

Editorial

Is dissection of level V necessary in patients with T₂–T₄N₀ supraglottic cancer?

ALESSANDRA RINALDO, M.D., ALFIO FERLITO, M.D., F.R.C.S. (Ed.), F.R.C.S., F.A.S.C.P.,
LUIZ P. KOWALSKI*, M.D., MIQUEL QUER†, M.D., CARLOS SUÁREZ‡**, M.D., XAVIER LEÓN†, M.D.,
K. THOMAS ROBBINS§, M.D., F.R.C.S.C., F.A.C.S.

Nodal status has a greater influence on the curability of supraglottic cancer than the status of the primary tumour. The proper management of the neck in patients with supraglottic cancer remains a subject of much debate. There is no general consensus of which type of neck dissection is more adequate in patients with supraglottic cancer without clinical, radiologic, or ultrasonic regional lymph node metastasis.

Elective dissection of cervical lymph nodes is commonly advocated for the treatment of patients with T₂–T₄N₀ supraglottic cancer. The philosophy of radical neck dissection has been replaced by a more selective approach in the absence of clinically obvious metastatic disease.¹

The procedure of choice for elective surgery, until recently, was usually modified radical neck dissection, in particular the 'type III' (or functional neck dissection)² which removes lymph node levels I, II, III, IV and V and preserves the sternocleidomastoid muscle, the internal jugular vein, the spinal accessory nerve and the submandibular gland. In 1990, Candela *et al.*³ retrospectively reviewed 247 consecutive patients with supraglottic or transglottic squamous cell carcinoma submitted to a comprehensive neck dissection. The analysis of the distribution of lymph node metastasis showed a remarkable preference for levels II and III. Levels I and V were rarely involved. Based on these observations, the authors proposed the indication of more selective neck dissections for patients with necks staged as N₀ or N₁.

In 1994, Shah and Andersen⁴ retrospectively reviewed the patterns of nodal metastasis in patients who underwent comprehensive dissections in an effort to validate the indication of less extensive surgical procedures in order to reduce post-operative morbidity. They reinforced the rationale for the indication of a lateral neck dissection in patients with laryngeal cancer.

More recently, complete functional neck dissection has been considered an unnecessarily extensive procedure for treatment of the clinically negative neck as levels I and V are rarely involved, particularly in the absence of clinically or radiologically apparent neck metastases.⁵ Thus, selective lateral neck dissection (jugular neck dissection) is a valid option in supraglottic cancer as this procedure preserves levels I and V where laryngeal cancer rarely metastasizes. The dissection of levels II, III and IV as part of an elective or therapeutic neck dissection is a common practice for patients with supraglottic cancer.

In 1999, Tu,⁶ in a prospective non-randomized study, suggested that a very limited neck dissection, called upper neck (level II) dissection for N₀ neck supraglottic cancer, can be considered a diagnostic as well as a therapeutic modality. In the case of subclinical metastasis on frozen section, a level III neck dissection was also performed.

In 1996, Ambrosch *et al.*⁷ mentioned that Steiner advocates performing 'limited' selective neck dissection, clearing only levels II and III for cancer of the larynx. In 2001, a retrospective study was published by Steiner's group.⁸ The authors believed that the dissection of levels II and III was sufficient when metastases were not suspected during surgery to level IV, a type of surgery that they had done routinely since 1979.

In 2001, León *et al.*⁹ published a retrospective revision of 79 patients with laryngeal cancer in which a conservative surgical approach to the clinically negative neck was adopted. Treatment consisted of a neck dissection at levels II and III with intraoperative biopsy of a sample of subdigastric and supraomohyoid nodes. When biopsy specimens were positive, dissection of levels IV and V was completed. In no case were positive nodes found at level V, therefore the authors do not consider it necessary to dissect level V in selective neck dissection.

From the Department of Surgical Sciences, ENT Clinic, University of Udine, Udine, Italy, Head and Neck Surgery and Otorhinolaryngology Department*, Centro de Tratamento e Pesquisa Hospital do Cancer A. C. Camargo, São Paulo, Brazil, Department of Otolaryngology† Hospital de Santa Creu i Sant Pau, Barcelona, Spain, Department of Otolaryngology‡, Hospital Universitario Central de Asturias, Oviedo, Spain, Instituto Universitario de Oncología del Principado de Asturias**, Oviedo, Spain, Division of Otolaryngology§, SIU School of Medicine, Springfield, IL, USA.

