

Clinical paper:
Head and neck oncology

A comparison of aesthetic, functional and patient subjective outcomes following lip-split mandibulotomy and mandibular lingual releasing access procedures

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Abstract. Good access to the site of oral cancer is essential to allow for adequate three-dimensional resection of the tumour. Splitting the lower lip in conjunction with a mandibulotomy offers excellent access to all areas of the mouth and pharynx, but this inevitably produces a facial scar and there is morbidity associated with the healing of the mandibulotomy. An alternative approach is the mandibular lingual releasing technique, which provides good access to the oral cavity and avoids the morbidity associated with lip-split mandibulotomy. The aim of this study was to compare aesthetic, functional and patient subjective outcomes between the two access procedures. One hundred and fifty patients had oral access procedures between 1992–95 (ninety lip-split mandibulotomy and sixty mandibular lingual release). Thirty patients fulfilled selection criteria (primary surgery as treatment, tumour size <5.1 cm, anterior oral cavity tumours, and reconstructed with a radial forearm free flap) and 10 patients from each group were able to attend a review appointment for objective clinical assessment of their speech, tongue mobility, lip competence and temporomandibular signs. Using items from the University of Washington quality of life questionnaire patient subjective outcomes were assessed. Using standardised photographs the clinician and lay persons assessed the overall post-operative facial appearance. The patients also assessed their own facial appearance using a similar scoring method.

Resection margins were similar in both groups and it would seem that both methods provide adequate access to the anterior oral cavity. Clinical examination showed no differences in function between the two access procedures. Although there was a small number, the lip-split mandibulotomy group reported significantly better speech, swallowing and chewing. Previous concerns about a possible detrimental effect on appearance following lip-split, were not borne out in this study.

Key words: aesthetic; function; outcome; oral cancer; access.

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In the surgical treatment of oral cancer it is imperative to have good access to the tumour to allow for adequate three-dimensional resection. It is advantageous to be able to resect an oral tumour without an access procedure and this can often be achieved in edentulous cases. However, even in the edentulous mandible and in most dentate cases, it is often necessary to utilize an access procedure. Splitting the lip via a mid-line or lateral lip-split incision in conjunction with a mandibulotomy allows the proximal mandible to be swung outwards to gain full access to the oral cavity and oropharynx. However, a morbidity of up to 35% has been reported^{12,16,17,19}, with the main problems being mal-union or non-union of the osteotomy, plate failure, wound sepsis and poor aesthetics⁶. There is a sharp division in the literature^{1,4,5,12} on whether a mandibulotomy should be carried out in a previously irradiated jaw.

Another means of gaining access to the oral cavity is via a mandibular lingual releasing approach¹⁹. This too provides excellent access and avoids facial scarring, and there is little evidence of morbidity in the literature other than fistula formation and osteoradionecrosis after high dose postoperative radiation¹⁹.

The functional outcomes following lip-split mandibulotomy have previously been described. SPIRO et al. reported a small number of patients who had persistent swallowing difficulty¹⁷. CHRISTOPOULOS et al. specifically assessed temporomandibular joint (TMJ) function and found that TMJ dysfunction was not a problem with this technique³ and objective masticatory function was maintained in a report by MARUNICK et al.¹¹. The only report of functional outcome following the mandibular lingual releasing access procedures has been by STRINGER et al.¹⁹, who stated that 12 out of 15 patients who had this technique were able to maintain their weight by oral diet alone.

The patient's ability to speak, swallow and chew has an important bearing on a patient's quality of life^{13,14,15} and in the absence of a comparative study in which both objective and subjective assessment of outcome of the two techniques are combined, the clinician is left to balance independently which procedure to use. The aim of our study was to compare both oral access methods, in relation to aesthetics, clinical functional examination and patient subjective outcome using validated questionnaires.

