Frequency and outcomes of submandibular gland obstruction following resection of squamous cell carcinomas in the vicinity of the submandibular duct

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ABSTRACT

INTRODUCTION The aim of this study was to report rates, associated factors and outcomes of submandibular gland obstruction following surgery for squamous cell carcinoma in the anterior floor of the mouth (FOM) or ventral tongue without a neck dissection where resection has involved (or has been in very close proximity to) the submandibular duct.

METHODS A retrospective case note review was carried out for the period January 2007 to December 2011. Only patients who received primary local surgical resection for squamous cell carcinoma of the anterior FOM or ventral tongue were included.

RESULTS Fifty-two patients were analysed. Fifteen (29%) developed submandibular gland symptoms following surgery. Symptoms resolved spontaneously for 14 (93%) and 1 patient required the submandibular duct to be repositioned. Comparatively, 2 patients (13%) developed symptoms when the duct was repositioned during primary surgery. No patients had their submandibular gland removed.

CONCLUSIONS Resection of small tumours associated with the FOM and ventral tongue in proximity to the submandibular duct is associated with obstructive symptoms in about a quarter of patients; this is reduced by half when redirecting the duct. Symptoms are self-limiting and self-resolving. A prospective clinical trial comparing duct repositioning with subcapsular gland excision would help clarify potential benefits and best treatment modalities.

KEYWORDS

Oral cancer – Saliva obstruction – Surgery – Submandibular duct repositioning – Audit

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The current trend is to perform de-escalating strategies including wide local excision for early oral cancers. This avoids neck dissection and microvascular free flap reconstruction, thereby preserving functional outcomes and quality of life.¹ However, one complication following local resection of oral cancers involving the floor of the mouth (FOM) or ventral tongue is submandibular gland obstruction. Furthermore, the literature remains imprecise with rates of submandibular gland obstructions varying considerably from 17% to 49% (Table 1).^{2–4}

The importance of addressing intraoperative duct repositioning and indications for further surgery is twofold. First, the current evidence is limited. Ord and Lee reported 2/13 patients (15%) with submandibular gland obstruction after duct repositioning following FOM resections.⁵ Second, this information is necessary for decisions regarding the best surgical therapy (ie repositioning vs removal of the submandibular gland). In addition, the complication of submandibular gland obstruction is a burden on both patients

and resources; obstructed glands cause patient discomfort and can also mask nodal spread, often requiring further imaging. This contributes to a fear of recurrence, which has been shown to be a dominant concern for patients during the follow-up period.⁶ Our study aimed to report rates, associated factors and outcomes of submandibular gland obstruction following surgery for squamous cell carcinoma close to the FOM without a neck dissection where resection has involved (or was in close proximity to) the submandibular duct.

Methods

The Liverpool oncology database was used to identify patients with primary surgical treatment for squamous cell carcinoma of the anterior FOM or ventral tongue between January 2007 and December 2011. Patients with a neck dissection, free flap reconstruction or posterior FOM resection were excluded. Case notes were searched, and data were extracted regarding

Table 1 Evidence from the literature

	Stimson, 1983 ²	Mihail, 1987 ³	Goodson, 2012 ⁴	Ord, 1996 ⁵	Present study
Number of patients	41	58	82 (41 floor of mouth or ventral tongue)	13	52
Surgery	Not mentioned			Not mentioned	
Laser		10 (17%)	82 (100%)		39 (75%)
Monopolar		12 (21%)			13 (25%)
Scalpel		36 (62%)			
Ducts repositioned	27/41 (66%)	0/58 (0%)	0/41 (0%)	13/13 (100%)	15/52 (29%)
Submandibular gland symptoms	7/41 (17%)	9/47 (19%)	20/41 (49%)	2/13 (15%)	15/52 (29%)
Outcomes	Lower occurrence of symptoms when the duct was redirected intraoperatively	No significant difference between surgical modalities (laser vs monopolar) in terms of symptoms	16/20 (80%) managed conservatively; 4/20 (20%) had ducts redirected	2/13 (15%) developed symptoms when ducts were repositioned	14/15 (93%) managed conservatively

the site and pathological stage of the tumour, operation details (including treatment modalities and submandibular duct identification and/or repositioning) and treatment outcomes. Postoperative submandibular duct obstruction was analysed by searching case notes and clinical letters for evidence of symptoms, imaging of the submandibular region via ultrasonography, magnetic resonance imaging (MRI) or fine needle aspiration (FNA), or reoperation for either duct repositioning or submandibular gland excision. Information was sought for up to six months following initial surgery. This audit was approved by the audit department.

Statistical analysis was predominantly descriptive. Additionally, Fisher's exact test or the chi-squared test were applied to comparative analyses of factors in relation to postoperative submandibular gland symptoms. Exact binomial confidence intervals (95% CIs) were computed for the percentage developing symptoms.

Results

From 2007 to 2011, 356 patients were managed for oral tongue ($n=205$) or FOM ($n=151$) cancer in the maxillofacial unit at Aintree University Hospital. Of these, 52 patients (31 men and 21 women) met the study criteria, with a mean age of 61 years (standard deviation: 12 years); 36 patients had FOM resections, 12 had ventral tongue resections, and 4 had combined FOM and ventral tongue resections (Table 2).

Overall, 15/52 patients (29%) developed submandibular gland symptoms following surgery (95% CI: 17–43%). Symptoms comprised submandibular swellings, which were unilateral in 11 cases (2 of these painful) and bilateral in 4 cases (1 painful). The symptom rate varied by clinical characteristics (Table 2). It was notably lower for those aged ≥ 65 years at 6% (1/17) as well as for those with the submandibular duct identified and repositioned in the primary surgery at 13% (2/15). Five patients had their duct identified but not repositioned intraoperatively, with four (80%) developing submandibular gland symptoms.

