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Classification of haemorrhage following tonsillectomy

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Abstract

To date there exists no sensible way of classifying the *intensity* of haemorrhage following tonsillectomy, though this is a prerequisite when comparing the results presented in literature. We evaluated the incidence of post-operative haemorrhage according to our classification in 602 patients who underwent tonsillectomy at our department in 1999. In 21 patients a grade 1 (spontaneous cessation) bleeding occurred. One patient had a grade 2 (infiltration anaesthesia), 14 patients had a grade 3 bleeding (treatment under general anaesthesia) with one patient receiving a blood transfusion. Two patients had a grade 4 bleeding (ligature of the external carotid artery). There was no patient with grade 5 bleeding (lethal outcome). Grades 1 and 3 had the same incidence rates. Primary haemorrhage (<24 hours) can be expected in the majority of patients undergoing tonsillectomy. Secondary haemorrhage is rare and can be life-threatening.

Key words: Tonsillectomy, complications

Introduction

Tonsillectomies are one of the most frequently performed surgical procedures in otolaryngology to resolve upper airway obstruction and recurrent or chronic throat infections and to manage recurrent childhood ear disease. Despite numerous efforts, haemorrhage is the most common and significant complication following tonsillectomy, occurring in less than 10 per cent of cases, most often within 24 hours, although it can occur at any time during the first two weeks.[1]

Mainly for economic reasons, tonsillectomies are increasingly performed on an outpatient basis after careful patient selection.[2–4] The AAO-HNS Pediatric Otolaryngology Committee published inpatient guidelines that may indicate overnight observation. Among these are age three years or less, abnormal coagulation values, peritonsillar abscess and obstructive sleep apnoea.[5]

In the literature, classification of post-operative haemorrhage as primary (<24 hours) or secondary (>24 hours) has been well established, although the terms are used loosely with confusion and are mixed with the term *reactionary* haemorrhage (which can be intra-operative or primary haemorrhage).[6] Unfortunately there exists no common classification for the *intensity* of post-operative haemorrhage, which makes the results of studies difficult to compare. The rate of post-operative haemorrhage in studies where any incidence of bleeding has been registered will obviously be much higher than in those where bleeding was only registered if treatment under general anaesthesia was necessary. We conducted this study in order to evaluate the incidence rates of haemorrhage following tonsillectomy in respect to the *intensity* of bleeding.

Materials and methods

In a retrospective study we analysed the documents of 602 patients who underwent tonsillectomy at our department in 1999. All patients were admitted one day before surgery and discharged six days following tonsillectomy. The procedure was always performed with scissors (cold technique). Intra-operatively bleeding vessels were treated by intraoral suture ligation (Catgut, 2×0 or Dexon 2×0). We never used a cautery for haemostasis. At least two rounds per day on the ward by the surgeon and a scheduled control by the nurses detected any sign of post-operative haemorrhage as early as possible. This was also documented in the patient's chart.

Post-operative haemorrhage was classified in a grading system that reflected the intensity of haemorrhage. Grade 1 was any post-operative haemorrhage with a spontaneous cessation, where icepacking was administered and sufficient.

Grade 2 bleeding needed further treatment under local anaesthesia. This was either by infiltration of 1:250 000 adrenalin containing one per cent lidocain, or additional bipolar coagulation.

In grade 3 bleeding treatment by suture ligation under general anaesthesia was necessary. In cases with diffuse bleeding we sutured the tonsillar pillars

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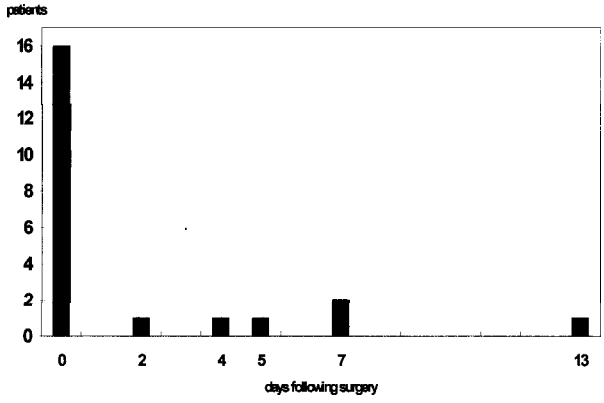

FIG. 1

Grade 1 bleeding was registered in a total of 21 patients who underwent tonsillectomy in our clinic in 1999. In the majority, 16 patients, it occurred as primary haemorrhage (<24 hours). One patient with grade 2 bleeding was treated seven days after tonsillectomy.

together. Care was taken to exclude any development of haematoma in the parapharyngeal space. Other measures such as blood transfusion or interventional radiology to achieve haemostasis could also be graded; the latter means were not available in our hospital.

