A quality improvement project evaluating haemostasis techniques during tonsillectomy.

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Title

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Key points

- Tonsillectomies are one of the commonest ENT procedures performed in the UK.
- Previous research suggests a possible correlation between surgical technique and the incidence of post-operative haemorrhage; however, these have not explored approaches to checking haemostasis.
- Our study shows that a multi-step approach to checking haemostasis, which includes both the Valsalva manoeuvre and Trendelenburg position can significantly reduce the incidence of post-operative haemorrhage.
- A second benefit to our multi-step approach is a reduction in the number of post-tonsillectomy bleeds that require a return to theatre for surgical exploration and intervention.
- Further studies which extend to regional centres should be conducted for comparison following incorporation of our proposed change in practice for intra-operative haemostasis checks.

Introduction

Tonsillectomies are one of the commonest ENT procedures performed in the UK. The last National Prospective Tonsillectomy Audit carried out in 2003/04 identified a total of 50,531 adult and paediatric patients who underwent a tonsillectomy within the UK [1], and interval commissioning reports conducted by The Royal College of Surgeons of England have recorded continued high volumes of caseloads, with over 31,000 performed in 2012/13 [2] and more than 27,000 performed in 2019/20 [3]. Although tonsillectomy is considered relatively low-risk, previous research has suggested a possible correlation between surgical techniques and the incidence of post-operative haemorrhage [1]; however, most of these explore the surgical equipment and dissection techniques used rather than the approach to checking haemostasis.

Aims and objectives

The aim of this quality improvement project was to evaluate our current practice for achieving and checking haemostasis in tonsillectomies, whilst considering if an alternative approach would result in improved patient outcomes. In doing so, we thereby focussed on the following objectives:

To identify a new practice, which is safe and sustainable, for achieving and checking haemostasis during tonsillectomy.

To reduce the incidence of post-operative haemorrhage following tonsillectomy.

Methods

We identified all patients who underwent a tonsillectomy (+/- other concurrent ENT procedures) by the main author at our local hospital. Informed consent was obtained from each participant prior to their procedure. The SQUIRE framework was used as our reporting guideline.

A two-cycle design was used for data collection, which involved the following: (1) a pre-intervention retrospective cycle covering two years and (2) a post-intervention prospective cycle covering the subsequent five-years. For each patient included in the study, the following parameters were noted:

1. Type of procedure performed,
2. Indication for surgery,
3. Post-operative complications including,
4. Primary haemorrhage,
5. Secondary haemorrhage,
6. Post operative infection.

We studied the management of all complications, particularly highlighting those who required further surgical intervention. Following this, we calculated the bleeding rate per annum for primary and secondary bleeds, with the intention to compare this to our subsequent data collection following implementation of our proposed change in practice for achieving and checking haemostasis.

The inclusion criteria included all dissection tonsillectomy procedures in children and adults by the main author. The exclusions included patients who had a tonsillectomy for histology due to suspected tonsillar cancer, and patients had a coblation intracapsular tonsillotomy. Patients with suspected tonsillar cancer have a potentially challenging vascular surgical field that might affect the haemorrhagic tendency and therefore skew the results. Similarly, intracapsular coblation tonsillotomy is a different procedure to dissection tonsillectomy and cannot be included into the sample.

Cycle one

This was a pre-intervention, retrospective cycle covering a two-year period (January 2013 – December 2014) of paediatric tonsillectomies performed by the main author at [**BLINDED**] ($n = 102$). The surgical technique used for achieving and checking haemostasis conformed to traditional ENT teachings, where each wound is packed with a tonsillectomy swab, the Boyle–Davis mouth gag (BDG) relaxed, and the neck positioned neutrally for one minute to check for any occult bleeders.

Intervention

The main author adopted the common techniques that are utilised in other otolaryngology and head and neck surgery procedures to develop the following multi-step approach to the haemostatic check at the final stage of a tonsillectomy:

1. Pack wound with swab, relax gag, and neutralise neck position for one minute.
2. Re-extend the Boyle–Davis mouth gag (BDG), remove swabs and wash the site with a saline-soaked swab.
3. Valsalva manoeuvre if allowed by airway device.
4. Trendelenburg position.

To ensure patient safety was not compromised during the second cycle, we carried out a researched, evidence-based approach to the implementation of a change in practice for achieving and checking haemostasis in our tonsillectomy cases. Recent studies have shown that the Trendelenburg position can detect a significantly higher number of bleeding vessels in head and neck surgery compared to the Valsalva manoeuvre alone, with one study reporting additional bleeding points identified in 68% of patients with the use of the Trendelenburg tilt following Valsalva[4]. In this same study, it is also important to note that in five cases, there was significant bleeding that required suturing which were not identified using the Valsalva manoeuvre alone.