Table 1. Clinical function measures

Assessment by clinician		Score		
Speech	Normal intelligible speech	1		
	Understand most words	2		
	Only few words understood	3		
	Incomprehensible (Range 1–4, lower score indicating better function)	4		
Tongue mobility	Normal	1		
	To lips	2		
	To alveolus	3		
	To palate	4		
	Immobile (Range 1–5, lower score indicating better function)	5		
Lip competence	At rest	1		
	On effort	2		
	Incompetent (Range 1–3, lower score indicating better function)	3		
TMJ Signs	Tenderness on palpation of TMJ	Yes=2	No=1	
	Muscle of mastication tenderness	Yes=2	No=1	
	Restricted opening	Yes=2	No=1	
	(Range 3–6, lower score indicating better function)			
Mental nerve function (Cumulative total of A+B+C+D, left and right sides)	A) Pattern of sensation	Normal	1	
		Dysaesthesia	2	
		Anaesthesia	3	
	B) Two point discrimination	<10 mm	1	
		10–15 mm	2	
		>15 mm	3	
	C) Von Frey hair	Positive	1	
		Negative	2	
	D) Non-validated subjective additional questions re lower lip symptoms	Pain	Yes	2
			No	1
		Tingling	Yes	2
			No	1
		Numbness	Yes	2
No			1	
(Range 12–28, lower score indicating better function)				
Facial nerve function (Cumulative total of left and right sides)	Measurement	Normal	8/8	1
		Slight	7/8	2
		Moderate	5–6/8	3
		Mod severe	3–4/8	4
		Severe	1–2/8	5
		Total	0/8	6
		(Range 2–12, lower score indicating better function)		

Patients and method

In the four years, 1992–1995 inclusive, 200 patients underwent primary surgery for previously untreated oral cancer at the Regional Maxillofacial Unit, Liverpool. One hundred and fifty of these had an access procedure to facilitate removal of oral carcinoma. Of these, 90 had a lip-split mandibulotomy and 60 a visor/mandibular lingual release. In order to isolate the effect of the two access procedures on function, strict

criteria were used to select the patient group. Those patients who had extensive tumours (>5 cm), had segmental bony resection or who had posterior oral cavity (e.g. retromolar, soft palate) or pharyngeal cancer, were excluded. A discrete cohort of 30 patients was identified who presented with relatively small (2–5 cm) anterior tumours (anterior and lateral tongue, floor of mouth and gingiva). All had a function preserving neck dissection and were reconstructed using a

fasciocutaneous radial forearm microvascular free flap at the initial operation. Of the 30 patients, 20 (10 lip-split, 10 visor) attended a research clinic at which objective and subjective measures of outcome were recorded. Information about clearance margins and tumour dimension were obtained from the case-notes.

An overall aesthetic assessment of the patient's face and neck appearance was made by the clinician and scored using a seven-point linear analogue with 1 as highly satisfactory and 7 as highly unsatisfactory. A group of seven lay observers were shown standardized photographs of the individual patient's face and neck and they too scored the overall appearance of the face and neck using the same seven-point scale. At the end of the clinical examination, the patients were asked to score their own face and neck appearance using the same scoring system.

Clinical examination was performed by one clinician (JD). Speech², tongue mobility, TMJ function and lip competence were scored using a simple numerical system (Table 1). Mental nerve function was tested using Von Frey hair set to 2 g pressure and by two-point discrimination. In addition, the surgeon assessed the pattern of sensation (normal, dysaesthesia or anaesthesia) and the patient was asked to report on pain tingling and numbness (Table 1). Facial nerve function was scored using the method described by HOUSE & BRACKMANN⁹ (Table 1). In all patients, upper branch facial nerve function was normal and any measured difference represented deficient function of the marginal mandibular branch of the facial nerve in that patient. For both mental and facial nerve function both, left and right sides were examined individually and an accumulative score was obtained.

Patients completed the University of Washington questionnaire (UW-QOL)⁷. Of the nine domains relating to the head and neck cancer patient (pain, disfigurement, activity, recreation/entertainment, employment, speech, chewing, swallowing, and shoulder disability), only disfigurement, speech, chewing and swallowing were measured. Each item is scaled from 0 (for poor health) to 100 (good health).

Analysis of variance was carried out on all objective and subjective measurements in each group using SPSS for Windows and level of significance was taken at the 0.05 level.

