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Oropharyngeal cancer in Denmark 1995–1999

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For a planned Scandinavian survey, a total of 710 consecutive Danish patients seen with primary oropharyngeal cancer in the 5-year period 1995–1999 were identified from the DAHANCA databases. The series represented 520 males and 190 females with primary squamous cell carcinoma in tonsil ($n = 426$), base of tongue ($n = 182$), soft palate ($n = 74$), and posterior wall ($n = 28$). Stage distribution was Stage 1: 6%, Stage 2: 17%, stage 3: 24% and Stage 4: 53%. World Health Organization performance status (PS) was recorded in 426 cases, of these 65% were PS = 0, 21% PS = 1, and 9% PS = 2. The primary treatment included radical radiotherapy alone in 87% of cases, surgery in 3%, surgery and radiotherapy in 3% and palliative treatment in 7% of cases. Chemotherapy was not used in the primary setting. Radiotherapy was given according to DAHANCA guidelines. All patients received external beam RT – with the hypoxic cell radio-sensitizer nimorazole – to a prescribed dose of 66–68 Gy in 33–34 fractions. Until DAHANCA 7 closed in October 1997, the standard fractionation was five fractions per week ($n = 216$), after October 1997 all patients were offered accelerated treatment with six fractions per week ($n = 367$). The preliminary 5-year loco-regional, cancer specific and overall survival rates for the entire series were 60%, 61%, and 47%, respectively. Positive prognostic factors for the outcome of radical radiotherapy included PS, clinical stage, the use of six fractions per week/short overall treatment time, and posterior wall or tonsil site. The current outcome seems satisfactory when compared with contemporary international series, and much improved over the last decades compared with data from 1963–1991 by Johansen *et al.* [*Acta Oncologica* **39**, 985] (38%, 44% and 31%, respectively).

Treatment of oropharyngeal squamous epithelial cancers Rikshospitalet, Norway – results achieved in 1995 through 1999

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We present the clinical outcome for the current treatment protocol for oropharyngeal squamous epithelial cancer in the years 1995–1999 at Rikshospitalet, Norway. A total of 73% (107) male and 27% (39) female patients were included in the study, the mean age being 60.3 years. Of the 146 patients, 48% (70 pat) had T1 or T2 tumours and 69% (101 pat) had regional metastases at the time of diagnosis. A total of 86% (126 pat) were treated with curative intent. Sixty-four patients received radiotherapy alone, whereas 63 patients were given a combined treatment. The overall survival was 33%. The 5-year disease-specific survival

rate was 45% and the 5-year disease-specific survival rate for patients treated with curative intent was 52%. The survival rate of T1 and T2 patients and T3 and T4 patients was 72% and 31%, respectively, in the group intended to treat.

Oropharyngeal cancer in Sweden 1995–1999, a retrospective analysis

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Sweden is a country with a population of approximately nine million inhabitants. In 2002, there were 46 749 new cases of cancer reported to the national Cancer Registry. Head and neck cancer constituted 2.5% of these (1145 new cases). Oropharyngeal cancer amounted to 17% (195 new cases) of all H&N cancer in 2002. During the years 1995–1999, 694 new cases of oropharyngeal cancer were diagnosed in Sweden according to the Swedish Cancer Registry, the yearly mean number thus being 139 cases. Eight cases were diagnosed at autopsy and were not included in further analysis, this analysis consisted thus of 686 cases. The male/female ratio was 69/31. Almost 64% ($n = 444$) of all cases are tonsillar carcinomas, cancer of the base of tongue makes up 19% ($n = 131$) whereas 7% ($n = 50$) of all tumours originated in the soft palate and 10% ($n = 69$) in the oropharyngeal wall or vallecula. Clinical data concerning stage, histology, treatment, outcome and survival were registered retrospectively at the different Swedish centres treating H&N cancer. The data have been collected and analysed at the Center for Head and Neck Oncology at the University Hospital in Örebro. Treatment strategies were evaluated and compared and will be presented. Survival analysis has been performed on both the collected clinical data, and for comparison, also with the data from the Swedish Cancer Registry. The 3- and 5-year overall survival rate for the 686 cases is 56%/49%. For carcinomas of the base of tongue the 3- and 5-year overall survival rate is 56%/50%, for carcinoma of the tonsil 59%/52% and for other parts of the oropharynx it is 45%/38%.

Oropharyngeal cancer and its treatment in Finland between 1995–1999 – a nationwide study

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Introduction. Oropharyngeal cancer is an aggressive tumour often diagnosed at advanced stage. In spite of radical combined modality treatment causing also significant morbidity, the survival figures have remained low. Thus, the treatment is still controversial and requires a multi-disciplinary approach. The purpose of this study was to investigate

the incidence, the used treatment approach and the outcome of oropharyngeal cancer in a nationwide study.

Patients and methods. Retrospective clinicopathological data of all patients who were diagnosed for a cancer of the oropharynx between 1995 and 1999 at the five university hospitals in Finland with a population of 5.2 million inhabitants were reviewed. All patients had a minimum 2-year follow-up.

Results. A total of 168 patients (145 men and 23 women with a mean age of 59 years; range 28–89 years) were included. The T categories were as follows: T1 $n = 34$; T2 $n = 55$; T3 $n = 40$; T4 $n = 39$. One hundred and seventeen (69.6%) patients presented with neck node metastases and three (1.2%) patients with distant metastases. A second primary tumour was observed in five (3.0%) patients. In the majority (61.2%) of the patients, the tumour was located in the lateral wall of the oropharynx. The posterior wall was affected only in nine (5.4%) patients. In 144 (85.7%) patients, the treatment was performed with curative intent. Of these, surgery of the primary tumour was performed in 122 (84.7%) patients and consisted of resection of the tumour with reconstruction of the surgical defect with pedicled flap or free tissue transfer in 66 (54.1%) patients. A neck dissection was performed in 86 (70.5%) out of these 122 cases. Surgery was the only treatment modality in 10 (8.2%) patients. Radiation treatment only (with or without chemotherapy) was given to 12 (8.3%), combined treatment with surgery + radiation to 119 (82.6%) and surgery + chemoradiation to three (2.1%) patients. Overall 3- and 5-year survival rates were 58% and 45%, respectively. Disease-specific 5-year survival rates by T-stage were as follows: T1 77%, T2 67%, T3 55% and T4 41%.

Conclusions. The variable treatment approach, the frequent locoregional recurrences and the modest survival point out the need to consider new strategies in the management of oropharyngeal cancer.

Radiofrequency-induced thermotherapy – an alternative palliative treatment in head and neck cancer

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Introduction. Bipolar radiofrequency-induced thermo-therapy (RFITT) is a minimally invasive electrosurgical technique characterized by a precise controllable effect in the tissue. It has demonstrable efficacy, safety and reproducibility in the management of unresectable solid malignancies. Our aim was to assess the morbidity and efficacy of RFITT in palliative treatment of head and neck cancer.

