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Review

Selective neck dissection: A review of the evidence

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SUMMARY

The management of regional metastatic disease in patients with oral cancer is a topic of controversy. Comprehensive neck dissection has been the mainstay of treatment historically, but clinicians have sought alternatives to limit the morbidity of the classic radical neck dissection. This article will review evidence on the applicability of selective neck dissection in two settings: as primary treatment of the clinically positive neck and as salvage treatment of recurrent neck disease after radiotherapy. In the text, for each article cited we supply the level of evidence thereof according to the Oxford Centre for Evidence-based medicine.

Introduction

Cervical lymphadenectomy has played an important role in the management of upper aerodigestive tract carcinomas for over a century. The proper application of neck dissection procedures has remained a matter of debate, as modifications to the classical procedure have been devised which result in less postoperative morbidity. Bocca et al.[1] demonstrated the oncologic soundness of procedures in which the jugular vein, sternocleidomastoid muscle, and accessory nerve are spared during the dissection.

More recently, selective procedures, in which nodal areas deemed not at risk are left undissected, have been introduced and applied widely. The selective procedures were developed in order to control regional metastasis while reducing the morbidity of radical neck dissection. The basis for description of selective neck dissection procedures is the classification system of lymph node levels published by the American Head and Neck Society.[2] Level I includes the submental and submandibular nodes, levels II–IV include the upper, middle, and lower jugular nodes respectively, and level V represents the posterior triangle nodes. Levels and sublevels are depicted in Figure 1. The spinal accessory nerve crosses level II, as depicted in the figure, dividing it into level IIa anteroinferiorly and the smaller level IIb posterosuperiorly.

The aim of this review is to describe the evidence available regarding the application of selective neck dissection procedures in two specific settings: primary treatment in the clinically node-positive neck, and treatment of persistent neck disease after primary radiotherapy.

Morbidity of neck dissection

It is beyond the scope of this review to comprehensively discuss postoperative morbidity of selective and comprehensive neck dissection. The most significant morbidities accrue from postoperative dysfunction of the spinal accessory nerve and resultant trapezius muscle denervation. Cappiello et al.[3] (level 4) performed a study which included electrophysiological testing comparing patients whose selective dissections included level V with those whose did not. Posterior triangle dissection was associated with abnormalities in shoulder strength and motion as well as trapezius muscle electromyography. Multiple studies have demonstrated significantly better shoulder pain scores and related quality of life after preservation of level V, presumably due to preserved accessory nerve function[4–7]; some data indicates that preservation of the cervical plexus contribution to the accessory nerve may also preserve trapezius function in these patients.[8]

In contrast, such evidence is scant regarding dissection of level II. Koybasioglu et al.[9] (level 4) performed a study in which electrophysiologic measurements of accessory nerve function were performed on 11 patients who underwent selective neck dissection with and without level IIb dissection. Interestingly, the authors concluded that dissection of level IIb did not result in any additional nerve dysfunction at the third postoperative month.

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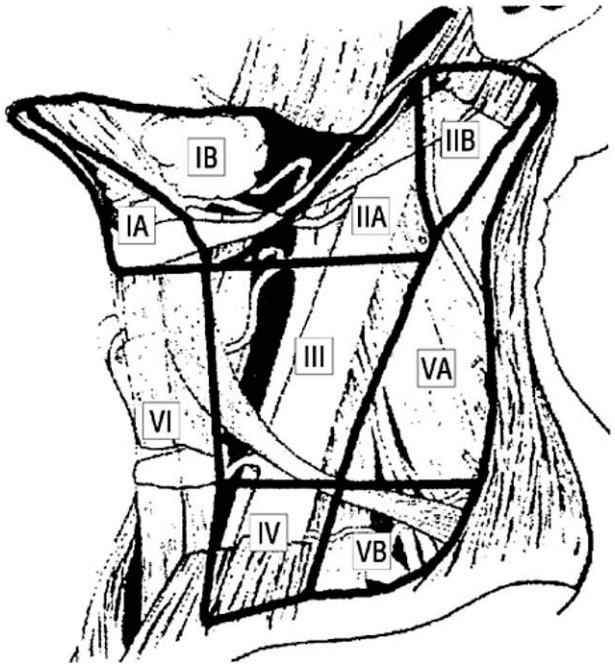

Figure 1 Neck lymph node slevels.[8]

Selective neck dissection for primary treatment of neck metastasis

Histopathologic studies of metastasis

The oncologic basis for selective neck dissection comes from analysis of histopathological findings in comprehensive neck dissection specimens. The underlying principle is that the pattern of neck metastasis from upper aerodigestive tract carcinomas is predictable based on the location of the primary lesion. Shah et al.[10] (level 4) provided evidence with a review of 1081 previously untreated patients with squamous cell carcinoma of the upper aerodigestive tract, all of whom underwent comprehensive neck dissection. Almost half of these patients had primary lesions in the oral cavity. In patients with oral carcinoma and clinical evidence of neck disease, the rate of pathologic involvement of level V nodes was 4%. All of these patients had metastases present in the anterior triangle, and all had tumors of the floor of mouth and lower alveolus.

