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The Impact of Post-Treatment Imaging in Peptide Receptor Radionuclide Therapy

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BACKGROUND

A small portion (11%) of radioactive decay of ¹⁷⁷Lu involves the emission of gamma photons, allowing for post-treatment imaging. Despite this capability, most centers do not routinely conduct post-treatment imaging. It is not well recognized that qualitative findings from post-PRRT imaging can influence clinical management. The aim of this study was to evaluate the rate of change in management from post treatment imaging.

METHODS

100 patients who received ¹⁷⁷Lu-DOTATATE for metastatic well-differentiated NETs at our institution between 2016 and 2021 retrospectively analyzed. Included patients received minimum two cycles & underwent 24-hour post-therapy SPECT/CT imaging after each cycle. Scans were compared to baseline post-cycle 1 images to assess response, divided into four groups: 1: Marked reduction in tumor volume; 2: Reduction but with residual disease; 3: Stable disease; 4: Development of new SSTR positive lesions.

Changes in management, were grouped into major and minor. Major: PRRT stopped due to progression, stopped due to marked response, delayed for targeted treatment of new/growing lesion, and stopped due to lab values. Minor: PRRT continued despite of borderline low/low lab value, characterization of pseudoprogression, and hydronephrosis noted leading to stent placement.

RESULTS

100 patients were analyzed. 84% had GEP NET (bronchial 6%, others 10%). 36% were Grade 1, 58% were Grade 2 & 6% were Grade 3. 64% received four cycles, 21% received three cycles and 15% received two cycles. Most patients (78% in post-cycle 2, 78.8% in post-cycle 3, and 73.4% in post-cycle 4 images) exhibited qualitatively stable disease on SPECT/CT over the course of PRRT. Post-therapy SPECT/CT resulted in a change in management in 27%. In 77% of those cases, post-therapy imaging led to major changes. Patients with a higher tumor grade had a higher proportion of change in management. However, no significant relationship was noted between the tumor grade and the impact on management.

Grade	Total (n=100)	Major (n=21)	Minor (n=6)	All (n=27)
G1	36% (36)	11% (4)	8% (3)	19% (7)
G2	58% (58)	22% (13)	5% (3)	26% (16)
G3	6% (6)	67% (4)	0	67% (4)

Table 1: Break down of change in management by Grade in patients with NETs that underwent post therapy SPECT imaging.

CONCLUSIONS

In a considerable proportion of patients (27%), post-treatment SPECT/CT imaging resulted in a change in management. The rate of change was higher in patients with higher-grade tumors. Although post-treatment imaging is typically discussed in the setting of dosimetry, qualitative impact of post-treatment imaging is common.

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