In 2002, Khafif-Hefetz *et al.*,¹⁰ in a retrospective study, questioned the need to dissect level IV as part of an elective dissection for patients with supraglottic and transglottic squamous cell carcinoma, especially if there is no adenopathy in other levels during surgery. However, for patients with clinically enlarged lymph nodes a neck dissection including level IV should be recommended.

In the same year, Redaelli de Zinis *et al.*¹¹ performed a retrospective review of 402 consecutive patients with supraglottic squamous cell carcinoma. They found that lymph node metastases occurred in a high percentage of patients (40 per cent), emphasizing the need for an elective neck dissection. The repetitive pattern of distribution, which mainly involved levels II, III and IV, suggested that the management of choice for T₂-T₄N₀ supraglottic cancer can be a lateral neck dissection which has the advantage over a comprehensive neck dissection of decreasing the operative time and the morbidity. These authors suggested performing a selective neck dissection including levels II-V whenever there is clinical, radiological or intra-operative evidence of metastases at any level.

In 2003, Spriano *et al.*¹² retrospectively evaluated 346 N₀ patients affected by laryngeal cancer. The patients underwent elective selective neck dissection, including levels II-V for a total of 602 dissected heminecks. They found the presence of node metastases at level V in 10 of 602 neck dissections (1.6 per cent). Although level V was involved very rarely, they performed elective selective neck dissection thinking that the discovery of an occult metastasis in level V in a few patients causes the 'shoulder syndrome', which without doubt is more frequent, and increases the length of the procedure.

In the same year, Pinilla *et al.*¹³ retrospectively examined 295 patients with laryngeal cancer and N₀ neck, 124 of which had supraglottic tumours. In their experience, routine bilateral functional neck dissection in supraglottic cancers, regardless of the size of the tumour, is the most beneficial approach for patients in terms of survival.

All but one of the above mentioned studies are retrospective and therefore show the limitations that are typical of any retrospective analysis. In particular, they do not contain information of the methods of node level identification or histological preparation (no information exists in the literature about the number of lymph nodes examined or the number of sections of each lymph node examined). Traditional techniques of pathologic analysis of neck dissections are potentially flawed and may not give a complete analysis.¹⁴⁻¹⁵ These traditional pathologic methods of assessing neck dissection specimens may miss isolated neoplastic cells, micrometastases, extracapsular spread and soft tissue deposits.¹⁶ The studies mentioned were not supported by immunohistochemical investigations which enhance epithelial neoplastic cell detection. A negative pathological report does not eliminate the possibility of occult disease in a single node or nodes. This phenomenon is referred to as subpathologic nodal metastasis in

distinction to subclinical metastasis.¹⁶ In 2004, Rinaldo *et al.*¹⁷ reviewed the incidence of occult subpathologic metastases detected by immunohistochemistry in patients with head and neck squamous cell carcinoma and found a mean incidence rate of 15.2 per cent.

In 2000, Buckley and MacLennan¹⁸ prospectively analyzed the prevalence and distribution of histological cervical node metastases in 100 consecutive patients in whom neck dissection was part of the primary treatment of laryngeal and hypopharyngeal cancer. All metastases in N₀ and N₁ disease were confined to levels II, III, IV and VI. Metastases to levels I and V were infrequent even in N+ disease. These results support the use of elective dissection of node levels II to IV for N₀ laryngeal and hypopharyngeal cancer. The authors suggest the inclusion of level VI nodes for tumours invading the subglottis, pyriform fossa apex, and postcricoid region. The prevalence of contralateral metastases indicates the use of bilateral neck dissection in midline or bilateral tumours. This study was not supported by immunohistochemistry.