Patients who had been returned to the operating theatre for persistent or excessive bleeding, in whom local measures to control bleeding had failed and in whom shock was imminent from continued blood loss, and for whom ligature of the external carotid artery was mandatory, were classified as grade 4 bleeding. The external carotid artery was identified following dissection of the common carotid artery, the carotid bulb and the first three branches deriving from the external carotid artery. We ligated the external carotid artery below and above the origin of the upper thyroid artery and the first three branches deriving from the external carotid artery (Silk 0).

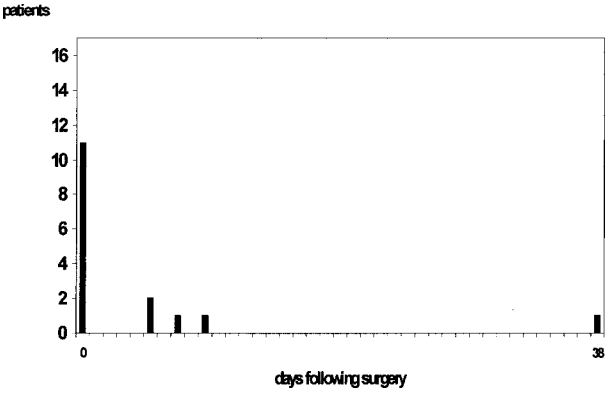

FIG. 2

Grade 3 bleeding occurred in 14 patients, in 11 of whom it was observed as primary haemorrhage (<24 hours). Grade 4 bleeding was observed in two patients, five and 38 days post-operatively.

Grade 5 bleeding was any post-operative haemorrhage with lethal outcome regardless of what treatments had been carried out.

Results and analysis

Of the 602, the youngest patient was 23 months, the oldest 89 years old (median 17 years, mean 20.64 years). Forty-eight per cent of the patients were male.

Recurrent or chronic throat infections indicated tonsillectomy in 245 patients (41 per cent); adenotonsillectomy was indicated to resolve upper airway obstruction due to hyperplasia of lymphoid tissue in 186 patients (31 per cent). One hundred and forty-two patients (24 per cent) underwent tonsillectomy because of quinsy, in 15 patients (2.5 per cent) remains of tonsils after previously performed tonsillectomy had to be removed. Cancer of the tonsils indicated tonsillectomy and additional neck dissection in 11 patients (1.8 per cent). Three patients (0.5 per cent) were operated upon because of infectious mononucleosis.

Haemorrhage following tonsillectomy occurred in a total of 38 patients (6.3 per cent). Repeated treatment to achieve haemostasis became necessary in none of our patients. The majority (55 per cent) of post-operative haemorrhage could be classified as grade 1 bleeding, which was observed in 21 patients (3.5 per cent). In 16 (76 per cent) of these haemorrhage was observed as primary bleeding; in three patients bleeding occurred during the hospital stay on days 2, 4 and 5. Two patients had to be readmitted on day 7 and day 13.

There was only one 33-year-old male patient with grade 2 bleeding that could be treated with coagulation under local anaesthesia. Discharge was postponed in this patient because of a short episode of haemorrhage on day 5.

