THE USE OF RADIOLOCALISATION OF THE SENTINEL LYMPH NODE IN HEAD AND NECK SQUAMOUS CELL CARCINOMA

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Introduction: In cases of squamous cell carcinomas of the oral cavity, oropharynx or supraglottis region, occult metastases have a relative high incidence, varying between 15% and 60%, according to some authors. [1] Management of patients with N0 has been intensely studied, because of the risk of occult metastases. [2,3]

Therapeutic methods include the use of radiotherapy and selective neck dissection. Detection methods of the first lymph node station invaded in the metastasisation process are especially important in elaborating a therapeutic protocol for the cancer patient. Techniques for this are intravital colorations, lymphography and radioactive isotope radio-localisation.

Materials and Methods: Repeated tries resulted in the formulation of 6 types of elective neck dissections which have evolved themselves from en-bloc resection to the excision of only the at-risk lymph node stations. The percentage of micro-metastases present in cases of patients with a negative sentinel lymph node is considered to be under 5% [8,9,10]. Thus the key to proper surgical treatment became the histological exam of the first lymph node. As a response to this, Alex et. al. has developed and published in 1993 a minimally invasive technique of localising the "sentinel" lymph node in the head and neck region, using a γ probe for transcutaneous radiolocalisation of sentinel nodes and thus facilitating the biopsy through a small incision. [11,12]

Results and Discussion: Radiolocalisation of the sentinel node has identified at least 2 sentinel lymph nodes in all 8 of the cases studied. In one of the cases, 2 out of 3 nodes in which micrometastases were found were classified as sentinel nodes. Therefore, skip-metastases may represent a non-standard variant of lymph drainage or even an aberration in anatomical pathways which run in parallel with standard, classical ones.

Key words: squamous cell carcinoma, radiolocalisation, sentinel lymph node

Résumé

L'utilisation de la radio-localisation du ganglion sentinelle dans le carcinoma spino-cellulaire de la tête et du cou

Introduction: Dans les cas des carcinomes spino-cellullaires de la cavité orale, de l'oropharynx et de la région supra-glottique) il y a une incidence accrue relative de métastases occultes qui varie entre 15-60% selon certains auteurs. [1]. Le protocole thérapeutique des patients avec N0 a été bien étudié à cause du risque de métastases occultes [2,3]. Les méthodes thérapeutiques utilisées sont chirurgicales (le curage ganglionnaire) et oncologiques (radio-thérapie).

La possibilité de détecter la première station lympho-ganglionnaire envahie par les cellules tumorales est particulièrement importante dans l'élaboration du protocole thérapeutique. Les techniques nécessaires sont: la coloration in vivo, la lymphographie et la radiolocalisation aux isotopes radioactifs.

Matériaux et Méthodes: Les techniques chirurgicales ont évolué et à présent il y a 6 types de curage électif ganglionnaire. Le pourcentage des métastases à distance chez les malades avec ganglion sentinelle négatif est inférieur de 5% [8,9,10]. Donc, la clé du traitement oncologique approprié est l'examen histologique de la première station du ganglion. Comme réponse, Alex et al. a développé et publié en 1993, une technique minimale invasive pour localiser le ganglion sentinelle dans la région de la tête et du cou. Ils utilisaient une sonde γ pour détecter les émissions radio des isotopes radioactifs, facilitant ainsi la biopsie à travers une petite incision. [11,12]

Résultats et Discussion: La radiolocalisation du ganglion sentinelle a identifié 2 ganglions sentinelle au minimum dans tous les 8 cas étudiés. Dans un de ces cas, 2 parmi les trois ganglions aux métastases était classifié comme ganglion sentinelle. Nous n'avons pas eu de résultats faux positifs. Donc, il y a la possibilité que les métastases à distance existent parallèlement avec les voies anatomiques classiques.

Mots clés: carcinoma spino-cellulaire, radiolocalisation ganglion sentinelle
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INTRODUCTION

In cases of squamous cell carcinoma of head and neck region localised either in the oral, oropharyngeal and supraglottis region the incidence of occult metastases is relatively high, varying according to different authors between 15 and 60% [1]. These occult metastases are the result of multiple factors like: localisation and size of tumor, perineural invasion, perivascular invasion and host-tumor relations [2]. Management of patients with N0 has been intensely studied, considering the high risk of occult metastases [2,3]. Therapeutic options include selective neck dissections and radiotherapy. Modalities for detecting the first lymph node affected in the lymphatic metastasizing process are extremely important for management of a oncologic patient. They are: intravital dye colorations, lymphography and radiolocalisation with radioactive isotopes. Thus radical neck dissections are performed in case of the invasion of the first lymph node station, the “sentinel” lymph node.

Head and neck cancers have a high rate of lymphatic metastasation. The prognosis in cases of local lymph-node metastases is reduced by 50% indifferently of T. Therefore the early detection of lymph node tumoral involvement is crucial for optimal management of the case, from an surgical standpoint as well as a radiotherapeutic one.

