

cardiac complications must be identified by repetitive ECG and echocardiography to avoid lethal cardiac damage by early intervention, and (iii) comprehensive management team play a pivotal role for these early detection and intervention. Further accumulation of case reports is needed to sophisticate cancer treatment using immune checkpoint inhibitors.

Conflict of interest

The authors declare no conflict of interest.

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Editorial Comment

Editorial Comment to Pembrolizumab-induced myasthenia gravis with myositis and presumable myocarditis in a patient with bladder cancer

Todo *et al.* described a case of myasthenia gravis (MG) with myositis and myocarditis in a patient who received pembrolizumab for recurrent bladder cancer.¹ Neuromuscular immune-related adverse events (irAEs) associated with immune checkpoint inhibitors (ICIs) are relatively rare. A study reported that only 12 (0.12%) patients had MG among 9869 patients treated with nivolumab in Japan.²

Although concomitant myositis or myocarditis is infrequently observed in patients with idiopathic MG, they were often observed as irAEs during ICI treatment in patients with MG, as in this case.² As mentioned by the authors, these neuromuscular irAEs can induce fatal events; therefore, cardiac examination should be performed when MG is suspected during ICI treatment, and the hospital should organize a comprehensive management team before starting the ICI treatment.

Another interesting point in this case is that only a single administration of pembrolizumab achieved almost complete response, which lasted >6 months after its discontinuation. Several studies demonstrated that irAE development was positively associated with the survival outcome of ICI treatment.^{3,4} Furthermore, oncological outcomes were not different between patients who discontinued ICI treatment due to adverse events and those who did not.⁵ In terms of ICI re-treatment after irAE, Santini *et al.* demonstrated that 52% of patients in the re-treatment cohort experienced irAE recurrence (initial irAEs, 26%; new irAEs, 26%).⁶ It is recommended to treat cases of bladder cancer progression with another treatment such as

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table S1. Clinical course of the case.

taxane-based chemotherapy rather than ICI re-treatment because of the frequent recurrence of irAE.

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