Methods. The multi-disciplinary Head and Neck Tumour Board at Helsinki University Central Hospital, Finland enrolled 10 patients with head and neck cancer without curative treatment possibilities in the study after evaluation. There were four pharyngeal carcinomas (T4N2c, rN2b, T4N0M1 and rT4), one unknown primary (T0N3) growing through the skin on the neck, two recurrent malignant melanomas originating from the maxillary sinuses, one carcinoma of the tongue (T2N0) and two laryngeal carcinomas (T4N0M0, rT4rN2c). Radiofrequency-induced thermo-therapy was performed with a CelonLabPrecision® (470 kHz) generator using a CelonProSurge® hand piece. The treatment was administered under local or general anesthesia at 4-weekly intervals (one to three treatments). The aim of the palliation was to reduce pain ($n = 8$), to minimize the secretion from the tumour site ($n = 5$) and to

secure the upper airways ($n = 4$). The subjective morbidity of the treatment was evaluated with a questionnaire. The clinical response to the treatment was assessed with computed tomography or magnetic resonance imaging when possible.

Results. All but two of the patients received palliation. Radiofrequency-induced thermotherapy induced clinically only a partial response but there were radiologically detectable changes, which will be discussed. There were no treatment-related complications, and the patients tolerated the treatment well.

Conclusion. Radiofrequency-induced thermotherapy in head and neck cancer patients is easy to perform, well tolerated, and induces radiologically detectable changes in the tumour mass. Continuous evaluation of RFITT treatment modality is warranted in selected patients.

Reconstruction of fronto-orbital defects with biomaterials

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Backgrounds. Bioactive ceramics include bioactive glasses, glass ceramics, calcium phosphate ceramics and their components. These materials are capable of chemically bonding to bone tissue. Bioactive glasses have osteoconductive properties. The composites of bioactive glass with biodegradable materials have been tested to increase the ability to shape the material.

Material and methods. A retrospective review was conducted of the results of 138 patients. Fifty-six patients were reconstructed with frontal sinus obliteration after chronic inflammations, 61 patients were operated on for fronto-orbital traumas and 21 patients were reconstructed after fronto-orbital tumour resections from 1991–2003 in our ENT department. Tumours and traumas involved the nasopharyngeus, the paranasal sinuses, the orbit and/or the meninges. For dura reconstruction, we used fascial lata and fibrin glue to seal the entire defect in the skull bone. In extensive defects in the skull base and orbit, we used bone substitutes such as bioactive glass (10), hydroxyapatite (6) and calcium phosphate (5). The frontal sinus was obliterated in all 56 cases with bioactive glass granules. Fronto-orbital traumas were reconstructed with bioactive glass plates. Eight of the patients were preoperatively irradiated to a dose of 60–65 Gy.

Results. In all cases, the tumour resections and reconstructions, sinus obliterations and trauma reconstructions were well tolerated with a good functional and cosmetic results. The bone transplantations were fixed with titanium or resorbable plates and screws. Three of the 56 frontal sinus occlusion were re-operated (5%) during the follow-up of 5 years. The re-operations were caused by a new mucocele. In fronto-orbital reconstructions, we have re-operated orbital floor in four cases (7%), when the patients have postoperative diplopia or enophthalmos. All 11 benign and six of 10 patients (60%) with malignant nasopharyngeal tumours are alive with a follow-up of 32 months. Two of 21 (10%), the complicate tumour and trauma cases, were re-operated due to local mucocele.

Conclusions. The biomaterials have been a safe, stabile and osteoconductive material in follow-ups. The reconstructions with bioactive glass, hydroxyapatite and calcium phosphate are associated with a low morbidity and have given a good functional result in skull base surgery.

Injection of local anaesthetic in the pedicle of pectoralis major myocutaneous flap shortens hospitalization of surgically treated head and neck cancer patients

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Pectoralis major myocutaneous flap was used in 33 patients as a primary reconstruction following ablative surgery of oral cavity or laryngopharynx in Tampere University hospital during the period from January 1990 to December 2000. Since November 1998, we started to inject bubivacain local anaesthetic solution postoperatively into the muscular pedicle of the flap. After the flap has been trimmed and sutured to the defect margins in the mouth, a spiral epidural catheter (Perifix® Soft tip 701 filter set, Manufactory Braun) was inserted through the skin of the chest wall by a special needle (18 G, Touhy). The catheter was sutured loosely to the muscular fascia and tightly to the chest wall skin. Through the catheter, 4 mL of 0.25% bubivacain solution (Marcaïn®, Manufactory AstraZeneca) was injected to the muscle pedicle every 8 h for 6 days. Ten patients formed the bubivacain group and 23 patients having been operated before 1998 served as the control group. The ages of the patients ranged from 32 to 82 years. Nineteen of them were males. Delayed healing prolongs the hospitalization time. In this respect, the most significant complications are flap necrosis and orocutaneous fistulas. They also affect the beginning of swallowing. The overall complication rate was lower in the bubivacain group than in the control group, 40% versus 61%, but because of reasonably small sizes of the groups there were no statistically significant differences between the groups in the frequency of complications. In the bubivacain group 1, patient had partial skin necrosis (10%), while in the control group in addition to four partial (17%) there was also three total skin necroses (13%) and one loss of the entire flap (4%). In the ability to take semisolid food, there was a statistically significant difference between the groups ($P = 0.039$) in favour of the bubivacain group. Accordingly, the mean hospital stay in the bubivacain group was 20 days compared with 27 days in the control group ($P = 0.012$), which lowers the already high treatment expenses of surgically treated head and neck cancer patients.

Bone-anchored mucosal flap as a reconstructive alternative after resections of carcinomas of the anterior floor of mouth and gingival – pilot study of four patients

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Defects after resections of T2 and limited T4 tumours of the anterior floor of mouth and gingival are normally reconstructed with free forearm flaps or bilateral mesolabial flaps in our institution. Due to donor site morbidity, sensibility problems and unpredictable scar formation with impact on speech and swallowing, we developed a reconstructive alternative.

Material. Four patients with 4 – 5 × 2.5 – 3 cm sized defects after resections of T2 squamous cell carcinomas of anterior floor of the mouth ($n = 3$) and gingival ($n = 1$), including partial mandibulectomy.

Method. A local mucosal flap was raised from the inferior aspect of the tongue. Multiple holes were drilled in the exterior cortex of the mandibular defect. The flap was being pulled forward and anchored to these drilled holes by three to zero sutures. In a similar fashion, the inner

aspect of the chin was anchored to the same holes for watertight closure, and to make it independent of the mucosal tongue flap.

Results: The mucosal flap was relaxed and the tongue normalized in its position within a week. The patients returned home after 4 days in hospital. No one was tracheotomized. After 12 months, they were in local control with normal speech and swallowing capacity. Two had normal and two slightly impaired sensibility of the flap.

Discussion: This local bone-anchored mucosal flap has the following advantages: short OR-time and hospitalization, only one surgeon is needed, there is no donor site morbidity, and functional results are good. We propose this flap as a reconstructive alternative for defects up to the size of T2 and small T4 lesions of the anterior floor of mouth and gingiva.

Impact of diagnostic delays on survival and recurrence of laryngeal cancer

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Background. Even though it is generally accepted that earlier detection of cancer improves the survival, there is still some discrepancy about the impact of professional and patient-dependent diagnostic delays on the prognosis of laryngeal cancer. Also, the impact of diagnostic delays on the risk of recurrence after treatment is unclear.

