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Outpatient parotidectomy with or without the use of a post-operative drain: a retrospective bi-institutional study

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## SUMMARY

### Objective

Parotid surgery is historically performed as an inpatient procedure and suction drains are predominantly used during surgery. Recent literature provides evidence that outpatient parotid surgery is safe and effective. Our study aims to describe the results of drainless outpatient parotidectomy and outpatient parotidectomy with drain placement and compare their outcomes.

### Design

Retrospective cohort study

### Participants

Patients that underwent outpatient drain-less parotidectomy and patients that underwent outpatient parotidectomy with post-operative drain placement.

### Results

Three hundred eighty patients underwent outpatient parotidectomy with drain placement and 31 patients underwent outpatient drainless parotidectomy in two different hospitals. The incidence of hematoma (drain: 3.1% vs. drainless: 0%,  $p=1$ ), infection (drain: 14.3% vs. drainless: 13.8%,  $p=1$ ), and salivary fistula (drain: 5.6% vs. drainless: 3.4,  $p=1$ ) were comparable between both groups. Seroma or sialocele was more frequently seen in the drain-less group (27.6% vs. 6.2%,  $p<0.001$ ), but were all managed conservatively. Within ten days after surgery, unplanned visits seemed more frequent in the drain group, although the difference was not statistically significant (14.9% vs. 3.4%,  $p=0.16$ ).

### Conclusions

Outpatient parotid surgery with or without the use of a post-operative drain is safe, practical, and feasible. Same-day discharge with and without drain placement yield comparable outcomes. However, the results need to be interpreted cautiously as this study was limited by a small cohort of parotidectomies without drain placement. Future studies should further compare both approaches.

**Key Words:** parotid gland, parotid, parotid surgery, salivary gland tumor, salivary gland surgery, outpatient surgery, outpatient, same-day surgery, drain placement, retrospective study

**Key Points:**

1. This retrospective study reports on the outcomes of outpatient parotid gland surgery with and without drain placement.
2. This study presents the largest retrospective cohort of outpatient performed parotidectomies to date.
3. For outpatient surgery to be successful, the procedure, the anesthesia, as well as the patient need to be a good fit.
4. Same-day discharge with and without a drain after parotid gland surgery yields comparable outcomes.
5. Outpatient parotid gland surgery is a safe, practical and feasible alternative to inpatient surgery in select patients.

**Data Availability Statement:** The deidentified individual participant data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

## Introduction

The general treatment of a parotid tumor is surgical resection (parotidectomy). The extent of the procedure depends on the histopathological subtype, location, and size of the tumor, as well as preferences and experience of the surgeon. Post-surgery, a vacuum drain is often placed to drain and obliterate the dead space left after tumor and parotid tissue removal, which often warrants an inpatient overnight stay. In most practices, the drain is removed when the drainage fluid volume is under a certain amount per 24 hours. However, numerous other factors (high age, comorbidities, distance from home to hospital) influence the choice between inpatient and outpatient surgery. Altogether this results in an average length of stay of 1.8 – 2.5 days (1, 2).

Over the course of years, outpatient surgery has become a routine practice in otorhinolaryngology. The primary motivators for performing outpatient surgery were to decrease healthcare costs and to make more efficient use of hospital facilities and personnel (3). In 1991, Steckler was the first to describe outpatient parotid gland surgery. Patients left the hospital with a drain, which was removed on day three after surgery. This proved convenient for both patient and caregiver, and, most importantly, safe. (4). Parotid surgery is suitable for day-case surgery because of its low post-operative morbidity.

It is clinician, patient and health-system dependent whether parotidectomy can be performed as an outpatient or inpatient procedure. As stated, most clinicians routinely place post-operative suction drains after parotid surgery. Some physicians have questioned the standard use of drain placement in parotid gland surgery. Studies on this subject report the use of fibrin sealants and pressure (balaclava) bandages in selected patients. Drainless parotidectomy could make way for same-day discharge without the need to report back for drain removal (5-7).

Current literature regarding outpatient parotid surgery is relatively sparse. A recent systematic review regarding outpatient parotid surgery includes only six studies: five describing outpatient procedures using a drain and only one that reports on a drainless approach (8). It concludes that outpatient parotid surgery is safe and feasible in select patients.

