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CASE REPORT

Rapid desensitisation for antibiotic anaphylaxis prior to surgical removal of teeth

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Abstract

We present a case report of a 59-year-old female presenting for extraction of multiple teeth but known to have anaphylaxis to multiple antibiotics. She underwent rapid desensitization to intravenous Cephazolin 24 hours prior to surgery. The surgery preceded uneventfully.

Serious drug reactions occur in 6.7% of hospitalised patients and are the 4th to 6th leading cause of death in such patients[1,2]. Anaphylaxis or drug-induced Type I hypersensitivity reactions result from the release of mediators from IgE-sensitised mast cells and basophils. The incidence of anaphylaxis during anaesthesia ranges from 1 in 10 000 to 1 in 20 000[3,4]. The most common drug-related causes of intraoperative anaphylaxis are muscle relaxants and antibiotics. Penicillins and cephalosporins account for about 70% of antibiotic perioperative anaphylaxis[5].

Our patient has had multiple severe allergic reactions to antibiotics. She has had anaphylaxis following penicillin, tetracycline, gentamicin and cephalosporins. She has had severe urticaria following bactrim, erythromycin, vibramycin and cefaclor.

After discussion with the patient, maxillo-facial surgeon, immunologist and anaesthetist, it was decided that she undergo rapid desensitisation protocol. Patient consent for this publication was sought and given.

Case report

A 59-year-old female presented for surgical removal of multiple teeth. She weighed 48 kg and was 148 cm in height. The patient had co-morbidities of well-controlled asthma on ventolin and symbicort, well-controlled gastro-oesophageal reflux on nexium and dermatographia for which she was on Phenergan. She was also taking metoprolol for palpitations. The patient smoked 20 cigarettes a day. She was also on Lyrica, Endep and Palexia for chronic back pain.

She had cervical fusion 4 years ago and a lumbar spine reconstruction in September 2019. She did not report any issues with the anaesthetic but did state that both times she had undergone a rapid desensitisation protocol for antibiotics.

The patient stated that she was 'allergic to all antibiotics' and had a letter from her immunologist from 1998: 'The patient is a known multiple antibiotic reactor ... some of which were IgE- mediated and if she required an antibiotic for any reason, I strongly recommend that she undergo a rapid desensitisation.'

During history taking, the patient revealed not seeing her immunologist since 1998. Patient decided to defer repeat testing and instead to undergo acute rapid desensitisation protocol (Table 1).

The patient was admitted to Strathfield Private Hospital Intensive Care Unit 24 h prior to surgery to undergo the desensitisation. She developed an itch on her upper and lower extremities in the middle of the night and also described a 'lump in her throat' but there was no obvious swelling or haemodynamic change. This had not occurred with the previous two desensitisations. She was given oral phenergan 25 mg and prednisone 50 mg. The itch settled overnight. The itch returned the next morning but with less intensity.

The patient underwent a standard induction using midazolam, fentanyl, propofol and vecuronium to facilitate naso-tracheal intubation with portex 6.0 Nasal RAE endotracheal tube. Adrenaline 1:10 000 was available in case of anaphylaxis. Dexamethasone 8 mg was given as part of our usual practice. The patient was maintained on sevoflurane and reversed at the end of the case with sugammadex.

She was given 2 g of cephazolin intraoperatively and cephazolin was continued 1 g every eight hourly for 48 h post-operatively. The patient was discharged with no oral antibiotics.

Table 1 Instructions and Step Protocol:

Instructions
1. Informed consent
2. IV access line and consider arterial line
3. Vital signs observation every 15 min with emergency drugs and equipment accessible
4. After the completion of each step, the next step should be started immediately without delay
5. All observations should be documented including adverse reactions
6. In case of severe anaphylaxis, on call physician is notified to stabilise patient and to determine whether or not to continue the procedure

Step protocol

Drug: Cefazolin desensitisation

Solution	Total volume (mL)	Concentration (mg/mL)	Dose (mg)
1	250	0.08	20
2	250	0.80	200
3	250	8.00	2000

Step	Solution	Rate (mL/h)	Time (min)	Volume infused (mL)	Dose (mg)	Cumulative dose (mg)
1	1	2	15	0.5	0.040	0.040
2	1	5	15	1.25	0.1	0.14
3	1	10	15	2.5	0.2	0.34
4	1	20	15	5	0.4	0.74
5	2	5	15	1.25	1	1.74
6	2	10	15	2.5	2	3.74
7	2	20	15	5	4	7.74
8	2	40	15	10	8	15.74
9	3	10	15	2.5	20	35.74
10	3	20	15	5	40	75.74
11	3	40	15	10	80	155.74
12	3	80	172.90	230.53	1844.26	2000

Discussion

Desensitization for type 1 hypersensitivity reactions in penicillin-allergic patients was first developed 50 years ago[6]. Rapid administration of suboptimal doses of penicillin, followed by the full therapeutic dose was safely achieved in the 1980s leading to the concept of 'temporary clinical tolerisation'[7,8]. Since then, there have been scattered case reports of rapid desensitisation using similar rapid desensitisation protocols. These typically start at about 1:100 000 dilution and double the dose, every 15–20 min until reaching the target dose. Patient's informed consent needs to be obtained first and full resuscitation equipment available while exposing a sensitised patient to a potentially lethal drug antigen. Antihistamines and/or steroids are given for breakthrough symptoms as occurred in our case.

The molecular basis behind how rapid desensitisation works is still unclear but mast cell models show profound inhibition of cell activation during desensitisation[9].

It is important to note that the desensitisation requires a constant presence of the drug. It needs to be continued at regular intervals depending on its pharmacokinetics[10], otherwise the effect of the desensitistion is lost as was with our patient between surgeries.

There are no documented cases in literature for surgical removal of multiple teeth with rapid desensitisation protocol.

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Conflict of interest and grant for study

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