Paraganglioma Not Only Secrete Catecholamines but Also Inflammatory Cytokines: A Case Report

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Case report

Keywords: paraganglioma, inflammatory response syndrome, interleukin-6

Posted Date: September 3rd, 2020

DOI: https://doi.org/10.21203/rs.3.rs-48503/v1

Abstract

Background: Paraganglioma not only can secrete catecholamines with vasoconstriction activity resulting in hypertension and metabolic disorders,but also cytokines which can induce inflammatory response syndrome.

Case presentation: We report a 19-year-old girl with a paraganglioma that presented with fever and thrombocytosis, leukocytosis, and elevated high sensitivity C-reactive protein. After paraganglioma's resection, the little girl had no fever and the platelet, white blood cell and high sensitivity C-reactive protein recover to nomal level.

Conclusion: We propose in the future we should check cytokine in patients with paroxysmal hypertension complicated with inflammatory response syndrome and thrombocytosis, and think of that it may be caused by pheochromocytoma or paraganglioma.

Background

Pheochromocytoma is a group of neuroendocrine tumors originating from the adrenal medulla and sympathetic nervous system. Most pheochromocytoma is located in the adrenal gland. However, a small part of pheochromocytoma is located in the autonomic nervous system outside the adrenal gland, which is called ectopic pheochromocytoma or paraganglioma in clinical. As we all know,paraganglioma can secrete catecholamines with vasoconstriction activity, resulting in hypertension and metabolic disorders. But some pheochromocytoma may also secrete hormones, neuropeptides and cytokines, including interleukin-1 (IL-1), IL-6, tumor necrosis factor α (TNF-α) and interferon-γ (IFN-γ). These inflammatory cytokines can induce inflammation response syndrome in the body,leading to fever and thrombocytosis. [1–3] Here we report a young girl with paraganglioma induced hypertension, fever and thrombocytosis.

Case Presentation

A 19-year-old girl (162 cm, 40 kg) came to our hospital due to suffering from fever, intermittent headache and unclear vision for some days. She had a two-month history of hypertension with the highest blood pressure of 200/110 mmHg. The biochemical parameters were white blood cell count 14.56×10^9/l,platelet(PLT) count 1112×10^9/l, hemoglobin 81 g/l, C-reaction protein(CRP) 116.3 mg/l, urine catechol amine 2947.20 nmol (reference range: 94.5-238.3 nmol), urine noradrenalin 2916.82 nmol (reference range: 80.3–164 nmol), urine adrenalin 30.38 nmol (reference range: 12.5–70.4 nmol), urine vanillin mandelic acid 212.95 μmol (reference range < 68.6 μmol) at 24 h. The abdominal enhanced computed tomography(CT) showed that an enhanced mass was found at the right anterior lower adrenal gland, based on which the diagnosis of paraganglioma was suggested for this patient (Fig. 1). A question came to our mind:was this girl's fever and thrombocytosis due to paraganglioma or hematologic diseases? In order to make clear whether the patient was complicated with hematologic disease, We

made a bone marrow puncture, which indicated normal bone marrow .Thus, It made sure that the patient's clinical manifestation was all caused by paraganglioma.

The major difference between this patient and the other paraganglioma patient is the long-term intermittent fever and severe thrombocytosis. These characteristics of paraganglioma were rarely reported previously. This patient needs surgical treatment, and we did preoperative preparation and treatment for the young girl. To abatement the fever,antibiotic,non-steroidal anti-inflammatory drugs(NSAIDs) and dexamethasone were provided for the patient, however, These were not effective. She also orally took hydroxycarbamide and apheresis platelets to decrease platelets and prevent thrombosis, and α-adrenergic receptor blocker with calcium channel blocker to decrease blood pressure. 7 days later, the patient had the resection of right side paraganglioma with abdomen under general anesthesia. It took 40 minutes from tumor isolation to tumor vessel ligation. During this period the highest blood pressure was 185 / 118 mmHg, the heart rate was 120 times / min, and phentolamine, nitroglycerin, and magnesium sulfate were added up to 120 mg, 0.8 mg and 2.5 g, respectively. After tumor resection, the blood pressure decreased, and norepinephrine was pumped at 0.15–0.25 μg/(kg·min) to maintain blood pressure. A 5 × 4 cm tumor was resected finally.The operation was successful.After the operation,the little girl had no fever and the platelet recover to nomal level. Changes in perioperative related laboratory parameters were showed in table I.So we finally confirmed that her clinical manifestations were only caused by paraganglioma. The patient was discharged at postoperative day 11.