Our study aims to describe the results of two cohorts: the first cohort contains patients that had outpatient parotidectomy with drain placement and the second cohort contains patients that had outpatient parotidectomy without drain placement.

## Methods

A retrospective cohort study was conducted, including cohorts from two different hospitals. All consecutive patients that underwent a parotidectomy between 1-1-2011 until 1-1-2020 at the Radboudumc and between 1-1-2018 and 1-6-2022 at the NHS Tayside were identified. The data was gathered between 1-1-2020 and 1-5-2020 at the Radboudumc and between 1-1-2022 and 1-7-2022 at NHS Tayside. All written patient charts and electronic patient files were reviewed and the following variables were gathered: age, ASA-score, anticoagulant use, planned as an outpatient procedure (an overnight stay was considered as an inpatient procedure), reason of prolonged stay, pathological examination result, unplanned visits in the emergency department (ED) or outpatient clinic visit, and the occurrence of post-operative complications such as hemorrhage (necessitating surgical intervention), hematoma (treated conservatively), seroma or sialocele (differentiation impossible; no routine amylase check), salivary fistula, or infection. Infection was registered when antibiotics were prescribed in combination with redness and or swelling present in the post-operative course. All patients had at least 2 months of follow-up (up until the first outpatient clinic visit).

### *Drain treatment group - indication and procedure*

At the Radboudumc otorhinolaryngology department outpatient parotidectomy is considered standard practice. Exclusion criteria for outpatient parotidectomy are simultaneous neck dissection, extended surgery in case of malignancy, a (partly) parapharyngeal resection, significant comorbidities, or no carer present at home post-surgery. The outpatient procedure consists of a parotidectomy with low-vacuum drain placement. Patients are discharged with this drain after at least four hours of observation. The drain is removed two to four days after surgery by a nurse in the outpatient clinic.

### *Drainless treatment group - indication and procedure*

At the NHS Tayside otorhinolaryngology department drain-less outpatient parotidectomy is the standard practice. The following exclusion rules apply: concurrent neck dissection, extended surgery in case of malignancy, a (partly) parapharyngeal resection, long distance from home to hospital, significant comorbidities, or no carer present at home post-surgery. The drain-less approach at NHS Tayside includes an intra-operative prophylactic or therapeutic use of a hemostatic agent, the approximation of parotid wound bed with or without a sternocleidomastoid flap, and the application of a pressure dressing or a balaclava bandage for 24-48 hours post-operatively. Patients are discharged after at least four hours of observation(7).

### *Statistical analysis*

All data were analyzed using IBM SPSS statistics, version 25 (IBM Corp., Armonk, New York, United States). Means were noted alongside with the calculated standard deviation (SD). Differences in mean age between treatment groups were analyzed using the unpaired sample t-test. The Chi-squared and Fisher exact tests were applied to detect differences between descriptive data, complication rates, and ED visits. A p-value <0.05 was regarded as significant.

## *Ethical approval*

This study was approved by the research ethics committee of the Radboudumc and the clinical governance department at the NHS Tayside. Informed consent was waived because of the retrospective nature of the study and because of the use of anonymous clinical data. The study was performed following the principles of the Declaration of Helsinki.



## Results

During the study period, 380 patients underwent outpatient parotidectomy at the Radboudumc (drain group), and 31 patients underwent outpatient parotidectomy at NHS Tayside (drainless group).

The mean age in the drain group was 53.9 years (SD 13.5), compared to 56 years (SD 12.7) in the drainless group ( $p=0.405$ ). These and other patient characteristics are summarized in Table 1.

Most patients in both groups had benign superficial tumors. Hemostatic agents were used in the drain-less group in all but nine patients. In ten patients in the drain-less group a sternocleidomastoid flap was pulled and sutured to the remaining parotid bed. Other per- and post-operative observations are summarized in Table 2.

Ultimately, 322 of the 380 patients planned for outpatient surgery in the drain group (84.7%) were discharged the same day. In the drainless group, 29 of 31 (93.6%) were able to leave the hospital the same day. The most frequent reasons for an unplanned prolonged stay appeared to be anesthesia-related, including post-operative nausea in the drain group (3.9%), and drowsiness and hypotension in the drainless group (both  $n=1$ , 3.2%). All reasons for a prolonged stay are listed in Table 3.

