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Resuscitation

Hypertensive Emergency by Renal Artery Stenosis in the Child at Intensive Care: About Two Cases

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Abstract **Case Report**

Hypertension affects children and teenagers more rarely than adults, and is a major and very common cardiovascular risk factor. It is often a fortuitous discovery during complications (hypertensive emergencies). The hypertensive emergency by stenosis of the renal artery, in pediatric, is particular in its clinical presentation, defined by a severe hypertension accompanied by ischemic or haemorrhagic failure of one or more organs. Hypertensive emergencies are rare in children in intensive care. However they are very severe and renal etiologies are not sometimes sought. The care must be multidisciplinary. We report two hypertensive emergency observations received in the intensive care unit of the Ziguinchor Peace Hospital.

Keywords: Encephalopathy - Renal artery stenosis – Child – Resuscitation.

INTRODUCTION

Hypertension is a major and very common cardiovascular risk factor. It affects children and adolescents more rarely than adults. It is defined when their Systolic Blood Pressure (SBP) or Diastolic blood pressure (DBP) is ≥ 95th percentile based on age, sex and height, and observed during three separate medical visits [1].

However, it is often a fortuitous discovery or during a hypertensive emergency with involvement of an organ requiring intravenous treatment associated and with organ treatment and hospitalization in a specialized environment. The hypertensive emergency by renal artery stenosis, in pediatric, is particular in its clinical presentation, defined by a severe hypertension accompanied by ischemic or haemorrhagic failure of one or more organs. We report two hypertensive emergency observations received in the intensive care unit of the Ziguinchor Peace Hospital.

Observation 1

This is an 11-year-old child, 2nd of a sibling of 5 healthy living children with full immunization status and good psychomotor development. There was no particular medical-surgical history. The patient had been consulted at Ophthalmology on the morning of 02/28/2019 for conjunctival hyperemia in the left eye treated with Diclofenac, Tobrex and Indocollyre. We received him in the afternoon of 02/28/19 for a state of psychomotor agitation, and the examination found a hypertensive encephalopathy. Complementary exams at the admission are:

Biology	- **Complete blood Counts** : Hemoglobin=10g/dl ; RBC =5,4 ; Hematocrit=35,5% ; WBC = 9.100 ; Platelets = 431.000 - **Blood Electrolytes** : Na^+=129,1 ; K^+=3,19 ; Cl^-=91 - **Renal function** : Urea=0,78 ; Creatinine=10 - **Liver transaminases** : ALAT= 30 ; ASAT=50 - **Prothrombine Time /INR** =100% / 0,99 - **Blood grouping** = OO - - **Emmel Test :** negative
Imaging	- **ECG** : Regular sinusal tachycardia, QRS axis + 60, Negatives T waves in D3 ; aVF ; V1 ; V2 ; V3 ; Left ventricular hypertrophy - **Echocardiography :** normal - **Brain and abdominal scan**: normal - **Abdominal ultrasound :** Left renal atrophy - **Renal arteries Doppler Ultrasound**: left renal artery stenosis.

RBC: Red Blood Cells WBC: White Blood Cells INR : International Normalized Ratio
ECG: electrocardiogram

The diagnosis of severe hypertensive relapse on left renal artery stenosis complicated by functional acute renal failure was retained. The treatment was:

Treatment	- Hospitalization (urine catheter, scope, IV line) - Midazolam IV at admission time - Nicardipine IV (syringe pump) Day 1 to Day 4 - Anti-H2 IV : 1amp x 2 /day (Day 1 to Day 4) - Paracetamol IV Day 1 to Day 4 - Solution : GS 5% ; 2g NaCl ; 1gKCl - Amlodipine 10mg PO : 1cp by day (after Day 2) - Beta-blocker (Bisoprolol): 1cp by day (after Day 2)

IV: Intra Venous, GS: Glucose solution

A checkup was performed on day 2 of hospitalization and showed at the blood analysis: Na^+ = 135.7; K^+ = 4.06; Cl^- = 89.5 and renal function: Urea = 0.30; Creatinine = 08. At Day 12 of hospitalization, our patient presented a good evolution marked by a normalization of the arterial pressure under Amlodipine 10mg and Bisoprolol. He is secondarily referred to Dakar to continue the treatment in vascular surgery.