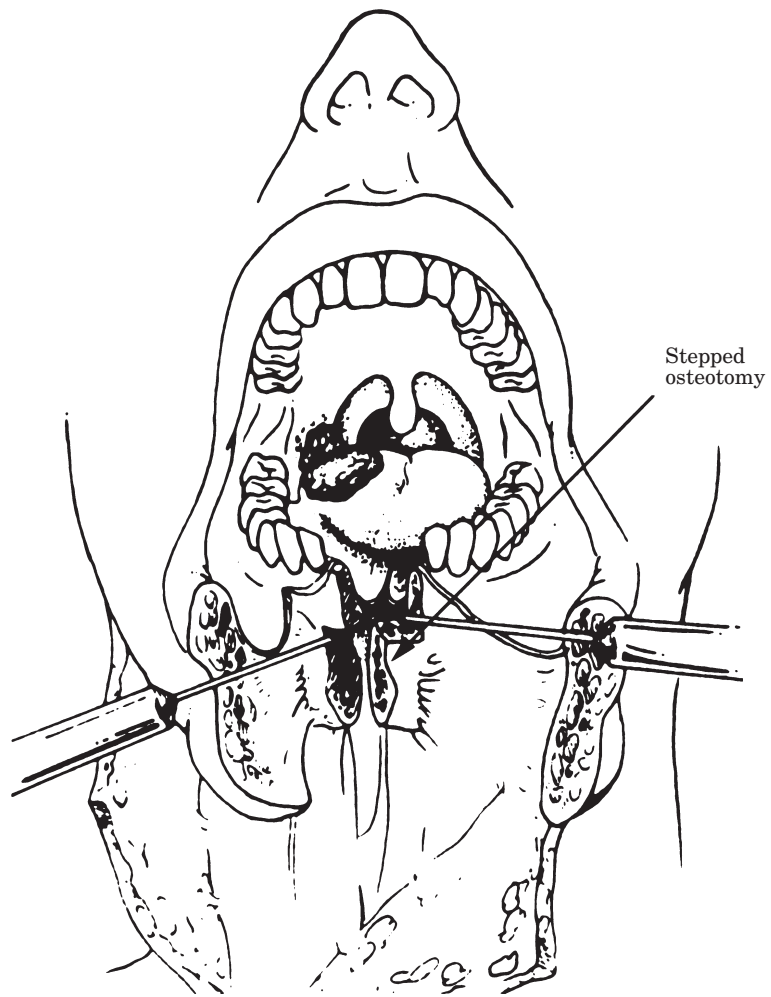


Fig. 1. Lip split mandibulotomy.

Surgical technique

Lip split mandibulotomy

With this technique¹⁷, the lower lip and anterior mandibular labial sulcus are incised, usually in continuity with the neck dissection incision. After prelocating and removing mini bone plates, the mandibulotomy is carried out (Fig. 1). A lingual sulcus releasing incision is then made to allow the mandible to be swung out. To prevent occlusal disharmony in the dentate patient, perfect reduction of the bone fragments is required. We routinely incorporate chevrons into the incision which ensures accurate wound closure, no straight line contracture and a broken line of the peri-oral scar, which improves the aesthetic result of the healed lip⁸.

Mandibular lingual releasing approach

With this technique¹⁸, an incision is made mastoid to mastoid and sub-

platysmal skin flaps are raised initially to the lower border of mandible. On the inner aspect of the mandible, geniohyoid, mylohyoid and genioglossus muscles are carefully detached. In the mouth, an alveolar crest or lingual gingival sulcus incision is made (Fig. 2). The floor of mouth and tongue can then be dropped into the neck (Fig. 3). By de-gloving the mandible anteriorly and transecting the mental nerves for later repair, additional access can be achieved for very posterior tumours. Accurate reattachment of genioglossus and geniohyoid muscles is essential to restore the oral diaphragm.

Results

Of the 20 patients in this study, 10 had a mandibular lingual release approach and 10 had a lip-split mandibulotomy. Table 2 compares the clinical details of

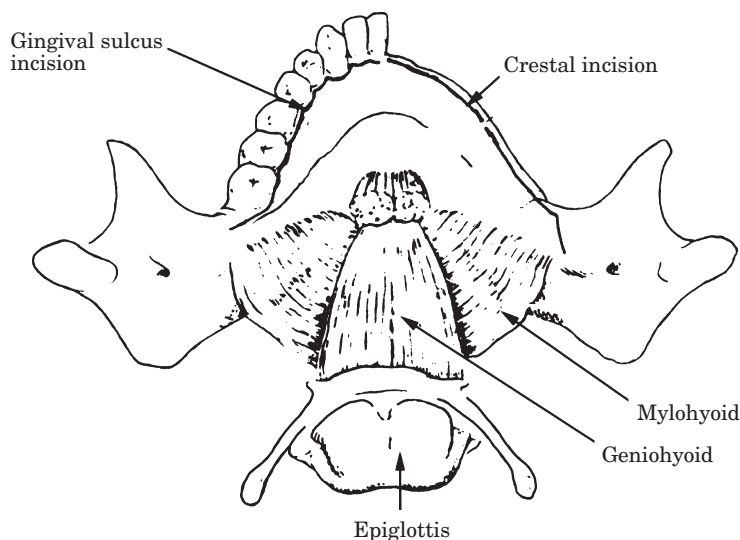


Fig. 2. Mandibular lingual release incision. Showing floor of mouth muscles that require to be detached.

