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Case report

A case of sudden death after ultrasound-guided percutaneous alcohol injection of a paraganglioma mis-diagnosed as a peri-renal cyst

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ABSTRACT

Paragangliomas are cromaffin tumors arising from the neural crest cells of parasympathetic or sympathetic ganglia. They are known to be rare causes of sudden death. Here we present the autopsy findings, as well as microscopical and immunohistochemistry study, of a 48-years-old woman who died suddenly after a percutaneous alcohol injection of a peri-renal cyst previously diagnosed as a common complex cyst. She manifested a multiorgan failure, with acute heart failure, systemic and pulmonary vasoconstriction with hypoxia, metabolic acidosis (pH 6.974). It was therefore enacted resuscitation that was ineffective.

The autopsy pointed out, close to the upper right renal pole, a cyst characterized by very friable walls and septa, with a thickness of approximately 0.5 cm and containing about 75 cm^3 of hemoserous fluid. Microscopically, through immunohistochemical examinations, the cyst showed the presence of chromaffin cells, containing enzymes involved in the synthesis of catecholamines, in particular noradrenalin. So, the cause of the death was ascertained in an multi-organ failure caused by a massive release of catecholamines (noradrenaline) from the cyst, identified post-mortem (on the basis of histologic and immunohistochemical examinations) in a noradrenalin-secreting paraganglioma, that remained silent until the cyst ablation.

1. Introduction

Paragangliomas, as well as pheocromocytomas, are neuroendocrine tumors derived from cromaffin cells. Pheochromocytomas and paragangliomas are rare: their total prevalence can be estimated to lie between 1:6500 and 1:2500 with the annual incidence in the US of 500 to 1600 cases per year [1]. They occur in about 0.05% to 0.1% of patients with sustained hypertension. However, this probably accounts for only 50% of people harboring pheochromocytoma or paraganglioma, because about half the patients with pheochromocytoma or paraganglioma have paroxysmal hypertension or normotension. Moreover, their incidence may be higher owing to the lack of diagnosis until after death; a review of autopsy cases in Australia found that 0.05% had undiagnosed pheochromocytoma/paraganglioma [2].

Pheochromocytomas, the most common sympathetic ganglia-derived tumors, grow within the adrenal medulla.

Paragangliomas, that comprise 10–18% of all chromaffin tumors [3], develop from the neural crest cells. They may derive from parasympathetic or sympathetic ganglia. The first ones are most commonly found in the head and neck, arising from parasympathetic paraganglia (carotid body and glomus jugulotympanicus). Sympathetic-derived paragangliomas, rare in comparison with parasympathetic-derived ones, are located in the mediastinum and subdiaphragmatic regions [4].

In the present case, a pararenal paraganglioma was discovered during a forensic autopsy performed in a woman who died suddenly after a percutaneous alcoholization of a large cyst located near to the upper right renal pole. After the procedure, the woman's clinical conditions started to deteriorate, with difficulty breathing and then evidence of acidosis (pH 6.974), hypoxemia, tachycardia, hypertension, tachypnea and marked peripheral vasoconstriction. The woman didn't show any symptom before the treatment, except a lumbar pain.

2. Case report

A 48-years-old woman, without any major disease neither in her medical history nor in her family history, complained of a pain in the right lumbar region for which she underwent to some diagnostic imaging (ultrasound and CT) that placed diagnosis of a complex cyst close to the upper right renal pole that displaced the

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adjacent organ. Doctors performed percutaneous alcohol injection of the cyst under ultrasound guidance in order to reduce the size and consequently the symptoms. The pre-operative examinations didn't show any pathological result or contraindication. The woman underwent to the alcohol injection: there wasn't any intraprocedural complication, excepted a download arrhythmic (of bigeminy) resolved spontaneously. Doctors proceeded, in general anesthesia and under ultrasound guidance, in the insertion of catheter within the cyst, the aspiration of the cyst's content (for subsequent cytologic examination) and inoculation of 90% ethyl alcohol; the surgical operation lasted from 1.30 pm to 2.00 pm. After the procedure, the woman regularly awoke and was brought, at 2:19 pm, in apparent well-being, in recovery-room (blood pressure was 130/80, heart rate 80). At 2:40 pm the woman complained of dyspnea, so doctors gave her O2 therapy and started monitoring of vital parameters. Clinical condition of the patient continued to deteriorate, with evidence of acidosis (pH 6.974), hypoxemia, tachycardia, hypertension, tachypnea and marked peripheral vasoconstriction. It was therefore requested the intervention of the cardiologist who, together with anesthesiologists, enacted resuscitation, that was ineffective, and, at 17:45, the death was ascertained.