Methods. A retrospective population-based sample of 66 patients with laryngeal cancer in Northern Finland (about 750 000 inhabitants) between 1990 and 1995 was investigated. In addition to clinical data from tertiary care units and mortality data from the national death register, we collected data about the first medical visit in primary care where larynx-related symptoms were mentioned and/or where suspicion of laryngeal cancer was aroused.

Results. Long professional delay in diagnosis (>12 months) was an independent and statistically significant determinant of worsened prognosis in laryngeal cancer (adjusted relative hazard of death (HR) 4.74, $P = 0.05$). There was no correlation between patient delay and prognosis. Professional delay of 1 year or longer was also an independent predictor of both local (HR 4.62, $P = 0.02$) and neck (HR 9.5, $P = 0.015$) recurrence. Longer professional delay associated with the risk of local and neck recurrence particularly among patients with stage I–II disease. Patient delay did not have an effect on the risk of recurrence.

Comments. A long professional delay is a marked and independent determinant of impaired survival in laryngeal cancer and equals the effect of advanced stage. However, unlike in most other cancers, early symptoms and slow tumour growth give the physician a fairly long time to reach the correct diagnosis before the delay turns out to be fatal. Longer professional diagnostic delay (≥ 1 year) is also an independent predictor of an increased risk of local and neck recurrence in laryngeal cancer. These patients could benefit from more meticulous follow-up.

The impact of patient and professional diagnostic delays on survival in pharyngeal cancer

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Background: Cancers of the head and neck are still mostly detected at an advanced stage, especially pharyngeal cancers.

Methods. In order to study the impact of patient and professional delay on survival, we collected the data of 84 patients with pharyngeal cancer. In addition to clinical data from the tertiary care centre, we evaluated the data of the first medical visit in primary care before the diagnosis of malignancy had been made.

Results. The patients who had a patient delay of 2 months or more had a significantly higher relative hazard of death (HR) [HR 2.5, 95% confidence interval (CI) 1.39–4.38] compared with the patients with under 2 months of patient delay. This risk was significant among the patients with oropharyngeal ($P = 0.008$) and nasopharyngeal cancer ($P = 0.03$), but not in those with hypopharyngeal cancer ($P = 0.56$). In contrast, there was no relation between professional diagnostic delay and prognosis. Advanced stage (stage IV versus stage I–III) (HR 3.19, CI 1.61–6.35) and age (≥ 65 versus < 65 years) (HR 2.47, CI 1.32–4.62) were also associated with an impaired prognosis.

Conclusions. Shortening of patient delay would substantially improve survival in pharyngeal cancer, but this goal seems difficult to attain, as pharyngeal cancer causes symptoms late and no specific symptoms or patient characteristics were related to a long patient delay. Professional delay does not have an impact on survival in pharyngeal cancer.

Presentation of head and neck cancer patients in primary care

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Background. The survival of patients with head and neck cancer has not improved over the years, as the majority of patients present at an advanced stage. It is not known whether the delay in diagnosis caused by physicians and dentists is of importance here.

Methods. We analysed retrospectively a cohort of patients with carcinoma of the tongue, pharynx, or larynx diagnosed between 1 January 1986 and 31 December 1996 in Oulu University Hospital, a tertiary centre in Finland. In addition to clinical data from the tertiary centre and mortality data from the national death register, we collected data about the first medical visit in primary care that resulted, subsequently, in the diagnosis of malignancy.

Results. Of the 221 patients with data available, 62 had tongue, 66 pharyngeal, and 93 laryngeal cancers. At the initial visit, the number of patients referred correctly, followed-up, or left uncontrolled were: 40 (64%), nine (15%), and 13 (21%) for tongue cancer, 34 (52%), 14 (21%), and 18 (27%) for pharyngeal cancer, and 49 (53%), 30 (32%), and 14 (15%) for laryngeal cancer ($P = 0.05$ for the difference). Professional delay increased dramatically if no follow-up was arranged as compared with referral (145 versus 19 day for tongue cancer, 76 versus 20 day for pharyngeal cancer, and 209 versus 38 day for laryngeal cancer, $P < 0.001$ for all groups). The outcome of the initial visit only influenced survival in tongue and glottic cancers, where, compared with the referred patients, the adjusted relative hazard of death for the non-referred/not followed-up patients was 3.3 (95% confidence interval 1.2–8.7).

Conclusions. Misdiagnosis of tongue and glottic laryngeal cancers at the initial professional evaluation often leads to a fatal delay if the patient is left without any follow-up. No similar trend could be seen in pharyngeal and supraglottic laryngeal cancers, which seem to have a poor prognosis even when diagnosed correctly at the initial visit.

Health-related quality of life in patients with pharyngeal carcinoma, a 5-year follow-up

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Purpose. To evaluate the health-related quality of life (HRQL) of patients with pharyngeal carcinoma in a prospective longitudinal multi-center study at diagnosis, after 1 and 5 years in relation to tumour location and treatment modality.

Subjects and method. Eighty-nine patients (mean age 60.0 years; 76% males) with pharyngeal carcinoma were evaluated with standardized HRQL questionnaires; the European Organisation for Research and Treatment of Cancer, Quality of Life Questionnaire Core-30 (EORTC QLQ-C30), the EORTC QLQ-Head and Neck Cancer Module (EORTC QLQ-H&N35).

Results. Treatment-related side-effects deteriorated between diagnosis and the 5-year follow-up. Some specific side-effects got worse between 1 and 5 years such as teeth problems and sticky saliva. The HRQL results from the EORTC QLQ-H&N35 were significantly different from the norm data, whereas the results from the EORTC QLQ-C30 were not. The HRQL at diagnosis seems to be associated with survival, especially physical functioning scale and tumour stage, which could be regarded as predictive factors. Tumour stage and global quality of life scale at diagnosis seems to be related to HRQL after 5 years and could be regarded as predictive factors for quality of life. Patients with oropharyngeal carcinoma had at all time points better HRQL than patients with hypopharyngeal carcinoma. Patients treated with brachytherapy showed worse side-effects during and after treatment but had a higher survival rate.

Conclusions. HRQL-questionnaires could be valuable instruments in the treatment planning and serve as aid in foreseeing treatment side-effects. Evaluation of HRQL at diagnosis for patients with pharyngeal carcinoma is of value for the prognosis of HRQL over time and for the prognosis of survival. It should be recognized that treatment for pharyngeal carcinoma often results in long-term side-effects such as problems with senses and dry mouth and often generate increasing problems with teeth and sticky saliva.

