The Clinical Utility of MRI and CT-PET Following Radical Treatment for Cervical Carcinoma

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Background

Imaging follow up after radical treatment for cervical cancer with chemoradiotherapy with or without brachytherapy may be warranted if asymptomatic persistent or recurrent disease can be detected such that salvage treatment can be undertaken with curative intent. Robust prospective evidence of the utility of MRI and/or PET-CT scanning in the post-treatment surveillance of asymptomatic females is lacking. Based on limited evidence[1,2], the Scottish Intercollegiate Guidelines Network recommended a PET-CT scan 9 months post treatment as a good practice point[3].

At Aberdeen Royal Infirmary since 2013, follow up MRI at 3 months and/or PET-CT at 9 months post-treatment have been organised for patients in whom salvage pelvic exenteration would be considered in the event of central recurrence.

Methodology

All patients with cervical cancer treated non-surgically with curative intent at Aberdeen Royal Infirmary between 2012 and mid-2018 were identified from the radiotherapy database. Patients who had undergone a 3 month MRI and/or a 9 month CT-PET scan were identified and the results of these were collated, with the subsequent impact on patient management identified from the electronic patient record.

Results

Between January 2012 and May 2018, 126 patients were treated non-surgically in NHS Grampian for cervical carcinoma with curative intent. Of these, 29 and 32 asymptomatic patients underwent a post-treatment MRI and PET-CT scanning respectively, of whom 13 underwent both modalities. All patients had at least 12 months follow up post-imaging. The results of the relevant scans are displayed in the three boxes opposite.

MRI pelvis at 3 months (29 patients)

- 16 patients had no residual disease (NRD) and have not relapsed to date
- 5 patients had NRD but subsequently relapsed, of whom:
  - 3 relapsed with distant metastatic disease only
  - 1 relapsed with both distant and pelvic disease
  - 1 relapsed within an external iliac node
- 8 patients had residual or new disease, of whom:
  - 5 were unsuitable for salvage
  - 3 had potentially salvageable disease
    - 1 undergoing exenteration but subsequently relapsing
    - 1 progressing prior to planned exenteration
    - 1 deciding not to pursue salvage

The negative predictive value of MRI in this series was 76%, however, this rises to 90% for relapse confined to the pelvis (i.e. potentially salvageable relapse).

Whole body ^{18}FDG-PET-CT scan at 9 months (32 patients)

- 24 patients had NRD and have not relapsed to date
- 7 patients had unsalvageable metastatic and/or pelvic disease
- 1 patient had persistent pelvic side wall disease that was considered unsalvageable at the time but might now have been considered for salvage stereotactic body radiotherapy (SBRT).

The negative predictive value of PET-CT in this series was 100% (with at least 1 year follow up post-imaging in all patients).

Patients undergoing both MRI and PET-CT scanning

Thirteen patients underwent both modalities in our cohort. The cross-tabulation for the results of the 2 scans are displayed below.

	PET negative	PET positive
MRI negative	8	2*
MRI positive	0	3

*both patients had distant metastatic disease

Conclusions

- ❑ in this cohort of patients, post-treatment MRI at 3 months and/or PET-CT at 9 months have not led to any additional patients being cured of their cancer
- ❑ MRI scanning led to the identification of 3 potentially salvageable patients
- ❑ PET-CT scanning led to the identification of 1 potentially salvageable patient (using modern radiotherapy techniques)
- ❑ surveillance imaging can provide reassurance to patients with a negative scan, given the high negative predictive value for relapse in our series
- ❑ no patients with a negative MRI scan at 3-months had a PET scan that yielded potentially salvageable disease
- ❑ newer local therapy technologies (such as SBRT) may increase the utility of such imaging by defining radically treatable (but non-exenterable) pelvic or oligometastatic disease
- ❑ newer systemic therapies (such as immune checkpoint inhibitors) may increase the utility of such imaging if early detection of metastatic disease improves outcome

1. Grigsby *et al.* Posttherapy [18F] Fluorodeoxyglucose Positron Emission Tomography in Carcinoma of the Cervix: Response and Outcome. J Clin Oncol 2004;22(11):2167-2171
2. Ryu et al. Detection of Early Recurrence with 18F-FDG-PET in Patients with Cervical Cancer. J Nucl Med 2003;44:347-52
3. Scottish Intercollegiate Guidelines N. Management of Cervical Cancer. Edinburgh: NHS Quality Improvement Scotland, 2008 (now archived)