Observation 2

This is a child of 13 years old, 4th of a sibling of 6 healthy children, with complete vaccination status and good psychomotor development. In its antecedents, we found a notion of chronic headaches evolving for 3 months, which were initially calmed by paracetamol but then became resistant. They were also associated with visual blur. There followed an exacerbation of the symptoms requiring a consultation at the Health Center of Silence on 04/06/2019 from where he was referred the same day to the Reception and Emergencies Department of the Peace Hospital for an afebrile coma. He was transferred from emergency to resuscitation for continuation of care. The admission examination regained clear consciousness with a 15/15 (Glasgow Scale), systolic-diastolic hypertension at 160/124 mmHg, bilateral skin edema, decreased visual acuity, intermediate, reactive and bilateral mydriasis. Complementary examinations at the entrance highlighted:

Biology	- **Complete blood Counts** : Hemoglobin=14,8g/dl ; Hematocrit=43% ; WBC = 11 500 ; Platelets = 302.000 - **Blood Electrolytes** : Na^+=133 ; K^+=3,8 ; Cl^-=98 - **Renal function** : Urea=0,4 ; Creatinine=12 - **Liver transaminases** : ALAT= 20 ; ASAT=30 - **Prothrombine Time /INR** =100% / 1,2 - **Blood grouping** = OO + - **Emmel Test :** negative
Imaging	- **ECG** : Regular sinusal tachycardia, QRS axis +70, PR normal 12/100 - **Echocardiography :** normal - **Brain scan**: intraventricular haemorrhage - **Abdominal ultrasound :** signs of acute renal suffering + mean abundance ascites - **Renal arteries Doppler Ultrasound**: renal artery stenosis.

RBC: Red Blood Cells WBC: White Blood Cells INR: International Normalized Ratio
ASAT: AECG: electrocardiogram

We retained the diagnosis of meningeal hemorrhage by hypertensive pressure on stenosis of the intra-renal artery, complicated by an acute renal distress.

The treatment was:

Treatment	- Hospitalization (urine catheter, scope, IV line) - Mannitol 300ml in 20mn by day (Day 1 to Day 2) - Nicardipine IV (syringe pump) Day 1 to Day 4 - Anti-H2 IV : 1amp x 2 /day (Day 1 to Day 4) - Tramadol injectable à la PSE à l'admission - Paracetamol IV Day 1 to Day 4 - Solution : GS 5% ; 2g NaCl ; 1gKCl - Amlodipine 10mg PO : 1cp by day (after Day 2) - Beta-blocker (Bisoprolol): 1cp by day (after Day 2)

IV: Intra Venous, GS: Glucose solution

The evolution is marked on day 2 by a rise in blood pressure despite the use of amlodipine alone, which required the introduction of a combination of amlodipine and ACE inhibitor 10mg / 5mg. Moreover, seeing the persistence of visual blur, an ophthalmological opinion revealed a diffuse retinal exudate of a bilateral massive retinal lodge. Checks were performed on day 10 of hospitalization and showed on cerebral CT a reduction of the cerebral hemorrhage. On day 24 of hospitalization, our patient presented a good evolution marked by a normalization of the AP under Amlodipine / Perindopril 10 / 5mg (1tab / d), Bisoprolol (1tab / d), a disappearance of the platysma edemas and a diminution of the cerebral hemorrhage. He is secondarily referred to Dakar to continue the treatment in vascular surgery.

