

patient population during the study period. The relationship between increasing MEWS score and mortality is, however, very clear and is consistent with our early observations [3] and with studies that have shown a relationship with MEWS scores and outcome where the scores have been noted by an outreach team who have been asked to review the patient by the ward staff [4,5]. Our present study has also shown that for patients with MEWS scores of 3 or more, increasing age and presence on a medical ward are independently associated with an increased risk of death. This should allow the production of better predictive models based on MEWS score, age and underlying diagnosis. We are unsure why presence on the medical ward rather than on the surgical ward is associated with a greater chance of death. A possible explanation is that many medical patients have disease processes that are less reversible than many diseases managed on surgical wards.

The reduction in MEWS scores recorded in our study after the removal of educational funding has not meant that the system is no longer used. Not logging a score makes no difference to the calculation of the score or obtaining a medical review. The reduction in scores does, however, suggest that the system is not 'robust', as recommended by NCEPOD [1], without continued investment in training. This training is important to ensure accurate collection and calculation of MEWS scores and to ensure an appropriate medical review.

In summary, we have demonstrated a strong relationship between increasing MEWS score and outcome. Our results also suggest continued investment in training is required to maintain robust early warning or track and trigger systems.

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## Bradycardia–asystole during neck dissection

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### EDITOR:

During radical neck dissection, bradycardia and asystole are life-threatening signs of an exaggerated carotid sinus reflex (CSR) that may occasionally be observed in certain patients. This may be seen before, during or after head and neck surgery.

A 40-yr-old (smoker for 20 yr) male presented with difficulty in swallowing for 4 months and neck swelling for 1 month. Indirect laryngoscopy revealed a growth involving the right aryepiglottic

fold, extending to the epiglottis and pyriform sinus. A single hard immobile lymph node of 3 cm was found in the jugulodigastric triangle. A clinical diagnosis of carcinoma of the hypopharynx was made. A biopsy was performed under local anaesthesia, and histopathology confirmed the growth to be a squamous cell carcinoma. He received external radiation to the head and neck (60 Gy in 30 fractions over a period of 6 weeks). Direct laryngoscopy at the end of the treatment showed regression of the primary. He was then scheduled to undergo neck dissection for the residual nodal disease. Preoperative anaesthetic evaluation was unremarkable and no airway problems were anticipated.

In the operating room, monitoring was instituted and anaesthesia induced. After tracheal intubation

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anaesthesia was maintained with inhalational anaesthetics and controlled ventilation. The heart rate and blood pressure remained stable at induction (80–90 min<sup>-1</sup> and 130/80–110/70 mmHg, respectively) and throughout the initial part of the surgery. Using a modified McFee's incision, the surgeons proceeded to perform a radical neck dissection. During the dissection of level II nodes, bradycardia and junctional rhythm was noted. The heart rate decreased to 60 min<sup>-1</sup> and despite cessation of surgical stimulus; within 5 s the heart rate was 30 min<sup>-1</sup>. The blood pressure recorded was 60/40 mmHg and the inhalational agents were immediately discontinued. The administration of glycopyrrolate (0.2 mg i.v.) did not increase the heart rate and this was followed by an asystolic pause. Atropine (0.6 mg i.v.) was administered and preparation for external cardiac massage was made. Within 3 min of the initial event, the electrocardiogram monitor showed return of sinus rhythm and the heart rate increased to 60 min<sup>-1</sup>. Anaesthetics were re-instituted and surgery proceeded after infiltration of the area with lidocaine. The remainder of the anaesthetic was uneventful, he made satisfactory recovery with no haemodynamic events in the postoperative period and was discharged to continue follow-up as an outpatient.

This patient's episode of bradycardia preceding the hypotension and asystole occurring during neck dissection is typical of an exaggerated CSR [1]. The normal reflex plays a central role in blood pressure homeostasis and there are three subtypes. The cardio-inhibitory type (70–75% of cases) is where the predominant manifestation is sinus bradycardia, atrio-ventricular block or asystole. The response is due to exaggerated vagal action and can be abolished with atropine and treated with transvenous pacing. The second is the vasodepressor type, seen in 5–10% of cases. The predominant manifestation is a decrease in vasomotor tone without a change in heart rate. The third type is the mixed type (20–25% of cases) where a decrease in heart rate and vasomotor tone occurs simultaneously.

