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MAIN ARTICLE

Post-operative nausea and vomiting following paediatric day-case tonsillectomy: audit of the Epsom protocol

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Abstract

Objective: To audit a protocol for elective, day-case, paediatric ENT surgery, previously reported as enabling an overall post-operative nausea and vomiting rate of 2 per cent and a discharge rate of 100 per cent on the day of surgery.

Method: The audit included 91 children (45 boys and 46 girls) aged three to 14 years. Forty-seven children underwent tonsillectomy, 36 adenotonsillectomy and eight tonsillectomy with postnasal space examination; indications included recurrent tonsillitis, tonsillitis and nasal block, upper airway obstruction, and a combination of upper airway obstruction and recurrent tonsillitis.

Results: No post-operative nausea or vomiting was recorded in any of the children on the day of surgery, and no discharges were delayed. The reactionary haemorrhage rate was 1 per cent and the secondary haemorrhage rate 3.3 per cent.

Conclusion: These findings have implications for the safe same-day discharge of children following tonsillectomy.

Key words: Post Operative Nausea And Vomiting; Tonsillectomy; Child

Introduction

Ear, nose and throat surgery accounts for over 30 per cent of operative procedures performed on children. The majority of this workload is routine, elective surgery carried out in general hospitals. Although the Chief Medical Officer for England and Wales has set a target of 50 per cent of such operations to be performed as day cases,[1] the proportion of UK paediatric tonsillectomies conducted as day cases currently varies between 0 and 100 per cent, depending on the institution (A Kewell, personal communication) (Figure 1).

Post-operative nausea and vomiting is the most common symptom delaying day-case discharge. It is reported to occur in up to 30 per cent of children following ENT surgery, and results in delayed discharge and readmission to hospital.[2] Both early post-operative nausea and vomiting (i.e. within six hours of surgery) and pain are independent variables contributing to delayed recovery after day-case paediatric ENT surgery.[3]

In 2006, we described the 'Epsom protocol' (Table I)[4] for paediatric day-case ENT surgery anaesthesia, which resulted in no post-operative nausea or vomiting on the day of surgery, and post-operative nausea and vomiting rates of less than 5 per cent on the three successive post-operative days. Pain levels of zero to two (using the Wong–Baker Faces Pain Scale)[5] were achieved in 88 per cent of children. All patients were discharged on the day of surgery.

To validate the performance and reliability of the Epsom protocol in effectively reducing post-operative nausea and vomiting, we subsequently audited the protocol in a prospective clinical study involving a cohort of 91 children admitted electively for planned day-case tonsillectomy with or without adenoidectomy. In the original, 2006 study, the rate of post-operative nausea and vomiting was 7 per cent (range 0–14 per cent); and 0 per cent on the day of discharge.

We found that modifying the anaesthetic care specified in our protocol (designed to reduce post-operative pain, nausea and vomiting; see below for details) achieved measurable improvements in patient recovery. Here, we describe the modified Epsom protocol, and we discuss the implications of implementing such a protocol for children undergoing these common operations.

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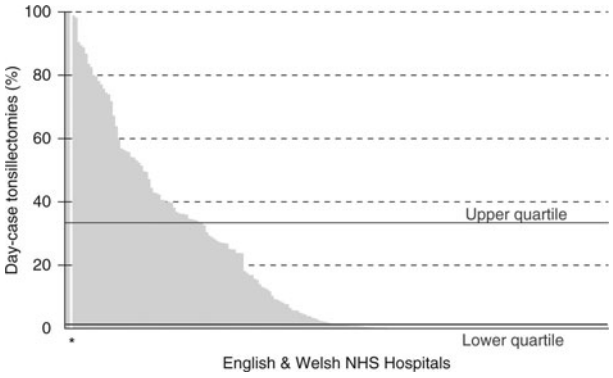

FIG. 1

Audit Commission data showing the range of paediatric day-case tonsillectomy rates (i.e. day-case tonsillectomies as a percentage of all tonsillectomies) in National Health Service (NHS) hospitals in England and Wales. The rate for Epsom and St Helier NHS Trust (100 per cent) is shown as a white bar (*).

Methods

During the period March 2008 to August 2009, data from children undergoing elective tonsillectomy with or without adenoidectomy were collected prospectively on the day of surgery.

As the intervention protocol had been previously approved, local ethical committee approval was not required for this audit.

The audit included 91 children (45 boys and 46 girls) between the ages of three and 14 years. Forty-seven patients underwent tonsillectomy, 36 adenotonsillectomy and eight tonsillectomy with postnasal space examination. Indications for surgery included recurrent tonsillitis, tonsillitis and nasal obstruction,upper airway obstruction, and a combination of upper airway obstruction and recurrent tonsillitis (Table II).

TABLE I
EPSOM PROTOCOL FOR CHILDREN'S DAY-CASE ENT SURGERY ANAESTHESIA

Clear fluids allowed until 2 h pre-operatively
Emla cream or Ametop over 2 suitable veins
Propofol 4 mg/kg
Intravenous ondansetron 0.1 mg/kg
Maintenance with sevoflurane in air & oxygen
Reinforced LMA in children 3 years & above
Spontaneous breathing via suitable breathing system
Dexamethasone 0.25 mg/kg
Rectal diclofenac 1 mg/kg
Rectal or intravenous paracetamol 20 mg/kg
Intramuscular codeine phosphate 1 mg/kg
Intravenous infusion with crystalloids 10 ml/kg (4–5 ml/kg/h)
Return to ward with free fluids & food on demand
Nursing observations for 6 h post-operatively
Post-operative consultant-led ward round
Nurse-led discharge 6 h post-operatively
Discharge medications:
– Azithromycin 10 mg/kg for 3 days
– Ibuprofen 5–10 mg/kg tds for 1 week
– Soluble paracetamol 15 mg/kg qds for 1 week
– Codeine phosphate syrup 0.75–1 mg/kg qds for 1 week

