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CASE REPORT

Diffuse Allergic Reaction to Patent Blue Dye for Sentinel Node Biopsy in Breast Cancer: A Case Report

Ling Jin[1], Jyh-Cherng Yu[2], Zhi-Jie Hong[2], Guo-Shiou Liao[2]

[1]Medical Student of National Defense Medical Center, [2]Department of Surgery, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan

We present the case of a 59-year-old Taiwanese female who is married and retired, and was diagnosed with invasive ductal carcinoma in her right breast at stage cT1cN0 (Stage IA). She visited us for further treatment and underwent breast-conserving surgery after communication. During the surgery in the operating room, Patent Blue V was injected to localize the sentinel lymph nodes. At the same time, the patient developed blue-colored urticaria around her whole body skin after the blue dye injection. This rare reaction alerted us to pay attention to the patient's vital signs and prevent a severe allergic reaction, but her vital signs remained stable throughout the operation process. Although her vital signs were stable when she returned to the nursing ward, the patient required more time to recover, possibly due to her allergic predisposition.

Key words: Allergy, patent blue, breast cancer, anaphylaxis, hypersensitivity, lymphatic mapping

INTRODUCTION

Patent Blue V is widely used as a food dye and for preoperative mapping. During breast cancer surgery and sentinel lymph node biopsy procedures (SLNB), the surgeon injects approximately 1–2 mL of blue dye around the tumor and/or subareolar region to identify the sentinel lymph nodes. Although the blue dye is effective and safe in most cases, with all patients experiencing a blue color change in their urine and stool, a small percentage of patients (about 1%–2%) may develop anaphylaxis to Patent Blue V, presenting with symptoms such as urticaria, pruritus, blue hives, and/or a generalized rash. In the majority of these cases, the allergy will disappear within 6 h, and no longer than 1 day. However, we present a rare case of a patient who developed diffuse urticaria pruritus, and whose allergy persisted for more than 1 day.

CASE REPORT

The patient was a 59-year-old Taiwanese female (height: 158 cm; weight: 54 kg; Asian) with a history of dyslipidemia who was diagnosed with invasive ductal carcinoma in her right breast at stage cT1cN0 (Stage IA) and underwent breast-conserving surgery. The patient had a history of allergy to nonsteroidal anti-inflammatory drugs (NSAIDs) medications. During the operation, after the injection of Patent Blue V, the patient developed blue hives on her eyelids, ears, armpits, thighs, trunk, and other areas of skin immediately, without any other symptoms or changes in vital signs monitored by anesthesia. No medication was prescribed. After the surgery, the patient was sent to the anesthesia recovery room for observation for about 1 h and then transferred to the nursing ward. The blue hives on the skin decreased after the blue dye injection and completely regressed in 36 h after the surgery without the need for any medication or complaints of pain or itching by the patient [Figure 1]. Although this case did not experience any changes in vital signs after the injection, the blue hives persisted for more than 24 h. Nevertheless, the patient recovered well without any other complications.

DISCUSSION

The incidence of allergy to patent blue V dye is

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Corresponding Author: Dr. Jyh-Cherng Yu, Department of Surgery, Tri-Service General Hospital, National Defense Medical Center, No. 325, Sec. 2, Chenggong Rd., Neihu Dist., Taipei 114, Taiwan. Tel: +886-2-87923311; Fax: +886-2-87927168. E-mail: doc20106@ndmctsgh.edu.tw

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Figure 1: Case 1 – 59-year-old, Taiwanese female (height: 158 cm; weight: 54 kg; Asian). The pictures depict body parts of a patient with a history of allergy to nonsteroidal anti-inflammatory drug and blue urticaria distributed all over their body. This pattern was observed in many patients. These pictures were selected because the patient's urticaria took longer to regress compared to other patients, and it was present for more than 24 h postoperation

approximately 1%–2%.[1-6] The majority of these cases present as asymptomatic urticaria, pruritus, blue hives, and/or a generalized rash, and typically resolve within 6 h without any medical intervention. Patients who are allergic to patent blue V usually recover without requiring any treatment. In our sample of 1636 cases of blue dye injection during surgery in the past 5 years, we observed 16 cases of anaphylaxis to Patent blue V, resulting in an incidence of 0.978%. This incidence is comparable to the reported rates of allergy to Patent V, which vary from 0.5% to 2.7%.[1-6]

In our 16 cases, every patient recovered without medical intervention but under vital sign monitoring. The majority of these cases had pruritus, blue hives, and/or a generalized rash, which resolved within 6–12 h [Figure 2] [Table 1]. Only one case, mentioned above, took longer than 24 h to resolve, and was near 36 h. This case had a history of allergy to NSAID, while the other 15 cases had no known history of allergies. Other literature has also found that patients allergic to patent V do not have a history of hypersensitivity reactions or allergies.