Patients with head and neck malignancies may present with recurrent episodes related to an exaggerated CSR [2]. Mechanical deformation of the carotid sinus (located at the bifurcation of the common carotid artery) by the tumour or metastatic nodal mass may result in an exaggerated response – bradycardia, hypotension, cardiac arrhythmia presenting as seizures, presyncope or syncope. These episodes can occur during neck examination, surgery or rarely occur spontaneously [3]. Preoperative radiation therapy is useful to treat metastatic head and neck malignancies that may otherwise be inoperable. Additionally, external radiation therapy

to the neck may provide relief from symptoms of CSR [4]. External radiation therapy is especially useful in treating metastatic tumour around the carotid sinus and those infiltrations of the carotid sheath which preclude surgical excision [5]. Unfortunately, the radiation itself can result in a variety of haemodynamic conditions [4,5] (including CSR) and significant carotid artery stenosis in patients who were previously asymptomatic.

During surgery (neck dissection), episodes of bradycardia–asystole have been previously reported [6]. Such events are reported to occur sporadically during head and neck surgery, but occasionally may prove fatal [7]. Once this exaggerated CSR occurs intra-operatively, as in this case, it can be corrected in most instances by a combination of cessation of surgical stimulus and administration of vagolytics. Low-dose vagolytics may paradoxically increase vagal tone and precipitate a cardiac arrest [8].

Though these exaggerated CSR's are often they are either infrequent or rarely reported or both. We reviewed the previous consecutive 150 neck dissections done in this hospital over past 36 months. No other episodes of bradycardia–asystole had been observed during surgery. This patient belonged to a small subset of 18 patients who had received radiation therapy before the surgery (mostly for advanced pharyngeal malignancies). We therefore speculate that preoperative external radiation therapy treatment may predispose patients to an exaggerated CSR during radical neck dissection. Further, in this patient, the preoperative disease (advanced pharyngeal malignancy with neck nodal metastasis), treatment (external radiation) and or intra-operative surgical procedure (radical neck dissection) individually or together may have contributed to this adverse event. Investigative studies would be required to determine the contribution of each of the above in the development of bradycardia–asystole during neck dissection.

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## Perioperative management of late metastasis of pheochromocytoma in clavicle

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### EDITOR:

Pheochromocytomas are uncommon functionally active catecholamine tumours of chromaffin cells, normally benign, and typically found in the adrenal medulla. A 10% of them are extra-adrenal and another 10% are malignant. Incidence of recurrence is about 6–23%, (17% in a large, recent and long follow-up study) and approximately half of these tumours are malignant [1]. In these cases, bone is the most common location. Recurrence more than 10 yr after initial treatment is rare. Perioperative management of adrenal pheochromocytoma is well studied [2,3] but not so in bones. In this case report, we describe a case of a pheochromocytoma clavicle metastasis 11 yr after the first surgery.

A 52-yr-old male, of height 172 cm and weight 81 kg, with no allergies, had undergone a right adrenalectomy 11 yr previously for malignant pheochromocytoma with resection and inferior vena cava prosthesis due to invasion of the tumour. He had been treated with acenocumarol since that

time. Postoperative follow-up laboratory and radiology tests had consistently been negative.

On admission, the patient reported pain in the right clavicle for a period of 3 months. Radiology revealed an osteolytic lesion in the distal part of the clavicle. A 24-h urinary catecholamine excretion showed an increase in the levels of epinephrine and norepinephrine, with normal values for the rest of the parameters. Metaiodobenzylguanidine scintigraphy showed captivation in the right clavicle and magnetic resonance imaging showed the lesion and ruled out adrenal recurrence. Clinically, the patient only reported clavicle pain and occasional palpitations (one episode in 2–3 months). Ambulatory arterial pressure measurement revealed one episode of hypertension of 160/90 mmHg and two episodes of tachycardia up to 130 beats min<sup>-1</sup>. The findings suggested the presence of recurrent pheochromocytoma.

After surgery was proposed, preoperative treatment with doxazosin 8 mg over 24 h was started and, 15 days later, treatment was carried out with atenolol 25 mg over 24 h. Acenocumarol was stopped and replaced by heparin. In the operating room, vital signs were measured with electrocardiogram (sinus rhythm at 60 beats min<sup>-1</sup>), arterial pressure (140/70 mmHg) and oxygen saturation (98%).

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