DISCUSSION

Arterial hypertension in children is more difficult to recognize than in adults. A child's blood pressure depends in particular on his height and weight [2]. Because the child is growing, his blood pressure can vary greatly depending on his age. Unlike adults, there can be no single reference value. Values take into account age, sex and percentile of child height. It is more difficult to quickly detect the presence of hypertension in a child than in an adult [3]. The age of patients often varies between 12 months to 16 years [4]. At preadolescence, essential hypertension is rare, so that the search for a secondary form is always indicated. Repeated measurements of blood pressure above the 95th percentile or a 24-hour outpatient ambulatory measure require further investigation. Repeated measurements between the 90th and 95th percentiles, however, require regular checks. The possible etiologies of secondary hypertension in children are numerous. Newborns and infants have a different etiological spectrum than toddlers or those of school age. More than half of hypertensive children have "renal" hypertension. These are mainly malformations of the excretory urinary tract, pathologies of the renal parenchyma or any pathology at the origin of a renal hypoperfusion. The diagnosis of exclusion of an essential hypertension is most of the time only at puberty. In addition to the numerous diseases that decrease blood flow in the renal arteries, we can cite in particular classic isthmic aortic stenosis (coarctation) in the toddlers, which can be clinically manifested by inguinal pulsations absent or delayed and hardly noticeable, with a low tension in the lower half of the body and too high in the upper half. In practice, an high blood pressure (HBP) may be the first manifestation of one of the basic diseases mentioned above, which must be investigated later. But very often, an HBP develops during a disease already known and predisposing to hypertension. In addition, hypertension sometimes develops after taking certain drugs or substances (nonsteroidal anti-inflammatory drugs, antiphlogistic drugs, glucocorticosteroids, ciclosporin, tacrolimus, amphetamines and especially methylphenidate). In the presence of a marked hypertension, inexplicable by current examinations, the almost classic question is that of the existence of a renal artery stenosis. Atherosclerotic stenosis is almost not seen in children and adolescents. If a stenosis exists, it usually results from one of the following pathologies: fibromuscular dysplasia, thrombosis of the renal artery or congenital multisystemic syndromes. In children with a condition that may sometimes be associated with renal artery stenosis, further renal artery examination is required, even if the result of Doppler ultrasound is normal. This is also valid in the presence of a difficult to control HBP. Magnetic resonance imaging with contrast medium for vessels is a minimally invasive and reliable examination without ionizing radiation. The measurement of the activity or the determination of renin, with assay of the concentration of aldosterone in the plasma, can also be very useful in the differential diagnosis. Monogenetic family forms of hypertension are very rare, usually difficult to control, and can manifest themselves in childhood. Family anamnesis may show signs of hypokalemia with metabolic alkalosis or hyperkalemia with metabolic acidosis; in these cases, plasma renin is usually suppressed ("low-renin hypertension"). Secondary hypertension is

characterized by an increase in BP caused by an underlying disease, such as renal dysfunction (chronic renal failure), cardiac abnormalities (coarctation of the aorta) or organ-related diseases such as the endocrine system (disorder of the adrenal glands) [5].

Renovascular hypertension (RVHT) in children is a rare condition. The essential goal of the imaging is to highlight a vascular lesion likely to benefit from endovascular treatment. The extreme sensitivity of children, especially newborns and infants to the neurological and cardiovascular complications of threatening hypertension, the rapidity, even the brutality, with which serious symptoms can develop require an urgent therapeutic response and adapted to the clinical situation [6]. Hypertensive emergency is defined as a severe hypertensive crisis associated with organ involvement. As in the case of an adult, extremely high blood pressure can severely damage organs and cause hypertensive encephalopathy, seizures, heart failure or stroke. This is an emergency situation and it is necessary to decrease AP quickly to prevent permanent lesions [3]. The most common signs are headaches. A cerebrovascular event, as well as a convulsive hypertensive encephalopathy are common. Renal involvement is common, of variable severity. A fundus can recover retinopathies stage 3 and 4 [4; 7]. The treatment of hypertensive emergencies consists in the hospitalization of the patients in the intensive care unit and the antihypertensive setting for intravenous injection of the electric syringe. Normalization of the arterial pressure is not indicated at first. In the absence of strong judgmental studies, the following objectives are usually proposed [8, 9]: initially, the goal is to obtain a blood pressure <160/100 mmHg in few hours. However, the reduction in the average arterial pressure should not exceed 25% in the first hours. In the longer term, the classic goal of blood pressure <140/90 mmHg will be targeted. But it will be necessary to relay by the treatment of the cause if possible. The hygienic and dietary measures and in particular the reduction of excess weight are an important step in the management. Surgery retains an important place in the treatment of renal vascular hypertension in children. Its prognosis is favorable because of the usual absence of atheroma and visceral and renal repercussions [10]. In several studies, evolution is often favorable if the care is early [4].

CONCLUSION

Hypertensive emergencies are a rare condition in the pediatric population. Clinical symptomatology is rich in functional signs that are related to their impact on vital organs. Management must be early in intensive care and multidisciplinary. The evolution is favorable with an adequate treatment.

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