References

1. Gasparovic S. The effect of carotid sinus stimulation on changes in blood pressure and the heart rate and rhythm during neck dissection. *Lijec Vjesn* 1985; **107**: 103–107 (in Croatian).
2. Muntz HR, Smith PG. Carotid sinus hypersensitivity: a cause of syncope in patients with tumors of the head and neck. *Laryngoscope* 1983; **93**: 1290–1293.
3. Murata M, Ojima K, Morikawa M, Aizawa Y. Recurrent paroxysmal hypotension and bradycardia in a patient with pharynx tumor metastasis to the cervical lymph nodes. *Jpn Circ J* 1986; **50**: 278–282.
4. Timmers HJ, Karemaker JM, Wieling W *et al*. Arterial baroreflex and peripheral chemoreflex function after radiotherapy for laryngeal or pharyngeal cancer. *Int J Radiat Oncol Biol Phys* 2002; **53**: 1203–1210.
5. Sharabi Y, Dendi R, Holmes C, Goldstein DS. Baroreflex failure as a late sequela of neck irradiation. *Hypertension* 2003; **42**: 110–116.
6. Cheng SW, Wu LL, Ting AC *et al*. Irradiation-induced extracranial carotid stenosis in patients with head and neck malignancies. *Am J Surg* 1999; **178**: 323–328.
7. Gasparovic S, Aljinovic N. Correction of the fall in pressure during radical neck dissection using local anesthesia of baroreceptors. *Chir Maxillofac Plast* 1982; **12**: 67–73 (in Croatian).
8. Cho SK, Hwang GS, Kim YK *et al*. Low-dose atropine amplifies cardiac vagal modulation and increases dynamic baroreflex function in humans. *Auton Neurosci* 2005; **118**: 108–115.

Perioperative management of late metastasis of phaeochromocytoma in clavicle

doi: 10.1017/S0265021507001196

EDITOR:

Phaeochromocytomas 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 phaeochromocytoma is well studied [2,3] but not so in bones. In this case report, we describe a case of a phaeochromocytoma 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 phaeochromocytoma with resection and inferior vena cava prothesis 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^{-1}. The findings suggested the presence of recurrent phaeochromocytoma.

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^{-1}), arterial pressure (140/70 mmHg) and oxygen saturation (98%).

Correspondence to: Isabel Ramos, Department of Anesthesiology, Hospital Universitario Mar-Esperanza (IMAS), PO Marítimo, 25–29, 08003 Barcelona, Spain. E-mail: Mramos@imas.imim.es; Tel: +34 93 248 33 50; Fax: +34 93 248 36 17

Accepted for publication 18 May 2007 EJA 4404
First published online 1 August 2007

Invasive pressure was measured by cannulation of the left radial artery, central venous pressure (CVP) by a catheter in the right internal jugular vein and anaesthetic depth by BIS (A-2000TM, bi-spectral index (BISTM) monitoring system; Aspect Medical Systems, Natick, MA, USA). General anaesthesia was induced with midazolam 1 mg, remifentanil 0.5 $\mu g\,kg^{-1}\,min^{-1}$, propofol 2 $mg\,kg^{-1}$ and cisatracurium 0.15 $mg\,kg^{-1}$. Anaesthesia was maintained with sevoflurane so that the BIS index would remain between 40 and 60 in a mixture of 50% oxygen/air together with remifentanil at 0.05–0.1 $\mu g\,kg^{-1}\,min^{-1}$. Muscle relaxation was achieved by a continuous infusion of 0.1 $mg\,kg^{-1}\,h^{-1}$ cisatracurium. The surgical procedure, a distal section of the right clavicle plus plastic repair, was carried out in the half-seated position. The duration of surgery was 50 min. Dexketoprophen 50 mg, morphine 0.15 $mg\,kg^{-1}$ and ondansetron 4 mg were admininistered intravenously 30 min before the end of surgery.

