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Clinical Radiology
The Royal College of Radiologists

Recommendations for cross-sectional imaging in cancer management, Second edition

Melanoma

Faculty of Clinical Radiology

Contents

Melanoma

Clinical background

The incidence of melanoma continues to rise,[1] due largely to increased sun exposure but also improved detection and reporting. Ultraviolet radiation accounts for more than three-quarters of melanoma in the UK. Fair and freckled-skinned people subjected to intense intermittent sun exposure are most at risk. Other risk factors include multiple naevi, sunbed use below the age of 35 and a family history of melanoma. The majority of patients presenting with a melanoma are treated by surgical excision, which should be undertaken by specialists engaged in a local skin multidisciplinary team (LSMDT). Recommended excision margins have been defined.[1] Typically patients require no imaging. Criteria for referral to a specialist skin MDT (SSMDT) have also been set out elsewhere.[1] However, regardless of presenting stage, all patients should be discussed by a skin MDT and their minimum dataset recorded (Appendix 1).

Primary staging is pathological (American Joint Committee on Cancer [AJCC] Staging Manual, 7th edn),[2] which reflects current understanding of prognostic features. Tumour thickness, mitotic rate and ulceration contribute to T-staging. Nodal metastatic disease is defined as microscopic; that is, clinically occult (not based on size) after for examplesentinel lymph node biopsy/lymph node clearance or macroscopic; that is, clinically or radiologically apparent. Microsatellites are defined as nests of intra-lymphatic cells with a diameter of >0.05 mm to ≤0.3 mm, ≤2 cm from the tumour while in-transit metastases are also before the first lymph node but >2 cm from the primary. These parameters together with the number of involved lymph nodes are prognostically predictive and so define the N-stage subcategories. Patients with regional lymph node metastases usually undergo block lymph node dissection and when fit even in the face of metastatic disease to avoid ulceration.

Once beyond the confines of the nodal basin malignant melanoma may metastasise widely including unusual sites such as bowel, spleen, heart and the genitourinary tract. Patients with oligo-metastatic disease may be offered stereotactic radiotherapy, metastasectomy or image-guided ablation accepting the limited available evidence. Treatment options for skin/soft tissue recurrence include surgery, laser therapy and isolated limb perfusion dependent on site and extent. Conventional chemotherapy is of limited benefit, but novel therapies such as ipilimumab and vemurafenib have transformed the treatment of metastatic melanoma by for example activating T-cells or blocking BRAF in BRAF V600E mutated melanomas. These two drugs are approved by the National Institute for Health and Care Excellence (NICE),[3,4] and other promising drugs are available. Hence molecular testing for patients suitable for systemic therapy is undertaken on biopsy material.

Imaging techniques

Sentinel lymph node biopsy (SLNB) can be considered in primary stage IB and above, but at time of writing trial data is awaited on impact of survival and cost benefit. Ultrasound and fine-needle aspiration cytology (FNAC) is a less sensitive alternative for identifying clinically occult lymph node metastases, but is accurate and widely used to confirm clinically suspected disease. Patients with lymphatic (stage III) or distant (stage IV) disease are usually imaged with CT of the head and body following SSMDT discussion. The scan area should be tailored according to the primary site and expected lymph node basin while noting head and trunk melanomas have a less predictable lymphatic drainage compared to limb tumours.

CT

CT remains the most utilised technique for staging.

- Head, chest, abdomen and pelvis (to cover the groin area) for primary staging of lower limb/lower body wall primary tumours.
- Head, neck, chest and abdomen for upper limb, scalp, neck and upper torso primary tumours.
- Oral administration of 1 litre of water or iodinated contrast medium.

- 100 ml of intravenous iodinated contrast medium injected at 3–4 ml/sec.
- MDCT is commenced at 20–25 seconds (neck and chest) and 70–80 seconds (abdomen and pelvis) post-injection.
- Using MDCT, slice thickness will depend on scanner capability. In general, sections are acquired at 1.25–2.5 mm and reformatted in coronal and sagittal planes.
- Examination of the brain immediately following contrast medium examination with CT suffices.

Values of $CTDI_{vol}$ should normally be below the relevant national reference dose for the region of scan and patient group (see Appendix and section on Radiation protection for the patient in CT in Section 2).

MRI

MRI is used at the discretion of the SSMDT; for example, for surgical planning; to better define deep structure involvement before lymph node dissection; for the central nervous system (CNS) and surveillance of the neck to reduce thyroid radiation. Whole-body diffusion-weighted MRI is showing promise in the setting of staging in high-risk patients, but more data is required.

PET-CT

Metastatic melanoma takes up ^{18}FDG avidly. It is more sensitive than CT alone and can be particularly useful in imaging the lower limbs. Indications include more accurate staging prior to metastasectomy and response to isolated limb perfusion.[5]

Follow-up

The majority of recurrences occur within three years, but can be more delayed. The detection of loco-regional recurrence and new primaries is underpinned by educated self-examination and clinic review. There is no role for imaging in the vast majority.

Ultrasound surveillance from the primary resection site to lymph node basin is more sensitive than clinical examination, but has not been widely adopted into routine clinical practice; a UK trial is under way.

The availability of new treatments, which are more effective in lower bulk disease, has resulted in recent guidelines for surveillance.[6] Despite a lack of randomised control trial data, the following is recommended for ‘high-risk’ patients:

- Body CT or PET-CT and MRI head: six monthly for three years then annual to the fifth year.

The definition of high risk is not universally agreed. Many consider a predicted five-year survival of less than 50% based on AJCC criteria to be high risk.[2] Local practices will vary given the uncertainty on survival impact and the number of surveillance scans implicated.

Tips

- When interpreting CT the visual search should be wide, given the unpredictable and sometimes unusual nature of metastasising melanoma.
- Efficacious immune modulating therapies do not always result in tumour shrinkage on anatomical imaging. Other patterns such as stability, initial growth followed by slow shrinkage and mixed response are all described as consistent with favourable survival.[7]
- Newer drug side-effects which may result in imaging include: colitis, hepatitis, neuropathy, endocrinopathies and rarely acute alveolitis.

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Appendix 1. Dataset (to be updated with dates through patient's follow up)

Patient identification
Location of primary
Date of primary diagnosis
Pathological stage
Lymph node involvement (including date of diagnosis)
If LN +ve: anatomical location
Method of detection
Metastatic sites (including date of diagnosis)
Imaging tests utilised
Enrolment into clinical trial (details)

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