Another recent cooperative prospective randomized study from the Brazilian Head and Neck Cancer Study Group¹⁹ has confirmed the oncologic reliability of the procedures by demonstrating no difference in survival between two cohorts of patients electively submitted to lateral neck dissection or modified radical neck dissection, type III, in the management of supraglottic and transglottic cancers. These results confirm the efficacy of lateral neck dissection in the elective treatment of the neck in patients with laryngeal cancers, which was associated with a reduction in post-operative complication rates as well as in the length of hospitalization. In this study it was also demonstrated that level IV metastases were extremely rare in patients with supraglottic tumours. Only patients with transglottic tumours involving the subglottis or extensive tumours involving the pyriform sinus had metastatic lymph nodes at level VI. This prospective study was also not supported by immunohistochemical investigations.

The main advantages of avoiding dissection of level V are the shortening of the surgical time, it is not necessary to manipulate the posterior portion of the spinal accessory nerve, and roots of the deep cervical plexus are preserved. In a study of the impact of the type of neck dissection on quality of life, Kuntz and Weymuller²⁰ found that pain and shoulder dysfunction were significantly worse when level V was dissected. Furthermore, in a study of the sensory changes associated with neck dissection, Saffold *et al.*²¹ reported that preservation of the cervical root branches resulted in a smaller area of anaesthesia than without a rootlet-preserving neck dissection technique.

In 1998, Talmi *et al.*²² published a prospective study regarding the pattern of metastases to the 'submuscular recess' (called also, level IIB, supra-retrospinal triangle, supra-retrospinal recess, and supraspinal accessory lymph node pad) and sug-

gested that the dissection of this area is not necessary when performing an elective neck dissection, limiting injury to the spinal accessory nerve without compromising the removal of lymph nodes at risk for involvement with cancer. In particular, there were 17 laryngeal cancers, 10 of which were supraglottic cancers, and the submuscular recess in all of these patients was not metastatic. Furthermore, only patients with clinically metastatic N₂ nodes had metastatic lymph nodes at level IIB.

In 2002, in order to evaluate lymphatic metastasis to the supraretrospinal triangle in laryngeal squamous carcinoma, Köybasioglu *et al.*²³ planned a prospective study and separately dissected supraretrospinal recess lymph nodes and submitted them to pathological examination. No metastasis was found in the N₀ necks treated with lateral neck dissection and none was found even in N₁ and N₂ necks treated with radical neck dissection and modified radical neck dissection. The authors concluded that level IIB may be left undissected during treatment of an N₀ neck with lateral neck dissection so that spinal accessory nerve dysfunction can be minimized and operative time can be saved.

In 2003, Silverman *et al.*²⁴ prospectively analyzed a series of 74 patients (90 selective neck dissections) including eight supraglottic laryngeal cancers (13 selective neck dissections). In none of these eight cases was metastasis to the submuscular recess present. Conversely, in four cases (two oral tongue, one postcricoid and one nasal cavity cancers) positive nodal metastases were found in the submuscular recess.

The results of prospective studies and the accurate histopathological assessment of neck dissections support the use of selective lateral neck dissection without dissecting level IIB in supraglottic cancer with clinically negative neck. This procedure would be designated selective neck dissection (IIA, III, IV).^{25,26} The dissection of level I and V is unnecessary.^{16,18,19,27-39} Buckley and MacLennan¹⁸ found that level I and V metastases only occurred in N_{2c} and N₃ disease. This suggests that selective dissection of levels II-IV is pathologically justified in N₀.

Limited selective dissection (levels II and III) could be insufficient, in particular for the presence of skin and occult metastases. Ambrosch *et al.*⁸ stated that the lymph nodes of level IV were removed only when metastases were clinically suspected during the neck dissection or proven by frozen section. The practice of choosing lymph nodes from neck dissections before sectioning will miss micrometastases smaller than 3 mm in diameter, which may represent one third of the positive nodes.¹⁸ The surgeon is not in a position to consistently differentiate benign from malignant lymph nodes intra-operatively.⁴⁰ The assumption that a frozen section is a good determinant for selection of the type of neck dissection is questionable for several reasons.⁴¹ Ferlito and Rinaldo⁴² suggest including also level IV in the surgical specimen, since extending the operation to this level does not appreciably increase operating time and morbidity except on the left side where the

thoracic duct should be avoided or securely ligated. The extra time taken to carry out this procedure is no more than 15 minutes. During the dissection of level IV it is possible to preserve the omoyoid muscle. Retraction of the sternocleidomastoid muscle permits adequate dissection.⁴³ The dissection of level IIB in the N₀ necks is not indicated so that spinal accessory nerve dysfunction can be minimized and operative time can be saved.²²⁻²⁴

