



# The management of vacuum neck drains in head and neck surgery and the comparison of two different practice protocols for drain removal

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## ABSTRACT

**INTRODUCTION** The management of vacuum neck drains in head and neck surgery is varied. We aimed to improve early drain removal and therefore patient discharge in a safe and effective manner.

**METHODS** The postoperative management of head and neck surgical patients with vacuum neck drains was reviewed retrospectively. A new policy was then implemented to measure drainage three times daily (midnight, 6am, midday). The decision for drain removal was based on the most recent drainage period (at <3ml per hour). A further patient cohort was subsequently assessed prospectively. The length of hospital stay was compared between the cohorts.

**RESULTS** The retrospective audit included 51 patients while the prospective audit included 47. The latter saw 16 patients (33%) discharged at least one day earlier than they would have been under the previous policy. No adverse effects were noted from earlier drain removal.

**CONCLUSIONS** Measuring drainage volumes three times daily allows for more accurate assessment of wound drainage, and this can lead to earlier removal of neck drains and safe discharge.

## KEYWORDS

Drainage – Head and neck surgery

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The need for drainage of surgical wounds in elective head and neck (H&N) surgery is dependant on factors such as extent of surgery and the anticipation of postoperative drainage.<sup>1</sup> Prolonged wound drainage can cause complications (eg seroma formation, wound infection and delayed healing) and it can incur additional cost as hospital stay is prolonged.<sup>2</sup> Although there are units that allow some patients to go home with the drain in place,<sup>3</sup> this practice has not been adopted in our patient management care pathway.

Previously in our practice, vacuum drains were removed if the drainage volume over 24 hours was <25ml. A study by Amir *et al* looked at eight-hourly drainage measurement and removed drains when the most recent drainage volume was <1ml per hour.<sup>4</sup> As a result, 65% more patients were discharged the day after surgery. In view of the reported success, a similar protocol was adopted at our institution to assess whether it would reproduce the encouraging findings. In our study, neck dissections were also included. The intention was to enable safe early removal of surgical neck drains, thereby improving the patient experience, shortening the length of stay and reducing complications of prolonged wound drains in situ.

## Methods

A retrospective audit was carried out of consecutive patients who underwent H&N surgery and had a vacuum suction neck drain placed between February and April 2013. The aim was to assess our management of these drains before implementation of a new management protocol. Elective H&N procedures that required vacuum neck drains are summarised in Table 1. The patients were a heterogeneous group who underwent a wide variety of operations from parotidectomies to radical neck dissections and total thyroidectomies.

Prior to the start of the prospective audit (which took place between December 2013 and March 2014), a meeting was held with the nursing staff to discuss the feasibility of this audit. The time for drainage measurement in the morning (6am) was chosen to coincide with the normal nursing observation rounds. Measuring drainage at midday was perceived to be onerous but after convincing the management staff of the potential benefits (which included safe and expedited discharge), this practice was implemented by the senior nurses. Implementation of wound drainage at

**Table 1** Retrospective analysis (1st audit cycle, February – April 2013) of vacuum neck drain management

Operation (1st cycle)	n	Median time for drain being in situ
Selective neck dissection +/- thyroidectomy	27 (53%)	4 days
Radical / modified radical neck dissection	10 (20%)	3.5 days
Parotidectomy (superficial, total and radical)	8 (16%)	2 days
Hemithyroidectomy / total thyroidectomy	4 (8%)	2 days
Other	2 (4%)	2 days
<b>Total</b>	<b>51 (100%)</b>	

**Table 2** Prospective analysis (2nd audit cycle, December 2013 – March 2014) of vacuum neck drain management with drainage volume measured three times daily

Operation (2nd cycle)	n	Median time for drain being in situ
Selective neck dissection +/- thyroidectomy	26 (55%)	3 days
Radical / modified radical neck dissection	5 (11%)	4 days
Parotidectomy (superficial, total and radical)	5 (11%)	2 days
Hemithyroidectomy / total thyroidectomy	7 (15%)	2 days
Other	4 (9%)	1.5 days
<b>Total</b>	<b>47 (100%)</b>	

midnight was relatively straightforward. The nurses were therefore instructed to measure neck wound drainage volumes at midnight, 6am and midday. Doctors were advised to ask for measurements at the specified times and were also reminded daily on the ward rounds by the authors.

