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Main Article

Effect of post-operative analgesia duration on post-tonsillectomy readmission rate: comparison of five-day and 14-day regime

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Abstract

Objectives: To determine whether the introduction of a 14-day post-tonsillectomy analgesic regime would be associated with a statistically significant decrease in readmission rate.

Method: A comparative study of tonsillectomy patients over two study periods. A retrospective review was undertaken of 342 patients (group one, five-day analgesic regime) who had undergone tonsillectomy. A prospective study was undertaken of 228 patients (group two, 14-day analgesic regime). The readmission rates for the two study periods were compared.

Results: The median age of group one patients was 8.1 years (range, zero to 43 years). In this group, 'cold steel' dissection was performed in 177 patients (52 per cent) and bipolar dissection in 165 patients (48 per cent); seven patients suffered reactionary haemorrhage, all from the cold steel dissection group. The median age of group two patients was 8.0 years (range, one to 47 years). In this group, cold steel dissection was performed in 103 patients (45 per cent) and bipolar dissection in 125 patients (55 per cent); there were no cases of reactionary haemorrhage. The readmission rate for group one was 9.9 per cent (34 patients), with 2.1 per cent (seven patients) returning to the operating theatre for control of haemorrhage. In group two, 8.8 per cent (20 patients) were readmitted and 1.3 per cent (three patients) returned to the operating theatre. The main reason for readmission was secondary haemorrhage: 9.1 per cent from group one and 8.3 per cent from group two. No significant difference in readmission was found between the 5-day analgesia and the 14-day analgesia groups ($p = 0.443$). However, there was a significant difference between the diathermy and cold steel dissection groups ($p < 0.001$). Patients undergoing bipolar diathermy were almost six times more likely to be readmitted than those undergoing cold steel dissection (odds ratio 5.78). The average time to readmission after tonsillectomy did not significantly differ between the two groups.

Conclusion: The post-tonsillectomy readmission rate was not affected by the duration of post-operative analgesia; however, operating technique did have an effect.

Key words: Tonsillectomy; Haemorrhage; Postoperative Pain; Diathermy

Introduction

Tonsillectomy is one of the most frequently performed surgical procedures. Many different techniques have been introduced to speed up the operation, minimise intra-operative bleeding and reduce post-operative morbidity. There has always been debate over the choice of technique and also over the preferred pre- and post-operative analgesia. Inadequate post-operative pain control has been identified as a common cause for general practitioner or family doctor attendance following tonsillectomy.[1,2] The efficacy of post-operative pain relief will influence the time taken to resume a normal diet and normal activity. However, there is no universal regime for the administration of post-tonsillectomy analgesia. It is generally recognised that pain leads to the restriction of muscular action, which in turn interferes with the mechanism of physiological tonsillar fossa clearance, increasing the possibility of infection and consequent bleeding.[3,4]

Many techniques of tonsillectomy have evolved over time, including blunt dissection, guillotine excision, cryosurgery, ultrasonic removal, monopolar and bipolar dissection, bipolar scissors dissection, laser dissection, coblation, and use of the harmonic scalpel.[3–7] All these techniques have advantages and disadvantages, and the debate about optimal technique continues in the literature.[8] Tonsillectomy in the UK has traditionally been carried out under

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general anaesthetic using 'cold steel' dissection, with ligation and/or diathermy for haemostasis.

There is consensus that tonsillectomy by diathermy dissection is quick, with little or no intra-operative bleeding. However, reports on post-operative morbidity are conflicting,[1,2,9] with opponents of the technique contending that there is increased post-operative pain and delayed healing, leading to increased risk of primary and secondary haemorrhage.[1] Notwithstanding the debate, the use of diathermy ('hot') techniques has increased greatly in routine practice, and diathermy dissection is now the most frequently used tonsillectomy technique.[10]

Cold steel dissection and bipolar forceps dissection were the two methods routinely used for tonsillectomy at the Birmingham Heartlands Hospital, a tertiary hospital. Patients had traditionally been given a five-day post-tonsillectomy analgesic pack when discharged from the hospital. However, the readmission rate following tonsillectomy in this hospital was relatively high. An audit showed a readmission rate of 10 per cent, mainly due to secondary haemorrhage, which also necessitated a return to theatre in 2.05 per cent of cases. Few patients were readmitted purely for pain control. By comparison, an average 1–5 per cent readmission rate has been reported in the literature.[1,2,9,10]

The aim of this study was to determine whether the introduction of a 14-day post-tonsillectomy analgesic regime would be associated with a statistically significant decrease in post-tonsillectomy readmission rate.