In view of the low morbidity of selective neck dissection there is no apparent disadvantage to carrying out a bilateral dissection.^{18,27,36,44-46} There are seldom side-effects from neck dissection as observed by means of Doppler ultrasonography: in all the cases the patency and flow of the internal jugular vein remained unaltered after neck dissection.⁴⁷ Thus for patients with supraglottic cancer whose primary disease is to be treated with surgery, we recommend removal of levels IIA-IV on each side of the neck. This procedure is usually referred to as a lateral neck dissection or selective neck dissection using the latest AHNS/AAO-HNS Neck Dissection Classification.²⁵ We do not believe it is necessary to remove level I or V unless there is evidence of nodes at multiple levels. Further prospective studies are needed to confirm preliminary observations that level IV can be omitted in patients who have clinically N₀ disease.

The combined goal of minimizing morbidity and avoiding overtreatment may be achieved by using bilateral selective lateral neck dissection in patients with supraglottic cancer and a clinically negative neck.

References

- 1 Ferlito A, Silver CE, Rinaldo A, Smith RV. Surgical treatment of the neck in cancer of the larynx. *ORL J Otorhinolaryngol Relat Spec* 2000;**62**:217-25
- 2 Ferlito A, Gavián J, Buckley JG, Shaha AR, Miodonski AJ, Rinaldo A. Functional neck dissection: fact and fiction. *Head Neck* 2001;**23**:804-8
- 3 Candela FC, Shah J, Jaques DP, Shah JP. Patterns of cervical node metastases from squamous carcinoma of the larynx. *Arch Otolaryngol Head Neck Surg* 1990;**116**:432-5
- 4 Shah JP, Andersen PE. The impact of patterns of nodal metastasis on modifications of neck dissection. *Ann Surg Oncol* 1994;**1**:521-32
- 5 Ferlito A, Rinaldo A. Level I dissection for laryngeal and hypopharyngeal cancer: is it indicated? *J Laryngol Otol* 1998;**112**:438-40
- 6 Tu GY. Upper neck (level II) dissection for N₀ neck supraglottic carcinoma. *Laryngoscope* 1999;**109**:467-70
- 7 Ambrosch P, Freudenberg L, Kron M, Steiner W. Selective neck dissection in the management of squamous cell carcinoma of the upper digestive tract. *Eur Arch Otorhinolaryngol* 1996;**253**:329-35
- 8 Ambrosch P, Kron M, Pradier O, Steiner W. Efficacy of selective neck dissection: A review of 503 cases of elective and therapeutic treatment of the neck in squamous cell carcinoma of the upper aerodigestive tract. *Otolaryngol Head Neck Surg* 2001;**124**:180-7
- 9 León X, Quer M, Orús C, Sancho FJ, Bagué S, Burgués J. Selective dissection of levels II-III with intraoperative control of the upper and middle jugular nodes: a therapeutic option for the N₀ neck. *Head Neck* 2001;**23**:441-6