Woolgar[11] (level 4) used a review of histopathologic findings to define expected and aberrant patterns of neck metastasis. Included were 439 patients with oral and oropharyngeal carcinoma who underwent comprehensive or selective neck dissection. The expected pattern was described as an "inverted cone," with maximal disease volume and maximal extracapsular spread at levels I and II, with progressive diminution inferiorly. Aberrant patterns included isolated metastasis at level Ia or IIb, involvement of the contralateral neck, skipping of a level other than level I, presence of a solitary micrometastasis, and multiple micrometastases in absence of conventional metastasis. Micrometastasis was defined as a deposit less than 2 mm in maximal dimension. Of patients with clinically evident metastasis, 67% had a typical pattern and 14% had a solitary micrometastasis, while the skip metastasis rate was 10%. Clinical findings and recurrence rates were not reported in this paper.

A similar study by Byers et al.[12] (level 4) reviewed pathologic findings at each level after neck dissection for oral tongue carcinomas in 277 patients. In that study, the authors reported a 16% rate of skip metastasis, and advocated that selective neck dissection, when performed for prognostic purposes in oral tongue carcinoma, should include levels I–IV, an extension of the commonly-used supraomohyoid dissection.

Level V

Impairment of shoulder function contributes significantly to morbidity after comprehensive neck dissection. Some of this morbidity derives from dysfunction of the accessory nerve; less surgical manipulation of the accessory nerve would naturally result in diminished morbidity. Many authors have therefore sought to determine the oncologic validity of leaving level V undisturbed.

Toward this end, Davidson et al.[13] (level 4) reviewed a series of 1277 comprehensive neck dissections, of which 569 were performed for oral cavity carcinoma. Metastasis was confirmed at level V in 2.4% of oral carcinoma patients who presented with clinical neck disease, and in 0.6% of patients who had subsequent neck dissection after initial observation.

In a similar study, Lim et al.[14] (level 4) reviewed 93 patients with oral and oropharyngeal carcinoma who underwent comprehensive dissection. Metastasis to level V was present in 5 of 93 (5%), of which 4 were clinically occult. McDuffie et al.[15] (level 4) provided similar data, with a 7.4% rate of pathological level V involvement in 94 neck dissections. These two studies both found clinically evident metastasis at multiple anterior triangle levels to be a predictor of metastasis to level V.

Dias et al.[16] (level 4) also provided data on 339 patients with oral carcinoma who underwent either elective or therapeutic neck dissection. Only 2% of patients had positive nodes at level V; all had clinical neck disease and all had involvement of multiple other node levels. De Zinis et al.[17] (level 4) reported a series of 89 patients treated for oral carcinoma with selective or comprehensive neck dissection; level V was involved in 1 of 89 (1%). Interestingly, 4 of the 5 neck failures in this series occurred within the previously dissected field, and would likely not have been prevented by inclusion of additional nodal levels.

Level IIb

Postoperative shoulder dysfunction after comprehensive neck dissection may also derive from manipulation of the nerve in level II. Several studies have addressed the oncologic efficacy of leaving level IIb undissected.

Kraus et al.[18] (level 4), in a study of 44 clinically N0 patients with oral and oropharyngeal carcinoma, found a 2% rate of metastasis to level IIb. Lim et al.[19] found a 5% rate in a review of 74 patients with oral carcinoma. Elsheikh et al.[20] (level 4) reported that 6% of 48 cN0 patients with oral carcinoma had metastasis to level IIb. In all three studies, all patients with positive level IIb also had positive nodes at level IIa. The latter study identified oral tongue primary tumors as more likely to result in level IIb metastases than those from other oral cavity sites.

In the presence of clinical neck metastasis, the rate of level IIb involvement is higher. Silverman et al.[21] (level 4) reported that 3 of 27 (11%) clinically positive necks demonstrated metastasis at level IIb; the presence of extracapsular spread and pathologic metastasis to level IIa were predictors of level IIb involvement; clinical N stage was not; nor was primary site; slightly under half of the patients in this study had primary tumors in the oral cavity. Talmi et al.[22] (level 4) reviewed results of 102 neck dissections, of which 4% were positive at level IIb. Of 22 patients with clinical N2 or larger disease, level IIb was positive in 18%. Interestingly, in this study there were no patients with proven metastasis at both level IIa and IIb.