Surgical treatment of post-operative bleeding under general anaesthesia, grade 3 bleeding, was necessary in 14 patients (2.3 per cent). The youngest of these patients was 14 years, the oldest 58 years old (median 28.5 years, mean 28.9 years). Seventy-five per cent were male. In two patients of this group we had to suture the tonsillar pillars together because of diffuse bleeding. In one of these a single blood transfusion had to be administered. Another 22-year-old patient had a huge coagula removed on the first post-operative day, but no haemorrhage occurred, so he was not considered as having a grade 3 bleeding. A single suture was sufficient in 14 cases, 11 were done on the day of operation, one each five, seven and nine days respectively after the operation. The patient with post-operative bleeding seven days after tonsillectomy indicated for quinsy had to be re-admitted after discharge on the day before. The patient with haemorrhage nine days after surgery had undergone tonsillectomy combined with a radical neck dissection because of cancer. Here discharge was not planned at that time. Hepatic cirrhosis was an underlying disease in this patient.

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Two patients with grade 4 bleeding had to be treated by ligature of the external carotid artery. One patient referred himself to massive bleeding to our emergency ambulance 38(!) days after surgery indicated for cancer of the left tonsil. He had undergone additional pre- and post-operative radio-chemotherapy. The second patient was a 19-year-old man with post-operative haemorrhage occurring five days after elective tonsillectomy. In this case significant bleeding had already been observed during the initial operation, necessitating an unusual number of sutures. Fortunately there was no patient with grade 5 bleeding.

Discussion

Tonsillectomies are one of the most frequently performed surgical procedures in otorhinolaryngology worldwide. For the patient's comfort, but mainly due to economic considerations, an increasing number of tonsillectomies is performed on an outpatient basis. Numerous studies have been carried out in order to evaluate risk factors like age, sleep apnoea, underlying disease, distance to the hospital, coagulation disorders and others. Many authors have come to the conclusion that tonsillectomy can be performed as an outpatient procedure if patients are carefully selected.[7–9] For this reason, some health insurance companies in the USA[10] and Europe[11] refuse to be charged for inpatient tonsillectomy and will pay only for a minimal hospital stay for patients found to belong to a risk group.

Haemorrhage following tonsillectomy is the most common and potentially life-threatening complication. Despite the efforts of all surgeons, post-operative haemorrhage seems to be unavoidable, with a varying incidence rate. This may be due to the complex blood supply of the tonsillar fossa with a network of anastomosing arteries deriving mainly from the ipsilateral external carotid artery, in rare cases also from the internal carotid artery.

Surveys have described decreasing fatality rates over the last century with a range of one lethal outcome in 3000 to more than 170 000 tonsillectomies.[1,12] This is mainly due to improvement in medical techniques and technology in anaesthesiology and the fact that the majority of tonsillectomies nowadays are performed under general anaesthesia with endotracheal intubation. There was no lethal outcome in this series.

Electrocautery and suture ligation are the common means for treatment of haemorrhage following tonsillectomy, with contradicting results. Bipolar cautery may cause a higher rate of secondary but less severe bleeding than transoral suture ligation.[13] Suture ligation has to be done with great care because of possible abnormalities in the course of the internal carotid artery.[14] If the needle is placed too deeply an injury of the wall of an artery can lead to a traumatic aneurysm (aneurysma spurium) which suddenly ruptures and leads to massive blood loss.[15,16] We never used electrocautery to achieve haemostasis during the operation. Only in those cases with post-operative haemorrhage where a single bleeding vessel could be identified did we use bipolar forceps. We are convinced that especially young surgeons in training tend to use electrocautery as field cauterization to reduce their operation time. What they leave is an extensive field of necrosis which becomes the subject of digestion by the enzyme- and bacteria-containing saliva. When sloughing of the eschar occurs, deeply running larger arteries will be exposed and start bleeding, which can be massive.

Pre-operative assessment of haemostatic factors, complete blood count, prothrombin time, partial thromboplastin time and bleeding time seems to have some predictive value, but there exists no consensus whether or not a minimal coagulation screening program should be performed.[17] Some authors mention the important financial implication if coagulation studies were performed only in patients with positive histories.[18] According to the recommendation of the American Academy of Otolaryngology, Head and Neck Surgery (AAO-HNS), coagulation studies should only be carried out in patients with positive histories or physical examinations.[19]

In each case we evaluated partial throboplastin time and prothrombin time and did a complete blood cell count to detect a possible coagulation disorder, but none of our patients with post-operative bleeding had any laboratory abnormalities. In the literature haemorrhage following tonsillectomy has been classified only according to time of occurrence: primary bleeding being defined as occurring within 24 hours and secondary bleeding occurring after 24 hours. Some reports have defined per-operative haemorrhage as primary and bleeding within 24 hours as reactionary, which is confusing.[6]