Table I Changes in perioperative related laboratory parameters

	Before operation	After operation	Discharge	Reference range
PLT(*10^9 /l)	1055	418	247	125–350
FIB(g/l)	9.52	5.99	4.09	2–4
MA(mm)	87.6	81	69.9	50–70
CI	3.6	3.7	1.4	-3-3
hsCRP(mg/l)	> 10.4	/	2.43	0–3

Discussion And Conclusions

This case rarely presents the paraganglioma not only secrete catecholamines but also inflammatory cytokines induced inflammatory response syndrome.

This patient had been diagnosed as paragangliomas before operation. Her clinical manifestation was especially prominent. Besides hypertension, dizziness, palpitation, sweating and unclear vision, the patient had recurrent fever and thrombocytosis. This case is very rare. Preoperative antibiotic,NSAIDs and corticosteroids were not effective in antipyretic, and the platelets were progressively elevated. Surgical resection is an effective way to treat this disease. [4] After surgery, the fever, platelets, high sensitive C-

reactive protein (hsCRP) and coagulation parameters all decreased. Thus, it confirmed that the fever and thrombocytosis were caused by paraganglioma, and that our diagnosis was correct. The pathological report also confirmed the effect of the treatment.

Pheochromocytoma or paraganglioma associated inflammatory response syndrome is more often caused by IL-6 in the reports.[5–9] IL-6 is physiologically expressed in the adrenal cortex, but not in the adrenal medulla.[10] IL-6 is a multifunctional cytokine that plays a key role in the development of immune and inflammatory. IL-6 is produced not only by lymphoid cells and monocytes, but also by endothelial cells, fibroblasts, adipose cells, myocardial and skeletal cells. [11] It's a pity that the cytokines of this patient was not checked and it could not be determined which cytokine had increased.

Through this case and literature consulting, we know that pheochromocytoma or paraganglioma not only secrete catecholamines but also inflammatory cytokines.Therefore, in the future we should check cytokine in patients with paroxysmal hypertension complicated with inflammatory response syndrome and thrombocytosis, and think of that it may be caused by pheochromocytoma or paraganglioma.

Abbreviations

PLT
platelet, FIB:fibrinogen, CT:computed tomography, C-reactive protein:CRP, hsCRP:high sensitivity C-reactive protein, NSAIDs:non-steroidal anti-inflammatory drugs, IL-1:interleukin-1, IL-6:interleukin-6, TNF-α:tumor necrosis factor α, IFN-γ:interferon-γ.

Declarations

Ethics approval and consent to participate

A consent for participation was obtained from the patient. A copy of the written informed consent is available for review by the editor of this journal.

Consent for publication

A consent for publication was obtained from the patient. A copy of the written informed consent is available for review by the editor of this journal.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

Supported by Shaanxi International Science and Technology Cooperation and Exchange Program(2014KW21-03)

Authors' contributions

KS is responsible for the conception and design of the project, the acquisition and interpretation of data, the drafting and revision of the manuscript. TY, QW, JT contributed critical revision of the important intellectual content. KS, JT were involved in the anesthesia and operation of the case. All authors read and approved the final manuscript.

Acknowledgements

All contributors for this study are included in the authors. No conflicts of interest declared.

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Figures

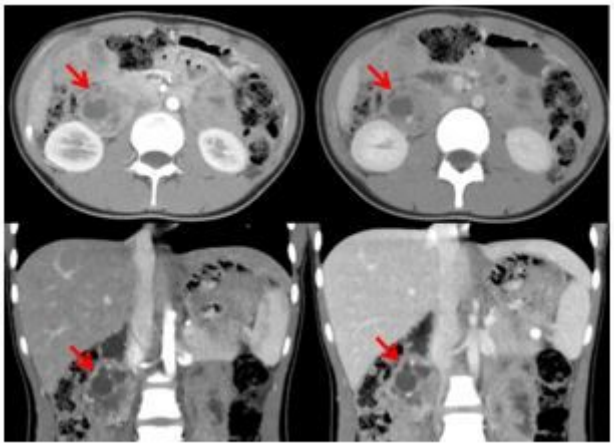

Figure 1

A 5 × 4 cm an enhanced mass was found at the right anterior lower adrenal gland