H = hours; LMA = Laryngeal mask airway; tds = thrice daily; qds = four times daily

TABLE II
INDICATIONS FOR SURGERY

Patient age	T	T + NO	UAO	UAO + T	Total
<5 y	7	4	14	2	27
5 y to 9 y 11 mth	27	5	14	0	46
10 y to 14 y 11 mth	13	3	2	0	18
>15 y	9	0	0	0	9
Total	56	12	30	2	100

Data represent patient numbers. T = recurrent acute tonsillitis; T + NB = recurrent acute tonsillitis plus nasal obstruction; UAO = upper airway obstruction; UAO + T = upper airway obstruction plus recurrent acute tonsillitis; y = years; mth = months

All audit patients underwent surgery performed by the surgical author (PJR). The anaesthetic author (BNE) supervised patients' anaesthesia in seven cases and delivered anaesthesia personally in the remaining 84.

Tonsillectomy was performed using Coblation® dissection (Arthrocare, Austin, TX, USA), and adenoidectomy was performed under direct vision using suction coagulation.[6,7] Both techniques mitigate perioperative blood loss in children, although Coblation has been reported to have a higher secondary haemorrhage rate than 'cold steel' dissection, particularly while the surgeon is learning the technique.[8–10]

Anaesthetic management followed the Epsom protocol (Table I), with the exception that paracetamol was administered intravenously, in order to achieve rapid onset of action with improved bioavailability.[11]

Post-operative management was the same as in our 2006 study, with free fluids offered on return to the ward and, if tolerated, food on demand. Any nausea and vomiting were recorded.

Results

No post-operative nausea or vomiting was recorded in any patient on the day of operation, and no discharges were delayed. For five patients, the nursing record was incomplete, and no assessment of post-operative nausea and vomiting status could thus be made.

Ninety-one per cent of patients required no additional analgesia during admission. Those patients who did need analgesia required one dose only. This was at the discretion of the nursing staff, using a pre-prepared prescription chart with the option of liquid ibuprofen, paracetamol or codeine suspension, dependent on nursing staff assessment of the patient's pain and any contraindications to any of the analgesia prescribed. No child required additional analgesia.

None of the patients suffered post-operative bleeding following adenoidectomy.

One patient (1 per cent) had a minor reactionary bleed on the ward, within three hours of surgery, and was returned to theatre to stop the bleeding. No transfusion was required, and the child was discharged home later the same day. (The expected rate of immediate post-tonsillectomy haemorrhage is 1.0 per cent.)[12]

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Three children (3.3 per cent) had a secondary haemorrhage, all within 10 days of surgery. These were managed conservatively, with no transfusion or return to theatre. (The expected rate of delayed post-tonsillectomy haemorrhage is 3.6 per cent.)[12]

Discussion

There are robust published data supporting the routine use of dexamethasone for elective surgery, although the mechanism of action of this drug in reducing post-operative nausea and vomiting is unknown.[13–15]

When combined with dexamethasone, ondansetron has been reported to prevent nausea and vomiting almost completely. When used together, these two drugs are relatively free of significant adverse effects.[16,17] Similar benefit has been observed for a combination of dexamethasone and another serotonin antagonist, tropisetron.[18]

It is also likely that the lowest dose of dexamethasone (0.0625 mg/kg) is as effective as higher doses in achieving a beneficial antiemetic effect.[19]

Czarnetzki *et al.*[20] have recently raised concerns that dexamethasone, while reducing post-operative nausea and vomiting, may be associated with an increased risk of post-operative bleeding. This study raised many methodological and analytical concerns, and was abandoned because of an unacceptably high bleeding rate (11 per cent). Some of the children involved had multiple episodes of bleeding, and it is possible that these patients had an undiagnosed coagulation disorder such as von Willebrand's disease.[21]

Where routine use of an antiemetic has been adopted, and use of opiate analgesia and nitrous oxide anaesthesia continued, a modest improvement in post-operative nausea and vomiting has been reported (from 27 to 11 per cent). However, this does not match the low level observed in our current audit of the Epsom protocol.[22]

- **Post-operative nausea and vomiting is a common cause of morbidity following routine, elective paediatric ENT surgery**
- **Post-operative nausea and vomiting is a common reason for delayed discharge, whereas low post-operative nausea and vomiting rates facilitate same-day discharge**
- **This study audited and validated a protocol that enables very low rates of post-operative nausea and vomiting**

National UK data have indicated an expected readmission rate of 2.8 per cent following ENT day-case surgery.[2] Furthermore, the Royal College of Surgeons of England guidance specifies that day surgery should be limited to procedures with an expected readmission rate of no more than 2–4 per cent.[23] In our study, 100 per cent of children managed using the Epsom protocol were discharged home on the day of surgery, with the predominant variable being absence of post-operative nausea and vomiting. We have previously reported a parental satisfaction rate of over 94 per cent for the Epsom protocol.[24]

Conclusion

This audit of the Epsom protocol for the management of elective, day-case, paediatric ENT surgery, first described in 2006, demonstrated the benefit of this approach to anaesthesia and analgesia. No post-operative nausea and vomiting occurred, and 100 per cent of patients were discharged on the day of surgery. Furthermore, previously published data indicate a high rate of parental satisfaction.

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