



Zirconium-89 labelled rituximab PET-CT imaging of Graves' orbitopathy

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Graves' orbitopathy (GO) is the main extrathyroidal manifestation of Graves' disease. A proportion of patients have moderate to severe orbital inflammation, with corneal ulceration, intense pain or even compressive optic neuropathy [1]. High-dose glucocorticoids (GCs) are the first-line treatment in these patients. When high-dose GCs fail to reduce the inflammation, shared decision-making is recommended for selecting a second-line treatment. Options for treatment include a second course of intravenous GCs, oral GCs combined with orbital radiotherapy, rituximab or watchful waiting [2]. Rituximab treatment is not yet approved for clinical use in GO and roughly 50% do not have significant improvement 1 year after treatment [3]. In rheumatoid arthritis, zirconium-89-labelled rituximab (⁸⁹Zr-rituximab) PET-CT shows promising clinical value with higher rates of response to therapy in patients with higher ⁸⁹Zr-rituximab uptake in responders than in non-responders

[4]. ⁸⁹Zr-rituximab PET scanning is approved by Dutch authorities to select patients for rituximab treatment and is used in our hospital to select patients with orbital inflammatory disease (including GO) that might benefit from rituximab treatment. In a recent retrospective study, we showed that of 4 patients with intense ⁸⁹Zr-rituximab uptake in orbital inflammatory disease, 3 patients responded well to rituximab treatment [5]. Here, we present a patient with GO refractory to intravenous GCs. PET-CT performed 3 days after 74 MBq ⁸⁹Zr-rituximab showed high uptake in orbital musculature. ⁸⁹Zr-rituximab binding more than in normal bone marrow and comparable to binding in normal lymph nodes was observed in thickened medial rectus muscle of the left eye (SUVmax 5.9) and the superior rectus muscle of the right eye (SUVmax 5.2) (Figure 1 A coronal CT reconstruction, B coronal PET-CT reconstruction, C axial PET-CT reconstruction of right superior rectus muscle and D axial PET-CT reconstruction of left medial rectus muscle). Because of high ⁸⁹Zr-rituximab uptake, rituximab treatment was initiated.

This article is part of the Topical Collection on Image of the month.

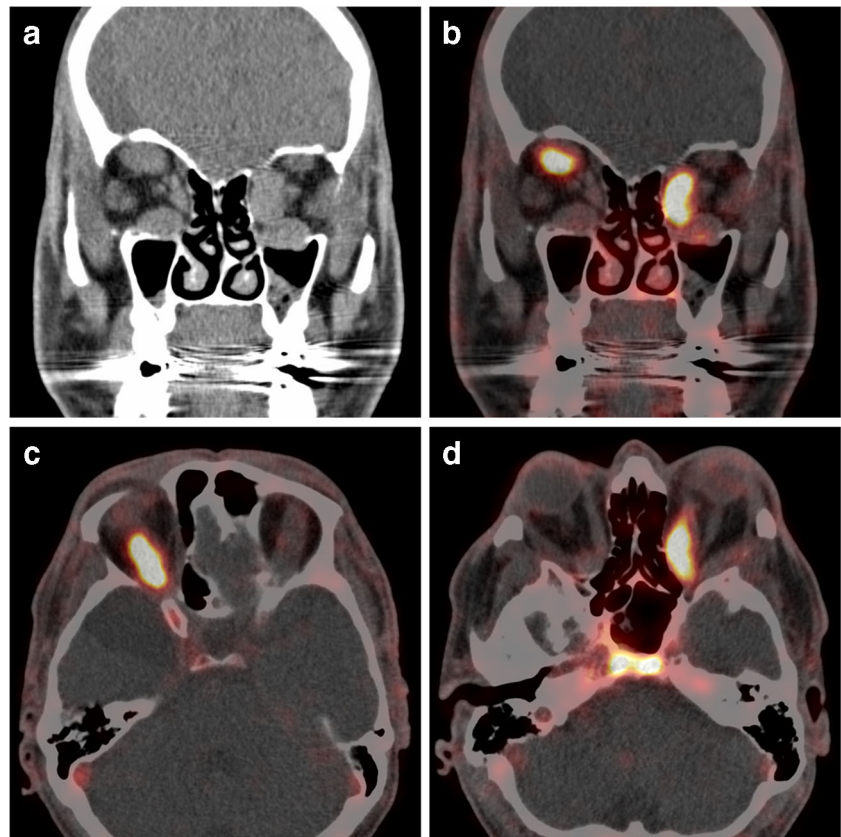
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Figure 1



Compliance with Ethical Standards The authors declare that they have no conflicts of interest.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from the participant included in the study.

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