Mood, anxiety and sense of humor in head and neck cancer patients as related to disease stage, prognosis and quality of life

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Male patients with newly diagnosed head and neck (HN) squamous cell carcinoma (SCC) or benign HN disease answered questionnaires assessing the following: Beck Depression Inventory (BDI), Spielberger Trait Anxiety Inventory (STAI) (state) and Svebak humour questionnaire (SHQ). Patients with cachexia or older than 80 years of age were excluded. Seventy-eight male patients with newly diagnosed HNSCC and 61 patients with benign HN disease were included. The TNM stage and prognosis were also determined. Following successful therapy, BDI and Quality of Life (QoL) by the European Organisation Treatment for Research and Treatment of Cancer Quality of life Questionnaire (EORTC-QLQ) C30/H&N35 were determined in 27 surviving patients. Control patients had

the least BDI and STAI scores, followed by patients with limited cancer disease and these with extended cancer disease, with, however, a considerable overlap between the groups. Higher N stage was more associated with high anxiety and mood than higher T stage. Both anxiety and mood level at diagnosis predicted prognosis, but not so after adjustment for TNM stage at diagnosis. Beck Depression Inventory at diagnosis and follow-up correlated marginally. Beck Depression Inventory following treatment, but not at diagnosis, was associated with level of QoL. The SHQ score at diagnosis predicted QoL and BDI at follow-up both directly and adjusted by the neuroticism (personality trait) score.

Changes from 1992 to 2002 in 'the continuum of care' for patients with squamous cell carcinoma of the head and neck – a Danish nationwide survey from DAHANCA

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The clinical workup for patients with head and neck cancer is often complicated and time consuming, which makes the 'continuum of care' complex. The continuum of care is an important measurement of quality of care, a parameter of great concern to the patient. Shortage of staff and treatment facilities – leading to waiting lists – may worsen this situation even more. A general impression of prolonged workup time led in 2003 to a nationwide study of waiting time from first contact to the health care system to treatment of patients with squamous cell carcinoma of the head and neck. Charts of all 394 new patients with squamous cell carcinoma of the oral cavity, pharynx and larynx, seen at the five oncology centres in January–April 1992 and 2002, respectively, were reviewed. Of these, definitive treatment was radiotherapy in 319 cases, surgery in 54 cases. The continuum of care was divided in the time interval from the first contact to the health care system to diagnosis and the time from diagnosis until onset of treatment. Total time from first health care system contact to start of definitive treatment was significantly longer in 2002 than in 1992 (median 69 *versus* 50 days, $P < 0.001$). Time used for diagnosis was slightly shorter in 2002 compared with 1992 (median 17 *versus* 20 days, not significant). Time for treatment preparation and planning was 47 days in 2002 *versus* 31 days in 1992 ($P < 0.001$). In conclusion, this nationwide study showed that the continuum of care was significantly longer in 2002 compared with 1992. The prolongation was mainly in the planning phase and may be related to shortage of treatment units, the increasing number of imaging procedures and the practice of CT-based dose planning.

Changed treatment strategy of neck metastasis in tonsil cancer, experiences from Örebro

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Background. Tonsillar carcinoma is a relatively common cancer of the head and neck area. In most cases, the tumour has spread to regional

lymphnodes at the time of diagnosis. Patients with tonsil cancer can be treated with surgery, radiotherapy or with a combination of the two modalities. There is no consensus in Sweden or other countries about the optimal treatment for the best survival rates. At Örebro University Hospital patients with tonsil cancer have routinely been treated with radiotherapy. Patients with neck metastasis have in addition had a neck dissection.

Method. Relevant treatment details and treatment results of all head and neck malignancies have been registered since 1988.

Result. An excerpt from the local tumour register showed that 105 patients with tonsil cancer received radiation treatment during a 14-year period (1988–2002). Eighty-nine of these patients had metastasis in the neck. Fifty-two with regional metastasis were treated with a neck dissection. Viable cancer in the specimen was found in 11 of these patients. In nine of these 11 patients, the metastatic neck nodes were palpable after radiotherapy. Thirty-one patients with regional metastasis did not undergo neck dissection. One of these patients had a regional recurrence of the disease. In the whole material, there were only two regional recurrences. Because of the above, there has been a shift of the indication to proceed to surgery. Today, we carry out neck dissection only in patients with palpable neck nodes or in patients where CT scan shows a pathological node after radiotherapy. The radiation dose to known pathological nodes is the same as to the tonsil tumour.

Conclusion. A continuous registration of treatment results has resulted in fewer neck dissections in patients with tonsillar carcinoma and regional metastasis. The treatment results are as good, hopefully with less morbidity.

Histopathological findings in N⁺ neck specimens following radiotherapy in head and neck cancer patients. Is a neck dissection indicated?

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Background. A planned neck dissection (ND) following radiotherapy (RT) is standard procedure in patients with N⁺ head and neck cancer at our institutions. In many other centres, this is not the case, especially not in N1-necks. The aim of this retrospective study is to evaluate if unnecessary NDs are performed.

Methods. A review of the medical records in Stockholm between 1998 and 2002 was performed. Patients with squamous cell carcinoma of the head and neck with regional metastases receiving primary RT (60 Gy or more) followed by ND were included. Patients with carcinoma of the nasopharynx were excluded. The pathology reports were reviewed and correlated to the clinical findings in the neck following RT. The primary site of the tumour and the degree of differentiation was documented.

Results. A total of 158 patients were included in the study. Complete clinical remission in the neck after RT was found in 64 patients (40.5%). Viable malignant cells were found in 15 (23.4%) of these 64 patients. This group was further analysed according to N-stage.

Conclusions. Even though the number of patients is small, our findings suggest that a planned ND following RT may be indicated in head and neck cancer patients with regional metastases, even after a clinical complete remission in the neck. A follow-up study on cause-specific survival, loco-regional recurrence rates, disease-free interval and the morbidity

following individually tailored neck dissections should be performed. Until further knowledge or better methods for preoperative evaluation are available and considering a probable worse prognosis after salvage surgery, we do not intend to change our present policy.

Identical genetic changes in primary tumours, recurrences, second primaries and free surgical margins stress the need for long-term systemic adjuvant therapy in squamous cell carcinoma of the head and neck
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Despite tremendous development in surgery and radiotherapy, prognosis for patients with squamous cell carcinoma of the head and neck (SCCHN) is basically unchanged over the last decades. Bigger resections, higher doses of radiotherapy given in more efficient fractionation schedules, have not to any higher degree reduced the frequency of recurrences and second primaries, which ultimately kill the patients. Modern molecular data indicate that cells with identical genetic changes as the primary tumours can be found in histologically normal resection margins. Furthermore, multiple genetic studies of SCCHN have shown that second primaries often share monoclonal origin with the primary tumour. Histologically normal cells in a field around a tumour to up to seven centimetres of diameter reveal identical genetic profile with the primary tumour. These findings indicate that superficial spread of precursor cells from the tumour or implantation metastasis of cells exfoliated from the primary tumour occurs. Furthermore, this underscores the hypothesis that second primaries cannot merely be explained by Slaughter's theory of field cancerization. Identical genetic changes in the primary tumour and the second primary implicate that they are closely related. Taken together, this stresses the hypothesis that bigger resections and higher doses are not the way to go in the future. This doomed area surrounding the tumour needs systemic prophylactic treatment. This literature review of more than 2000 papers in the field concludes that adjuvant therapy after complete remission must be the only logic solution to lower recurrences. Potential candidate drugs and study protocols are being presented.

Sentinel lymph node biopsy in N0 oral and oropharyngeal squamous cell carcinoma

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Introduction. Sentinel lymph node (SLN) biopsy has become a standard technique in the management of breast carcinoma and melanoma, and the method has been widely examined in head and neck carcinoma. In some centres, it has already replaced elective neck dissection as a staging method for clinically N0 necks. The aim of our study is to examine the feasibility of SLN biopsy in oral and oropharyngeal squamous cell carcinoma (SCC) and clinically N0 neck.