MATERIALS AND METHODS

The constant preoccupation of surgeons for refining the techniques of neck dissection, starting from the concept of radical neck dissection introduced by Crile in 1906 and leading to modified radical neck dissections by Suarez, Bocca and Pignataro [4,5,6], have modified the perspective on the necessity of radical interventions on lymphatic tissues [7]. This is due also to the advancements in mollecullar biology, precisely the discovery of tumoral cell metastasation and tumoral cell biology. Repeated trial-and-error has lead to the formulation of 6 types of elective neck dissections, that evolved from the en-bloc resection of at-risk lymphatic node stations. The percent of micrometastases present in case of patients with negative sentinel node is thought to be less than 5% [8,9,10]. Thus, the key to proper surgical treatment has become the histological examination of the first lymph node station.

As a response to these efforts, Alex et. al. has developed (in 1993) a minimally invasive technique of localising the sentinel lymph node in the head and neck region, using a γ probe for transcutaneous radiolocalisation of the sentinel lymph node and thus facilitating the histological examination of it by way of a small skin incision [11,12]. Many authors who reported using this method found success rates up to 95% in determining the sentinel node [13-17]. In case of head and neck melanoma, a study reported the success rate to be 96% [18].

In 1996 Alex et. al. were the first to report the utilisation of this new method in a case of squamous cell carcinoma of the upper aero-digestive pole, specifically the supraglottis larynx. The study performed by them after these discoveries was decisive in the elaboration of new approaches of neck dissections in patients with malignant neoplasms of the head and neck region [1]. The radioactive isotope used was technetium 99m (99mTc) mixed with coloidal sulphur (CIS-US, Bedford, MA). The radiotracer (0.1 mci in 1-2.5 ml) was injected transcutaneously around the primary tumor [11,12].

For obtaining a measure of emissions of 98%, the count resulting from a “hot spot” has to be at least 3 percent more intense than the base signal. From a practical standpoint, to correctly identify a hot spot, the respective region has to be recorded at least 15 times (approximatively 10 seconds) and show a value of emissions at least 3 times more than the base value [11,12]. For each patient measurements were performed with the γ probe in 4 distinct moments:

- before performing the incision;
- after excision of the node station (ex vivo)
- the remaining area after excision of the hot spot;
- random operating theatre positions (this was done to establish the base value of radioactivity).

After excision, the lymphadenectomy piece was placed on the dissection table and lymph nodes were isolated from surrounding tissue [19]. The sentinel lymph node was sent towards histological analysis in a separate marked container. The incidence of micrometastases in sentinel nodes was compared to that in the rest of lymphadenectomy tissues.

RESULTS AND DISCUSSION

Sentinel lymph node radiolocalisation has found the presence of at least 2 sentinel nodes in all eight cases studied. In one of the cases, 2 out of 3 lymph nodes found to contain micrometastases were correctly identified as sentinel nodes. There wasn’t any case in which we registered a false positive result.

R.H. Randal has, in 1948, during his studies at Harvard Medical School under the tutelage of J.H. Means, first elaborated the notion that the evolution of malignant neoplasm of the larynx is correlated with the prelaryngeal lymph node. He was the one who named this lymph node the “delphian” lymph node, from the Oracle of Delphi [20]. This concept was later improved upon with the studies performed by Cabanas, in 1977, who studied the relation between the sentinel lymph node and the cancer of the penis [21]. He concluded that only some lymph nodes may play the part of a sentinel node by being the first involved in the lymphatic metastasisation process. Thus the sentinel node, being the first station to receive tumoral cells (micrometas-
tases), can predict the type of tumoral involvement of the whole lymphatic drainage basin. In cases of cutaneous melanoma, the sentinel node can predict with precision regional metastasation, with a rate of false negative results under 4% and a predictive value for negative sentinel nodes of 98.5% [11,12].

All things considered, recent lymphatic scintigraphy studies have questioned the precision of classic lymphatic drainage models (used until this point) and have elaborated the theory of skip metastases [22,23]. According to these
studies, the map of each individual’s lymphatic network may be up to 60% different than the standard anatomical model. Thus skip metastases may represent a non-standard variant of the lymphatic drainage model or may be the result of a aberration in the lymphatics network which runs in parallel with the classic model.

**CONCLUSIONS**

Sentinel lymph node technique proved to be a viable means of detecting lymphatic spread of the squamous cell carcinoma of the head and neck region. Several techniques have been taken into consideration and a number of studies tried to advocate for the use of one or more of them. The radio-localization technique is an efficient technique, with low false-negative and false-positive results that can be used in the management of neck dissection. The learning curve for the procedure is short but there is the need for trained personnel, oncology surgeons, to apply the technique. The equipment needed for performing sentinel lymph node detection via radio-localization is somewhat expensive and there is the need for certain approvals to use radio-labeled isotopes. Still, data assessment on the lymph nodes is the best and the therapy is guided, according to the oncology surgical guidelines, by this technique.

**REFERENCES**