

## Predictive Factors and Incidence Analysis to Cervical Level IIB Metastasis in the Upper Aerodigestive Tract Carcinoma

Emílio Tosto Neto, Terence Farias, João Henrique da Cunha Villela, Raphael Fernandes Calhau\* & Fernando Luiz Dias

*Department of Head and Neck Surgery, Brazilian National Cancer Institute, Brazil*

\***Correspondence to:** Dr. Raphael Fernandes Calhau, Department of Head and Neck Surgery, Brazilian National Cancer Institute, Brazil.

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### Abstract

#### Objective

To evaluate the incidence of metastases to the Level IIB (suprascapular) in patients submitted to neck dissections for squamous cell carcinoma (SCC) of the upper aerodigestive tract and to identify the regional predictive factors for nodal metastases at this level.

#### Methods

All neck dissections (ND) carried through by the Head and Neck Surgery Department (INCA-MS-RJ) in the period of four months had been studied retrospectively. A hundred and fifty-seven dissections performed in 97 patients had been analyzed. All the dissections had the separate levels in the surgery by the surgeon or by the first assistant and the Level IIB was dissected separately from the remaining levels. The statistical analysis was made using the Qui-square and Cox regression tests, having been considered as positive p value  $\leq 0.05$ .

## Results

A total of 5 neck dissections had shown pathologically positive nodes in the Level IIb (incidence = 3.18%). Among the analyzed factors, only the occurrence of metastatic nodes at the Level V ( $p = 0.03$ ) and the macroscopic extracapsular spread ( $p = 0.0001$ ) had statistical significance as predictable of metastases for the Level IIb. None of the other analyzed factors were statistically significant (tumor site, pT, pN, metastases to other levels, perivascular invasion, perineural invasion, adjacent soft tissues spread).

## Conclusion

Our study disclosed low incidence of supraspinal metastases (Level IIb) in patients submitted to neck dissection for SCC of the upper aerodigestive tract. The only identified predictive factor of the incidence of metastases to Level IIb had been the presence of metastases to Level V and macroscopic extracapsular spread. Analyzing our results and comparing with the data in the literature, we believe that it has given enough to justify the accomplishment of prospective randomized trials so as to evaluate the value of elective supraspinal dissection, mainly in the clinically negative necks.

## Introduction

Squamous cell carcinoma (SCC) is the most common histological type among the Malignant Neoplasias that occur in the head and neck regions. Among the prognostic factors concerning this disease, the presence or absence of neck metastasis is the main survival indicator in these patients. The treatment to be chosen (surgery, radiation therapy, or both) depends on several factors such as anatomic site and primary lesion stage, neck disease status, among others. Surgery is generally the treatment of choice [1,2]. As the methods used in the treatments evolved (with multimodal frequency) and the increasing concern with quality of life, there is a growing tendency towards more conservative treatments for patients suffering from H&N SCC.

The aggression to the spinal accessory nerve (SAN) during Neck Dissection (ND) can happen due to various mechanisms such as nerve traction, compression by retractors, devascularization during dissection, burns caused by electrocautery, or accidental ligation during hemostasis proceedings, which often results in morbidities such as shoulder dysfunction and chronic pain. The moments of more intense handling occur during Dissection of "Level V" and Level IIb.

The purpose of our study is to evaluate the incidence of metastases at Level IIb, and the presence of factors that can work as predictors of metastasis occurrences at this level in patients treated for SCC of the Upper Aerodigestive Tract (UADT).

## Patients and Methods

All ND performed by the Head and Neck Surgery Department at the National Institute of cancer (INCA) have prospectively been studied between four months. The inclusion criteria were patients who had undergone ND for SCC of UADT, in which the ND surgical parts had had their levels separated during transoperative.

Of a total of 281 ND performed in the above mentioned period, 61 have been excluded (for either not being a case of SCC or because levels had not been separated during the transoperatory). One hundred and fifty-seven (157) ND performed on 97 patients were included in the study. All cases had their levels separated during the operatory procedure by the surgeon or the first assistant, and Level IIb was resected separately from the rest of the Dissection.

The facts studied were Anatomic Site of primary lesion, pathological T (pT), pathological N (pN), presence of metastases in other levels, angiolymphatic invasion, perineural invasion, capsular spread of metastases, and spread of primary tumor to soft tissues of the neck.

The statistical analysis was carried out through the Qui-square methods (univariate analysis of the metastasis predictive factors to Level IIb) and Cox regression (multivariate analysis). P values lower or equal to 0.05 were considered statistically significant.