Method. Fifty-eight patients with T1, T2 or T3 oral and oropharyngeal SCC were included. Immunoscintigraphy using Tc99 Nanocol® or Albu-

ress® (average dose 74 MBq, volume 0.2 mL) was performed 1 day preoperatively. Patent Blue V® dye was injected peritumourally shortly before the operation. The elective neck dissection ($n = 62$ neck sides) was carried out in a normal manner. During the operation, the radioactive or/and Patent Blue V dye positive lymph nodes were identified and marked. Histopathological examination included sections of the SLNs at 2 mm intervals.

Results. The scintigraphy showed SLNs in 52 of the 62 dissected necks. SLNs were identified in 56 (89%) necks. Ten of the neck dissection specimens in nine patients contained metastatic lymph nodes. In six necks the metastases were in SLNs only, and in four necks metastases were detected in dissection specimens, although SLNs were free of disease. The sensitivity of the method was 60% (6/10 necks).

Conclusion. Sentinel lymph node biopsy alone would have led to inadequate treatment in four out of nine patients with occult metastases. Consequently, elective neck dissection cannot yet be replaced by SLN biopsy.

Chemoradiotherapy with accelerated hyperfractionation with or without brachytherapy in locoregionally very advanced head and neck cancers

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Introduction. The prognosis of advanced H&N carcinomas is disappointingly poor. The cure rate of T4 tumours treated with radiotherapy alone reported in the literature is 10–25%. Chemotherapy concurrent with radiation has shown promising results but is difficult to administer with accelerated hyperfractionated radiotherapy, mainly due to enhanced mucosal toxicity.

Material and methods. We have treated 33 patients, 25 males, eight females, mean age 56 years, in a chemoradiation protocol.

Inclusion criteria. Advanced unresectable T4 and/or N3 squamous cell carcinomas, acceptable performance status and M0. Site of origin was: tongue (5), floor of mouth (6), tonsil (12), base of tongue (5), sinonasal/nasopharynx (3), hypopharynx (1), unknown primary (1). Advanced T4 disease was present in 31 cases and N3 in seven cases.

Treatment. Two courses of induction chemotherapy (cisplatin 100 mg/m² day 1, 5-FU 1000 mg/m² 96 h infusion) followed by accelerated hyperfractionated radiotherapy (1.7 Gy twice daily with a 9 day break after 2 weeks, total dose 68 Gy). Cisplatin (80–100 mg/m² day 1 and 22 of radiation) was administered concurrently with radiotherapy. An interstitial PDR brachytherapy boost 35 Gy was given when possible (in these cases external radiation dose 40.8 Gy). An essential part of the treatment has been to keep the overall treatment time as short as possible. Neck dissection was performed together with brachytherapy in 18 cases.

Results. Three patients died unexpectedly at the time of the first course of chemotherapy (cause of death: one septic, one cardiac and one gastrointestinal bleeding). One patient has not yet completed treatment, 29 patients completed treatment. Complete tumour remission was achieved in 28/29 patients (97%). With a median time to follow-up of 32 months, we have seen five recurrences (three local, two distant metastasis). Two of the local recurrences have been treated successfully with salvage surgery. Three patients are dead of disease. No recurrence was seen >1 year. At present, 26/30 patients (87%) are alive.

Genetic profiling predict outcome of radiotherapy in oropharyngeal cancer

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Treatment of squamous cell carcinoma of the head and neck (SCCHN) is based on TNM classification. Biomarkers have not so far been incorporated into the diagnostic and prognostic toolbox for clinicians. Primary radiotherapy is commonly used for oropharyngeal SCC and other sites. It is fairly efficient but accompanied by high morbidity. Ideally, responders should be identified prior to treatment and potential non-responders as well, in order to reduce over- and undertreatment. A biological fingerprint that reflects radiosensitivity would in this context be useful. We used high through put cDNA microarray analysis of 20 000 genes on diagnostic biopsies from 44 patients with SCCHN, predominantly oropharyngeal cancers. The analysis identified dozens of specific genes that distinguished between responders and non-responders. Many of these genes are involved in tumour development, progression, drug resistance and metastasis. Furthermore, gene profiles were identified that distinguished between patients with poor and better survival, as well as between tonsil carcinomas *versus* other sites. In summary, we show that gene profiling can predict outcome of radiotherapy for the patients, and could possibly be used to individualize treatment. We will investigate the strongest biomarkers from this study in a larger clinical material of tonsil carcinomas by immunohistochemistry, to verify the findings. Prospective trials based on these biomarkers must then be the next logic step.

Long-time experience of pulsed brachytherapy in base of tongue cancers

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Introduction. PDR fractionation was designed to combine LDR radiobiology and modern stepping source machine afterloading. The base of tongue (BOT) is a classical LDR brachytherapy site. Very few long-term results concerning PDR brachytherapy on selective sites have been published. Our aim with this prospective clinical serie, which constitutes >95% BOT cases presented to our center of Head and Neck oncology, is to reveal the result that can be obtained with an accelerated combined treatment set up where the total treatment time with external radiotherapy, brachytherapy and neck node surgery is concluded within 5–6 weeks.

Method and materials. Between 1993 and 2003 we have treated 56 patients, 42 males and 14 females, median age 62 (38–82) years with BOT cancers. 54 were squamous cell and two were adenoidcystic cancers.

Main treatment setups:

A PDR brachytherapy only 60 Gy/6 days. For tumours in previously irradiated areas; (= in brackets)

B External hyperfractionated RT 1.7 Gy bid to 40.8 Gy followed by 10–14 days rest and finally a PDR boost 35 Gy/3.5 days. Pulse = 0.83 Gy every second hour.

C B + neck lymphadenectomy in the same procedure as the implant.

Results. Median follow-up = 32 (2–108) months Local control = 50/56 (89%) DFS = 46/56 (82%) OS = 36/56 (64%). We noticed four persistent soft tissue necroses and four osteoradionecroses. Seven patients had temporary soft tissue necrosis, which healed on therapy.

Discussion. Our result is comparable to recently published results for LDR ¹⁹²Ir brachytherapy [Gibbs *et al.* Int. J. Radition Oncol Biol Phys 2003; 57:s489–494]. Local control for advanced tumours (T3–T4) seems to be better than with external radiotherapy alone [Mendenhall *et al.* JCO 2000;18;s35–42].

Conclusion. PDR brachytherapy seems to give the same excellent results as LDR ¹⁹²Ir brachytherapy.

Stage	T1N0	T1N ⁺	T2N0	T2N ⁺	T3N0	T3N ⁺	T4N0	T4N ⁺	Total	P
No.	(2)	4(1)	6(2)	18	5(1)	5	4	12	56	(6)
Setup	(A)	C(A)	B(A)	C	B(A)	C	B	C		(A)

Computed tomography of chest and abdomen in patients with newly diagnosed head and neck squamous cell carcinoma

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Background. The benefits of computed tomographic scanning (CT) of the chest and abdomen as a routine screening method for patients with newly diagnosed head and neck squamous cell carcinoma (HNSCC) remain unclear.

