

Oncological safety of the Hayes-Martin manoeuvre in neck dissections for node-positive oropharyngeal squamous cell carcinoma

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Abstract

Introduction: The Hayes-Martin manoeuvre involves ligation of the posterior facial vein and superior reflection of the investing fascia below the mandible to preserve the marginal mandibular nerve. The peri-facial nodes thus remain undissected. We perform this manoeuvre routinely during modified radical neck dissection for metastatic oropharyngeal squamous cell cancer. Here, we review the oncological safety and marginal mandibular nerve preservation rates of this manoeuvre from 2004 to 2009.

Method: Retrospective review of the head and neck oncology database (2004–2009) at Addenbrooke's Hospital, Cambridge, UK, a tertiary referral centre for head and neck oncology.

Results: Thirty-four patients underwent modified radical neck dissection for metastatic oropharyngeal squamous cell carcinoma. The primary tumour included the tonsil in 19 cases, base of tongue in 10 and posterior pharyngeal wall in 5. The neck nodal status was N₁ in 4 cases, N_{2a} in 11, N_{2b} in 10, N_{2c} in 4 and N₃ in 5. All patients had adjuvant radiotherapy. Median follow up was four years (range, two to five). No peri-facial nodal region recurrences were seen. Four patients had temporary marginal mandibular nerve weakness; beyond two months, no weakness was seen.

Conclusion: In neck dissections for oropharyngeal squamous cell carcinoma, the marginal mandibular nerve and accompanying facial nodes can be safely preserved without oncological risk using the Hayes-Martin manoeuvre.

Key words: Neck Dissection; Facial Nerve; Oropharyngeal Carcinoma; Submandibular Gland

Introduction

Cervical neck metastasis is the most significant prognostic factor in oropharyngeal carcinoma, with multiple studies demonstrating an approximately 50 per cent reduction in survival with node positivity.^{1,2} In order to achieve both local control and cure, the role of a formal neck dissection remains undisputed. The extent of neck dissection, however, has been the subject of scrutiny in many studies, with various groups advocating procedures ranging from radical neck dissection to, more recently, selective neck dissection.³ Regardless of which procedure is utilised for the management of neck metastasis from oropharyngeal carcinoma, nodal levels one to three are universally included.

Neck dissections have well-known complications. One which is well-documented is post-operative weakness of the depressor angularis muscle, due to an underlying injury of the marginal mandibular branch of the facial nerve.⁴ This can be due to complete nerve neurotmesis or transient neuropraxia from stretching.

The marginal mandibular nerve has a variable course in relation to the inferior ramus of the mandible. Following its emergence from the anterior border of the parotid gland, it swings inferiorly to a variable degree before crossing lateral to the facial vascular pedicle. It remains in a plane lateral to the superficial layer of the deep cervical fascia enveloping the submandibular gland.⁵

Hayes Martin described a now well-known manoeuvre to prevent injury to this nerve, which involved ligating the facial vein at a level approximately two finger-breadths below the mandible and then retracting the superficial layer of the deep cervical fascia with the subplatysmal plane as far as the mandibular ramus.^{6,7} As a result of this, the peri-facial nodal groups remain undissected.

The purpose of this study was primarily to analyse recurrence within the facial nodes in cases of metastatic oropharyngeal cancer, and secondarily to analyse the incidence of long-term marginal mandibular nerve preservation, following neck dissection with the Hayes-Martin manoeuvre for oropharyngeal cancer, performed in our institution.

Methods

A retrospective review of all neck dissections performed for oropharyngeal cancer from 2004 to 2009 was undertaken, with the approval of the institutional review board.

All patients underwent pre-operative investigation within a multidisciplinary head and neck team, and were staged using computed tomography (CT) scans of the head and neck. Primary surgical management of neck metastasis was undertaken for bulky disease defined as node (N) stage two and above, unless there was a patient preference against, or contraindications to, chemoradiotherapy.

We excluded from analysis any patients who underwent neck dissection as a salvage procedure post-chemoradiotherapy, or who underwent selective neck dissection.

All patients underwent modified radical neck dissections (types 1 to 3) with the Hayes-Martin manoeuvre, with removal of nodal basins 1 to 5. From 2007 onwards, neck dissections were performed using a harmonic scalpel. The nodal regions were submitted (attached to a board) for histopathological analysis.

Adjuvant radiotherapy was administered to all patients in the series, as they had by definition stage three or four disease.

Follow up of patients was performed according to current guidelines, that is, monthly in the first year, extending eventually to six-monthly in the fifth year after treatment.⁸ During the follow-up period, patients were comprehensively examined for signs of local or regional recurrence. When recurrence was suspected, further imaging was obtained, in the form of ultrasound and CT scans, together with further biopsies. Patients were then re-presented for discussion at the multidisciplinary meeting to decide on future treatment strategies.

For the purpose of this paper, we focused on recurrence in facial nodes and assessed the long-term function of the marginal mandibular nerve.

Results

Thirty-four patients who underwent modified radical neck dissection for metastatic oropharyngeal cancers were included for analysis. There were 21 men and 13 women in the cohort, with a median age of 63 years (range, 47–72 years). The primary tumour involved the tonsil in 19 patients, the tongue base in 10 and the posterior pharyngeal wall in 5 (Table I). The neck status was N₁ in 4 patients, N_{2a} in 11, N_{2b}

TABLE I
SITE OF PRIMARY TUMOUR

Site	Tumours (n (%))
Tonsil	19 (55.6)
Base of tongue	10 (29.4)
Posterior pharyngeal wall	5 (14.7)

TABLE II
NECK DISSECTION NODAL HARVEST

Neck level	Nodes (n)*
1	6
2	13
3	8
4	6
5	8

*Mean number harvested.

in 10, N_{2c} in 4 and N₃ in 5. The nodal harvest is outlined in Table II.