- 10 Khafif-Hefetz A, Fliss DM, Medina JE. The incidence of level IV metastases in squamous cell carcinoma of the larynx. 2002 Annual Meeting Program, American Head and Neck Society, Boca Raton, FL, 2002; Scientific poster n° 30: 52–3
- 11 Redaelli de Zinis LO, Nicolai P, Tomenzoli D, Ghizzardi D, Trimarchi M, Cappiello J, *et al.* The distribution of lymph node metastases in supraglottic squamous cell carcinoma: therapeutic implications. *Head Neck* 2002;**24**:913–20
- 12 Spriano G, Piantanida R, Pellini R, Muscatello L. Elective treatment of the neck in squamous cell carcinoma of the larynx: clinical experience. *Head Neck* 2003;**25**:97–102
- 13 Pinilla M, González FM, López-Cortijo C, Arellano B, Herrero J, Trinidad A, *et al.* Management of N₀ neck in laryngeal carcinoma. Impact on patient's survival. *J Laryngol Otol* 2003;**117**:63–6
- 14 Buckley JG, Feber T. Surgical treatment of cervical node metastases from squamous carcinoma of the upper aerodigestive tract: evaluation of the evidence for modifications of neck dissection. *Head Neck* 2001;**23**:907–15
- 15 Jose J, Coatesworth AP, MacLennan K. Cervical metastases in upper aerodigestive tract squamous cell carcinoma: histopathologic analysis and reporting. *Head Neck* 2003;**25**:194–7
- 16 Byers RM, Clayman GL, McGill D, Andrews T, Kare RP, Roberts DB, *et al.* Selective neck dissections for squamous carcinoma of the upper aerodigestive tract: patterns of regional failure. *Head Neck* 1999;**21**:499–505
- 17 Rinaldo A, Devaney KO, Ferlito A. Immunohistochemical studies in the identification of lymph nodes micrometastases in patients with squamous cell carcinoma of the head and neck. *ORL* (in press)
- 18 Buckley JG, MacLennan K. Cervical node metastases in laryngeal and hypopharyngeal cancer: a prospective analysis of prevalence and distribution. *Head Neck* 2000;**22**:380–5
- 19 Brazilian Head and Neck Cancer Study Group. End results of a prospective trial on elective lateral neck dissection vs type III modified radical neck dissection in the management of supraglottic and transglottic carcinomas. *Head Neck* 1999;**21**:694–702
- 20 Kuntz AL, Weymuller EA Jr. Impact of neck dissection on quality of life. *Laryngoscope* 1999;**109**:1334–8
- 21 Saffold SH, Wax MK, Nguyen A, Caro JE, Andersen PE, Everts EC, *et al.* Sensory changes associated with selective neck dissection. *Arch Otolaryngol Head Neck Surg* 2000;**126**:425–8
- 22 Talmi YP, Hoffman HT, Horowitz Z, McCulloch TM, Funk GF, Graham SM, *et al.* Patterns of metastases to the upper jugular lymph nodes (the 'submuscular recess'). *Head Neck* 1998;**20**:682–6
- 23 Köybasioglu A, Uslu S, Yilmaz M, Inal E, Ileri F, Asal K. Lymphatic metastasis to the supraretrospinal recess in laryngeal squamous cell carcinoma. *Ann Otol Rhinol Laryngol* 2002;**111**:96–9
- 24 Silverman DA, El-Hajj M, Strome S, Esclamado RM. Prevalence of nodal metastases in the submuscular recess (level IIb) during selective neck dissection. *Arch Otolaryngol Head Neck Surg* 2003;**129**:724–8
- 25 Robbins KT, Clayman G, Levine PA, Medina J, Sessions R, Shaha A, *et al.* American Head and Neck Society; American Academy of Otolaryngology – Head and Neck Surgery. Neck dissection classification update: revisions proposed by the American Head and Neck Society and the American Academy of Otolaryngology – Head and Neck Surgery. *Arch Otolaryngol Head Neck Surg* 2002;**128**:751–8
- 26 Ferlito A. Classification and terminology of neck dissection. *Arch Otolaryngol Head Neck Surg* 2002;**128**:747–8
- 27 Ferlito A, Buckley JG, Shaha AR, Silver CE, Rinaldo A, Kowalski L. The role of neck dissection in the treatment of supraglottic laryngeal cancer. *Acta Otolaryngol* 2001;**121**:448–53