Methods. Consecutive patients with a primary HNSCC (T Stage: T2–T4) and or regionally metastatic disease (i.e. N⁺) were eligible for inclusion. CT scans of the chest and abdomen were performed.

Results. We examined 100 patients. Two patients had pulmonary metastases at presentation. An occult aortic aneurysm required surgical repair prior to anticancer therapy in one patient. Two additional aortic aneurysms were found. In 15 patients non-specific CT findings warranted further examinations or close follow-up. The abdomen was negative for metastatic HNSCC in all patients.

Conclusion. Routine CT screening of the chest and abdomen upstaged two patients (2%) and altered the treatment approach in three patients (3%). Based on these findings, we do not recommend routine CT screening of the chest and abdomen in patients with previously untreated HNSCC. Chest CT is indicated for patients with abnormal chest X ray. Abdominal imaging does not seem beneficial.

Disposable heat and moisture exchanger and reusable multi-magnetic automatic speaking valve in speech rehabilitation after total laryngectomy

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Objective. To compare disposable heat and moisture exchanger (HME) with a reusable multi-magnet automatic speaking valve (ASV) in speech

rehabilitation after total laryngectomy. Moreover, patients' health-related quality of life (HRQoL) was assessed.

Patients and methods. Fourteen laryngectomized male patients who had used HME successfully before receiving ASV entered the study. Their mean age was 62 years (range 40–85), and they were examined by an ENT specialist and a speech pathologist. Structured questionnaires were used to collect data on voicing and breathing, skin adhesion, voice and speech quality and HRQoL. Mean phonation time and loudness range were analysed, and a group of speech pathologist evaluated the quality of voice perceptually.

Results. Twelve out of 14 (86%) patients had used ASV on special social occasions but only one out of 14 (7%) had used it continuously. There were three main reasons why ASV was considered not to be suitable for continuous use: nine out of 14 (64%) patients reported that breathing was heavier, seven out of 14 (50%) patients found speaking more difficult and four out of 14 (29%) patients' subjective quality of voice was worse with ASV. All the patients, however, were willing to carry on occasional use of ASV. With HME the phonation time tended to be longer (n.s.) and the softest phonation softer ($t = 2.366$; d.f. = 13; $P = 0.034$, paired samples test) compared with ASV referring to a better function of HME. However, the loudest phonation was louder i.e. the performance was better with ASV ($t = 2.795$; d.f. = 13; $P = 0.015$, paired samples test). The problems on the dimensions of breathing and speaking, in addition to eating and sexual activity, compared with the age-matched male Finnish general population, were confirmed by the 15D profile, but the overall HRQoL as assessed by the 15D was quite similar (patients 0.877, population 0.884, n.s.).

Conclusions. ASV was a useful additional device for prosthetic voice rehabilitation in a selected group of laryngectomized patients. Interestingly, total laryngectomy seems not to lower patients' HRQoL notably.

High-resolution genome-wide copy number and expression analysis of laryngeal carcinoma

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Introduction. Molecular mechanisms contributing to initiation and progression of HNSCC tumours are still largely unknown. Previous studies by comparative genomic hybridization have suggested that genetic alterations may have prognostic significance in head and neck tumours, but the resolution has remained low.

Methods. We performed an integrated high-resolution analysis of copy number and gene expression to identify genetic alterations that are involved in laryngeal cancer. Laryngeal cancer cell lines (UT-SCC) and tumour samples consisting of more than 70% of tumour cells were examined. Agilent's oligo and cDNA microarrays containing 17 000 and 12 000 unique genes, respectively, served as a platform for copy number and gene expression analysis.

Results. We identified copy number alterations in several previously known chromosomal regions on an average resolution of 500 kb, including gains in 3q, 7p, and 11q and deletions in 3p, 4q and 18q. Integration of copy number and gene expression analysis revealed genes,

such as EGFR, as well as novel genes not yet characterized in HNSCC that showed consistent pattern of copy number and expression.

Conclusions. Integration of copy number and expression analyses allowed us to identify genes involved in laryngeal squamous cell cancer. The bioinformatic analysis of the combined copy number and expression data will provide useful resource for further studies.

Presence of DNA of human papillomavirus 16 but no other types in tumour-free tonsillar tissue

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Background. Although HPV-16 may play a role in tonsillar carcinogenesis, little is known about HPV DNA prevalence in tumour-free tonsils.

Methods. Tonsillar tissue from patients ($n = 212$) undergoing surgery because of chronic or recurrent tonsillitis or tonsillar hypertrophy as well as exfoliated tonsillar cells from normal tonsils of control subjects ($n = 189$) were analysed for HPV DNA by nested PCR using consensus primers MY09/11 and GP5+/6+.

Results. The prevalence of HPV DNA was 6.1% (13 of 212) in patients' tonsillar tissue and 0.5% (one of 189) in exfoliated-cell samples. Sequencing of amplicons revealed that all HPV-positive tonsillar tissue samples from tonsillectomy patients, including children, harbored oncogenic HPV-16; the only HPV-positive brushed sample from normal tonsils was type 58. Antibodies to the major capsid protein L1 of HPV-16 were found as frequently in patients as in controls, and HPV-16 L1 seropositivity was mainly seen in the group aged between 26 and 40 years.

Conclusions. Only HPV-16 was detectable in tumour-free tonsillar tissue and tonsillar epithelial cells may serve as a reservoir for this virus which is associated with tonsillar carcinogenesis. The presence of HPV-16 DNA in tumour-free tonsils did not appear to lead to L1 antibodies production.

Quantitative automated image analysis of laryngeal squamous cell cancer

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Objective. To improve classification of laryngeal squamous cell carcinoma and its precursors for treatment and prognostic evaluation, we applied computer-assisted quantitative image analysis on immunohistochemical markers in histological specimens.

Methods. Specimens of squamous cell carcinomas of the larynx and dysplastic lesions of varying severity were stained with antibodies to vessel structures, proliferation markers and stromal components, collagen I and collagen III. The number, size, shape, structure and locations of vessels of

different sizes (1), proliferating cells and collagen fibres (2,3) were determined by automated quantitative image analysis in epithelial cells, carcinomatous areas, in areas surrounding epithelial islets and in stroma. Digitized micrographs were analysed as grey-level bitmaps with 256-level depth. The computer program determined for each specimen the number, size, shape as well as staining intensity for each marker of the study. The results were related to clinical data, history and follow-up for each patient. **Results.** This method was applicable for the analysis of large series of patients with a reproducibility and sensitivity exceeding 99%. Angiogenesis was distinct in all neoplasms in relation to degree of differentiation, occurring also in pre-malignant lesions. Increased angiogenesis was associated with decreased survival, depending upon morphology and area of study. In carcinomas, vessel numbers increased significantly when compared with non-neoplastic tissue and even more around epithelial islets. Vessels were arranged in a garland type pattern, in bursts, as well as exhibiting directional angiogenesis, indicating an effect of neoplastic epithelium on surrounding stroma. Indicators of proliferative activity, expression of PCNA and Ki67, were also related to location in neoplasms and pre-neoplastic lesions, with increased cell proliferation in basal layers of dysplastic epithelium, less so in central areas of differentiated squamous cell carcinomas and being diffuse in less differentiated neoplasms. Expression of markers of collagen deposition increased during pre-neoplasia and early malignancy, decreasing in distribution in moderately differentiated neoplasms and having abnormal distribution in highly malignant undifferentiated neoplasms.

