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Loco-regional recurrence after surgical treatment of oral squamous cell carcinoma: Proposals for follow-up imaging based on literature, national guidelines and institutional experience

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ABSTRACT

The recurrence rate following the treatment of oral squamous cell carcinoma (OSCC) by primary surgery is about 10%–26%. The earliest possible diagnosis of residual tumour, recurrence of local tumour disease, and subsequent metastasis is essential for an improvement of the overall survival and of the survival period for affected patients. No international consensus exists for a post-therapeutic surveillance schedule for OSCCs.

Based on a review of the literature, existing guidelines, and our institutional experience, we have established an algorithm for the follow-up of these patients regarding the timing and techniques of postoperative imaging. We recommend a follow-up interval of 6 weeks during the first half-year after discharge from hospital by single clinical and alternating clinical check-ups combined with computed tomography (CT) or magnetic resonance imaging (MRI), followed by an interval of 3 months in the second half-year, with clinical and radiological check-ups. In year 2, we recommend a follow-up interval of 3 months with single clinical and alternating clinical check-ups combined with CT or MRI. In year 3, we recommend screening every 6 months, both clinically and via imaging, because of the decreased risk of recurrence. From year 5 onwards, our recommendation is a clinical and imaging-based examination every 6–12 months, depending on patient risk factors and disease progression. Four standard imaging techniques, namely positron emission tomography (PET), CT, MRI, and ultrasound (US), are discussed concerning their range of application, sensitivity, and specificity. Furthermore, the technical aspects of our institutional protocols are described in detail. In highly frequented head and neck cancer centres, PET and US are of secondary importance, since CT and MRI are nowadays highly efficient tools in primary diagnostic and post-therapeutic surveillance.

1. Introduction

Oral and oropharyngeal cancers are together the sixth most common cancers currently in the world, with an increasing incidence of oral squamous cell carcinoma (OSCC) (Bagan and Scully, 2008; Warnakulasuriya, 2009). The recurrence rate of OSCC is currently reported to be approximately 10%–26% (Kissun et al., 2006; Mücke et al., 2009; Rivelli et al., 2011; Sasaki et al., 2011). About two-thirds of all recurrent tumours occur, in particular, within the first 2–3 years after treatment. Recurrent disease or subsequent metastasis within the first 18 months after primary surgical treatment worsens the 5-year survival rate of patients by about 20.5%–27.6% (Liu et al., 2007; Mücke et al., 2009).

Most endeavours in the clinic and in research with respect to OSCC are undertaken to improve primary treatment; they include diagnostic imaging, navigational resection, immediate (microsurgical) reconstruction, determination of relevant co-factors, tumour markers, and individualized (adjuvant) therapies. Nevertheless, recurrent disease remains a highly challenging problem in follow-up. Anatomical distortion, increased fibrosis, bleeding,

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inflammation, infection, and tissue oedema caused by surgical intervention represent diagnostic dilemmas for radiologists and surgeons during follow-up (Wiener et al., 2006; Al-Ibraheem et al., 2009; de Bree et al., 2009). Technical advances might lead to a higher detection rate of recurrence after radical treatment of OSCC (Flynn et al., 2010).

In the most common 10 cancer entities, close-meshed follow-up is strongly recommended and is often presented in existing guidelines. However no international consensus or guideline exists that recommends detailed post-treatment follow-up protocols of clinical, radiological, and nuclear medicine examination with dedicated requirements for computed tomography (CT)-, magnetic resonance imaging (MRI)-, and positron emission tomography (PET)-based image fusion protocols in patients with OSCC treated initially by surgery.

Our aim has been to establish an algorithm for the follow-up of these patients. An ideal algorithm has to include recommendations for short- and long-term screening intervals, along with timing and techniques for any postoperative imaging (Liu et al., 2012; Manikantan et al., 2009).

Four standard imaging techniques are frequently used in the follow-up of OSCC patients, namely PET, CT, MRI, and ultrasound (US). Their range of application and various sensitivity and specificity levels complicate the situation regarding standardized postoperative examination. In addition, nonspecialized physicians often naively choose the time intervals and imaging techniques for their patients during follow-up. Moreover, good detection rates and cost-effectiveness need to be guaranteed independently of the examiner.