- 28 Ferlito A, Rinaldo A. Controversies in the treatment of N₀ neck in laryngeal cancer: neck dissection, no surgery or sentinel lymph node biopsy? *ORL J Otorhinolaryngol Relat Spec* 2000;**62**:287–9
- 29 Wong RJ, Rinaldo A, Ferlito A, Shah JP. Occult cervical metastasis in head and neck cancer and its impact on therapy. *Acta Otolaryngol* 2002;**122**:107–14
- 30 dos Santos CR, Goncalves Filho J, Magrin J, Johnson LF, Ferlito A, Kowalski LP. Involvement of level I neck lymph nodes in advanced squamous carcinoma of the larynx. *Ann Otol Rhinol Laryngol* 2001;**110**:982–4
- 31 Ferlito A, Buckley JG, Shaha AR, Rinaldo A. Contemporary important considerations in diagnosis and treatment of head and neck cancer. *Acta Otolaryngol* 2002;**122**:115–20
- 32 Ferlito A, Shaha AR, Rinaldo A. Evolution in the philosophy of neck dissection. *Acta Otolaryngol* 2001;**121**:963–6
- 33 Ferlito A, Shaha AR, Rinaldo A. Surgical management of head and neck cancer: the next decade. *Acta Otolaryngol* 2001;**121**:772–6
- 34 Ferlito A, Buckley JG, Shaha AR, Rinaldo A. Rationale for selective neck dissection in tumors of the upper aerodigestive tract. *Acta Otolaryngol* 2001;**121**:548–55
- 35 Pellitteri PK, Robbins KT, Neuman T. Expanded application of selective neck dissection with regard to nodal status. *Head Neck* 1997;**19**:260–5
- 36 Pillsbury HC III, Clark M. A rationale for therapy of the N₀ neck. *Laryngoscope* 1997;**107**:1294–315
- 37 Pitman KT, Johnson JT, Myers EN. Effectiveness of selective neck dissection for management of the clinically negative neck. *Arch Otolaryngol Head Neck Surg* 1997;**123**:917–22
- 38 Clayman GL, Frank DK. Selective neck dissection of an anatomically appropriate levels is as efficacious as modified radical neck dissection for elective treatment of the clinically negative neck in patients with squamous cell carcinoma of the upper respiratory and digestive tracts. *Arch Otolaryngol Head Neck Surg* 1998;**124**:348–52
- 39 Mira E, Benazzo M, Rossi V, Zanoletti E. Efficacy of selective lymph node dissection in clinically negative neck. *Otolaryngol Head Neck Surg* 2002;**127**:279–83
- 40 Rinaldo A, Devaney KO, Ferlito A. Can the surgeon consistently differentiate intraoperatively benign from malignant lymph nodes? *Oral Oncol* 2004;**40**:361–3
- 41 Finn S, Toner M, Timon C. The node-negative neck: accuracy of clinical intraoperative lymph node assessment for metastatic disease in head and neck cancer. *Laryngoscope* 2002;**112**:630–3
- 42 Ferlito A, Rinaldo A. Selective lateral neck dissection for laryngeal cancer in the clinically negative neck: is it justified? *J Laryngol Otol* 1998;**112**:921–4
- 43 Ferlito A, Silver CE. Neck dissection. In: Silver CE, Ferlito A, eds. *Surgery for Cancer of the Larynx and Related Structures*. Philadelphia: Saunders, 1996; 299–324
- 44 Myers EN, Fagan JF. Management of the neck cancer of the larynx. *Ann Otol Rhinol Laryngol* 1999;**108**:828–32
- 45 Weber PC, Johnson JT, Myers EN. The impact of bilateral neck dissection on pattern of recurrence and survival in supraglottic carcinoma. *Arch Otolaryngol Head Neck Surg* 1994;**120**:703–6
- 46 Lutz CK, Johnson JT, Wagner RL, Myers EN. Supraglottic carcinoma: patterns of recurrence. *Ann Otol Rhinol Laryngol* 1990;**99**:12–17
- 47 Prim MP, de Diego JI, Fernandez-Zubillaga A, Garcia-Raya P, Madero R, Gavilan J. Patency and flow of the internal jugular vein after functional neck dissection. *Laryngoscope* 2000;**110**:47–50

Address for correspondence:

Alfio Ferlito, M.D., F.R.C.S. (Ed.), F.R.C.S., F.A.S.C.P.,
 Director of the Department of Surgical Sciences,
 Professor and Chairman of the ENT Clinic,
 University of Udine,
 Policlinico Universitario,
 Piazzale S. Maria della Misericordia,
 I-33100 Udine, Italy.

Fax: +39 0432 559339

E-mail: a.ferlito@uniud.it