

Review Article

Level I dissection for laryngeal and hypopharyngeal cancer: is it indicated?

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Abstract

Squamous cell carcinoma of the larynx and hypopharynx tends to metastasize frequently to cervical lymph nodes, the location of which depends mainly on the site of the primary lesion. Five anatomical levels of cervical nodes have consequently been defined to standardize the terminology used to describe which lymph node groups are at risk for metastatic spread. Level I includes the submental and submandibular triangles. This review considers the role of these triangles in neck dissection and concludes that, unless there is clear evidence of spread, the inclusion of the level I triangles in the neck dissection is unwarranted since these nodes are not really at risk. There is therefore an important role for selective neck dissection in suitable cases of squamous cell carcinoma of the larynx and hypopharynx.

Key words: Laryngeal neoplasms; Hypopharyngeal neoplasms; Lymph nodes

Introduction

The Memorial Sloan-Kettering group has defined five anatomic levels or regions of cervical lymph nodes (Shah *et al.*, 1981) to standardize the terminology used to describe lymph node groups at risk for tumour metastases. Level or region I contains the submental and the submandibular triangles (Robbins *et al.*, 1991), also called Ia and Ib respectively.

The submental triangle or space is bounded laterally by the anterior bellies of both digastric muscles, inferiorly by the hyoid bone and superiorly by the symphysis of the mandible. The mylohyoid muscle forms the floor of this triangle. The submental nodes may number from two to eight and are subdivided into three groups: the anterior, middle and posterior. The lymph nodes lie in the adipose tissue of the submental triangle between the platysma and the mylohyoid muscles.

The submandibular triangle (also called the submaxillary or digastric triangle) is bounded anteriorly by the anterior belly of the digastric muscle, posteriorly by the posterior belly of this muscle, superiorly by the body of the mandible, inferiorly by the hyoid bone, superficially by the platysma muscle, and deeply by the floor of mouth structures.

The mylohyoid muscle forms the floor of this triangle, and the hyoglossus muscle contributes to a small part of the floor. Submandibular nodes may number from four to seven and they are classified by Rouvière (1932) in five groups: preglandular, retroglandular, prevascular, retrovascular and intracapsular nodes, according to their proximity to the submandibular gland, the anterior facial vein and the capsula. Small lymph nodes are normally found in the parotid gland, but not in the submandibular gland. The efferent drainage of the submandibular nodes is mainly into the internal jugular nodes. The dissection of this triangle usually includes the excision of the submandibular gland. This operation requires careful anatomical dissection and protection of three nerves: the marginal mandibular branch of the facial nerve, the lingual nerve and the hypoglossal nerve.

The boundaries of level I lymph nodes include the body of the mandible, the anterior belly of the contralateral digastric muscle, and the anterior and posterior bellies of the ipsilateral digastric muscle (Robbins, 1994). The submental, the submandibular, the superior carotid and inferior carotid triangles constitute the anterior cervical triangle.

This review attempts to reach valid conclusions on the role of the level I triangles in neck dissections for tumours of the larynx and hypopharynx.

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Anatomy of cervical lymphatics in relation to laryngeal and hypopharyngeal cancers

Squamous cell carcinoma of the larynx and hypopharynx has a high tendency to metastasize to the cervical lymph nodes. In the great majority of cases few lymph nodes are involved. Metastases are usually ipsilateral, often bilateral and exceptionally contralateral. The location of the cervical lymph node metastases is closely linked with the site of the primary lesion. The main spread of supraglottic and hypopharyngeal cancers is along the jugular chain; upper jugular nodes (jugulo-digastric nodes) are the most commonly affected, followed closely by mid-jugular nodes (jugulo-omohyoid nodes). Posterior cervical nodes are seldom involved. Nodes of the submaxillary triangle are rarely involved and submental nodes are almost never affected (Lindberg, 1972). Subglottic cancers metastasize to the lower deep cervical jugular chain, prelaryngeal (Delphian) node or nodes, paratracheal nodes, lymph nodes of the recurrent nerve chain and supraclavicular nodes. If cervical nodal metastases are present they usually occur in an orderly progression from level II, III and IV. 'Skip metastases', in which the cancer bypasses levels II, III and IV or all levels and metastasizes directly to level I, are extremely rare (Candela *et al.*, 1990; Moe *et al.*, 1996).

