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Head and Neck cancer (nasopharynx excluded): general aspects

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Many common points characterise head and neck cancers, including those treated with brachytherapy, such as tumours of the oral cavity and the oropharynx. Before describing the main malignant tumours, site by site, some generalities, which apply to almost all these head and neck cancers, will be reviewed in this chapter.

1 Introduction

1.1 Epidemiology

The overall incidence of head and neck cancer varies between countries and ranges from 8 to 22% in males, and from 1 to 8% in females. During the last several decades, head and neck cancer rates have been increasing, particularly between 1950 and 1970, with a slight decrease thereafter (1,2,3,5). During the last fifty years, the mortality resulting from these cancers appears stable. In France it represents 9% of cancer mortality in men and 2% in women, and the first and sixth in incidence, respectively (1).

1.2 Aetiology – risk factors

The two main risk factors are tobacco and alcohol. These risks depend on the quantity of consumption and the duration of these addictions. In some Asiatic countries, chewing tobacco, often mixed with lime, betel leaves or arec nuts, increases the risk of oral cavity cancer. In other countries, people who use snuff have also an increased incidence. Riboflavin deficiency may constitute a risk factor but conversely, vitamin C may play a protective role. Some occupational hazards have also been suggested, such as exposure to machine oil, mustard gas, and sheet metal (14,18).

Immunosuppressed patients, such as renal, liver, homograft recipients, HIV infected patients, and those with poor oral hygiene or chronic mechanic irritation, are predisposed to develop head and neck cancers, and particularly oral cancers for the last two risk factors (5,12).

To conclude, tobacco and alcohol are the two main risk factors. The relative risk of death is from 1 to 4 for tobacco, and from 1 to 25 for alcohol (14).

2 Anatomical topography

2.1 Primary tumour

The oral cavity begins at the lips (vermillion border) and ends at a virtual plane defined by the soft palate, the anterior pillar of the tonsil, and the posterior limit of the mobile tongue. The oral cavity includes the posterior part of the lips and the commissura, the floor of mouth, the mobile tongue, the buccal mucosa, and the alveolar ridges (11,17).

The oropharynx follows the oral cavity, extending from the plane of the hard palate to the hyoid bone. The oropharynx includes the faucial arch (soft palate, uvula, tonsils and anterior and posterior pillars of the tonsils), the base of tongue, and the pharyngeal walls (11,14).

2.2 Regional lymph nodes

Classically, five main nodal groups are described in the cervical area: submental and submandibular, jugulodigastric (or subdigastric), midjugular (or supraomohyoid), low cervical (or supraclavicular), and spinal (or posterior cervical). The jugulodigastric nodal group plays an essential role in head & neck cancer because it drains the majority of ENT lymph. Two additional factors must be considered, possible crossed routes going to contralateral lymph nodes, and direct drainage from the submental and submandibular group to the midjugular group (8, 14, 15, 16, 20).

3 Pathology

Squamous cell carcinoma represents at least 90% of all oral cavity and oropharyngeal cancers. Its variants include well differentiated (more than 75% keratinization) to moderately differentiated carcinoma (25-75% keratinization), and poorly differentiated carcinoma (less than 25% keratinization). Brachytherapy is usually not indicated in other types of cancer, such as adenocarcinomas, melanoma, lymphomas, sarcomas, etc. (13, 14, 17).

4 Work Up

All patients presenting with head and neck cancer require a detailed examination of the head and neck region as well as a thorough general physical examination. In addition, routine blood examination is performed, chest radiograph and electrocardiogramme are done. No routine bone scan or ultrasonographic examination of the liver is indicated, as the risk of liver and bone metastases is very low (7, 14,17).

In most patients, especially those with tumours of the posterior part of the oral cavity and the oropharynx, an examination under general anaesthesia, preferably in combination with panendoscopy to rule out synchronous second primary tumours, is carried out. Panendoscopy includes bronchial and oesophageal examination with brush cytological tests and biopsies of any visible lesion, with vital staining with toluidine blue. It reveals some 2 per cent synchronous tumours, which would not otherwise have been detected at that time. As no major complication is associated with this procedure, it is generally agreed it should be included as part of the initial work-up (14).

Computerised tomography (CT) and magnetic resonance imaging (MRI) are both useful. The CT scan shows both soft tissue and bone, and is better than MRI for evaluating nodes. MRI is better at detecting muscle infiltration, because of better tumour-muscle contrast. MRI is also more sensitive than CT scanning at showing invasion of the medullary space of the mandible and tumour spread along the inferior alveolar nerve. 3D visualisation of the tumour volume is also easier with MRI (6,9,10,14).

Both CT and MRI are particularly useful in tumours of the retromolar trigone and the oropharynx. MRI is particularly indicated in infiltrating and/or ulcerating tumours of the tongue in visualising deep extension to the muscle of the tongue, which may be clinically undetectable (6,9,10).

