

Sudden bradycardia during saline wash of the chest wall in a patient undergoing modified radical mastectomy - A case study

Dear Editor,

Reflex bradycardia during anaesthesia and surgery is common. Bradycardia may occur during laryngoscopy, creation of pneumoperitoneum, handling of the bowel, stretching of the peritoneum, uterine cervical dilatation, manipulation of the eyeball and electroconvulsive therapy, among others. Vagal nerve stimulation is implicated in most cases.^[1] Other reasons include the administration of parasympathomimetic, sympatholytic or cardiodepressant drugs. We describe an unexpected occurrence of bradycardia during saline wash of the surgical field in a patient undergoing modified radical mastectomy.

We report a 43-year-old lady weighing 61 kg with non-metastatic carcinoma left breast posted for left-sided modified radical mastectomy. She had no known comorbidities. She did not receive any chemotherapy or radiotherapy and was planned for upfront surgery. Her baseline heart rate was 100 beats/minute and her blood

pressure was 136/82 mmHg. In the operating room, general anaesthesia was induced with intravenous fentanyl 100 µg, propofol 110 mg, lignocaine 80 mg and vecuronium 6 mg, and trachea intubated. Anaesthesia was maintained with sevoflurane in oxygen-air mixture. She required a single bolus of intravenous 3 mg ephedrine for the hypotension encountered in the induction-to-incision time period when the end-tidal sevoflurane minimum alveolar concentration (MAC) was 1.0. The blood pressure was 92/64 mmHg and the heart rate was 92 beats/minute at that time. She received paracetamol 1 g and tramadol 100 mg intravenously about 15 and 30 min after induction, respectively. The patient did not receive atropine or glycopyrrolate during the procedure. Mastectomy was completed uneventfully, and level 1, 2 and 3 axillary lymph nodes were dissected. About 90 min into the surgery after achieving haemostasis, the surgical field was washed with normal saline. Suddenly, the heart rate dropped down from 85 beats per minute to 48 beats/minute. Electrocardiogram showed sinus bradycardia with progressively increasing R-R interval. Blood pressure was 134/86 mmHg, peripheral oxygen saturation was 100% and end-tidal carbon dioxide was 33 mmHg. Immediately, suction was applied to the surgical field and fluid was removed. Even before atropine could be given, the heart rate picked up spontaneously and reached 80 beats/minute once the saline was fully suctioned out. Bradycardia was momentary with spontaneous recovery. Further wash

was deferred. Surgical closure was uneventful. Blood loss was estimated to be around 100 mL. Subsequent course was uneventful.

There have been instances of bradycardia during cold saline irrigation of the brain,^[2] eyes^[3] and thoracic cavity.^[4] The surgical field of mastectomy does not involve any body cavity or structures supplied by vagal afferents. However, there could have been microscopic variation in receptors in the field. Our patient was under adequate plane of anaesthesia with an end-tidal sevoflurane MAC of 0.9 during the event. The chest wall was retracted using a pair of Lane's tissue holding forceps before the saline wash. There was an interval of about 30 s between the retraction and pouring of saline. The heart rate was stable after retraction until saline was poured. Thus, the temporal association between saline wash and bradycardia suggested that the wash was the reason for bradycardia. The wash solution was lukewarm to touch with gloved hands. Since the surgeons immediately suctioned out the saline and did not have enough contact time with the saline, the saline could have been at a temperature lower than the body temperature. A possible explanation could either be a stretch reflex caused by a large amount of saline poured all at once or the activation of the diving reflex. The stretch reflex could have been due to microscopic anatomical variation in the distribution of receptors in the chest wall. The diving reflex is a mammalian protective reflex to conserve oxygen during diving in the water, which is triggered by the application of cold water to areas of the face supplied by the trigeminal nerve.^[3] The response consists of bradycardia, apnoea and peripheral vasoconstriction with diversion of blood flow to vital organs.^[5] Though the classical diving reflex is triggered by facial immersion, a recent meta-analysis observed that total body immersion elicited a greater response than forehead cooling alone.^[6] Thus, there could be receptors in the chest and abdominal wall that could also trigger a similar diving reflex. A similar diving reflex could have been triggered in our patient due to direct stimulation of receptors in the thoracic wall. The incidence of such events and the association of various factors need to be studied in future research to establish any consistent association.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient consented to her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be

published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

AR Karthik, Aravind Narayanan, Anjana Vasudevan¹

Departments of Anaesthesia, Pain and Palliative Care and ¹Surgical Oncology (Breast Oncology), Cancer Institute (WIA), Adyar, Chennai, Tamil Nadu, India

Address for correspondence:

Dr. AR Karthik,
Flat No. 6, Jasmine Enclave, Anna Avenue, Bakthavatsalam Nagar,
Adyar, Chennai – 600 020, Tamil Nadu, India.
E-mail: arkarthik1234@yahoo.com

Submitted: 14-Feb-2023

Revised: 29-Mar-2023

Accepted: 30-Mar-2023

Published: 06-Sep-2023

REFERENCES

- Doyle DJ, Mark PW. Reflex bradycardia during surgery. *Can J Anaesth* 1990;37:219–22.
- Sinha PK, Neema PK, Manikandan S, Unnikrishnan KP, Rathod RC. Bradycardia and sinus arrest following saline wash of the brain during epilepsy surgery. *J Neurosurg Anesthesiol* 2004;16:160–3.
- Arndt GA, Stock MC. Bradycardia during cold ocular wash under general anaesthesia: An example of the diving reflex. *Can J Anaesth* 1993;40:511–4.
- Park SJ, Lee DW. Sinus bradycardia following saline wash of the pleural cavity during a video-assisted thoracoscopic surgery-A case report. *Korean J Anesthesiol* 2009;57:233.
- Panneton WM. The Mammalian diving response: An enigmatic reflex to preserve life? *Physiology* 2013;28:284–97.
- Ackermann SP, Raab M, Backschat S, Smith DJC, Javelle F, Laborde S. The diving response and cardiac vagal activity: A systematic review and meta-analysis. *Psychophysiology* 2023;60:e14183.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Quick response code	Website: https://journals.lww.com/ijaweb
	DOI: 10.4103/ija.ija_115_23

How to cite this article: Karthik AR, Narayanan A, Vasudevan A. Sudden bradycardia during saline wash of the chest wall in a patient undergoing modified radical mastectomy - A case study. *Indian J Anaesth* 2023;67:837-8.

© 2023 Indian Journal of Anaesthesia | Published by Wolters Kluwer - Medknow