Discussion

The inclusion of the level I in radical and modified neck dissections is questionable for the treatment of cancer of the larynx and hypopharynx. Pietrantonio and Fior (1958) in a review of 570 cancers of the larynx and hypopharynx operated in the ENT Department of Milan between 1948 and 1954, stated that the submandibular triangle should not be included in the neck dissection since lymph vessels do not drain to this region.

Feind (1972) found only five patients with submandibular node involvement as a result of retrograde flow, in a series of 96 patients with cancer of the larynx. Lindberg's clinical study (1972) demonstrated that submandibular lymph nodes were rarely involved in metastatic spread from primary supraglottic and hypopharyngeal cancers. None of the patients had submental node involvement. Feldman and Applebaum (1977) reported 26 laryngeal cancers without metastases in the submandibular triangle. In a retrospective study of 428 patients with a squamous cell carcinoma of the head and neck and clinically negative neck, none of the 196 patients with cancers of the larynx and hypopharynx had pathologically positive nodes in the submental and submaxillary triangles (Byers *et al.*, 1988). It is therefore unnecessary to include the nodes of the submandibular triangle in neck dissection since these nodes are not at risk (Byers *et al.*, 1988).

A retrospective analysis of 472 radical neck specimens revealed 19 cases of cervical metastases limited to the submandibular triangle from occult

primary tumours. In no instance did the primary lesion originate from regions located within the larynx and hypopharynx (Strasnick *et al.*, 1990).

Candela *et al.* (1990) reported that level I was rarely involved in the clinically staged N0 (five per cent) and N+ patients (7.8 per cent) with primary squamous carcinoma of the supraglottis and glottis, but they do not specify which level I triangles were involved. Only one patient with level I nodal metastases had isolated involvement outside level II, III or IV and represents the only patient with a skip metastasis. They believe patients with supraglottic cancer and evidence of extralaryngeal spread of the primary tumour (either grossly or on frozen section) should have level I dissection and any patients with evidence of N2 nodal disease at the time of operation should undergo a comprehensive functional or radical neck dissection to ensure removal of all nodes at risk (Candela *et al.*, 1990).

Wenig and Applebaum (1991) found only in two cases (two per cent) that tumours of the larynx and hypopharynx metastasized to the submandibular triangle and concluded that in the absence of clinical and radiographical evidence of metastatic spread in the submandibular triangle, the dissection of this area is not justified.

Redaelli de Zinis *et al.* (1994) have encountered only one case of lymph node involvement at level I out of 99 patients with lymph node metastases from supraglottic squamous cell carcinoma and in this case, also, other levels were involved.

Li *et al.* (1996) found only in eight cases metastases at level I in 125 patients with histopathologically confirmed metastatic nodes for cancer of the larynx and hypopharynx. Moe *et al.* (1996) have encountered metastases at level I (submandibular) in patients with advanced laryngeal cancer and only two patients had exclusively submandibular lymph node involvement without histologically positive nodes at other levels. The authors have not mentioned the presence of metastases in submental lymph nodes.

There is a large amount of evidence to support the conviction that submental triangle should be spared in laryngeal and hypopharyngeal malignancies, given the absence of lymph node metastases. Besides, these tumours rarely, ie. only in advanced cases, metastasize to the submandibular triangle. Therefore in the absence of clinical, radiographic and cytological evidence of metastatic spread, the dissection of this area is not justified in neck dissection. There is an expanded role for selective neck dissection in selected patients with metastatic cervical disease from primary squamous cell carcinoma of the larynx and hypopharynx (Pellitteri *et al.*, 1997). The selection of patients should be based on patho-anatomic considerations with reference to the primary site of the tumour and demonstrated level(s) of metastatic involvement (Pellitteri *et al.*, 1997). We believe that there is no indication for standard radical neck dissection in cancers of the larynx and hypopharynx considering that the submental triangle is never involved. We should remove only lymph

node groups believed to be at risk, and the lymph nodes of level I are not believed to be at risk for cancers of the larynx and hypopharynx.

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