The maximum neck wound drainage rate of 20ml in six hours (3.3ml per hour) was set as the upper limit of when a drain could be removed (albeit not at night). This volume was chosen as it is an easy figure to remember. Furthermore, in the senior author's experience, it is safe for drain removal. Clinicians were advised to act on the drainage rate of the preceding six hours (ie midnight to 6am or 6am to midday) rather than on the 24-hour drainage volume unless the latter was significantly high (eg >100ml per day). The final decision on drain removal rested with the surgical team and every case was assessed on its own merit.

## Results

The retrospective audit (first cycle) included 51 patients (Table 1). The mean age was 56 years (range: 26–78 years). Nineteen patients (37%) did not have drainage

measured at midnight. One patient who developed a neck collection after drain removal was managed conservatively without any adverse sequelae. The patient had a modified radical neck dissection and the drain was removed on day 3 after a drainage measurement of 20ml between midnight and 6am. Day 1 produced 155ml and day 2 produced 62ml in total. The patient returned to hospital on day 10 with a wound seroma, which was aspirated.

The prospective audit (2nd cycle) included 47 patients (Table 2). The mean age was 51 years (range: 18–81 years). Sixteen patients (33%) were discharged early, saving 16 bed days. Of these, 7 patients (15%) were discharged in the afternoon subsequent to the drainage being reviewed at lunchtime. No complication was noted in any of these patients as a result of earlier drain removal. Nineteen cases (40%) were identified where there was deviation from the recommended practice, resulting in delayed removal of neck drains. This translated to a saving of 29 bed days being lost. Comparing the length of time the drain was in situ between the audits only showed a statistical significant difference for selective neck dissection procedures (Table 3).

**Table 3** Comparison of length of time of drain being in situ in the two audit cycles

Operation	Median time for drain being in situ		p-value*
	1st cycle	2nd cycle	
Selective neck dissection +/- thyroidectomy	4 days	3 days	<0.001
Radical / modified radical neck dissection	3.5 days	4 days	1
Parotidectomy (superficial, total and radical)	2 days	2 days	0.943
Hemithyroidectomy / total thyroidectomy	2 days	2 days	1
Other	2 days	1.5 days (No statistical analysis due to small numbers)	

\*Mann–Whitney U test

## Discussion

The main finding of this comparative study was the cost efficiency gained by implementation of the new neck drain management protocol, which allowed earlier safe patient discharge. This equated to total cost savings of £2,336 over the period of the second audit cycle (£146 per bed day). Moreover, a further £4,234 (29 bed days) could have been saved owing to the 19 patients for whom there was a deviation from the protocol that led to delayed drain removal. It is important to note that the cost of a bed day is considerably higher in several other NHS trusts. The lack of consensus in the criteria used for neck drain removal could be a reflection of either the complexity of the subject or the level of experience of the clinician (junior doctor) making the decision to remove the neck drain rather than simply the volume of drain output.

It is well documented that early drain removal is preferred by patients and decreases discomfort. This has the effect of improving patient mobilisation and possibly reducing postoperative complications such as deep vein thrombosis and chest infections. The patient can be discharged home earlier without a drain.<sup>4,6</sup> There is also the additional advantage of improved patient flow, allowing the following day's elective patients to be admitted.

The retrospective audit highlighted the need for change in our management of H&N vacuum drains (ie acting only on 24-hour drainage). Subsequent recommendations improved rates of early drain removal and patient discharge by 33%. Only selective neck dissection showed a statistically significant difference in the timing of drain removal. The numbers of cases in the other groups were possibly too low to show an effect. There is still improvement to be made, especially with non-measurement of drains at the specified times.

In the 40% of cases where there was deviation from the recommended protocol, this related mostly to measuring wound drainage at midday. Doctors preferred to leave the drain for another 24 hours than review the drainage at

midday. Trying to break this habit is difficult and if the authors had not been on the morning ward round reminding the team of the proposed benefits of regular wound drainage review, there would have been higher non-compliance with the policy. However, it was apparent that as the study progressed and patients were discharged earlier than expected, doctors on the ward were more likely to review wound drainage at midday.

## Conclusions

Most recommendations on when to remove vacuum drains are based on 24-hour drainage rates<sup>5,6</sup> and this can be inaccurate as most wound drainage tends to occur within the first few hours following surgery. This audit adds to the growing body of evidence that by interval measurement of drainage volumes in 24 hours, a more accurate and current wound drainage rate can be assessed.

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