Cycle two

This was a post-intervention, prospective cycle covering approximately a five-year period (January 2015 – September 2016; January 2018 – July 2021) of tonsillectomies performed by the main author at [**BLINDED**] ($n = 153$). The process for checking haemostasis outlined above was used in all cases, following which the outcomes from both cycles were compared.

Results

In both cycles, the commonest procedures performed were tonsillectomy and adenotonsillectomy, respectively (Table 1), with the most common surgical indications being recurrent tonsillitis and obstructive sleep apnoea (Table 2).

Procedure	Cycle 1	Cycle 2
Tonsillectomy	74%	60%
Adenotonsillectomy	11%	24%
Adenotonsillectomy + grommets	7%	9%
Bilateral grommets + tonsillectomy	7%	5%
Microlaryngoscopy and bronchoscopy (MLB) + tonsillectomy	1%	1%
MLB + adenotonsillectomy	0%	1%

Table - Procedures performed

Indication	Cycle 1	Cycle 2
Recurrent tonsillitis	59%	44%
Obstructive sleep apnoea (OSA)	34%	47%
Tonsillar asymmetry	5%	5%
Tonsillitis + OSA	2%	0%
Croup + tonsillitis	0%	1%
Croup + OSA	1%	0%
Quinsy	0%	1%
Periodic fever, aphthous stomatitis, pharyngitis, and cervical adenitis (PFAPA)	0%	1%

Table - Indications for procedure

As detailed in Table 3, 14% of patients in the first cycle of this project had endured post-operative bleeding compered to 7% of patients in the second cycle. However, the primary haemorrhage rate had dropped from 3% in the first cycle to complete absence (0%) in the second cycle. Secondary haemorrhage rates had also decreased between the two cycles from 11% to 7%. Post-operative infection rates were similar in both cycles. Antibiotics were given in 68% and 100% of post-operative complications in cycle one and two respectively, with 37% patients returning to theatres for examination under anaesthetic and arrest of haemorrhage in cycle one compared to only 5% in cycle two (Table 4). This need for further surgical exploration accounts for 50% of post-operative bleeds in cycle one, and 9% cycle two following our intervention.

Table 3 - Post-operative complications

Management	Cycle 1	Cycle 2
Antibiotics	68%	100%
Return to theatre (EUA)	37%	5%
Post-operative bleeds requiring further surgical exploration / intervention	50%	9%

Complication	Cycle 1	Cycle 2
Primary bleed	3%	0%
Secondary bleed	11%	7%
Infection	5%	6%

Table - Management of post-operative complications

Discussion

Our change in practice for checking for adequate intra-operative haemostasis has successfully reduced the incidence of post-operative haemorrhage in our tonsillectomy patients. The most important impact is the significant absence of any primary post-tonsillectomy bleeding in the second cycle. Moreover, the data suggests a second benefit of reducing the number of post-operative bleeds requiring further surgical exploration and intervention and therefore reducing patients' morbidity and mortality. These successes not only have the potential to improve the post-operative recovery of our paediatric patients, but also reduce the incidence of re-admissions, length of hospital stay and resource allocation.

One potential limitation that we have identified in this study is the use of a single surgeon's patient workload, preventing us from comparing operative surgical techniques for the tonsillectomy itself. However, as the purpose of this study was to compare post-operative complications following a change in our approach to checking haemostasis, we consider that using the outcomes of one surgeon should rule out other factors that could influence the outcomes due to operative technique variability. To further add support to our results, we would propose additional audits with a larger patient cohort, from multiple regions and consultant workloads, so we may determine a consensus for adequate haemostasis checks, regardless of methods of dissection.

Conclusion

Through the implementation of a four-step, evidence-based process of achieving and checking adequate haemostasis, this project has successfully reduced the overall incidence of post-operative haemorrhage in our paediatric tonsillectomy cases. Furthermore, our change in haemostasis practice has suggested a second benefit of reducing the number of post-operative bleeds which require a return to theatre for further surgical exploration and intervention. However, despite these suggested improvements in patient outcomes, further audits should be conducted to incorporate a larger patient cohort with extension to other regional centres for comparison following incorporation of our proposed change in practice for intra-operative haemostasis checks.

References

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