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Main Article

Departmental audit of tonsillectomy haemorrhage rates: pitfalls in interpretation

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Abstract

Concerns that a largely anecdotal increase in post tonsillectomy haemorrhage rates was related to the introduction of disposable instruments have prompted much investigation. The result has been, rather, to highlight other variables influencing this risk, but especially to insist on the following:

1 Training in traditional 'cold' techniques.
2 Regular departmental audit of haemorrhage rates.
3 Presentation of such data to patients to ensure informed consent.

This audit demonstrates the pitfalls in interpretation of crude data, unadjusted for case-mix, in predicting individual patient risk and in national ranking of unit performance.

Key words: Tonsillectomy; Haemorrhage; Informed Consent; Audit

Introduction

Concern at a perceived increase in the rate of haemorrhage associated with tonsillectomy coincided with the compulsory adoption of disposable instruments in the UK in 2001. Large-scale studies have since aimed to quantify the risk, determine any risk factors and derive recommendations to influence practice. All have stressed the need for a personal individual unit audit of such complications. The implication is that unit haemorrhage rates persistently beyond an accepted range will be identified and outliers' performance compared with the standards set by national audit.

Such an approach carries pitfalls if crude data is unadjusted for case-mix. Whilst this is self-evident to clinicians experienced in scientific appraisal of the medical literature and in the rigours of evidence-based medicine, resulting data may alarm managers, the public or politicians.

The National Prospective Tonsillectomy Audit (NPTA) suggested that significant risk factors, and, so, potential variables in case-mix, included:

1 Use of 'hot' techniques (e.g. diathermy for dissection on haemostasis).
2 Increasing patient age.
3 Male gender.
4 Surgery for sepsis rather than obstruction.[1]

Methods

We, retrospectively, reviewed the case notes of all adult patients (over 16 years old), who had undergone tonsillectomy during the one-year period March 2004 to February 2005 inclusive, in our Department (JCUH).

We gathered the following data from the medical records:

1 Age and sex of patient.
2 Indication for surgery.
3 Type of dissection.
4 Method of haemostasis.
5 Post-operative medication.
6 Occurrence of primary haemorrhage.
7 Occurrence of secondary haemorrhage.

Primary haemorrhage was defined, as per National Prospective Tonsillectomy Audit (NPTA) criteria, as a significant bleed in the first 24 hours (strictly a reactionary haemorrhage) which required any of:

1 Delayed discharge.
2 Return to theatre.
3 Transfusion.

Secondary haemorrhage was any subsequent bleed requiring readmission, with or without a return to theatre or transfusion.

We contrasted the characteristics of bleeders and non-bleeders to identify risk factors, applying the χ^2 test. We compared these findings and the crude, unadjusted, haemorrhage rate with that of the NPTA and then sought differences in our case-mix to that of the national audit.

Results

One hundred and eighty-two adult patients underwent tonsillectomy in the one-year period March

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TABLE I

INDICATIONS FOR SURGERY IN THIS STUDY COMPARED WITH IN NPTAA

Indications	This Study (per cent)	NPTA (Adults) (per cent)
Quinsy	10	5
Recurrent/chronic tonsillitis	80.2	92
OSA	5.5	2
Biopsy	4.4	0

OSA = Obstructive Sleep Apnoea

2004 to February 2005. Ages ranged from 17–68 years (mean 23.5 years) with 117 females and 65 males. In addition to traditional bilateral tonsillectomy in 167 patients, five underwent unilateral excision and 11 tonsillectomies were combined with palatoplasty. Indications for surgery are presented in Table I and techniques of dissection and haemostasis in Figures 1 and 2 respectively.

All patients received intensive post-operative analgesia, either co-codamol and diclofenac or paracetamol and diclofenac, but 35/182 also received antibiotic prophylaxis.

Haemorrhage rates

Fifteen patients (8.2 per cent) developed a post-operative haemorrhage, two with primary (reactionary) bleeding and thirteen (7.1 per cent) secondarily, all of the latter between the second and eighth post-operative day. Three patients (1.6 per cent) required return to theatre, one with primary and two with secondary bleeds. Two patients required blood transfusion.

Risk factors

In this small study, only two proposed potential risk factors demonstrated a statistically significant association with increased haemorrhage rates. Use of monopolar diathermy, rather than ligature for haemostasis, resulted in an 18 per cent rate of post-operative bleed ($p = 0.019$). Female gender was linked with increased risk (11 of 15 post-operative bleeds $p = 0.010$). There was a trend for greater risk when surgery was indicated by tonsil sepsis rather than obstruction, but this failed to achieve statistical significance. Antibiotic prophylaxis was used in 35/182 (19.3 per cent), but with no evidence of any influence on risk, as an exactly identical proportion of those who bled (3/15, 20 per cent) had received antibiotics.

Discussion

Haemorrhage rates

This audit of post tonsillectomy bleeding demonstrates an 8.2 per cent risk, a figure which seems initially to compare unfavourably with the frequently quoted National Prospective Tonsillectomy Audit (NPTA) overall rate, for adults and children, of 3.5 per cent.[1] However, for adults over 16 years of age, as in our study, the NPTA figure rose to 4.9 per cent. Indeed they showed that the odds ratio for haemorrhage continues to increase by 1.02 per year, but did not provide data for age distribution in their adult population to allow comparison and adjustment.