Conclusion. The results showed computer-assisted analysis of immunohistochemical markers to be a useful adjunct to existing methods of tumour analysis. However, reproducible definitions of components of neoplastic lesions are needed to establish these markers as independent predictors of clinical behaviour.

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Versican expression in pharyngeal squamous cell carcinoma

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Introduction. Versican, a large chondroitin sulphate proteoglycan, belongs to the aggrecan gene family. It is a component of the extracellu-

lar matrix (ECM) in various soft tissues, and its protein structure comprises several active domains. Between the G1 and G3 domains of the versican core protein locates the central domain for the attachment of glycosaminoglycan (GAG) side chains. Transcriptional variations in combining the two possible subdomains (α GAG or β GAG) for GAG-attachment region produce four different versican isoforms, namely V0, V1, V2 and V3. The name versican highlights its diverse biological actions, including cell adhesion, proliferation, migration, and assembly of ECM. Elevated versican levels reported in several malignant tumours suggest versican involvement in cancer development and progression. Versican expression has not been previously explored in HNC. The exact role of versican, in human neoplasms still remains unclear.

Aims. To investigate the expression of versican in pharyngeal squamous cell carcinoma (PSCC) and its relation to histological differentiation, clinical data as well as prognosis.

Methods. For the retrospective survey tissue material from 118 primary PSCC tumours (oropharynx or hypopharynx) were obtained for analyses. The immunohistochemical expression of versican was studied and was related to the clinical data and survival.

Results. In the primary tumours, strongest stromal versican expression was graded as low in 59 (50%), and high in 59 (50%) cases. Additional intracellular versican staining was seen in nine (8%) tumours. In local lymph node metastases, strong stromal versican staining was statistically significantly more common as compared with the staining in the primary tumours ($P = 0.018$). Strong stromal versican staining was more commonly seen also in less advanced tumours ($P = 0.015$). There was no association between versican expression and the other investigated variables (TNM status, histologic grade). Neither stromal nor intracellular versican expression predicted overall survival (OS) in this material.

Conclusions. Versican is more strongly expressed in the stroma of local metastases as well as in the earlier stages of the disease in PSCC. However, versican expression is not an independent prognostic factor in this entity.

Postoperative tissue oxygen monitoring of microvascular free flaps in head and neck tumour surgery and reconstruction

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Microvascular free flaps are currently routinely used for reconstruction in head and neck tumour surgery. Postoperative circulatory impairment of the flap leads to failure of the reconstruction and a major re-operation is required with an elevated risk of complications. If the circulatory problem can be detected as early as possible measures for saving the flap can be started without delay and in most cases the reconstruction can be saved with a simple revision of the anastomoses. Many different methods for monitoring the circulation in the flap have been introduced but no golden standard is available. In head and neck reconstructions, it is often hard to observe the flaps visually and the use of previously introduced methods – i.e. percutaneous oxygen pressure measurement, photoplethysmography and ultrasonic Doppler monitoring are difficult. The ideal system should be easy to use, reliable, and harmless to the flap and it should rapidly alarm the personnel of possible circulatory problems. The Licox® O₂-probe seems to be particularly suitable for postoperative monitoring in microvascular free flaps. It measures the oxygen partial pressure in tissue. A simple polyethylene probe is inserted into the flap. The oxygen in tissue diffuses through the wall of the probe to its inner electrolytic chamber where the O₂ is transformed at a negatively polarized precious metal electrode into OH⁻ ions. The current

from the O₂-reduction is the raw signal of the sensor. Between 1999 and 2002, we have used the Licox® probe in 37 head and neck cancer patients. Twenty-three patients had a radial forearm flap reconstruction, eight with fibula + skin, two latissimus dorsi, one rectus abdominis, one fibula and radial forearm flap and two patients with crista iliaca and a radial forearm flap. The Licox® system indicated a circulatory problem in nine cases leading to six revisions. three cases cleared by changing patients' head position etc. – circulation after this good. Only one flap was lost giving a 97.5% total success rate. Our results show that the Licox® system is a simple and reliable method for postoperative tissue oxygen monitoring in microvascular free flaps.

Microdialysis in clinical practice: monitoring of intraoral free flaps

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Introduction/purpose. Postoperative monitoring of free flaps is of critical significance to success. Microdialysis techniques are well established in pre-clinical research and have recently been applied to clinical practice. Microdialysis offers the possibility to monitor the metabolism of a flap continuously. Ischemia induces metabolic changes and these changes can be detected by microdialysis sampling. Clinical examination is the golden standard of postoperative free flap monitoring but with intraorally situated or buried flaps this is difficult or impossible. The higher failure rate of buried flaps compared with non-buried ones indicates this problem. Therefore it is profitable to search for a reliable monitoring aid. This study presents our clinical experience with the microdialysis technique in free flaps in head and neck region.

Materials and methods. The study group consisted of 15 adult patients who underwent oropharyngeal cancer resection and immediate reconstruction with free flap (mainly anterolateral thigh flap) during autumn/winter 2002. The microdialysis catheter was placed into the subcutaneous adipose tissue of the flap in the end of the surgical procedure. Glucose, glycerol, lactate and pyruvate concentrations were measured in the flap. Samples were taken once hourly. The investigation continued 72 h postoperatively.

Results. Two flaps out of fifteen failed (re-operations were not successful). One flap because of insufficiency of perforating vessels and another due to venous drainage problems leading to slow death of the flap. Other flaps survived without problems. In both problem cases microdialysis indicated ischemia one to 2 h before it became clinically evident. No false positive or negative cases were reported. In one case the microdialysis catheter had to be changed because of malfunction. The malfunction of the catheter was easy to distinguish from vascular compromise.

Conclusion. Microdialysis is a novel reliable method to detect flap ischemia at early stage especially in buried flaps when clinical monitoring is difficult or impossible making early surgical intervention possible. Microdialysis also reduces patient discomfort caused by repeated clinical examination of the flap.

Reconstruction of an extensive maxilla defect – case report

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The intact maxillae contribute to the facial appearance and to important functions such as speech, mastication, and deglutination. Aim of the

reconstruction of maxilla defects is to restore these properties. We report about our experience in a maxilla reconstruction after tumour resection of a low malignant adenocancer (T4N0M0) of the left sinus ethmoidalis in a 43-year-old otherwise healthy man. The tumour resection involved the left maxilla, the floor and medial orbital wall including an exenteratio orbitae, and the fronto-ethmoid area including some dura mater on the left side. The defect was classified type III b according to Cordeiro et al. [*Plast Reconstr Surg* 105: 2331, 2000]. Our concept of reconstruction included all the above-mentioned aspects and secondary rehabilitation with dental implants. A free vascularized iliac crest bone with two single parts of obliquus internus muscle was employed for reconstruction. The bony part was used for reconstruction of the left maxilla and the floor of the orbit. The two muscle pieces were used for coverage of the sinus frontalis, the eye socket, and the floor of the left nose. Uneventful postoperative course until 3 weeks postoperatively, when one piece of the muscle became necrotic probably due to compression. It was replaced by a free flap of part of the right vastus lateralis muscle. Two weeks later, full-dose irradiation followed (68 Gy). Uneventful course until 5 months post-irradiation, when parts of the original skin at the left cheek and the left wall of the nose became infected and subsequently necrotic. A biopsy taken from the necrotic area showed no tumour growth. Thus, debridement was done and a free flap of part of the left vastus lateralis muscle was used for coverage. Now, 15 months since the first operation, there is no evidence of disease, the patient works 50% in his former job, and dental rehabilitation is in progress. An eye prosthesis is not wished so far. Donor site morbidity is negligible. The performed reconstruction was extensive after resection of such a large and high malignant tumour and this could be discussed as 'too much'. A large muscle flap as primary coverage and secondary bone reconstruction might also have been an option. On the other hand, after the presented reconstruction, complete rehabilitation is possible and in progress, which is important especially regarding the young age of the patient.

