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Multi-Institutional Report on Toxicities of Concurrent Nivolumab and Radiation Therapy

Authors : Neha P. Amin, Maliha Zainib, Sean Parker, Malcolm Mattes

Abstract : Purpose/Objectives: Combination immunotherapy (IT) and radiation therapy (RT) is an actively growing field of clinical investigation due to promising findings of synergistic effects from immune-mediated mechanisms observed in preclinical studies and clinical data from case reports of abscopal effects. While there are many ongoing trials of combined IT-RT, there are still limited data on toxicity and outcome optimization regarding RT dose, fractionation, and sequencing of RT with IT. Nivolumab (NIVO), an anti-PD-1 monoclonal antibody, has been rapidly adopted in the clinic over the past 2 years, resulting in more patients being considered for concurrent RT-NIVO. Knowledge about the toxicity profile of combined RT-NIVO is important for both the patient and physician when making educated treatment decisions. The acute toxicity profile of concurrent RT-NIVO was analyzed in this study. Materials/Methods: A retrospective review of all consecutive patients who received NIVO from 1/2015 to 5/2017 at 4 separate centers within two separate institutions was performed. Those patients who completed a course of RT from 1 day prior to initial NIVO infusion through 1 month after last NIVO infusion were considered to have received concurrent therapy and included in the subsequent analysis. Descriptive statistics are reported for patient/tumor/treatment characteristics and observed acute toxicities within 3 months of RT completion. Results: Among 261 patients who received NIVO, 46 (17.6%) received concurrent RT to 67 different sites. The median f/u was 3.3 (.1-19.8) months, and 11/46 (24%) were still alive at last analysis. The most common histology, RT prescription, and treatment site included non-small cell lung cancer (23/46, 50%), 30 Gy in 10 fractions (16/67, 24%), and central thorax/abdomen (26/67, 39%), respectively. 79% (53/67) of irradiated sites were treated with 3D-conformal technique and palliative dose-fractionation. Grade 3, 4, and 5 toxicities were experienced by 11, 1, and 2 patients, respectively. However all grade 4 and 5 toxicities were outside of the irradiated area and attributed to the NIVO alone, and only 4/11 (36%) of the grade 3 toxicities were attributed to the RT-NIVO. The irradiated site in these cases included the brain [2/10 (20%)] and central thorax/abdomen [2/19 (10.5%)], including one unexpected grade 3 pancreatitides following stereotactic body RT to the left adrenal gland. Conclusions: Concurrent RT-NIVO is generally well tolerated, though with potentially increased rates of severe toxicity when irradiating the lung, abdomen, or brain. Pending more definitive data, we recommend counseling patients on the potentially increased rates of side effects from combined immunotherapy and radiotherapy to these locations. Future prospective trials assessing fractionation and sequencing of RT with IT will help inform combined therapy recommendations.

Keywords : combined immunotherapy and radiation, immunotherapy, Nivolumab, toxicity of concurrent immunotherapy and radiation
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