Materials and method

This was a comparative study of all patients undergoing tonsillectomy during two study periods in a university otolaryngology department. A retrospective review of 342 patients who had undergone bilateral tonsillectomy between January 2002 and December 2002 had already been undertaken. There were 270 children (79 per cent) and 72 adults (21 per cent) in this group (Table I). The review showed a 9.9 per cent readmission rate. Upon discharge, children in this group had been prescribed a five-day analgesic course, a combination of either paracetamol and ibuprofen, or paracetamol and codeine phosphate (for patients who could not tolerate non-steroidal anti-inflammatory drugs). Adults had been prescribed a combination of co-codamol (codeine phosphate and paracetamol) and diclofenac (or tramadol hydrochloride). Patients had been advised to take these drugs four to six-hourly, alternating from one to the other.

We hypothesised that inadequate pain control was responsible for the high readmission rate.

Therefore, a prospective study of 228 consecutive patients undergoing bilateral tonsillectomy between October 2003 and September 2004 was also undertaken to allow the readmission rates from the two study periods to be compared. This second group was made up of 187 children (82 per cent) and 41 adults (18 per cent) (Table I). Post-operatively, all patients were supplied with a two-week course of analgesia, using similar combinations to those described above. Prior to this study, departmental policy had stipulated the dispensing of a standard five-day analgesic pack following each tonsillectomy. Therefore, this change in policy required the cooperation of all the healthcare professionals involved, namely, pharmacists, nursing staff and the medical team. This was the reason for the time lapse between the retrospective and prospective studies.

In both groups, tonsillectomy was performed using reusable instruments, under general anaesthetic, on an in-patient basis. Either cold steel dissection or bipolar forceps dissection was used, according to the surgeon's preference. The method used was therefore neither predetermined nor randomised. All grades of surgeons working in the department participated during both study periods. The haemostasis technique comprised bipolar diathermy with or without ties during cold steel dissection tonsillectomy. Bipolar diathermy alone was used to complete haemostasis during bipolar dissection tonsillectomy. All patients presenting with secondary haemorrhage were routinely admitted to hospital, as per departmental policy.

Data collected included age, sex and method of operation. The reason for readmission and the management of each readmitted patient were recorded, along with the need for blood transfusion and the length of hospital stay. Post-operative haemorrhage was defined as reactionary if within 24 hours of surgery and secondary if occurring two to 14 days after surgery.

TABLE I

PATIENTS' DEMOGRAPHIC DATA

Patient type	Post-op analgesic regime	
	5 days* [*n* (%)]	14 days† [*n* (%)]
Children‡	270 (79)	187 (82)
Adults	72 (21)	41 (18)
Males	151 (44)	96 (42.1)
Females	191 (56)	132 (57.9)

*$n = 342$; age range zero to 43 years, median 8.1 years. †$n = 228$; age range one to 47 years, median 8.0 years. ‡≤16 years. Post-op = postoperative

Results

Three hundred and forty-two patients were supplied with a five-day post-operative analgesic pack on discharge; these patients were classified as group one. Forty-two (12 per cent) patients were hospitalised for more than one night post-operatively, for various reasons including nausea, pyrexia, anorexia, pain and haemorrhage. The study population in this group comprised 191 (56 per cent) female patients and 151 (44 per cent) male patients, with a median age of 8.1 years (range, zero to 43 years). In group one, cold steel dissection was performed in 177 patients (52 per cent) and bipolar dissection in 165 patients (48 per cent). Seven patients had reactionary haemorrhages, all from the cold steel dissection group.

