The Impact of Superficial Injections and Dynamic Scintigigraphy on Sentinel Node Biopsy in T1-T2N0 Oral Cavity Cancer by a Same–Day Protocol.

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Pathogenesis

- **Squamous Cell Carcinoma (SCC)** is thought to arise from keratinizing or malpighian epithelial cells.
- H&N’s cancers usually remain localized to the head and neck for months.
- Local tissue invasion is followed by metastases to regional lymph nodes.
- Distant lymphatic metastases tend to occur late.
- Hematogenous metastases are usually associated with large or persistent tumors and occur more commonly in immunocompromised patients.
Rationale

- **Oral Cavity SCC** spreads via lymphatic to the regional draining lymph nodes in the neck.

- Since the presence of **lymph node metastases** is an important prognostic factor in oral cavity cancer, **decreasing survival by 50%**, a reliable staging of the neck in this disease is imperative to determine further management.

*From Canniesburn Sentinel Node Biopsy in Oral and Oropharyngeal Cancer - Multicenter Trial Protocol*
Staging with SNB in H&N’s Cancers using a 2 Days Protocol

**Advantages**

- SNB may reduce the incidence of Elective Neck Dissection (END) required in management of patient with small tumour and N0 neck without affecting outcome
- Detection of nodal metastases at an earlier stage, because the few SNs selected from each patients can be subjected to more detailed histological analysis
- Significant **cost savings**

**Disadvantages**

- SNB in H&N’s cancers is “technically challenging”
- Nodes are often small, and drainage to multiple sentinel nodes is common.
- The **high number** of lymph nodes identified as SNs and their localisation on distant Neck’s Levels
- That could limits the practical application of this approach, because in these cases it is easier and safer to perform a selective neck dissection.
Anatomy of H&N’s Lymphatic System

- The **Tongue** has the blind lymph capillaries in the filiform papillae with the underlying plexus.
- Lymphatic capillaries have numerous anastomoses and are without valves.
- In the lymphatic vessels of H&N the valves are more numerous and they are placed at shorter intervals than in those of the lower extremity.
- In H&N there are more than 300 lymph-nodes (about 1:5 of the total body nodes).

Tongue Scanning Electron Micrograph
Gray’s Anatomy Int.Ed., 2000
Blue-Dye v Lymphoscintigraphy for SNB in H&N’s Cancers

- In H&N both Blue-dye and Radiocolloid traverse the lymphatics **rapidly**, appearing in the SN in less than 5 minutes *(in the feline study).*

*Pitman KT: Laryngoscope 2002; 112: 2101-13*
Radiocolloids Injection Technique

• We advise four Superficial perilesional injections. The needle was introduced about **1-2 mm under epithelium’s surface**, because in the sub-epithelium stroma there is a high concentration of lymphatic capillaries, providing a larger surface area for uptaking, a faster lymph drainage and a better identification of SN in shorter time. **That determines an highest success rate in SN identification.**

• If *deeper* injections are performed; the timing of the lymphoscintigraphy will be **longer**, whereas the Blood accumulation rate, the Background, the Bladder and the Liver uptake will increase.
Material and Methods

• **28 patients** *(17 m, 21 f, mean age 67.1 y)* affected by cT1-2N0 SCC of the oral cavity

• Lymphoscintigraphy was performed **3 hrs before Surgery** *(Same-Day protocol)*

• In the first 13 pts we performed **SNB+END**, while in the last 15 pts we performed **only SNB**.
Lymphoscintigraphic Protocol

• A local anesthetesthic is given (10% lidocaine spray) before injections

• Radiopharmaceutical: 99mTc-HSA Nanocoll ® (has an optimal particle size <80nm)

• Dose: 30-50 MBq

• Volume: <0.4 mL

• Superficial injections at four sites around the tumour

• A mouthwash is used immediately following injections to prevent pooling or swallowing of residual radioactivity by the patient
Image Acquisition

- Collimator: **LEG**
- Energy Window: **20%** window centered at 140 KeV
- Pixel matrix: **128x128**
- Views: **Lateral/Anterior**
- Zoom: **x1.5 - x2**
- Imaging starts **immediately** after injections
- **Dynamic and early Static** images were acquired within 30 minutes of injection
Pathologic Protocol

- The lymphonode is fixed in 10% neutral buffered formalin for 12-24 hours.
- The whole lymphonode is cut in 1-2 mm thick sections and embedd in paraffin.
- From each paraffin block 10 sections are stained with H&E and by immunoistochemistry for cytokeratin (MNF116, diluted 1/50).
SCC cT2N0, Tongue, 1/3 Anterior

I.P., male, 52 y

5 min
SCC cT2N0, FOM, Left Lateral

Q.T., male, 68 y
SCC cT2N0, Tongue 2/3 Posterior, Right Lateral

D.M.S, male, 66 y

30 min
Results

• The SNs were found in all patients.
• In 93% of them the SNs were localised on Neck’s Level 1 and/or 2 of the ipsilateral neck.
• The mean number of SNs detected was 2.2 for each patient.
• Metastases were found in 10/28 cases (35.7%).
• In 5/10 cases the SN+ was as exclusive site of metastasis.
• The follow up mean 37 months of patients with negative SN (without END) showed no neck recurrence.
Advantages of Dynamic Lymphoscintigraphy and *Same-Day Protocol* for SNB in Oral SCC

- To visualize the **lymph drainage pathways** of the tumour.
- To try to distinguish **SNs**, the lymph nodes receiving the lymph directly from the tumour, from *second-tier and third-tier* lymph nodes.
- To achieve an optimal count rate and **ratio target/background** at the surgery time.
Conclusion

• This approach allows to identify the SNs (on average two per case) at the Neck’s Levels closest to the tumour.

• In our experience occurred a pathologic upstaging in 10/28 Pts (in 5/10 Pts the SN was as exclusive site of metastasis).

• In our experience no false negative SNs- were found.

• These data are encouraging, however it is necessary to confirm this approach by Clinical Trials with a standardised method, such as “The European Sentinel Node Trial” started in November 2005.

The Sentinel Node in the Management of Mouth Cancer Prospective Multi Institutional European Study.
Thank you for your attention!

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