The interesting aspect is not only that the patient's symptoms regressed more slowly but also that a larger area of their body showed an allergic reaction, which was more obvious than in the other cases.[1,2,6,7] Although the condition may sound serious and uncommon, the patient did not

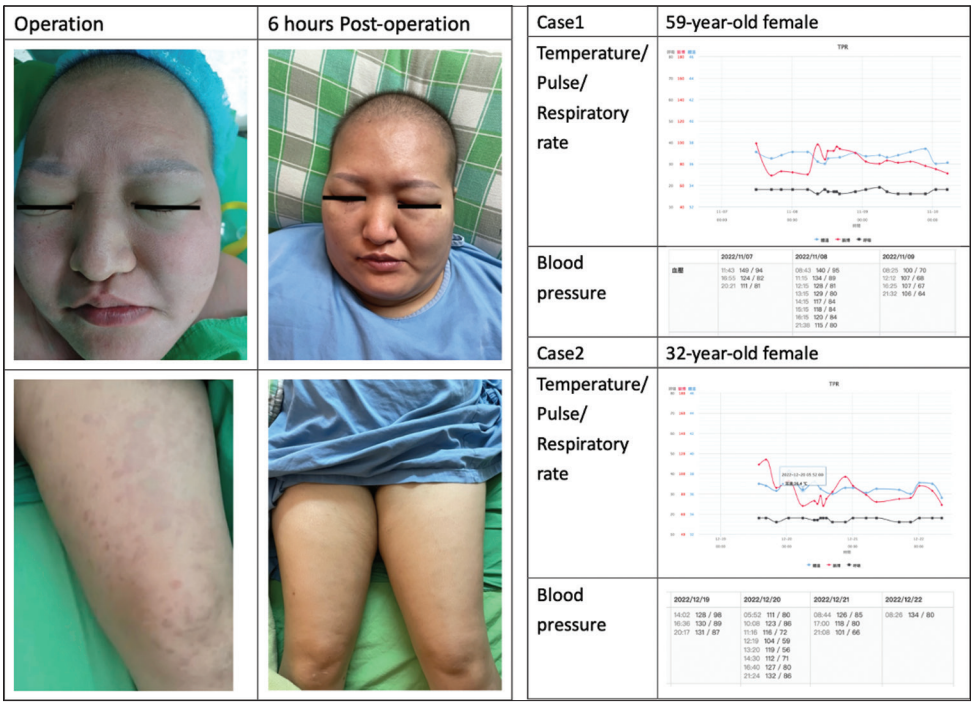

Figure 2: Case 2 – 32-year-old, Taiwanese female (height: 175 cm; weight: 100 kg; Asian). The pictures depict body parts of a patient with no history of allergy who developed blue urticaria, which resolved within 12 h postoperation. It is worth noting that the vital signs of both patients remained stable throughout the episode

Table 1: The number of the patients with allergic blue urticaria about different regressing time

Regressing time	<24 hours	>24 hours
Number of patients with allergic blue urticaria / Number of patients under patent blue V dye	15/1636	1/1636

complain of any itchiness, pain, or difficulty breathing. Moreover, their vital signs remained stable without requiring any medical intervention.[2,5,7]

Therefore, the next time we encounter a patient with a history of allergies, especially to NSAIDs, we should be aware that the recovery time may be longer and the urticaria, pruritus, blue hives, and/or generalized rash may be more severe and widespread. However, we should also observe the vital signs of these patients for more than 1 day to ensure that the allergic reaction does not pose a threat to the patients.

In addition, we do not believe that routine preoperative skin prick tests (SPT), intradermal tests (IDT), or drug provocation tests (DPT) are necessary if the patent blue dye is properly dosed and administered intraparenchymally or intradermally.[2,7,8] The primary responsibility of healthcare professionals is to provide clear and comprehensive explanations of the potential side effects of patent blue V injection before the operation. Patients with a history of allergies should be monitored for more than 24 h due to the potential for slower regression and more severe allergic reactions.

In the case of allergy to Patent blue V, some literature suggests arranging preoperative SPT, IDT, and DPTs,[2,7,8] or using methylene blue as a substitute[5] (although some studies indicate the risk of skin necrosis with intradermal methylene blue injection).[9,10] However, based on our experience, monitoring the patient's vital signs, including heart rate, blood pressure, and SpO_2, and having antihistamine and steroid medication readily available as a precautionary measure is the recommended course of action.[6]

CONCLUSION

In our clinical experience and in related references, it has been found that the allergic reaction to Patent Blue V may occur in 0.5% to 2.7% of cases. Therefore, when performing SLNB using Patent Blue V, it is important to explain the risks and prevalence of allergic reactions, especially to patients with a history of allergies. It is important to note that patients usually recover without medical intervention, but it is still necessary to monitor their vital signs to prevent severe anaphylaxis. In addition, we should inform our nursing staff that they do not need to be nervous if a patient shows an

allergic reaction. Instead, they should closely monitor the patient's vital signs and wait for the patient to recover on their own.

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Data availability statement

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In this form, the patients gave their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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