulted, the arrest of which required tamponing. Only post-operative rhinoscopic examinations can show how much instrumental injury is associated with many of these excessive hemorrhages.

The size and consistency of the pharyngeal tonsil is a determining factor in some of these accidents. It is well known, to workers in this field, that in older subjects, these growths undergo fibrosis, which excess of connective tissue diminishes the contractile power of the vessels and disposes to undue flow of blood. Conversely, less bleeding is to be expected when lymphoid tissue makes up the greater part of this tonsil. The acute inflammatory affections of the adenoid, the frequency of which is not sufficiently recognized, naturally leaves it in an extremely vascular condition. Operative interference while the adenoid is in this state, or shortly after, predisposes to excessive bleeding.

While unable to prove by any data from these collated cases that hemorrhage occurs more frequently when no anæsthetic, general or local, is used, it is highly probable, and particularly in children, that as operation without anæsthesia is accompanied by much gagging and unintentional movements of the suffering patient, under such circumstances there is more liability to instrumental injury.

The statistical evidence does not allow us to conclude that the nature of the instruments used determined some of these untoward results. The curette alone was used far more frequently. This instrument is deservedly becoming the instrument of choice, as the forceps are capable of causing more injury, even in expert hands. There is no safe instrument for the unskillful and inexperienced operator.

REMARKS AND POST-OPERATIVE MEASURES.

Of great practical import is the question relating to the time of the bleeding. In the vast majority of instances this complication appeared within the first twenty-four hours after the operation. A

few records show undoubted secondary hemorrhages; noteworthy is Preble's case (Table 1, case 1), in which a fatal accident occurred on the eighth day.

Among the agents pressed into service to control the bleeding, perchloride of iron, ergot, antiyprine, and adrenalin, were frequently used and with varying results. Post-nasal tamponing was the measure most frequently resorted to and with most gratifying results, except in hemophilia.

To induce syncope by placing the patient in the upright position is a recommended, though crude and uncertain, mode of arresting post-operative bleeding. My records bear witness that in a few instances the occurrence of syncope produced the desired result. In many more, however, it had no influence whatever.

There is no guarantee that even after operating a great number of times we will be so fortunate as to escape our Waterloo. Undesirable, even, are those hemorrhages in which death is escaped, but which leave the patient profoundly exsanguinated and the general health impaired for months. Not a few of the accidents recorded might have been prevented by a careful inquiry *before operating* relative to the hemophilic tendency.

Our first and most important duty is to elicit all facts relating to the possible existence of this diathesis. We must remember that heredity is a strong factor and that hemophilia is transmitted through the female members to the male offspring. Important is the claim that hemophiliacs suffer from throat affections to an unusual degree. They are thus thrust on us. Traces of this diathesis may exist in families and in individuals without the appearance of such typical symptoms as joint affections and ecchymoses. Generally the history of how the family behave after tooth extractions is a pretty safe guide as to our own attitude.

In the light of present knowledge relative to the value of chloride of calcium as a hemostatic agent, we really seem justified in no longer regarding the hemophilic as hopelessly inoperable. Accumulating evidence tends to prove that if this drug be given internally a few days prior to operating, the hemophilic shows a markedly lessened tendency to excessive bleeding, both during and after operation. The dose recommended is 30 grains as the initial one and five grains every hour until five or six such doses are taken. This treatment is kept up for not more than three days before the contemplated operation, for if too much of the drug is given the blood loses its coagulating properties.

As already intimated other dyscrasiæ, such as the rheumatic, the strumous and many forms of anemia, are positive contraindications to operative measures.

Our conduct in the presence of hemorrhages of this nature should be to proceed either by the use of hemostatics or by resort to mechanical means. Adrenalin, in the writer's experience, and from accumulating testimony, deserves its reputation as a powerful vaso-motor constrictor. By repeated and forcible injection through a good spray of the original solution into the nasal cavity, it will reach the bleeding surfaces. Unless the hemorrhage has its source in a large vessel the adrenalin will seldom fail us. In extreme cases its administration internally is not devoid of benefit. Peroxide of hydrogen, used in the same manner, has, in my own experience, answered the purpose admirably. The possibility of its entering the accessory sinuses is remote and, moreover, the grave complication which we are fighting justifies any measure.

These two hemostatics will be especially applicable where there is constant or intermittent oozing of blood along the posterior pharyngeal wall, or through the nose. When there is a brisk flow, spurting in character, we cannot safely place reliance on any drug, used locally or internally. Time is an important element and post-nasal plugging should be quickly performed. Effective also is the thrusting of a strip of gauze behind the soft palate by digital manipulations. The gauze is packed tightly, filling the whole rhinopharynx, and is kept in its wedge-like position by forcible pressure of the hand, carried behind the soft palate. It cannot be insisted on too strongly that the armamentarium of the throat specialist should contain such essentials as hemostatics and the various mechanical appliances which best permit him to cope with a problem of the gravest import. Post-nasal plugs of various sizes should be always ready for immediate use. We must be forearmed and ever on the alert.

While it is quite obvious that in a strict sense we have no preventive measures, we can at least minimize the risk of bleeding by enjoining, after adenectomy, enforced rest in bed for 24 hours after the operation. The next day should be spent indoors quietly and free from all boisterous playing. The giving of cold drinks and chipped ice *ad libitum* should form part of the routine post-operative treatment. These measures are imperative, particularly in young subjects, if we wish to avoid a catastrophe.