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TABLE II
PATIENTS' CLINICAL CHARACTERISTICS

Clinical feature	Post-op analgesic regime			
	5-day*		14-day†	
	CSD (*n*)	BFD (*n*)	CSD (*n*)	BFD (*n*)
Cases	177	165	103	125
Readmitted	8	26	3	17
Primary haemorrhage	7	0	0	0
Secondary haemorrhage	8	23	2	17
Other		3 (pain)	1 (lung abscess)	
Return to theatre/ transfusion		7 (2.1%)		3 (1.3%)
Transfusion only		6		1
Average time to readmission (days)	6.1 (range 2–10)	6.7 (range 3–12)	6.0 (range 1–15)	6.4 (range 1–10)

*$n = 342$; †$n = 228$. CSD = cold steel dissection; BFD = bipolar forceps dissection

The second group (group two), comprising 228 patients, was given a 14-day post-operative analgesic pack on discharge. The median age of this group was 8.0 years (range, one to 47 years). There were 132 female patients (57.9 per cent) and 96 male patients (42.1 per cent) (see Table I). All but three patients (6.8 per cent) were discharged home the morning after the procedure. These three patients each stayed an extra night in hospital because of poor oral intake. Cold steel dissection was used in 103 patients (45 per cent) and bipolar dissection in 125 patients (55 per cent). There were no cases of reactionary haemorrhage in this group; however, the data were insufficient to conduct the relevant statistical analysis.

Readmitted patients

The readmission rate for group one was 9.9 per cent (34 patients), with 2.1 per cent (seven patients) returning to the operating theatre for control of haemorrhage (Table II). In group two, 8.8 per cent (20 patients) were readmitted and 1.3 per cent (three patients) returned to the operating theatre. In both groups, all the patients who returned to theatre had been operated upon using bipolar forceps dissection, and all needed blood transfusion. The main reason for readmission in most cases was secondary haemorrhage: 9.1 per cent from group one and 8.3 per cent from group two. A haemorrhage of sufficient severity to require blood transfusion was suffered by a total of 13 patients (3.8 per cent) from group one and four patients (1.8 per cent) from group two.

The average time to readmission after tonsillectomy was not significantly different between the groups. In group one, the average time to readmission was 6.1 days (range, two to 10 days) for cold steel dissection and 6.7 days (range, three to 12 days) for bipolar forceps dissection. In group two, the average time to readmission was six days (range, one to 15 days) for cold steel dissection and 6.4 days (range, one to 12 days) for bipolar forceps dissection. The readmitted patients spent between one and 10 days (average 3.5 days) in hospital following readmission. The longest stay was 10 days, by a patient with a lung abscess.

TABLE III
POST-TONSILLECTOMY READMISSIONS

Post-op analgesia (days)	Surgical method	Readmissions (*n*)
5	CSD	8/177
5	BFD	26/165
14	CSD	3/103
14	BFD	17/125

CSD = cold steel dissection; BFD = bipolar forceps dissection

Statistical analysis

Logistic regression was used to evaluate the relationships between readmission and analgesia duration and between readmission and operative method, in order to obtain the best model for predicting the probability of readmission given the method of operation and the duration of analgesia. The duration of analgesia and the method of operation were independent variables, and readmission was the response variable. In order to analyse the interaction between the independent variables and the response variable, regression analysis was conducted using a binomial logit model (Table III). The analysis showed that there was very strong evidence of a relationship between readmission and method of operation ($p < 0.001$), but no evidence of a relationship between readmission and duration of analgesia ($p = 0.443$) or of an interactive effect of both factors. Therefore, in this model, the method of operation was the only predictor variable for readmission. Given the fitted model, the odds ratio was 5.78; i.e. those operated upon using bipolar forceps dissection were almost six times more likely to be readmitted than those operated upon using cold steel dissection.