Primary bleeding is considered to be more dangerous, because of the risks of airway compromise due to aspiration or laryngospasm and of invisible swallowing of blood with a consequent collapse of the circulation. Secondary bleeding has been reported as occurring rarely, in the majority of patients five to 10 days following surgery.[1,12]

Obviously a classification of the *intensity* of post-operative haemorrhage is still lacking, although this would be necessary for a comparison of the results presented in the literature. Some authors take into consideration patients with any episode of haemorrhage, some only those who have to be returned to the operating theatre. Of course the latter will report lower rates of post-operative bleeding and underestimate the incidence of haemorrhage.

Guida and Mattuci graded bleeding in 1000 patients as follows: grade 0 reflected no observed haemorrhage, grade 1 indicated mild bleeding which stopped spontaneously. Grade 2 bleeding required cauterization or injection of epinephrine-containing lidocain or saline. Grade 3 bleeding required haemostatic control under general anaesthesia. In this grading system the authors mentioned post-operative haemorrhage following adenoidectomy too.[20]

Kang *et al*. defined post-operative haemorrhage as active (I: requiring return to the operating theatre and II: eschar removal by suctioning and application of anaesthetic and vasoconstricting agents); or not active at consultation (III: no active bleeding seen but re-admission for observation and IV: bleeding reported by parents at first post-operative visit at seven to 10 days).[21]

Richmond *et al*. analysed complications following adeno-tonsillectomy in 784 children, and divided bleeding into *major* episodes, requiring operative intervention, and *minor* episodes which did not.[22]

Handler *et al*. divided 1445 children into the following groups: A: non-bleeders; B: immediate major bleeding requiring return to the operating theatre; C: immediate minor bleeding with re-admission of the patient for observation; D: delayed major bleeding; E: delayed minor bleeding; F: delayed minor bleeding not requiring re-admission.[23]

Watson *et al*. analysed in 1036 patients prospectively the incidence of post-operative bleeding, comparing ligatures with diathermy as common techniques to achieve haemostasis. The severity of post-operative haemorrhage was graded into false alarm (no actual evidence of bleeding), minor bleeding (observation only), moderate bleed (active non-surgical intervention) and major bleeding (operation and/or transfusion needed).[24]

In contrast to adenoidectomy, haemorrhage following tonsillectomy is much more frequent and has to be considered as a potentially life-threatening complication. Therefore the number of performed adenoidectomies and tonsillectomies and the incidences of post-operative haemorrhage should never be mixed as in many studies and in the classification of Guida and Mattucci.[20]

A classification of post-operative haemorrhage should not only register the incidence rates but consider also the *intensity* of bleeding. In patients with no post-operative bleeding we are not convinced that this also should be classified, as in the studies of Kang *et al*.,[21] Handler *et al*.[23] or Watson *et al*.,[24] who graded cases with false alarm and no bleeding.

Our classification is not only focused on the intensity of haemorrhage but also covers different means of haemostasis and developments such as interventional radiology, although our hospital does not offer this particular technique. All episodes of post-operative haemorrhage should be classified by the surgeon or experienced staff members. In cases with haemorrhage after discharge and no active leeding it should be categorized as grade 1 (spontaneous cessation).

Our classification system has one disadvantage, because the decision whether or not treatment under general anaesthesia should be performed is not always related to the intensity of bleeding but reflects also aspects such as age, language and psychological problems. On the other hand, children with continuous bleeding do not tolerate high amounts of blood loss, and indications such as language and psychological problems were found to be extremely rare in our patients. This may be different in other hospitals.

Conclusion

In our study no difference was found regarding bleeding that stopped spontaneously or needed treatment under general anaesthesia. Both occurred in the majority of patients on the day of surgery. The continuous improvement of the techniques in surgery, haemostasis and anaesthesia may have an effect not only on the incidence but also on the intensity of post-operative haemorrhage, which could be detected by this classification system, making the results capable of comparison in the literature.

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