All patients had adjuvant radiotherapy. Patients who had definitive chemoradiotherapy followed by salvage neck dissection were not included, as the technical surgical planes were less clear and this could have predisposed to a higher rate of marginal mandibular nerve weakness.

Patients were followed up for a median duration of four years (range, two to five years). No recurrences were noted in the peri-facial nodal region. There were two recurrences noted at the skull base in the jugular foramen region, one in level four and one in level one. Four patients had temporary marginal mandibular nerve weakness, but none had weakness that persisted beyond two months. There were no cases of permanent palsy.

Discussion

The facial nodes have been classified into four major groups, namely, malar, infraorbital, buccinator and mandibular.⁹ The node of Stahr has been described as a constant feature in the area where the facial vascular pedicle crosses the mandibular ramus.¹⁰ In cancers of the oral cavity and in metastatic cutaneous squamous cell cancers, the role of the facial nodes in harbouring microscopic disease has been widely published.^{5,7,11} For oral cavity squamous cell carcinoma, an incidence of facial node disease in the range of 29 to 35 per cent has been reported. The efferent drainage of these nodes is most commonly to the submandibular (level one b) lymph node region. There has been no clear documentation of the involvement of facial nodes in cancers of the oropharynx.

Neck dissections, commonly of the modified radical variety, are some of the most robust techniques for controlling disease in the node-positive neck. Various combinations of structures, including the internal jugular vein, sternocleidomastoid muscle and the accessory nerve, may be removed or preserved to obtain disease clearance during these block dissections.

Temporary or permanent weakness of the marginal mandibular nerve is a well described complication of neck dissections, and is frequently under-reported. The reported prevalence of injury ranges from 11 per cent to as high as 43 per cent, depending on the parameters utilised.^{12,13} Weakness can result even after apparent gross anatomical preservation of the nerve,

as evidenced by one study which found that up to 23 per cent of patients had a reduced number of functional motor units in the orbicularis oris muscle despite clear nerve preservation.¹⁴

There are several described techniques which aim to ensure marginal mandibular nerve preservation. These include identification of the nerve in the subplatysmal plane, aided by loupe magnification and superior reflection of the nerve trunk, and the Hayes-Martin manoeuvre we utilised.

Dissection of the marginal mandibular nerve can result in post-operative weakness even with anatomical and neurophysiological confirmation of its integrity, due to factors including traction, devascularisation or the conduction block due to diathermy current during flap elevation.

The Hayes-Martin manoeuvre is based on entering a deeper plane of dissection, with ligation of the facial vein within the superior flap of the deep cervical fascia, hence preserving the marginal mandibular nerve. During a neck dissection, when the superior subplatysmal flap is elevated, upon reaching the hyoid, the capsule of the submandibular gland is identified and entered. This capsule is then followed anteriorly to the anterior belly of the digastric muscle, following which the capsular layer is raised to the mandibular ramus. This has the anatomical virtue of preventing removal of the peri-facial nodes.

In cases of oropharyngeal cancer, the necessity of removing the facial nodes in order to clear occult disease is poorly documented. The small amount of information available describes pathological deposits in 6–8 per cent of facial nodes of patients with oropharyngeal cancer.^{7,9} Based on the dictum that nodal dissections should be performed in cases in which the risk of metastasis is greater than 20 per cent, one could argue that routine dissection of the facial nodes is not required. This would avoid the risk of marginal mandibular nerve injury, without having a deleterious oncological effect. It has also been observed that there are no reports of any de novo presentations of peri-facial nodes in the setting of metastatic oropharyngeal cancer, neither are there any reports of recurrences in that region. Even with the limited data available, this allows us to infer that the peri-facial nodes are not an important drainage basin for metastatic oropharyngeal cancer.

In our study, neck dissections were predominantly performed for treatment of N₂ positive oropharyngeal cancer, and all patients received adjuvant radiotherapy. It is well known that radiotherapy is effective in eradicating micrometastases and achieves excellent local control.¹⁵ The radiation field would encompass the territory of facial nodes.¹⁶ In our opinion, the low prevalence of occult metastases, as well as the eradicated effect of adjuvant radiotherapy on potential micrometastases, mean that routine facial node dissection is not justified, given the risk of reduced quality of life due to marginal mandibular nerve palsy.

Recurrent disease in the facial nodes after definitive surgical treatment or chemoradiotherapy is rarely documented. It is also not known whether residual disease in the facial nodes could be a potential source of recurrence; however, our follow-up data do not suggest this to be the case.

- **Comprehensive neck dissection remains vital for cervical neck metastasis (especially node stage two or greater)**
- **The Hayes-Martin manoeuvre (submandibular region capsular dissection) protects the marginal mandibular nerve**
- **Following this, metastatic disease in the peri-facial nodal region is negligible**
- **Level one capsular dissection is oncologically sound and spares the marginal mandibular nerve**

Within our series, all subsites of the oropharynx treated surgically in our institution are represented. Although our site-specific numbers are limited in certain regions, such as the posterior pharyngeal wall and the tongue base, due to our tendency to utilise primary chemoradiotherapy for treatment within these regions, our overall data for the whole oropharynx should be valid for the facial nodes (given similar nodal drainage pathways). Furthermore, we achieved excellent patient compliance and complete follow up of our patient cohort.

As suggested by others, the severity of neck disease did not impact on the overall recurrence within the facial nodes, suggesting that bulky neck disease is not necessarily a factor in facial node recurrence.

Conclusion

Routine dissection of the facial nodes is not required for treatment of node-positive oropharyngeal cancer. This avoids the risk to the marginal mandibular nerve in the long term, and does not impact on regional disease recurrence, given that the relevant area is irradiated by adjuvant radiotherapy.

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