Paragangliomas are rare, highly vascular tumors that arise from autonomic nerve ganglia. Paragangliomas that originate from the parasympathetic ganglia in the neck are also known as “carotid body tumors,” “chemodectomas,” “glomus jugulare tumors,” and “non-chromaffin paragangliomas.” These carotid body tumors are usually non-functional, however, their highly vascular nature poses a significant risk of severe hemorrhage during resection. Several techniques, such as intra-operative arterio-arterial ligation, selective embolization, and balloon occlusion have been used with variable success to control operative field bleeding of carotid body tumors [1, 2].

Paragangliomas derived from sympathetic ganglia arise in the mediastinum, heart, retro-peritoneum, and pelvis. These sympathetic paragangliomas are often described as “extra-adrenal pheochromocytomas.” Like the carotid body tumors, sympathetic paragangliomas are highly vascular; however, these tumors may also produce catecholamines that lead to significant hypertension both before and during surgical treatment.

Sympathetic paragangliomas are rarely embolized because of the technical challenges and fear of precipitating hypertensive crisis. A small number of cases using embolization of adrenal pheochromocytomas have been reported [3-5]. These procedures are typically done several days before surgical resection to allow medical stabilization of the patient’s catecholamine-induced hypertension.

Case Presentation

The patient is a 44-year-old man with a long-standing history of hypertension. Physical exam at the time of diagnosis was notable for a supine blood pressure of 172/112 with a pulse of 60, and standing blood pressure of 140/106 with a pulse of 60. The patient was taking several medications for his blood pressure: labetalol, prazosin, benazepril, and hydrochlorothiazide.

After multiple episodes of recurrent epigastric pain, the patient had a thin-section abdominal CT scan showing a 7.1 x 6.0 x 7.2 cm mass inferior and posterior to the head of the pancreas, likely retroperitoneal, with possible invasion of the adjacent vena cava and duodenum (Figure 1A).

A second mass measuring 3.1 x 2.9 cm was present in the right bladder wall (Figure 1B), consistent with a second paraganglioma. A 1-cm left adrenal adenoma was also identified. Whole-body 123I-metaiodobenzyl-guanidine (123I-MIBG) scanning showed avid uptake in the retroperitoneal mass, mild uptake in the bladder mass, and no unusual uptake in the adrenal glands.

The patient was scheduled for sequential embolization and surgical resection of the abdominal and bladder masses on the same day. The patient’s blood pressure was monitored with an arterial transducer. Using iohexol non-ionic contrast (Iohexol, Amersham Health) to reduce the risk of hypertensive crisis, trans-femoral arteriography revealed that the abdominal paraganglioma was vascularized via the left circumflex artery (Figure 2A). A 5-French selective visceral C-2 (Cook) catheter was used to select the right L2 lumbar vessel and a 3-French micro-catheter (Boston Scientific) was used to super-selectively catheterize branches of the lumbar artery (Figure 2B). The tumor was embolized with 3x2 mm platinum tulip micro-coils (Cook) to prevent inadvertent embolization of arteries distal to those supplying the tumor. Gelfoam slurry was then injected. After the embolization, repeat abdominal arteriography (Figure 2C) confirmed a reduction of the visualized tumor vascularity. There was no rise in blood pressure during or after the embolization procedure, and plasma normetanephrines did not rise.

The patient described here exemplifies the feasibility and potential benefits of rapid, sequential pre-operative embolization and surgical resection of a large, functional abdominal paraganglioma. This combination of immediate pre-operative embolization and surgical resection may help decrease operative complications, including hypertensive crisis, improve the surgical outcome in patients with large secretory vascular tumors, may provide palliation for patients with unresectable tumors.

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