Discussion

Poor pain control is recognised as a common reason for patients seeing their family doctor following

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an operation. Although most post-tonsillectomy patients are discharged from hospital after one night, post-discharge morbidity is quite high. Up to 60 per cent of patients consult their general practitioner in the first post-operative week because of various complaints, such as poor pain control, poor oral intake, fever and bleeding.[1,2,11]

Secondary or delayed haemorrhages are attributed to infection in the tonsillar fossae.[3] Contractions of the pharyngeal muscles are responsible for physiological clearance of the tonsillar bed, and infections are due to debris and food accumulating in those areas. Restriction of muscular action by pain or voluntary immobility interferes with the mechanism of physiological tonsillar clearance, increasing the possibility of infection and consequent bleeding.[4]

In the present study, we found no significant difference in the readmission rates between patients supplied with a five-day analgesic pack (9.9 per cent) and those given a 14-day pack (8.8 per cent). Specifically, the change to a 14-day post-tonsillectomy analgesic pack did not result in a statistically significant change in readmission rates ($p = 0.443$). There was, however, a significant difference in readmission rates between patients undergoing cold steel dissection and those undergoing bipolar forceps dissection ($p < 0.001$), with the latter group more likely to be readmitted. The odds ratio was 5.78, implying that those operated upon using the bipolar method were almost six times more likely to be readmitted than those operated upon using the cold steel method. The duration of analgesia was not significantly related to readmission when the method of operation was taken into account. This was consistent with the findings of previous studies comparing 'hot' and cold' techniques.[10,11] The main reason for readmission was haemorrhage. Haemorrhages were more severe in patients operated upon using the bipolar method, as all the patients who required a return to the operating theatre were from this group. Three patients from group one were readmitted simply for pain control, but none from group two. One patient in group two, operated upon using cold steel dissection, was readmitted with a lung abscess. This was probably the result of aspiration of blood during surgery, as the patient was medically fit pre-operatively (i.e. American Society of Anesthesiology grade one).

Our centre's overall secondary haemorrhage rates of 9.1 for group one and 8.3 per cent for group two were high, compared with the average rates of 1–5 per cent reported in the literature.[1,2,10,12] However, higher rates, of up to 14 per cent,[9,11] have also been reported. The reason for this difference is not clear. Although most of the secondary haemorrhage patients were operated upon using bipolar forceps dissection, this alone may not account for the high haemorrhage rate, as other studies found lower rates, of between 3 and 6 per cent, in this group of patients.[10,13]

The use of hot techniques has increased in the past two decades; haemorrhage rates have also increased. Some surgeons have tried to minimise intra-operative blood loss by intensive use of diathermy; however, in so doing they may cause significant thermal damage to surrounding tissue, which manifests itself several days later in large areas of slough and secondary haemorrhage.[10] Following bipolar diathermy dissection tonsillectomy, an increased incidence of post-operative morbidity has been well documented, in the form of sore throat, otalgia and poor oral intake. This accounts for the significant rate of post-operative general practitioner consultation by patients.[1,2]

Currently, there is an increasing drive to limit the duration of hospital stay for post-operative patients – hence the increase in the number of procedures carried out as day-cases.[14] The aim is to discharge patients back to the community, in order to enhance their return to normal activity. It is therefore desirable to ensure that they do not return to hospital in the immediate post-discharge period. It follows that minimising the risk factors associated with high readmission rates must be a desirable objective.

Improvements in tonsillectomy techniques are defined by the reduction of post-operative discomfort, early return to normal activities, and low rates of post-operative haemorrhage and consequent readmission. However, in each of these respects, bipolar forceps dissection has been shown to be worse than cold steel dissection.[1,10,12] Nevertheless, it remains a popular technique.[10]

- **This comparative study examined the effect of post-operative analgesia duration on post-tonsillectomy readmission rates**
- **There was no demonstrable benefit in placing patients on a 14-day analgesic regime, compared with a five-day regime**
- **The main reason for readmission was secondary haemorrhage resulting from the use of 'hot' surgical techniques**

Our study was designed purely to determine whether the introduction of a 14-day post-tonsillectomy analgesic regime would be associated with a significant decrease in readmission rate, compared with a five-day analgesic regime. However, no such benefit was demonstrated. The main reason for readmission following tonsillectomy was the use of bipolar forceps dissection, leading to secondary haemorrhage, rather than the duration of post-operative analgesia.

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