## Results

Ninety-seven (97) patients were studied (13 women and 84 men) and submitted to 157 ND (38 unilateral ND and 59 bilateral).

The most frequent primary anatomic site was the Larynx (53.5% of the ND), followed by the Oral Cavity (29.3%). One patient presented oropharyngeal and hypopharyngeal synchronous lesions and was submitted to bilateral ND (1.3%) - Table 1.

**Table 1:** Distribution according to anatomic site of ND performed on patients suffering from H&N SCC at INCa, between February and May, 2018

Site	N = 157 patients (%)
Larynx	84 ND (53.5%)
Oral cavity	46 ND (29.3%)
Oropharynx	10 ND (6.4%)
Hypopharynx	8 ND (5.1%)
Occult primary	4 ND (2.5%)
Nasal cavity	3 ND (1.9%)
Oropharynx + hypopharynx	2 ND (1.3%)

When considering the type of ND which had been performed, lateral ND (Levels II and IV) was performed in 77 cases (49.7%) Radical (modified or classical) ND in 52 cases (33.2%). Supraomohyoid ND (SOHND) and posterolateral ND were also been performed - Table 2.

**Table 2:** Types of Neck dissection During the period at INCA, between February and May, 2018

Dissection Type	# (%)
Lateral	78 (49.7%)
Radical	52 (33.2%)
Supraomohyoid	23 (14.6%)
Posterolateral	4 (2.5%)

The mean of resected lymph nodes by cervical level was of 4.66 at Level I; 7.22 at Level IIa; 8.10 at Level III; 6.64 at Level IV; 7.01 at Level V; and 3.99 at Level IIb - Table 3.

**Table 3:** Average and variation of the resected lymph nodes by cervical level of patients submitted to ND for H&N SCC at INCa between February and May, 2018

Level	# Resected Lymph Nodes
Level I	4.66 (1-31)
Level IIa	7.22 (1-30)
III	8.10 (1-26)
IV	6.64 (1-21)
V	7.01 (0-27)
IIb	3.99 (0-21)

When the compromised levels were assessed, Level I was positive in 25 cases, with an average of 1.64 compromised lymph nodes. Level IIa was compromised for 55 cases, with an average of 1.47 compromised lymph nodes; Level III was compromised in 26 cases, with 1.5 compromised lymph nodes; Level IV was positive in 14 cases, with an average of 1.42 compromised lymph nodes; and Level V was positive in 9 cases, with 2.44 positive lymph nodes. Only the metastasis presence to Level V (p=0.03) was positive as predictor of metastasis occurrence to Level IIb. Stage pN did not show any statistical significance (P=0.9) - table 4.

**Table 4:** Association between cervical metastasis occurrence, neck level, with presence of cervical metastasis at Level IIb in patients submitted to ND for H&N SCC, at INCa between February and May, 2018

Metastasis to Level IIb			
Cervical level	Yes	No	p
Level I	2	75	0.38
level IIa	4	153	0.10
level III	2	155	0.43
level IV	1	130	0.95
level V	3	52	0.03

Of the 157 ND analyzed, 5 presented lymph node at Level IIb, corresponding to 3.18% of the cases. Considering the positive cases, in 1 of them the primary was of oral cavity, 1 in the nasal cavity, 1 in the oropharynx and 1 patient with oropharynx and hypopharynx synchronic lesions presented bilateral metastases to this level. None of the ND performed on patients with primary lesion in the larynx presented metastasis to Level IIb. The primary site did not present statistical significance as a predictive factor of metastasis to Level IIb ( $p=0.18$ ), as well as stage pT ( $p=0.13$ ).

Primary tumor spread to soft tissue ( $p=0.97$ ), perineural invasion ( $p=0.62$ ), angiolymphatic invasion ( $p=0.16$ ) were not significant either.

The occurrence of metastatic capsular spread was present in all of the cases in which metastases occurred to Level IIb ( $p=0.0001$ ).

When the multivariate analysis was carried out, the presence of metastasis to Level V ( $p=0.004$ ) and the capsular spread ( $p=0.01$ ) remained as positive predictive factors.

## Discussion

The SAN is described as a merely motor nerve, having as primary activity the innervation of the trapezius and sternocleidomastoid muscles [3]. The loss of this nerve function, followed by the functional loss of this musculature (mainly of the trapezius muscle) is responsible for the clinical complex called “shoulder syndrome” (motor functional deficit, cervical stiffness and shoulder chronic pain). The signs and symptoms can happen separately or associated, being present in up to 80% of the patients submitted to ND [4,5]. The high frequency in which the Syndrome is present has a direct influence on the quality of life of the patients treated by Head & Neck SCC.