### *Complication rates and unplanned visits*

Post-operative complication rates, emergency visits, and readmission rates are summarized in Table 4.

Seroma or sialocele formation was more frequently seen in the drainless group (27.6% vs. 6.2%,  $p<0.001$ ). No correlation was found between the use of these fibrin sealants and the occurrence of post-operative seroma/sialocele (Cramers  $V = 0.365$ ,  $p=0.145$ ).

Ten hematomas occurred in the drain group, of which two patients used anticoagulant therapy (acetylic acid), versus no hematomas in the drainless group. One re-bleed that necessitated immediate exploration in the operating theatre occurred in the drain group, whereas no re-bleeds occurred in the drainless cohort.

In comparison to the drain group, there were fewer unplanned visits within ten days after surgery reported in the drain-less group, although the difference was not statistically significant (14.9% vs. 3.4%,  $p=0.1$ ). Within the drain group, only 1 of the 17 unplanned visits within three days after surgery in the drain group was directly drain related (drain dysfunction). Most visits within three days occurred because of redness and swelling due to possible infection ( $n = 12$ ), and four visits were because of swelling that was not directly drain related (drain was still functioning). In the drain-less group, only one unplanned visit was noted within three days after surgery, which was because of seroma or sialocele.

In the drain group, two patients were readmitted (0.6%). One patient was readmitted the day after surgery because of severe nausea, and the other was readmitted one week after surgery because of a hemorrhage that occurred when the stitches were removed. This patient used oral anticoagulants (acenocoumarol). Of the five re-bleeds that happened in the anesthesia unit, zero patients used anticoagulant therapy.

In the drainless group, the patient that had an unplanned visit because of seroma/sialocele was the only readmitted patient (3.4%). This patient subsequently had an aspiration of seroma and was discharged the next day following a review by the ENT team.

## Discussion

It is still common practice to perform inpatient parotid gland surgery. Our study presents two cohorts in two different hospitals that underwent outpatient parotidectomy with either a drain-less approach or with post-operative drain placement.

Notably, no major complications occurred in both the drainless and drain groups, rendering that outpatient parotid gland surgery is safe and feasible. The majority of the complications that did occur were managed conservatively in either the emergency department, the outpatient clinic, or by the general practitioner. All hemorrhages that occurred were timely manageable and occurred under safe circumstances.

A recently conducted systematic review found a pooled incidence of 2.9% for hematoma's (9), which is similar to the hematoma rate in the current study (3.1%). Of note, no hematomas occurred in the drain-less cohort. This could be attributed to by the intra-operative prophylactic or therapeutic use of a hemostatic agent, the use of a sternocleidomastoid flap, and the use of the balaclava bandage.

Despite these prophylactic measures, there was a higher frequency of post-operative seroma or sialocele reported in the drain-less group (drainless: n=8 or 27.6%, drain: n=20 or 6.2%,  $p<0.001$ ). While the exact reason for this observation remained unclear, this could possibly be caused by over-diagnosis of sialocele or seroma. The diagnosis of sialocele or seroma and the differentiation between this and a hematoma or even post-operative edema is difficult, especially when no drain is placed, but also when examined by non-ENT practitioners, such as the general practitioner or emergency department doctor, who are unfamiliar in managing these patients in the post-operative course. Previous literature on drainless parotid surgery has not shown a higher frequency of seroma or sialocele formation, whilst these studies included larger sample sizes (6, 10, 11). Future studies should include short term post-operative follow-up with an ENT physician to evaluate if seroma or sialocele is in fact more apparent. And if seromas would indeed be more common when omitting drain placement, the question is: what is less favorable for the patient: having the nuisance of a drain in situ, or temporary swelling due to a seroma? In addition, patient preference as towards inpatient or outpatient surgery is also an interesting topic. Not all patients may desire outpatient surgery, mostly because of anxiety related to the immediate post-operative period or drain-related fears. Both of these questions could be answered in a future prospective study that includes quality of life questionnaires.

