

CORRESPONDENCE

Successful administration of second dose of BNT162b2 COVID-19 vaccine in two patients with potential anaphylaxis to first dose

Dear Editor,

We read with interest the discussion by Cabanillas et al on polyethylene glycol (PEG) as a hidden allergen in the BNT162b2 COVID-19 vaccine.¹

We were referred two female patients in December 2020, who reacted within minutes of vaccination. Patient 1 was 53 years old with no anaphylaxis history. Patient 2 was 35 years old with well-controlled asthma, with previous anaphylaxis to shellfish and contrast media. We performed allergy testing to PEG3350 and the vaccine itself. Second doses were successfully administered via graded dosing.

Five minutes after her first vaccination, Patient 1 experienced light-headedness, prickling to lips and mouth, chest tightness, facial flushing, palpitations, and sudden tenesmus. She remained normotensive. Nursing documented facial erythema, lip swelling, angioedema, difficulty breathing, throat tightness, and a feeling of dread. The patient disputed throat tightness or angioedema 5 days later. A code blue was called. Her symptoms rapidly improved with 0.5 mg of IM epinephrine and IV fluids.

Patient 2 experienced throat tightness, mild mouth itching, profound weakness, shortness of breath, and difficulty breathing 2–3 minutes following vaccination. Nursing records indicated angioedema. A code blue was called. No vitals were taken. Epinephrine 0.5 mg IM was administered. She was transferred to emergency (ER) and experienced a second wave of shortness of breath, throat tightness, and documented wheeze. Salbutamol, methylprednisolone, and diphenhydramine were administered, with improvement.

Both patients were referred for urgent allergy assessment. Skin testing to PEG3350 two weeks after initial reaction was negative. Patient 2 was oral challenged to PEG3350 without reaction. Neither patients had known PEG allergy. Literature on PEG allergies suggests that tolerating higher molecular weight formulations implies tolerance to lower molecular weight formulations.² Accordingly, it was reassuring our patients tolerated PEG3350, suggesting they would tolerate the PEG2000 in the vaccine.^{2,3} That said, more recent work suggests skin testing to native PEG may be falsely negative. Testing to PEGylated liposomes, which more closely resemble PEG in the vaccine, may improve sensitivity.⁴

We obtained vaccine that would otherwise be discarded (remnants), for skin testing. Skin testing at full strength was completed without reaction. Intradermal testing to dilute (1:10) and full-concentration (1:1) vaccine was also negative. A healthy control confirmed no irritation to the vaccine.

As there were no reports of administering second doses to high-risk patients, we administered second doses in the ER using a graded dosing regimen (Table 1), following previously described protocols.⁵ The regimen used 0.05 mL of vaccine remnant, in addition to the patient's assigned dose. This limited vaccine waste. Patients were premedicated with prednisone 40 mg the day prior and the day of the second dose, and 10 mg of cetirizine. This regimen was extrapolated from literature describing premedication for contrast media reactions, to attenuate mast-cell mediated and T-cell mediated reactions. Mast-cell mediated reactions were considered possible, given skin testing did not confirm IgE reactions. Both patients received their doses successfully, with no objective reaction. Patient 1 described heat to her face with the final graded dose, but had no visible flushing or hemodynamic changes.

As discussed by Cabanillas et al, allergy testing to PEG should be considered when patients react to the Pfizer vaccine; if negative, testing to PEGylated liposomes should be considered.⁴ As done by Troelnikov and in our study, skin testing to vaccine remnants is also suggested.⁴

TABLE 1 Desensitization regimen for vaccine administration

Solution	Volume (equivalent vaccine volume)	Time following previous dose
Dilute vaccine, 1:10	0.1 mL (0.01 mL)	10 min
Dilute vaccine, 1:10	0.4 mL (0.04 mL)	10 min
Full concentration vaccine	0.05 mL	15 min
Full concentration vaccine	0.10 mL	15 min
Full concentration vaccine	0.15 mL	15 min

Both of our patients successfully received their second doses via a graded dosing protocol. Premedication was extrapolated from literature on contrast media non-IgE reactions, as skin testing did not confirm IgE allergy. Future administration of the protocol without premedication can be considered.

As with other vaccines, patients experiencing severe reactions to COVID-19 vaccines can safely undergo allergy testing and vaccine desensitization.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare. Both contributed equally to the work undertaken for allergy evaluation and drafting of this article.

INFORMED CONSENT

Both patients did provide written informed consent for both the protocol and publication of their cases.

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