2. Material and methods

To find articles dealing with this topic in the literature, we scanned the PubMed database during June 2014 by means of the following keywords: “OSCC” and “follow-up” and “recurrence” and “PET” or “CT” or “MRI” or “ultrasound” ($n = 14$). Articles dealing with patients who had a second cancer disease or had experienced only prior chemotherapy/radio-chemotherapy and who were therefore at higher risk for recurrence were excluded so that we could focus on post-surgical follow-up. We analysed this literature to obtain hints and trends for the most useful imaging technique at the most suitable time points. Our own institutional experience was included based on the evaluation of 773 patients treated with curative intent by surgery in our hospital between 1992 and 2006 (Mücke et al., 2009).

3. Results

3.1. Recommendation for follow-up strategy

The available data demonstrate the urgent need for close surveillance, especially during the first 2 years after surgical treatment, because of the high recurrence rates independent of UICC stages. Based on this, we regard an interval of up to 2 years postoperatively as the “short-term” follow-up interval and suggest narrower time intervals of clinical and radiological follow-up appointments during this time than in the subsequent years following tumour clearance. Ongoing follow-up appointments are indispensable but tolerable, with extended intervals from the third year onwards.

The strategy being pursued by our department is shown in Table 1. We prefer closely spaced check-ups starting 6 weeks after discharge from hospital in the short-term follow-up period, namely, every 6 weeks (months 1–6) and then every 3 months (months 6–24), with single clinical and alternating clinical check-ups combined with CT or MRI. We suggest 3-monthly screening within the first 2 years with the above-mentioned algorithms, since most of the recurrences occur within this time interval. In contrast to Rivelli et al. and King et al., we prefer the more closely spaced use of imaging because of the risk of recurrence in deep tissue; this is difficult to detect by palpation (King et al., 2011; Rivelli et al., 2011).

Clinical examination is based on anamnesis (aspects of the B-symptomatic triad of fever, weight loss, and night sweats), full-mouth inspection, and cervical lymph node palpation. Patients should also be regularly interrogated about their quality of life. Because of the high rate of asymptomatic recurrences, as mentioned above, we strongly recommend additional morphological imaging (CT or MRI) at every second appointment. Within the third year, we recommend the frequency of follow-ups to be increased because of the decreased but still existing risk of recurrence. Hence, the review appointments in year 3 are every 6 months, both clinically and via imaging. Within years 4 and 5, our recommendation is for clinical and imaging-based examination every 6 or 12 months, depending on patient risk factors and progress to date. From year 6 onwards after tumour clearance, we rely on yearly routine check-ups by the patient's dentist or OMFS/ENT specialist.

If an ambiguity or clinical inconsistency is present in the morphological image finding with regard to tumour recurrence or persistence, and if this cannot be cleared by a second clinical investigation or simple biopsy, we consider this as an indication for an additional PET scan, but not earlier than 3 months postoperatively. If any kind of recurrence is identified within any interval of the follow-up surveillance, this can be regarded as an indication for a recommencement of the follow-up algorithm. Contrary to others (Kanatas et al., 2014), we never consider an early signing-off of patients with UICC-I disease after 3 years, because we have not noticed a significant difference in the recurrence rates at this time point in our own patient population (Mücke et al., 2009).

3.2. Available imaging techniques

Four imaging-based techniques are commonly used for follow-up. For a standardized radiological follow-up, we recommend a

Table 1
Strategy pursued by our department.

Year	Month	Follow-up interval	Clinical examination	Imaging device	
				Either CT or MRI	PET
First year*	1–6	Every 6 weeks	x	x** (**every second time)	
*Starting point: 6 weeks after discharge from hospital	7–12	Every 3 months	x	x	a) Ambiguous CT or MRI results that cannot be clarified clinically or via direct biopsy b) Suspected distant metastasis
Second year	13–24	Every 3 months	x	x**	
Third year	25–36	Every 6 months	x	x	
Fourth year	37–48	Every 6 months	x	x**	
Fifth year	49–60	Every 12 months	x	x	