Free anterolateral thigh flap in head and neck reconstructions

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Introduction. The free anterolateral thigh flap (ALT) is a versatile flap, fasciocutaneous or musculocutaneous, thick or thin, according to the requirements of the recipient site. The donor site morbidity is minimal, and as cancer patients tend to be thin, the flap is usually of suitable thickness to be molded into a new tongue or tonsillar bed. In thicker patients it can, however, also be thinned to 3–5 mm of subcutaneous tissue if a cuff of tissue is spared around the perforator. There is a learning curve, as the perforator anatomy varies, but the benefits outweigh the disadvantage of the tedious dissection.

Materials and methods. During the period from 1/2001 to 11/2002, the free anterolateral thigh flap was used as a reconstruction in 33 patients, in the head and neck area. Most had been operated for T3–T4 oropharyngeal cancer, two pharyngolaryngectomies, two total glossectomies, 12 hemiglossectomies and 12 had tonsillar or retromolar tumours. One patient had an extensive squamous cell carcinoma requiring enucleation, and three were used to cover gunshot injuries of the face. One chimeric flap with two skin islands was used to cover a defect from recurrent sarcoma of the mandible. A sensory nerve was co-apted in all cases, and a part of vastus lateralis muscle with motor innervation was included for the total glossectomy cases.

Results. One flap failed due to insufficiency of perforators, and two developed major edge necrosis requiring revisions. Three others were re-explored, but salvaged. During the follow-up time one patient has died from the disease, and one is permanently hospitalized. All others have been eligible for follow-up, 12 have reached 1 year. Three have required minor revisions, debulking or intraoral scar release. All have resumed normal or soft diet. The donor site was closed directly in all but one, which was skin grafted. One patient devel-

oped a seroma and minor wound rupture. None complained of donor site pain or functional problems, but most had some dog-ear formation.

Conclusions. The anterolateral thigh flap is especially suitable for intra-oral reconstruction due to its thinness and pliability. The donor morbidity is minimal. In our practice, during the last two years, the ALT has mostly replaced the radial forearm flap in reconstructions of the head and neck region.

Abstracts from the 17th Annual Meeting of the Scandinavian Society for Head and Neck Oncology, Gothenburg, Sweden, 22–24 April 2005

Oral tongue cancer in Finland between 1995 and 1999

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Introduction. Management of oral tongue cancer (OTC) remains a challenging problem. The purpose of this study was to investigate the used treatment approach and the outcome of OTC in a nationwide study.

Methods. Retrospective clinicopathological data of all patients who were diagnosed for a cancer of the oral tongue between 1995 and 1999 at the five University Hospitals in Finland with a population of 5.2 million inhabitants were reviewed. The mean follow-up time for the whole patient series was at least 5 years.

Results. A total of 235 patients (125 men, 110 women; mean age 61.6 years; range 24–90 years) were included. The T categories were as follows: T1, $n = 79$; T2, $n = 102$; T3, $n = 38$; T4, $n = 15$. In the majority (77%) of the patients the tumour was located in the lateral border of the tongue. Fifty-nine (25.1%) patients presented with neck node metastases. Surgery of the primary tumour was performed in 218 (92.8%) patients and in 69 (29.4%) patients consisted of resection of the tumour with reconstruction of the surgical defect. An ipsilateral neck dissection was performed in 114 (48.5%) cases and a bilateral neck dissection in nine (3.8%) cases. Pre- or postoperative radiation treatment was given to 131 (55.7%) patients. The rate for locoregional recurrences was 27.8%. Twenty-seven patients (18%) with N0 neck disease had regional recurrences. The 3- and 5-year disease-specific survival (DSS) rates for the whole patient series were 74% and 64% respectively. The 3- and 5-year DSS rates for stage 1 tumours were 88% and 74%, for stage 2 tumours 74% and 62%, for stage 3 tumours 79% and 71% and for stage 4 tumours 33% and 33%, respectively.

Conclusions. In the present study the surgical treatment approach seems effective in controlling early stage OTC but the frequent locoregional recurrences and the modest survival, in spite of combined radiotherapy and surgery, point out the need to consider new strategies in the management of advanced stage disease.

Risk Factors and Prognosis in Early Tongue Cancer

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Cancer of the oral tongue carries a bad prognosis with 30–40% local and regional recurrences even with T1–T2 tumours. Several different treatment strategies have been advocated without improving survival. Many studies have tried to find prognostic factors influencing outcome and pattern of recurrence.

Method. 1988–2001 we treated 137 patients with cancer of the tongue; 88 patients with T1–T2 tumours are analyzed here. In 1994–95 we changed treatment pattern to do RT postoperatively instead of preoperatively. Surgery was the primary treatment in 43 cases (single treatment in 23 and combined with RT in 20). TNM: T1 ($n = 24$) and T2 ($n = 19$). Three patients were N+. Forty-five patients did not have primary surgery (40 ext RT in combination with surg ($n = 21$) and brachytherapy ($n = 18$). TNM: T1 ($n = 8$) and T2 ($n = 29$). Nine patients were N+ (all T2).

Results. Forty-three patients had primary surgery (post op external RT in 17, brachytherapy in 5) with 11 recurrences (4 local, 6 regional and 1 locoregional). Forty-five patients were treated with ext RT (40) or brachytherapy ($n = 4$) or neck ($n = 1$). This was combined with brachytherapy ($n = 14$) and surgery ($n = 21$). Eleven recurrences (6 local, 4 regional and 1 locoregional). Five patients were never free of disease. In group 1 (surgery) recurrence rate was 26% and in group 2 (ext RT) 38%. Of 88 patients 14 were <40 y (3 died of disease), 29 were 41–60 y (dod: 7) and 45 were >60 y (dod: 18). Of 29 reexams of surgical specimens the growth pattern graded 1–2 ($n = 21$) and 3–4 ($n = 8$). Grading according to Batsakis, 3–4 is less well delineated. Tumor thickness: <5 mm 5 pat, 5–9 mm 15 pat, >10 mm 10 pat.

Conclusion. Generally older age groups present with more advanced disease. The younger age group does better and usually present with less advanced disease. Results indicate that tumour thickness <5 mm is a favourable prognostic sign as is growth pattern 1–2. A recurrence