

## **PENETRATING TRAUMA OF BRACHIOCEPHALIC ARTERY LESION WITH EMBOLIZATION OF FOREIGN BODY TO RIGHT AXILLARY ARTERY IN PEDIATRIC PATIENT: CASE PRESENTATION AND HIS MANAGEMENT.**

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**ABSTRACT: BACKGROUND:** Penetrating injuries of the intrathoracic great vessels are well recognized although uncommon in pediatric patients, and management in pediatric patients presents some challenges. Surgical repair of Innominate Artery lesions by midline sternotomy is the standard approach, but for hemodynamically stable patients, endovascular intervention is being increasingly performed. **CASE REPORT:** Our case report is about an hemodynamically stable 7 years-old boy with late presentation 3 days after suffering stab wound by sharp metallic object at the base of the anterior neck Zone 1 complicated with Brachiocephalic Artery Lesion and embolization of foreign body to right axillary artery and successful treatment.

**KEY WORDS:** Penetrating Trauma, Vascular Lesion, Embolization of foreign body, Endovascular Stenting, Brachiocephalic Artery Stenting.

**KEY CLINICAL MESSAGE:** Minimally invasive approach and resolution of vascular lesions in pediatric patients to avoid the morbidity of mayor surgical dissection of great vessels of the thorax.

### **BACKGROUND:**

Penetrating injuries of the intrathoracic great vessels are well recognized, although, uncommon<sup>1,2</sup>. Surgical repair of Trauma of the aortic arch and its branches has an

increased morbidity and mortality risk<sup>3</sup>. It is known that more than 70% of patients die of major thoracic vascular injuries before arriving to the hospital<sup>1</sup>, the remaining percentage of these patients who gets medical assistance can be divided in 3 different groups according to the clinical presentation: first, the majority of these patient will have hard signs of vascular trauma, second, some will present just soft signs requiring additional diagnostic tools, and third, a smaller group would remain occult for undefine period of time followed by a broad spectrum of late complications.<sup>4,5</sup>

Pediatric population with vascular trauma will always present some challenges<sup>2,3</sup>. Surgical repair of Innominate Artery lesions by midline sternotomy is the standard approach, but represent a high risk of complications, such as been unable to control a mediastinal hematoma, followed by a massive bleeding and exsanguination. To avoid this high risk, endovascular intervention is being increasingly performed in hemodynamically stable patients, decreasing the surgical morbidity with promise results. But there are some questions to be answered regarding the use of prosthetic stents in pediatric patients: the absent of pediatric-size stent grafts and delivery systems, and the potential complications after expected vessel growth in this population<sup>2,6</sup>.

We present a case of an hemodynamically stable 7 years-old boy with a late presentation of stab wound at the base of anterior neck (Zone 1) complicated with Brachiocefalic Artery Lesion treated with endovascular intervention, and delayed diagnosis of foreign body embolism to Right Axillary Artery.

#### **CASE REPORT:**

7 years old boy with 3 days post-stab wound by sharp metallic piece (detached while his father was culturing wood by his axe) in the base of anterior neck (Zone 1) was transferred from another hospital with Chest AngioCT (Image No. 1) showed injury in the superior-anterior and inferior-posterior faces of the distal 1/3 of brachiocephalic artery. During admission patient remain in stable conditions, angiogram using right femoral artery approach with 4fr femoral sheath was done confirming Brachiocephalic Artery lesion with evidence of superior anterior 5 mm pseudoaneurysm and inferior posterior 3 mm pseudoaneurysm, such arterial lesion was covered with an Atrium 9 mm stent (Image No 2, and 3), followed by contrast injection with no extravasation and good flow to subclavian and right common carotid arteries was confirmed. Hospital stay length of 2 days, in stable conditions at discharge. 7 days later when he came to the clinic for follow up, he presented weak Right Radial and brachial pulses but with good Right upper limb function and well perfused, therefore immediately admitted for diagnostic catheterization evidencing brachiocephalic stent patent with good flow to Right carotid and subclavian arteries, and a small metallic fragment with a sharp edges embolized into the proximal one third of the axillary artery (Image No. 4), patient was

referred to vascular surgery who electively extracted the foreign body from the Right axillary artery through surgical approach and primary repair of the artery, currently Right radial and brachial pulses are palpable, discharge home in good condition with no new active concern, hospital stay length of 4 days.

## **DISCUSSION:**

Penetrating trauma with resultant injury of intrathoracic great vessels can cause significant morbidity and mortality. The presentation of a child with stab wound in the chest or neck complicated with a lesion of the intrathoracic great vessels in stable conditions is a rare finding. The usual approach is surgical repair through midline sternotomy with major risks and complication rates.

The evolution of Minimally invasive techniques in vascular trauma, and the continuous improvement in the available products, such as stents and endografts has demonstrate to be an excellent alternative to be implemented in hemodynamically stable patients, avoiding a midline sternotomy and followed by a fast recovery, as we did in this case with good outcome and short hospital stay length.

In some cases, the embolization of foreign bodies (like small particles of the object which provoked the injury) can be an additional challenge for the treating physicians with late clinical presentation and complications. Other case reports and small case series has been presented describing different practices, from endovascular approach for foreign bodies retrieval, and surgical excision to non-operative conduct as close observation. However, it is common sense to remove symptomatic foreign body embolus through any of the previously mentioned techniques.<sup>7,8,9</sup>

## **CONCLUSION:**

Minimally invasive endovascular techniques have increasingly been introduced in the armamentarium of treatment for Vascular injuries, avoiding high rate of complications of open surgical approach, as well of the advantage of a fast recovery and short length of hospital stay. However, some questions still need to be answered, the use of endovascular prosthetic stent grafts in pediatric patients as the absent of pediatric-size stents and delivery systems, the potential complications after expected vessel growth, among others.

In this case a 9mm stent was placed, which should be enough size for the child future life, besides that, it can be re-dilated few millimeters extra if needed<sup>2,6</sup>. Otherwise, follow up of these pediatric patients should be done to clear the questions mentioned above.

We also would like to recommend the need for full body screening, especially in penetrating trauma to avoid delayed evidence of embolism as it happened in this case.

## **AUTHORS' CONTRIBUTION:**

1. Zerpa, Luis. MD, contributed with concept and design, interpretation, drafting article, critical revision, approval, and writing of this article.
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## **CONFLICT OF INTEREST STATEMENT:**

We (the authors listed below) have no conflict of interest to declare.

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### **ETHICAL STATEMENT:**

All procedures performed in the patient whose case report is presented above were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Also, informed consent was obtained from patient's custodian involved in this case report.

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**FIGURE LEGENDS:**

Image No. 1 (Chest AngioCT).

Image No. 2 (Angiogram: Brachiocephalic Artery lesion).

Image No. 3 (Angiogram: stent deployment).

Image No. 4 (Angiogram: Foreign Body embolized in Right Axillary Artery).