During surgery, haemodynamic parameters showed a tendency to hypotension with a heart rate above 50–65 beats min^{-1}, CVP of 10 mmHg and urine output of 1 $mL\,kg^{-1}\,h^{-1}$. A colloid infusion of 500 mL was administered. There were no haemodynamic changes during tumour resection. The patient remained haemodynamically stable during the postoperative period without the need for antihypertensive drugs. No episodes of hypoglycaemia were observed. He remained in the recovery room for 24 h and was discharged from hospital 4 days later. Pathology laboratory tests confirmed metastasis of the phaeochromocytoma. Subsequent laboratory tests and imaging techniques confirmed eradication of the tumour.

Malignancy is defined by imaging procedures through the evidence of histological tumour cells in non-cromaffin tissues or by metastasis. Recurrence is defined by the reappearance of the clinical signs after complete eradication, demonstrated by laboratory or imaging tests. The present case is a malignant recurrence of phaeocromocytoma in the clavicle. While some reports describe major incidence of malignant phaeochromocytoma in extra-adrenal locations, other authors describe the same incidence in both sites [4]. Large tumours (more than 5 cm long) have increased risk of malignancy. Bone, lung, lymphatic nodes and liver are the most common sites of phaeochromocytoma metastasis. Recurrences of pheocrhomocytoma up to 16 yr after initial treatment have been reported, but recurrences after more than 10 yr is rare [5].

In order to reduce the wide blood pressure fluctuations during the manipulation of the tumour, an adrenergic selective α_1-receptor blocker, doxazosin [6], was used prior to β-adrenergic blocking with atenolol. In our case, there was no hypertension during manipulation and no hypotension after tumour resection. Values of epinephrine, norepinephrine, methylepinephrine and vanillylmandelic acid in urine have been identified as risk factors for complications during phaeochromocytoma and paraganglioma surgery [7]. Preoperative use of adrenergic receptor-blocking drugs reduces complications from hypertensive crises during tumour manipulation, but this response cannot be completely avoided. Metastasis in bone seems to behave differently from visceral sites, resembling an isolated tumour without the typical haemodynamic changes of catecholamine-active paragangliomas.

I. Ramos, I. González, R. Martínez, L. Trillo
Department of Anesthesiology
Hospital Universitario Mar-Esperanza (IMAS)
UAB, Barcelona, Spain

J. Sánchez
Department of Radiology
Hospital Universitario del Mar (IMAS)
UAB, Barcelona, Spain

References

1. Amar L, Servais A, Gimenez-Roqueplo J-P, Zinzindohoue F, Chatellier G, Plouin P-F. Year of diagnosis, features at presentation, and risk of recurrence in patients with pheochromocytoma or secreting paraganglioma. *J Clin Endocrinol Metab* 2005; **90**: 2110–2116.
2. Prys-Roberts C. Phaeochromocytoma – recent progress in its management. *Br J Anaesth* 2000; **85**: 44–57.
3. Pace N, Buttigieg M. Phaeochromocytoma. *Br J Anaesth* 2003; **3**: 20–23.
4. Goldstein R, O'Neil JA, Holcomb G *et al*. Clinical experience over 48 years with pheochromocytoma. *Ann Surg* 1999; **229**: 755–766.
5. Tang S-H, Chen A, Lee C-T, Yu D-S, Chang S-Y, Sun G-H. Remote recurrence of malignant pheochromocytoma 14 years after primary operation. *J Urol* 2003; **169**: 269.
6. Prys-Roberts C, Farndon JR. Efficacy and safety of doxazosin for perioperative management of patients with pheochromocytoma. *World J Surg* 2002; **26**: 1037–1042.
7. Kinney MAO, Warner ME, vanHeerden JA *et al*. Perianesthetic risks and outcomes of pheochromocytoma and paraganglioma resection. *Anesth Analg* 2000; **91**: 1118–1123.