2.1. Autopsy findings

The external examination didn't reveal anything, except a well nourished female; at lumbar region, the presence of a catheter was observed. The autopsy pointed out the following results. Heart (290 g in weight) was markedly pale and flaccid, without any other pathological finding. Lungs, respectively the right one 895 g and the left one 785 g in weight, showed massive edema and congestion. Close to the upper right renal pole was observed the cyst [Fig. 1] characterized by very friable walls and septa, with a thickness of approximately 0.5 cm and containing about 75 cm^3 of hemoserous fluid [Fig. 1]. The other organs were, according to the age of the subject, absolutely normal at gross examination.

2.2. Microscopic investigations

Samples of brain, lungs, heart, liver, spleen, kidney and the pararenal cyst were collected in order to perform histological examination. They were formalin fixed and paraffin embedded. After that, all sections were stained with hematoxylin and eosin.

Histological observation at light microscopy showed the following remarkable results: marked cerebral and lung congestion and edema; myocardium evaluation presented wide spread fibers fragmentation and many contraction bands [Fig. 2].

Fig. 1. The pararenal cyst, in situ.

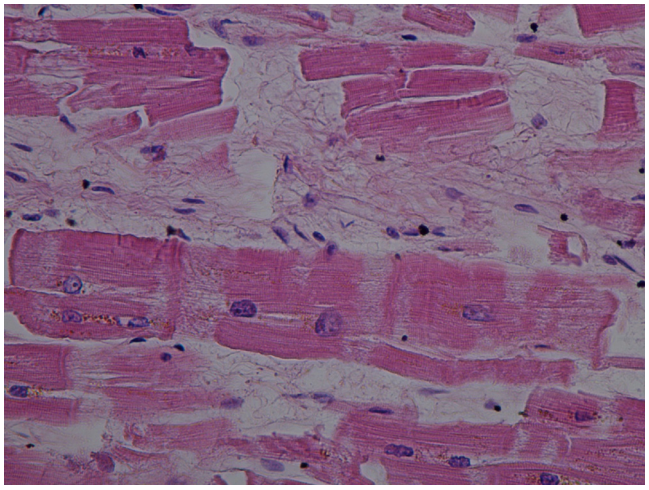

Fig. 2. Myocardium, HE, 400×.

The cyst's wall was characterized by large polygonal cells containing round and small nuclei [Figs. 3–5].

Immunostaining of cyst slides was also performed, using the following primary antibodies: anti Chromogranin-A (Ventana, mouse monoclonal antibody (IgG1), clone LK2H10, antigen retrival heat mediated, pure), anti S100 (Mouse Monoclonal Primary Antibody, Ventana, antigen retrival heat mediated, pure), anti dopamine-beta-hydrohylase (Chemicon, antigen retrival heat mediated, diluted 100-fold), anti phenylethanolamine-*N*-methyltransferase (Chemicon, antigen retrival heat mediated, diluted 1000-fold).

Immunohistochemical examinations of the cyst showed the presence of chromaffin cells, containing enzymes involved in the synthesis of catecholamines, in particular noradrenalin. In fact, immunohistochemistry showed positivity for anti-chromogranin-A (strong), [Figs. 5 and 6] anti S100 protein (mild) [Figs. 7 and 8], anti dopamine-beta-hydrohylase antibodies (mild) [Figs. 9 and 10]. Immunostaining for phenylethanolamine-*N*-methyltransferase showed no positivity [Fig. 11].

2.3. Toxicological examinations

Toxicological investigations have shown a blood concentration of ethyl alcohol of 0.46 g/l and in the cystic fluid the alcohol concentration was 51 g/l.

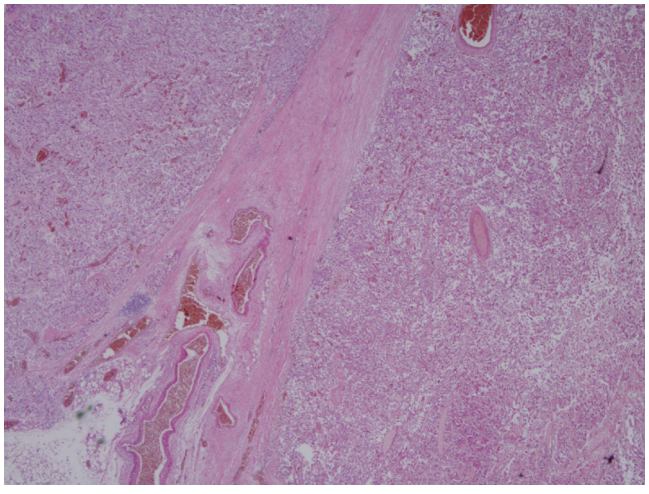

Fig. 3. Pararenal cyst, HE, 20×.