

BRIEF COMMUNICATION

Profound Hypotension after an Intradermal Injection of Indigo Carmine for Sentinel Node Mapping

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Intradermal injections of indigo carmine for sentinel node mapping are considered safe and no report of an adverse reaction has been published. The authors described two cases of profound hypotension in women that underwent breast-conserving

surgery after an intradermal injection of indigo carmine into the periareolar area for sentinel node mapping.

Key Words: Breast neoplasms, Hypotension, Indigo carmine, Intradermal injections, Sentinel lymph node biopsy

Indigo carmine (sodium indigotindisulfonate) was introduced in 1904 and is commonly used for locating the ureteral orifice, a severed ureter, or a fistula [1]. In Japan, sentinel node biopsy using indigo carmine has been performed since 1998 for breast surgery. Despite its long-term use, no adverse reaction has been reported after the intradermal injection of indigo carmine during breast surgery. However, rarely adverse reactions, such as, hypotension, bradycardia, and cardiac arrest, have been reported after an administration of indigo carmine, intravenously, during urologic or gynecologic surgery [2-4], and one report has described severe hypotension in a patient administered indigo carmine, intravaginally [5].

We experienced two cases of profound hypotension after an intradermal injection of indigo carmine into the periareolar area during breast surgery. The patients were 57-year-old (154 cm/64 kg) and 46-year-old (166 cm/66 kg) women with invasive ductal carcinoma in the left breast scheduled for breast-conserving surgery. Both had no history of allergy or previous exposure to indigo carmine. One of them had a history of diabetes mellitus and had undergone total abdominal hysterectomy (TAH) due to uterine myoma and endometriosis 2 years previously. She had not been administered indigo

carmine during TAH. Under general anesthesia, the usual preparations for breast cancer surgery were performed. The patients' vital signs were stable without the signs of massive bleeding or volume depletion. Before the main surgical procedure, after confirming of no blood aspiration, 5 mL of indigo carmine (0.8% sodium indigotindisulfonate; Korea United Pharm., Seoul, Korea) was injected intradermally around the subareolar area at the 3, 6, 9, and 12 o'clock positions. In the first patient, blood pressure was not measurable by noninvasive blood pressure monitoring and no carotid or femoral pulse was detected 1 minute after indigo carmine administration. After the administration of phenylephrine (100 µg), a right radial arterial line was blindly inserted. Two minutes after the readministration of phenylephrine (100 µg), carotid pulsation was detected and gradually strengthened; blood pressure was restored from 30/10 to 150/94 mm Hg. In the second case, immediately after the indigo carmine injection, blood pressure suddenly dropped to 50/30 mm Hg. Intravenous ephedrine (10 mg) was administered twice and blood pressure was restored to 144/89 mm Hg within 5 minutes. Before the hemodynamic event, no other components, such as muscle relaxant, and blood components were administered to the patients, and both had no evidence of skin rash or sign of bronchospasm, and heart rate were maintained at 60 to 70 beats per minute without electrocardiogram change during the events. No other adverse events occurred during the last-ing operation and the postoperative period.

Sentinel lymph node biopsy in breast cancer provides a means of reducing postoperative morbidity and improving

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quality of life by preventing excessive axillary dissection. The selection of blue dye or technetium radioisotope for lymphatic mapping depends on the surgeon's preference. Although several reports [6,7] of an anaphylactoid reaction after the administration of isosulfan blue dye have been issued, no such report has been previously issued of such a reaction following the intradermal injection of indigo carmine. Indigo carmine has stimulant and depressant effects. Although side effects are rare, the similar molecular structures of indigo carmine and serotonin suggest a common molecular basis for hemodynamic events [2-4,8]. Hypertension associated with indigo carmine has been attributed to vasoconstriction caused by a direct α -adrenergic activation or by the release of catecholamines leading to an increase in the total peripheral resistance, and diastolic and systolic blood pressures [8]; that is, in the same manner as serotonin. On the other hand, suppressive events have been presumed to be caused by an anaphylactoid or idiosyncratic reaction to dye [2,3]. Anaphylactoid reactions may occur after initial exposure to a substance and are not immunologically mediated reactions [9]. In some case reports, idiosyncratic anaphylactoid reaction was considered as the cause of abrupt severe hypotension without concurrent anaphylactic signs, such as, skin erythema or rash or a reactive airway reflex [2,3,9]. In this described cases, we only experienced severe hypotension without an anaphylactic reaction. It is notable that the majority of cases occur after an intravenous injection [2-4], whereas in our cases, incidents occurred after an intradermal injection, which is clinically considered safe. Although hypotensive events usually subside rapidly after the injection of ephedrine or phenylephrine, sometimes they can lead to catastrophic complications like cerebral ischemia [2]. Another possible explanation is the presence of impurities in the raw materials, reagents, and degradation during manufacture and storage in this drug [10]. There were five hypotensive events after intravenous injection of indigo carmine with the same lot number during a short period and determined the presence of impurities in the raw material. Important point

is that they did not prevent a hypotensive event, even in the diluting indigo carmine in normal saline and to administer it slowly over 5 minutes. Therefore, careful monitoring and vasopressor preparation is important before using indigo carmine.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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