In this cohort, 9/27 patients (33%) who had resections involving the anterior FOM developed symptoms and 5/12 (42%) developed symptoms for bilateral FOM resections. Of the 16 patients with ventral tongue resections, 3 (19%) developed symptoms; 14 were unilateral resections with 2 (14%) developing symptoms and 2 were bilateral resections with 1 (50%) developing symptoms.

Most patients (39/52, 75%) were treated with laser excision while the rest underwent monopolar cautery excision. The rate of submandibular gland symptoms was 26% for laser excision and 39% for monopolar cautery excision. Two patients received adjuvant radiotherapy. Neither of these developed any symptoms.

Imaging was performed in eight cases. This comprised ultrasonography for six patients, MRI for one patient, and both ultrasonography and FNA for one patient.

For symptomatic patients, 14/15 (93%) were monitored, with symptoms resolving spontaneously within 1 year, and 1/15 (7%) had a further operation to reposition the duct. No patient had the submandibular gland removed.

Discussion

This study indicates that 29% of patients develop submandibular gland symptoms following resection of oral cavity squamous cell carcinoma in proximity to the duct, similar to rates reported in the literature.^{2–4} Significantly, only 13% developed symptoms when ducts were repositioned intraoperatively compared with 35% when not. This is further emphasised by 4/5 patients (80%) having symptoms when ducts were identified but not repositioned. Stimson and Leban² and Ord and Lee⁵ reported similar findings (Table 1). This demonstrates the potential benefit of repositioning the submandibular ducts when performing FOM or ventral tongue resections to decrease the occurrence of development of submandibular gland obstructive symptoms. This has a secondary benefit of decreasing further investigations that may be required, preventing

Table 2 Clinical characteristics and development of postoperative submandibular gland symptoms

		Submandibular gland symptoms	p-value*
All		15/52 (29%)	
Sex	Male	9/31 (29%)	>0.99
	Female	6/21 (29%)	
Age at operation	39–54 years	5/16 (31%)	0.02
	55–64 years	9/19 (47%)	
	65–93 years	1/17 (6%)	
Year of operation	2007–2009	8/25 (32%)	0.76
	2010–2011	7/27 (26%)	
Pathological TNM staging	T0/T1 N0	14/47 (30%)	>0.99 (T0/T1 N0 vs other)
	T2 N0	1/4 (25%)	
	T2 N1	0/1 (0%)	
Site lesion	Anterior unilateral FOM	8/24 (33%)	No test done
	Bilateral/midline FOM	4/11 (36%)	
	FOM unspecified	0/1 (0%)	
	Unilateral ventral tongue	1/11 (9%)	
	Bilateral ventral tongue	0/1 (0%)	
	Anterior unilateral FOM and unilateral ventral tongue	1/3 (33%)	
	Bilateral/midline FOM and unilateral ventral tongue	1/1 (100%)	
Treatment modality	Laser excision	10/38 (26%)	0.48 (laser vs monopolar)
	Monopolar cautery	5/12 (42%)	
	Laser and adjuvant radiotherapy	0/1 (0%)	
	Monopolar and adjuvant radiotherapy	0/1 (0%)	
Submandibular duct	Not identified	9/32 (28%)	0.02**
	Identified but not repositioned	4/5 (80%)	
	Identified and repositioned	2/15 (13%)	

TNM = tumour, lymph nodes, metastasis; FOM = floor of the mouth
 *Fisher's exact test (2 comparison groups) and chi-squared test (3 or more groups)
 ** $p=0.18$ for repositioned during surgery vs not repositioned (2/15 [13%] vs 13/37 [35%])

secondary surgery to reposition the ducts, as well as decreasing fear of reoccurrence in patients with oral cavity malignancies, which has been shown to affect their quality of life.⁶

Outcomes for patients from this study showed that the majority of symptoms resolve spontaneously and only require monitoring as 14/15 patients (93%) had spontaneous resolution within one year. However, repositioning of the submandibular ducts may be required as a secondary procedure if symptoms persist, with one patient in this study (7%) needing a secondary procedure.

Limitations to our audit include the small sample size and the lack of detailed operation data, specifically proximity of the duct to the site of resection. These necessarily restrict the conclusions that can be made. Despite this,

where possible, duct redirection should be performed at the primary procedure. A prospective clinical trial comparing duct repositioning with subcapsular gland excision assessing outcome indicators (including signs and symptoms of submandibular gland obstruction, secondary imaging and surgery) and a quality of life assessment for fear of reoccurrence would be of further benefit to help clarify potential advantages and determine the best treatment modality.

Our audit has changed the clinical practice of those involved, and an attempt is now made in every patient to identify and reposition the duct. The data from this audit have also helped in providing further information to patients when discussing informed consent for FOM excision for superficial cancers.

Conclusions

Resection of small tumours associated with the anterior FOM and ventral tongue in proximity to the submandibular duct is associated with obstructive symptoms in about a quarter of patients. This is reduced by half when redirecting the duct. Symptoms are self-limiting and self-resolving (within one year). There are also other benefits from repositioning the duct intraoperatively, including decreasing the fear of recurrence, the need for further imaging and secondary surgery. A prospective clinical trial comparing duct repositioning with subcapsular gland excision would help clarify the potential benefits and best treatment modalities.

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