The first SAN lesion description as a consequence of ND was carried out by Ewyng *et al.* [6] in 1952.

Leipzig *et al.* [5] evaluated 109 patients submitted to several types of ND. Out of those patients, 30% submitted to functional ND, the 50% submitted to modified radical ND, and 60% submitted to classical radical ND disclosed symptoms of “Shoulder Syndrome”.

Salerno *et al.* [7] in 2002 compared two groups which had been submitted to functional ND associated to laryngectomy, functional result and quality of life through electroneuromyography (EMG) and questionnaires. One group was provided with intense physiotherapeutic care. Both groups presented at least moderate motor dysfunction after surgery as well as chronic pain, classified as severe in roughly 50% of the cases, a month after surgery. EMG disclosed potential denervation of the trapezius muscle, supra and infra spinal in 76.6% in one of the groups and 73.3% in the other. The late results were better for patients who had received physiotherapy.

Cappiello *et al.* [8] found traces of EMG with latency increase ( $p=0.001$ ) and amplitude decrease ( $p=0.008$ ) in patients submitted to ND and evaluated one year after surgical treatment when compared to the side which had not been treated. These alterations have been found in up to 85% of the patients.

Kraus *et al.* [9]. evaluated 44 patients with N0 neck submitted to SOHND for SCC of the oral cavity or oropharynx, finding a 2% global incidence of metastases to Level IIB and of 6.7% in positive pN patients.

Lim *et al.* [10], in a similar study, found a 5% incidence. On this study, all patients with metastasis to Level IIB also had metastatic lymph nodes at Level IIa [10].

Silverman *et al.* [11], when evaluating patients treated for SADT SCC, found a 1.6% incidence of metastases to Level IIB in clinically patients N0 and of 11.15 in N+ patients, with a global incidence of metastases to Level IIB of 4.4%.

These incidence related outcomes are quite similar to those also found by Talmi *et al.* [12], who evaluated 71 patients submitted to ND (102 ND), finding a 10.3% incidence of metastases to Level IIB in N+ patients and of 0% in N0 patients, with a 4% global incidence [12]. Chone *et al.* [13] evaluated the chance of metastases to the Apex of the Posterior Triangle in 62 ND, which anatomically corresponds to Level IIB, finding a 6.5% global incidence (2.3% of necks N0 and of 16.75 in necks N+).

These numbers confirm the global incidence of 3.18% found in our study.

Silverman *et al.* [11] also searched for factors which could be associated to the occurrence of metastases to Level IIB, in which the advanced stage N ( $p=0.003$ ), the presence of metastases to Level IIa ( $p=0.001$ ) and the capsular spread ( $p=0.01$ ) were statistically relevant to this association. These results were partially in accordance to those obtained in our study. We found relevance associated to the presence of metastases to Level V ( $p=0.003$ ) and capsular spread of metastasis ( $p=0.001$ ). The presence of metastases to Level IIa was not relevant.

Another relevant finding in our study was the fact that no case of laryngeal SCC submitted to ND showed metastasis to Level IIB. Such result was also found by Coskun *et al.* [14] when evaluating 113 selective ND (II to IV) performed on patients treated for Larynx SCC.

The low incidence shown in the literature, mainly in N0 patients, and the factors associated to the presence of metastatic adenopathy to Level IIB raises the questioning if the suprascapular level resection during selective ND would influence on the oncological results of these patients treatments, and if their exclusion could not bring a positive impact in the quality of life.

**Table 5:** Literature data about the compromising of the Level IIB during ND for Head and Neck SCC

	N0	N+	Global incidence
Talmi <i>et al.</i> [12]	0%	10.3%	4%
Chone <i>et al.</i> [13]	2.3%	16.7%	6.5%
Kraus <i>et al.</i> [9]	6.6%	-	2%
Lim <i>et al.</i> [10]	-	-	5%
INCA**	-	-	3.18%

\*N0 patients /pN+; \*\*Current study



## Conclusion

The occurrence of metastases to Level IIb was low (3.18%), being similar to results found in other studies. Among the studied factors, only the presence of metastases to Level V and the presence of metastases with capsular spread disclosed as metastatic predictive factors to Level IIb.

These results lead us to believe that there is enough data to justify randomized study accomplishments that can evaluate the real need for Level IIb dissection, mainly in N0 necks.

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