There was no difference in unplanned visits within three days between both groups (representing the maximum time that the drain was left in place), and only one visit in the drain group was directly related to drain placement. Unplanned visits within ten days after surgery were more prevalent in the drain group (drain: 14.9%, drainless: 3.4%,  $p=0.1$ ), however these outcomes did not differ significantly.

The occurrence of salivary fistulas as a complication was comparable between both cohorts (drain: 5.6%, drainless: 3.4%,  $p=1$ ). This is slightly higher than the 3.1% incidence rate reported in the earlier mentioned systematic review (9). However, some previous studies report that salivary fistulas may occur more frequently after less extensive parotidectomy, such as superficial parotidectomy and partial superficial parotidectomy (12, 13). This observation probably explains the slightly more

frequent occurrence of salivary fistulas, as our patients mostly had benign superficial tumors that are preferably treated by partial superficial parotidectomy.

Surgical site infection occurrence rates were similar in both studies (drain: 14.3%, drainless: 13.8%,  $p=1$ ). This is on the high spectrum compared to the pooled incidence of 2.1% that was reported in the earlier cited systematic review (9). This is most likely caused by the definition used for surgical site infection in this retrospective study. If antibiotics were prescribed for a possible infection in the post-operative course, we registered this as an infection, although practically this may not necessarily represent a 'true' infection and may result in the overestimation of the incidence of infections.

For outpatient surgery to be successful, the procedure, the anesthesia, as well as the patient need to be a good fit. Our results primarily prove that the procedure is capable of being performed in an outpatient fashion. Moreover, these results showed that the primary reasons of staying overnight are related to the anesthesia, mostly being nausea and drowsiness. There are various careful considerations as to the anesthesia and its recovery process. Although some describe the use of sedation combined with locoregional anesthesia (14-16), general anesthesia is by far the most frequently performed for outpatient parotid surgery. Frequently used general anesthetics in outpatient surgery are propofol alone, or propofol induction combined with sevoflurane or desflurane. The use of propofol is associated with a lower incidence of post-operative nausea and vomiting, whereas the use of sevoflurane and desflurane is associated with faster post-operative recovery (17). During the post-operative recovery post-operative nausea should be managed with sufficient anti-emetics, and post-operative pain scores should be frequently assessed and acted upon. Patients are considered ready for discharge when they are able to walk, drink, and urinate.

This study was limited by several factors. First, and most importantly, the drainless group had a small sample size. Other limitations include the possibility of information bias caused by the retrospective nature of the study. Further, the decision of performing outpatient or inpatient surgery is based on many factors, such as patient preference, comorbidities, tumor size, tumor location, tumor dignity. No strict guidelines as to which patients can and cannot be planned in outpatient surgery exist, which may cause selection bias and introduces heterogeneity amongst included patients. Another important confounder lies in the fact that both cohorts were treated in different hospitals, and that any found differences in complications may also be attributed to by differences between the treating surgeons, hospitals and/or countries. Last, basic demographics did not differ between both group, but residual confounding remains as not all relevant patient characteristics are compared (e.g. smoking, hypertension, use of anticoagulants), whereas these may be positively or negatively related to the investigated outcome measure (e.g. use of anticoagulants and hematoma formation).

This study describes the results of drain and drainless outpatient parotidectomy side-by-side. It presents the most extensive retrospective cohort study of parotidectomies performed in outpatient setting published to date. The results support outpatient parotid gland surgery, both methods prove to be safe as no major complications occurred outside of the hospital. However, given all the mentioned limitations, the direct comparison of the both procedures in this study needs to be evaluated with caution. Considering the relatively small cohort of parotidectomies without drain placement, further studies regarding this technique are warranted. In addition, studies are needed that evaluate patient satisfaction and patient preference.