CT has a high sensitivity for diagnosis of metastatic cervical nodes, These nodes typically have a specific image, with a central hypodensity and an enhancing peripheral rim. However, the density of the node may be homogeneous, and the size only is of significance. The maximal normal limit of size for submandibular and subdiaphragmatic nodes is approximately 1.5 cm. The systematic use of CT imaging often results in nodal upstaging by showing metastatic nodes in N0 patients or by detecting additional nodes in patients whose clinical examination has shown metastatic spread to the neck (6,9,15).

Cervical ultrasonography is a non-invasive technique, which has a high sensitivity for diagnosis and measurement of subclinical adenopathies. Fine needle aspiration may be useful in doubtful cases (14).

5 Dental preparation

An evaluation of oral hygiene and dental status should always be made. Mandibular panoramic radiographs are indicated and provide information about the height and the structure of the mandible as well as radiographic evidence of bone destruction (2,4). When radiotherapy is planned, a complete evaluation of the dental and periodontal status will be made by the oral surgeon (2,4).

- Teeth with caries should be restored. Teeth with deep caries or poor periodontal support must be removed and complete healing obtained before starting radiotherapy (2,4).
- If external beam irradiation of the salivary glands is performed, customised dental carriers should be made for daily topical fluoride gel applications (5 to 10 minutes per day) for the rest of the patient's life to prevent the occurrence of dental caries (2,4).
- A prosthesis including lead shielding should be made when brachytherapy of the lips, the mobile tongue, and the floor of mouth, is planned, to reduce the dose to the mandible and prevent osteoradionecrosis (7). This shielding system is made of 2mm thick lead encompassed by plastic protection. It is made for each patient, and adapted to the anatomy and tumour volume to be implanted. In fact, two dental shielding systems are made for each patient. The first is made of lead and the second of acrylic resin alone. The transparent gutter is used for X-ray control during the implantation procedure and for the dosimetry, in order to reproduce the same conditions as during the treatment. The leaded shielding is worn by the patient during the whole duration of the irradiation, to protect teeth, gum, and mandible, reducing the transmitted dose by about 50% (7,11).

6 Monitoring during the implant

During the implantation, close follow-up of the patient is mandatory, in order to detect possible displacement of radioactive sources. Adequate analgesia and anti-inflammatory cover is given; mouth washes and proper feeding are essential. Antibiotics may be useful (19). The patient must also be taught about the inflammatory reaction, which always occurs after the removal of the implants, and starts at about 7 days, increases until the third week, is stable for one week, and then decreases and finally disappears at the end of the sixth week. For intracavitary treatments, the risk of superinfection is low, but it is necessary to verify the position of the applicator during the irradiation (11,19).

7 Treatment of the Neck

Treatment of the primary tumour will be detailed in the specific chapter. Implantation can be the sole treatment or delivered as a boost after reduced dose external beam irradiation. Treatment of the primary tumour and the neck are intimately associated in head and neck cancer. Cervical nodes can be treated by surgery and/or irradiation (8,15,16,20).

In clinically negative nodes patients, when the primary tumour is definitively treated with an implant, the neck can be closely followed or electively dissected. However, even in this situation, twenty to 40% of these patients present occult regional disease. To date, there are no reliable criteria for identifying these patients, although some biological predictors of neck metastases have been reported (depth of muscle invasion, double DNA aneuploidy and histologic differentiation of the tumour). The decision should be made between an elective neck dissection or a "watchful waiting" policy. There is no randomised study demonstrating an advantage in survival with either policy, but the salvage rate of a subsequent therapeutic dissection is shown to be about 50% only (16,20). For this reason although a strict follow-up (monthly) may be still considered acceptable, the patient should be counselled of the potential increased risk and an elective neck dissection recommended if compliance with follow-up is doubtful (15,16,20).

If an elective dissection has been decided on, it always includes the submandibular nodes (and submental nodes, in anterior tumours), the subdigastic nodes, and the mid jugular nodes, bilaterally in central tumours, and homolaterally in tumours affecting only one side. Low cervical nodes are dissected only if these nodes are found to be positive (11,15,16).

If there is clinical evidence of node involvement of cervical nodes at time of presentation and the nodes are primarily treated with surgery, the low cervical nodes are systematically dissected (11, 16).

Postoperative radiotherapy produces increased local-regional control if there are multiple metastatic nodes or the capsule is ruptured and should therefore be considered the standard option. The implanted area is shielded with a cerobend block.

If the primary tumour is first treated with external beam irradiation, the neck nodes are irradiated to a dose of 45 to 50 Gy at the same time. In N0 patients, this elective irradiation seems sufficient in most cases to control the neck and no further treatment is needed. When nodes are palpable at time of presentation, the irradiation must be completed by either a further 25-30 Gy electron beam irradiation of the involved nodes or a neck dissection (8,11).

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