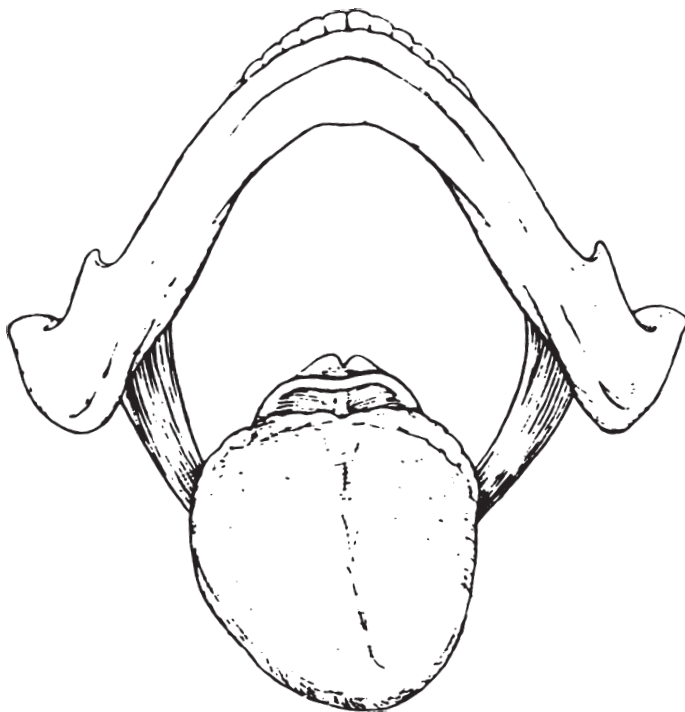


Fig. 3. Mandibular lingual release (showing tongue dropped into neck).

the two groups. Patients in the lip-split mandibulotomy were slightly older and had been operated on more recently. Resection margins were similar with eight patients in each group having clear margins (>5 mm) and two patients with close tumour margins (less than 5 mm). There were no cases of involved margins. The lip-split mandibulotomy group tended to have slightly smaller primary tumours with all 10 patients having

lesions less than 4 cm compared with eight patients in the mandibular lingual release group.

The aesthetic findings are given in Table 3 and there was no statistical difference between groups on clinical or lay person assessment, nor did the patients subjectively record a difference. The clinician tended to rate patients as having a more satisfactory appearance than the laypersons and patients.

The clinical examination showed little functional deficit of speech, tongue movement, lip competence, TMJ signs, mental nerve or facial nerve function (Table 4). Tongue mobility was slightly worse in the mandibular lingual releasing group but did not reach statistical significance.

The comparison of subjective outcome using the UW-QOL is shown in Table 5. In both groups the main impairment reported was for chewing. Patients who had a mandibular lingual release scored less favourably on speech, swallowing and chewing and the differences were statistically significant. The patients scored similarly for disfigurement.

Discussion

To obtain adequate three-dimensional tumour clearance, an access procedure is often required. Both the lip-split mandibulotomy or mandibular lingual releasing techniques provide excellent access. From a search of the literature, this is the first study to compare the two access techniques in relation to aesthetics, clinical function and patient subjective outcome. In order to assess the influence of the access procedure itself, patients in the study were carefully matched for size, site of the tumour, surgery as the primary treatment modality and type of reconstruction. By imposing such a stringent selection criteria only a small cohort was recruited and data analysis is therefore prone to type 2 statistical error. It was not possible to match the groups exactly. Although all patients in the study had tumours between 2–5 cm, patients having mandibular lingual release tended to have slightly larger tumours, and this could possibly account for the poorer subjective performances in this group.

In their review of the lip-split mandibulotomy technique, GOORIS et al.⁶ extol the versatility of this access approach, while acknowledging that the facial scar produced is a disadvantage, especially in young patients and those who have the tendency to produce hypertrophic scars. LA FERRIERE et al.¹⁰ examined the functional and cosmetic outcome in a small series of patients who required composite mandibular resection over a 20-month period and assessed the lip and chin unit appearance of all 12 patients to be satisfactory. However, of the six patients who were assessed to have a 'superior' cosmetic appearance, all had a visor procedure, and they felt

Table 2. Clinical details

		Lip split/ mandibulotomy (n=10)	Mandibular lingual release (n=10)
Gender	Male	7	7
	Female	3	3
Age in years	Mean (months)	59.3	51.9
	Range (months)	45–72	43–65
Tumour size	2–3.9 cm	10	8
	4–5 cm	0	2
Site	Anterior floor of mouth	5	4
	Anterior tongue/lateral floor of mouth, buccal/gingival	5	6
Mandible resection	Nil	7	7
	Rim	3	3
Reconstruction	Soft tissue radial	10	10
Tumour margins	Clear	8	8
	Less than 5 mm	2	2
	Involved	0	0
Adjuvant radiotherapy (Post-op)	Yes	4	5
	No	6	5
Follow-up duration	Mean (months)	40.6	27.9
	Range (months)	10–60	8–54

Table 3. Aesthetic assessment. Overall aesthetic assessment of face and neck

Examiner	Lip-split mandibulotomy		Mandibular lingual release		Analysis of Variance P-value
	Mean	SD	Mean	SD	
Clinician	1.5	0.71	1.3	0.67	0.52
Patient	2.0	1.25	2.0	0.94	1.00
Laypersons	2.5	0.64	2.8	0.91	0.50

Scored on a linear analogue with 1 as highly satisfactory and 7 as highly unsatisfactory.

