Treated Head & Neck Cancer: Scar vs. Recurrence?

On MR examination, most primary head and neck cancers are characterized by the distortion of the anatomy due to the mass effect, to the effacement of fat interfaces, to the erosion of bone structures and to the signal intensity of tumour, quite often very different from normal structures. The larger is the gradient between tumour signal and adjacent tissues, the more accurate is the mapping of tumour extent. Unfortunately, these more favourable conditions are frequently reversed when sub-clinical recurrent cancers have to be detected in the follow-up post-therapy. As a matter of fact, post-treatment changes alter the anatomy because of resection and reconstruction (surgery) or because of tissue alterations due to radiotherapy. In addition, these modifications can sum when a multimodality treatment has been delivered. The variability of the healing process and post-radiotherapy tissue changes makes the interpretations of MR findings, based on conventional sequences, rather challenging. An additional point is that any post-therapy head and neck MR examination is a matter of compromise between the acquisition time - both sequence duration and the whole protocol length - and the spatial resolution.
In this complex setting, the strategy of the MR examination has to be focused on three issues: to keep the examination time within 20-25 minutes (patient cooperation issue); to obtain first the sequences that help to recognize the new post-treatment anatomy (post-surgical healing, harvested tissues); and, finally, to maximize the gradient-of-signal between tumour and non-neoplastic tissues. In this context, the distinction of inflammation-related changes from tumour signal plays a critical value. Diffusion-Weighted Imaging (DWI) has the potential to improve the the discrimination of tumour from oedema/inflammation and from mature fibrosis. Several issues still have to be clarified in the use of DWI. The most important one regards how to integrate the pattern of DWI signals (b0, b1000, ADC map) with the findings of the "conventional sequences? Presently, the answer is a multi-parameter analysis, i.e. the combination of DWI parameters with findings on T2-weighting sequences, standard (within 3 minutes from injection) and late (after 5 minutes) post-contrast images. The paradigm for post-treatment sub-acute/chronic inflammation encompasses high signal on T2, b0 and high value on ADC map; post-contrast progressive enhancement. Recurrent squamous cell carcinomas tend to show low-to-intermediate T2 signal, lower signal on b0, a lesser decade on b1000, hence low-value on ADC map. Enhancement is earlier than for inflammatory changes with a wash out on late post-contrast images.