The increased risk with age has been reported in other large series[2] and is maximal at 30–34 years

FIG. 1

Types of dissection in tonsillectomy. CD = cold dissection; MF = monopolar forceps; BF = bipolar forceps. CD only: 84%; CD + MF: 0.5%; CD + BF: 3.8%; BF: 7.1%; MF: 1%; Laser: 2.7%

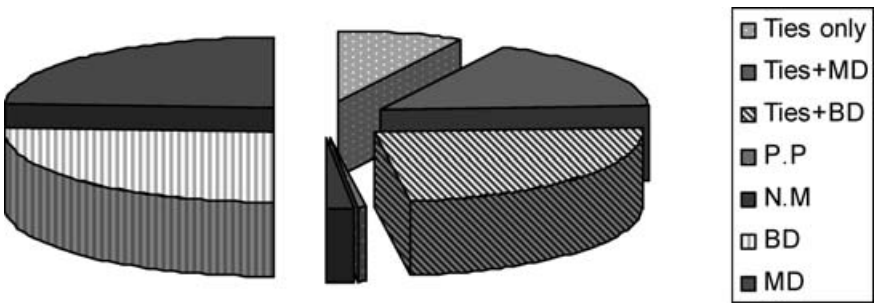

FIG. 2

Types of haemostasis used in operation. MD = monopolar diathermy; BD = bipolar diathermy; PP = plain packs; NM = Not mentioned. Ties only: 7.6%; Ties + MD: 16.4%; Ties + BD: 23.6%; BD: 25.8%; MD: 24.1%; PP: 0.5%; NM: 1.6%

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of age.[3] In addition to age, other factors in the case-mix, such as sex ratio and indications for surgery, will alter the relative risk of this complication. The NPTA presented a female/male adult ratio of 2.3/1 as compared to our reduced female preponderance of 1.8/1. The recognised greater risk for males to haemorrhage post-tonsillectomy[4,5] might have explained our higher overall rate (but see below).

Table I describes the indications for surgery as compared with those in the NPTA. No less than 10 per cent of our tonsillectomies followed a quinsy, as compared with 5 per cent in the NPTA. Three (20 per cent) of our haemorrhaging patients came from this small group.

Otherwise, there is a remarkable correlation between our findings and those of the NPTA. The national audit reported secondary haemorrhage as 86 per cent of all bleeds, our study reports 13/15 (86.7 per cent). Our return to theatre rate of 3/182 (1.6 per cent) compares with their national figure of 1.2 per cent Non Significant (NS).

The report of the NPTA indeed demonstrated that adjusting for case-mix could influence performance data for individual departments. Unadjusted bleeding rates ranged from 0–12 per cent for 130 NHS Trusts. Fourteen showed exceptionally high rates, but with adjustment for age, sex and indication for surgery, one dropped out and six more were added. Further adjustment for surgical technique and grade of surgeon reduced the resulting 19 units to 17 with high values for bleeding risk. Comparing these outliers with Department of Health Hospital Episode Statistics (HES) data showed only six units as showing abnormally high values in both.

This led the authors of the NPTA report to conclude that although variation may be due to differences in performance of Trusts, it may also be caused by:

1 Sampling variation.
2 Difference in patient characteristics.
3 Differences in hospital policy (such as readmission policies).
4 Data quality.[1]

Indeed, in 1998, our department changed its policy for management of patients presenting to casualty with secondary haemorrhage. A protocol only requiring admission for active bleeding changed to one demanding an overnight admission for observation, in all. The immediate consequence was an apparent doubling in the risk for secondary haemorrhage, as so defined. It has been suggested that return to theatre rate is a more useful indicator than readmission rate.[6]

Risk factors for haemorrhage

It would be presumptuous for a study of a population 1.5 per cent that of the National Prospective Tonsillectomy Audit (NPTA) to claim to offer supportive evidence or contradiction of the national findings. We have, however, confirmed the increased risk for 'hot techniques' for haemostasis for monopolar diathermy, carrying an 18 per cent risk ($p = 0.019$). A surprising tendency for females to bleed more than males (11/15 who bled, $p = 0.010$) may be a quirk of the small sample size. A confounding variable may relate to the high post-quinsy contributions to the study group. Of the 18 patients undergoing surgery post quinsy, 15 were female and all three bleeding after such surgery were female. The factor here may have been the earlier quinsy, not the sex of the patient. There was a statistically non-significant trend for bleeding to occur more in post sepsis surgery than in tonsillectomy for obstruction or histological diagnosis. This agrees with the findings of the NPTA and the insignificance is likely to represent a Type II error due to the small sample size and low power.

Post-operative antibiotics were prescribed in 35/182 but there was no evidence of benefit, rather, a (non-significant) trend for an increased bleeding rate. This is possibly due to a selection bias in, correctly, identifying a higher risk group, but is supported by a lack of evidence for any benefit in the literature.[7,8]

- **Meaningful evaluation of complication rates for tonsillectomy requires adjustment for case-mix**
- **Risk factors have been clearly identified in large-scale studies**
- **Departmental audit must consider not just unit haemorrhage rate but the relative contribution of such variables and their avoidance**
- **On-going audit will generally demonstrate regression to the mean for outliers, but is essential to identify persisting, possibly avoidable, risk factors**

Units auditing haemorrhage as a complication of their tonsillectomies must allow for case-mix and those variables which increase risk, and not be unduly influenced by a single 'snapshot' audit. Regular, detailed presentation of each incident allows monitoring and assurance of appropriate, timely management and, in the vast majority of any apparent outliers, repeated review of annual data will show regression to the mean.

Nonetheless even a trend, which fails to achieve statistical significance, towards greater risk, associated with one technique or surgeon, e.g. bipolar dissection tonsillectomy in trainee hands, may still lead to change in practice.[9]

Conclusion

It is human nature to show poor judgement of the odds of benefit/risk, as is evident in the enthusiasm for national lotteries contrasted with the fears associated with airline flight. In tonsillectomy, the recommendation that the risk of post-operative haemorrhage 'should be quantified, preferably using surgeon's own (or department's) figures' clearly reflects best practice. The real challenge is to modify such data to the individual characteristics of that patient.[10]

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