Table 4. Clinical examination

Examination	Lip-split mandibulotomy			Mandibular lingual release			Analysis of variance P-value
	Mean	SD	Range	Mean	SD	Range	
Speech	1.4	0.5	(1–2)	1.5	0.7	(1–3)	0.72
Tongue movement	1.6	0.8	(1–3)	2.2	1.3	(1–5)	0.26
Lip competency	1.1	0.3	(1–2)	1.0	0.0	(1–1)	0.3
TMJ signs	3.3	0.4	(3–4)	3.0	0.0	(3–3)	0.8
Mental nerve function	14.1	2.8	(12–19)	13.2	2.0	(12–16)	0.4
Facial nerve function	3.2	1.8	(2–7)	3.5	2.2	(2–7)	0.7

Lower score indicates better function.

Table 5. Subjective outcome

Domain	Lip-split mandibulotomy			Mandibular lingual release			Analysis of variance P-value
	Mean	SD	Range	Mean	SD	Range	
Speech UW-QOL	79.00	14.5	60–100	59.5	22.9	20–80	0.035
Swallowing UW-QOL	90.00	21.1	60–100	60.0	31.6	40–100	0.022
Chewing UW-QOL	65.00	24.2	60–100	40.0	21.1	20–80	0.024
Disfigurement UW-QOL	75.0	11.8	60–100	70.0	15.8	60–100	0.430

Higher score indicates better function.

that the absence of the lip and chin-splitting incision was the major aesthetic difference that set them apart from the others in the group. However, these authors, while reporting cosmetic out-

come, evaluated the overall appearance of the lip and chin unit only and did not specify how and by whom the patient was assessed. In our study, both groups subjectively rated their own overall face

and neck appearance similarly. The clinician tended to rate the aesthetic appearance of the patients better than both the patients themselves and the lay observers, who were the most critical of the patients' postoperative appearance.

From this study there is no difference in aesthetic outcome between lip-split mandibulotomy and mandibular lingual releasing access techniques and the reluctance to use the lip-split mandibulotomy on the basis of aesthetic appearance alone is unfounded.

Functional assessment after oral access procedures has not been well addressed in the surgical literature. SPIRO et al.¹⁷ while reporting their large series of mandibulotomy approaches to oropharyngeal tumours, did not discuss in detail functional outcome after surgery except for stating that the vast majority had 'satisfactory function', while 'seven patients had persistent swallowing problems'. In our study there were no significant clinical functional differences between the two groups i.e. facial nerve and mental nerve function, speech, tongue mobility and lip competence. There was no significant difference in the presence of TMJ signs between the two access methods. Intrinsic to the lip-split mandibulotomy access technique is the out-swinging of the mandible and it would seem that this does not cause significant long-term TMJ problems, which is in agreement with the study of CHRISTOPOULOS et al.³, which assessed post operative function after mandibulotomy.

Subjective assessments of speech, swallowing and chewing using the

University of Washington questionnaire indicated that lip-split mandibulotomy patients reported significantly better function than the mandibular lingual release patients. Even with careful, formal re-attachment of geniohyoid and genioglossus muscles, as advocated by STANLEY¹⁸, it is possible that the integrity of the oral diaphragm, which is vital for the functions of speech, swallowing and chewing, is impaired with this drop down technique. There was no difference in the level of disfigurement reported by each group using the University of Washington questionnaire.

In conclusion, both techniques afford excellent access to the mouth and oropharynx for the removal of cancer and benign lesions. While one would think that the avoidance of a facial scar would be a compelling reason for carrying out a mandibular lingual releasing technique in conjunction with a visor incision in preference to a lip-split mandibulotomy, our small study fails to show a clear aesthetic benefit. We feel that the poorer speech, swallowing and chewing subjective outcomes in this study associated with the mandibular lingual releasing technique, should be borne in mind when considering which access technique to use for small tumours. The study also highlights the importance of incorporating the patient's subjective opinion of outcome since this is more discerning than clinical examination alone.

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