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## List of tables

|                                 | Drain (n=380) | Drainless (n=31) | p-value |
|---------------------------------|---------------|------------------|---------|
| <b>Age mean (SD)</b>            | 53.9 (13.5)   | 56 (12.7)        | p=.760  |
| <b>Sex male n= (%)</b>          | 217 (57.1%)   | 15 (48.4%)       | P=0.930 |
| <b>ASA n= (%)</b>               |               |                  | P=0.617 |
| 1                               | 167 (44.3%)   | 16 (51.6%)       |         |
| 2                               | 192(50.9%)    | 13 (41.9%)       |         |
| 3                               | 18 (4.8%)     | 2 (6.5%)         |         |
| 4                               | (0%)          | (0%)             |         |
| <b>Anticoagulant use n= (%)</b> | 54 (14.2%)    | 2 (6.5%)         | P=0.287 |

Table 1. Patient characteristics

|                                      | Drain (n=380) |      | Drainless (n=31) |      | p-value |
|--------------------------------------|---------------|------|------------------|------|---------|
|                                      | N=            | %    | N=               | %    |         |
| <b>Tumor location</b>                |               |      |                  |      | p=.760  |
| Superficial lobe                     | 340           | 89.5 | 27               | 87.1 |         |
| Deep lobe                            | 40            | 10.5 | 4                | 12.9 |         |
| <b>Dignity</b>                       |               |      |                  |      | p=.989  |
| Benign                               | 310           | 81.6 | 25               | 80.6 |         |
| Malignant                            | 36            | 9.5  | 3                | 9.7  |         |
| Non-neoplastic                       | 34            | 8.9  | 3                | 9.7  |         |
| <b>Drain placement</b>               | 380           | 100  | -                | -    |         |
| <b>Sternocleidomastoid flap used</b> | 0             | 0%   | 10               | 32.3 |         |
| <b>Fibrin sealant</b>                |               |      |                  |      |         |
| Floseel                              | -             | -    | 5                | 16.1 |         |
| Tisseel                              | -             | -    | 16               | 51.6 |         |
| Surgiflo                             | -             | -    | 1                | 3.2  |         |
| No fibrin sealant                    | 380           | 100  | 9                | 29   |         |

Table 2. Per- and post-operative observations

| Reason                             | Drain (n=380) |     | Drainless (n=31) |     |
|------------------------------------|---------------|-----|------------------|-----|
|                                    | N=            | %   | N=               | %   |
| Nausea                             | 15            | 3.9 | -                | -   |
| Drowsiness                         | 7             | 1.8 | 1                | 3.2 |
| Surgery exceeded the allotted time | 6             | 1.6 | -                | -   |
| Hemorrhage                         | 5             | 1.3 | -                | -   |
| Urinary retention                  | 5             | 1.3 | -                | -   |
| OSAS <sup>a</sup>                  | 5             | 1.3 | -                | -   |
| Surgeon's preference               | 4             | 1.1 | -                | -   |

|                    |   |     |   |     |
|--------------------|---|-----|---|-----|
| Headache           | 3 | 0.8 | - | -   |
| Hematoma           | 2 | 0.5 | - | -   |
| Hypertension       | 2 | 0.5 | - | -   |
| Hypotension        | - | -   | 1 | 3.2 |
| Other <sup>b</sup> | 4 | 1.8 | - | -   |

<sup>a</sup> OSAS = Obstructive sleep apnea syndrome

<sup>b</sup> other includes language barrier (n=1, 0.3%), pain (n=1, 0.3%), tracheal stenosis (n=1, 0.3%), blast crisis (n=1, 0.3%)

Table 3. Reasons for a prolonged stay after surgery.

|                         | Drain (n=322)  |      | Drainless (n=29) |      | p-value |
|-------------------------|----------------|------|------------------|------|---------|
|                         | N=             | %    | N=               | %    |         |
| Infection               | 46             | 14.3 | 4                | 13.8 | 1       |
| Hematoma                | 10             | 3.1  | -                | -    | 1       |
| Seroma/sialocele        | 20             | 6.2  | 8                | 27.6 | < .001  |
| Salivary fistula        | 18             | 5.6  | 1                | 3.4  | 1       |
| Hemorrhage              | 1 <sup>a</sup> | 0.3  | -                | -    | 1       |
| Unplanned visits        |                |      |                  |      |         |
| < 3 days after surgery  | 17             | 5.3  | 1                | 3.4  | 1       |
| < 10 days after surgery | 48             | 14.9 | 1                | 3.4  | .1      |
| Readmissions            | 2              | 0.6  | 1                | 3.4  | .16     |

<sup>a</sup> five hemorrhages occurred directly post-surgery on the anesthesia unit, and therefore these patients were admitted for a longer period

Table 4. Complication rates, unplanned visits, and readmission rates for drain and drainless approach