Adrenal Neuroblastoma Producing Catecholamines Diagnosed in Adults: Case Report

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Abstract
Neuroblastoma is a solid tumor considered almost exclusively pediatric, with more than 95% of patients diagnosed before 10 years of age, with a mostly benign clinical course and with encouraging survival rates in these age ranges. It occurs rarely in adolescents, and the presentation in young adults or older people is even rarer; consequently, a more severe prognosis and higher mortality rates have been documented within this population. This is also due to a great limitation within the treatment since the chemotherapeutic regimens proposed so far are valid for pediatric patients, with low tolerance to it within the adult population. We present the case of a 24-year-old female patient with catecholamine-secreting neuroblastoma who obtained surgical management, with subsequent local tumor recurrence, with subsequent need for onco-specific and symptomatic management.

Introduction

Neuroblastoma is one of the most frequent solid tumors in early childhood, making up 8% of tumors within this age-group [1]. Approximately 600–700 new cases are reported per year in the USA. It is widely recognized as a pediatric malignancy since its mean age of
presentation is 18 months of age, and more than 90% of the population is diagnosed before they achieve the 10th year of life [2]. It occurs exceptionally in adolescents and even more so in young adults, with an incidence of 0.2 per million inhabitants per year. It is extremely rare in the adult population as well as its adrenal location [3].

The natural history of the disease in adults is largely unknown given its low incidence. For example, hypertension is an uncommon finding in the pediatric population with a prevalence of 10–25%; for the adult population, an equal presentation could be expected. However, the published cases are limited [4]. As a consequence of this, there is no specific chemotherapy regimen for these patients [5]. Here, we present the case of a young adult patient with a diagnosis of neuroblastoma, a catecholamine-producing adrenal tumor associated with arterial hypertension.

**Presentation**

A 24-year-old female patient, mixed race, with no significant history or family history of cancer, consulted for hypochondrial abdominal pain and the right flank that radiates to the lumbar region, accompanied by abdominal distension, epigastric pain, and weight loss of 7 kg in the last 4 months. She denies additional symptoms, such as palpitations, chest pain, dyspnea, and abnormal sweating. Magnetic resonance imaging reported an adrenal/retroperitoneal mass of 8 cm maximum axis. Therefore, a surgical resection was carried out. The pathology was positive for ganglioneuroblastoma of the nodular subtype and completely resected according to the clear borders, with a low mitotic index (<2%). The patient was classified as L1 according to criteria of the International Neuroblastoma Risk Group Staging System. However, 4 months later, a L2 level paravertebral retroperitoneal mass with a necrotic center was identified, resulting in metastatic neuroblastoma. The PET scan with FDG confirmed left retrocrural, retrocaval, and left para-aortic adenopathies, which were surgically removed, symbolizing a local recurrence. Distant metastasis or bone marrow infiltration was ruled out. Combination chemotherapy with cisplatin and etoposide was started. In his clinical follow-up, sinus tachycardia was documented in addition to systolic arterial hypertension that is associated with elevated blood catecholamines (Table 1), characterizing a catecholamine-secreting neuroblastoma, deciding alpha-adrenergic blockade with prazosin, with good symptomatic, clinical response and adequate blood pressure control.

**Discussion**

Neuroblastoma was first described in 1864 by Dr. Rudolf Virchow, as an “abdominal glioma.” Today, we know that it is a tumor originating from the sympathetic-adrenal lineage cells derived from the neural crest. Associated with multiple genetic mutations and among them, the most common is the enlargement of the N-Myc gene, occurring in 20% of patients of child age, determining an aggressive presentation and being much less common among adolescent and adult patients. Within the clinical presentation of neuroblastoma, nonspecific signs and symptoms predominate, depending on the primary location, with lumbar and abdominal pain as the most common symptoms [2]. As we saw in our patient, a clinical picture consisting of a mass and abdominal pain without special characteristics or additional symptoms would make us think of a specific etiology.

Neuroblastoma can originate from the adrenal medulla but can come from any sympathetic node. The most common site of presentation of neuroblastoma is the abdomen in 75%, and up to 47% may be of adrenal origin. A total of 85–90% of patients diagnosed with neuroblastoma
have evidence of increased catecholamine metabolites in the urine, and 87% of pediatric patients have increased dopamine in the blood [3–6].

In this case, an excess of catecholamines was confirmed. Given this, neuroblastoma survivors are at risk of developing left ventricular hypertrophy, arterial stiffness, renal failure, and arterial hypertension in the future. If high blood pressure occurs early, there is probably a greater risk of future cardiovascular complications. This makes the detection and follow-up of this type of comorbidities in cancer patients important.

Our patient was classified as L1 for the International Neuroblastoma Staging System, which was not suggestive of aggressive disease [7], but we must remind that the most important prognostic factor is the age of presentation. Regardless of the stage at the time of diagnosis, patients younger than 1 year have a high survival and even spontaneous remission of the disease [8]. There is limited information on the prognosis in adolescents and adults given the low prevalence; however, a poor prognosis is observed secondary to comorbidities and inability to tolerate the aggressive onco-specific treatment [9–11]. Our patient presented recurrence of her disease almost 4 months after surgical resection of the primary tumor, which marks a worse prognosis.

The treatment of neuroblastoma in the pediatric population has been widely studied and established. The surgical approach is the first line of defined treatment and is necessary for staging, in addition to optional combination chemotherapy that includes cyclophosphamide,
carboplatin, cisplatin, etoposide, teniposide, and doxorubicin [8]. The therapeutic scheme in adolescents and adults is less clear, and the polychemotherapy applied in the pediatric population is intense and poorly tolerated by adults. However, all adult patients are considered at high risk of death regardless of staging, so the same aggressive pediatric scheme is currently used with doses adjusted according to comorbidities and tolerance of the patient in question [9, 12, 13].

**Conclusion**

Neuroblastoma is a solid tumor derived from the neural crest, almost exclusively pediatric. However, it should be considered within the differential diagnoses regarding the presentation of adrenal masses in adults. The imaging approach is of great help for its diagnosis. Adrenal localization is rare, and blood and urine catecholamine metabolites may be elevated and cause additional symptoms such as high blood pressure. Its presentation in patients older than 10 years marks a poor prognosis given by the aggressiveness in its presentation and the few guidelines in the specific onco treatment in this age.

**Statement of Ethics**

The authors declare that they have followed the protocols of their work center on the publication of patient data. This study protocol was reviewed and approved by Fundacion Valle del Lili Ethics Committee, approval number 531. The authors declare that no patient data appear in this article, and the publication of the case was consented by the patient. Written consent was obtained from participants for publication of the details of their medical case and any accompanying images.

**Conflict of Interest Statement**

There is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported. This work was supported by Fundación Valle del Lili.

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**Author Contributions**

V.M. and G.E.G.G. gave the initial idea. M.A.U. recollected the data. All of the authors wrote the final article.

**Data Availability Statement**

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.
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