Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

General Surgery

Right Common Iliac Artery Gunshot Projectile Embolism

Andrea Villarreal-Juris[1*], Jhonatan Redroban-Lara[2], Josueph Ávila-Mora[3], Karolina Alcívar-Mendoza[1], Jennifer Bernal-Vesga[4], Gema Plaza-Vélez[5]

[1]General Surgery, Luis Vernaza Hospital, Guayaquil, Ecuador
[2]Central University of Ecuador, Quito, Ecuador
[3]Master's in Occupational Health and Safety with a Mention in Occupational Risks, University of the Hemispheres, Quito, Ecuador
[4]Autonomous University of Bucaramanga, Bucaramanga, Colombia
[5]General Surgery, SOLCA Hospital, Guayaquil, Ecuador

DOI: 10.36347/sjams.2024.v12i02.005 | **Received:** 25.12.2023 | **Accepted:** 03.02.2024 | **Published:** 06.02.2024

***Corresponding author:** Andrea Villarreal-Juris
General Surgery, Luis Vernaza Hospital, Guayaquil, Ecuador

Abstract **Case Report**

***Background*:** In Ecuador, the number of patients who have suffered gunshot wounds has increased remarkably, mainly due to the increase of terrorist groups. ***Clinical Case*:** 17-year-old male, arriving with pain, coldness, and paleness of the right lower limb after a gunshot wound to the right upper limb and right hemithorax. Exploratory laparotomy was performed after CT angiography revealed the presence of a hyperdense image in the right common iliac artery. In the trans operative study, after arteriotomy, a firearm projectile was identified in the lumen of the artery. Thrombectomy and primary repair were performed. ***Conclusion*:** Guidelines for the management of this type of patient are lacking. Treatment options and surgical decision must be made individually according to the site of the gunshot, severity of the injury and clinical status of the patient.

Keywords: Firearm, Embolism, Arterial Insufficiency, Ischemia, Trauma.

INTRODUCTION

Gunshot projectile embolism is a rare type of vascular trauma that occurs when this foreign body enters the cardiovascular system through the bloodstream. In 1978, Ritch *et al*., studied gunshot embolism during the Vietnam War and concluded that the incidence was 0.3% [1]. According to the American College of Surgeons Data Bank in the United States, 4.2% of admissions to trauma hospitals are due to gunshot injuries. In these patients, arterial trauma is relatively common, and stands for 10% of these cases [2]. Despite the relative frequency of vascular trauma related to gunshot projectiles, embolism is rare. The number of cases reported in the literature in the last 30 years suggest an approximate of 10 cases per year in the United States [3]. Currently, in Ecuador, gunshot wounds have increased proportionally to the increase in violence among civilians, explained by the presence of terrorist groups; therefore, increasing the probability of arterial injury [4]. There are no specific signs and symptoms in these cases since they are related to the projectile entering site. However, the most important factor in these cases is the limited time for resolution [3].

CLINICAL CASE

17-year-old male, who suffered a gunshot wound in the right upper limb 24 hours ago, with an entrance wound on the lateral side of the distal third of the arm and an exit wound located at the medial side of the arm; he also had an entrance wound in the right hemithorax at the 7th intercostal space on the anterior axillary line, but this one without an exit wound. At the time of admission, the patient's right lower limb was eutrophic, pale, hypothermic from the knee to the distal, with a decreased motion range and strength, increased sensitivity due to pain.

Femoral, popliteal, and distal pulses were absent, a linear Doppler signal exam showed linear monophasic flow in femoral, popliteal, and distal sites; segmental pressures of anterior and posterior tibialis were 50 mmHg, with an ankle-brachial index (ABI) of 0.4; there also was a delayed capillary refill.

A thoraco-abdomino-pelvic angiotomography performed particularly was reviewed, showing a 10 x 18 mm hyperdense image in the territory of the right common iliac artery, at 4.4 cm from the aortic bifurcation and adjacent to the right hypogastric artery emergence.

Therefore, an exploratory laparotomy was performed, followed by exploration and vascular control of the right common iliac artery with vessel loops, as well as of the external and internal iliac arteries.

When performing the transverse arteriotomy in the right common iliac artery, a solid foreign body was evident, corresponding to a gunshot projectile, which upon removal presented organized clots attached to it.

Retrograde and antegrade thrombectomy were performed until adequate flow and reflux was obtained; later, the arteriotomy was closed primarily using 5-0 prolene with continuous suture. Additionally, the patient presented a clotted right hemothorax for which he required video thoracostomy. During the latter, an injury was observed at the right inferior pulmonary vein, with clots around it, corresponding to the entrance wound of the projectile into the bloodstream. During the postoperative period, the patient presented an adequate clinical evolution, with a eutrophic, euthermic right lower limb, with preserved mobility and sensitivity; also, femoral, popliteal, and distal pulses were Grade 2, with a linear Doppler signal exam showing triphasic flow at in femoral, popliteal and distal areas; segmental pressures of anterior and posterior tibialis were 120 mmHg, with an ABI of 1.0.

DISCUSSION

There are two requirements for a gunshot projectile embolism to develop: the bullet must have a very low kinetic energy when entering the bloodstream, and the diameter of the vessel must exceed the diameter of the projectile. This type of embolism towards the peripheral arterial system is an extremely rare phenomenon, which usually ends in an underdiagnosis due to the lack of early symptoms [5]. It is important to keep in mind the signs of acute arterial occlusion: paresthesia, pain, paleness, absence of pulses, poikilothermy and paralysis, to determine the time of ischemia and evaluate the prognosis with Rutherford's classification [6]. Gunshot projectile embolism must be suspected when the patient presents discordance between the entrance and exit wounds, when there is only an entrance wound or when the signs/symptoms are not compatible with the original site of the injury [7]. In this case, the entrance wound at the right hemithorax did not present an exit wound, and the symptoms of the right lower extremity differed from the original site of the trauma. Once diagnosed, the projectile must be removed as quickly as possible, even if the patient is barely symptomatic, since the condition can evolve and become complicated with severe consequences [7]. In this case, despite not being surgically treated within the first 6 to 12 hours from the gunshot, the patient presented a favorable clinical evolution.

CONCLUSIONS

Although cases of gunshot wounds have increased in the country, and in our society, projectile embolisms are rare. Likewise, treatment options could range from observation to endovascular removal or open surgical removal. As there are no management guidelines for this type of case, the decision on the management of these patients must be made individually according to the characteristics of each patient, injury site, as well as the clinical conditions. The major and minor risks that could occur after just observation, or open or endovascular surgical removal must be assessed to make the better call.

Ethics: The presented case was described according to the Declaration of Helsinki.

REFERENCES

1. Rich, N. M., Collins Jr, G. J., Andersen, C. A., Mcdonald, P. T., Kozloff, L., & Ricotta, J. J. (1978). Missile emboli. *Journal of Trauma and Acute Care Surgery*, *18*(4), 236-239. Available from: https://pubmed.ncbi.nlm.nih.gov/660667/
2. Dumas, R. P., Seamon, M. J., Smith, B. P., Yang, W., Cannon, J. W., Schwab, C. W., ... & Holena, D. N. (2018). The epidemiology of emergency department thoracotomy in a statewide trauma system: Does center volume matter?. *The journal of trauma and acute care surgery*, *85*(2), 311. Available from: /pmc/articles/PMC6081242/
3. Mussie, E., Singh, S., Kumaran, M., & Krishan, K. (2023). Bullet embolization after a penetrating gunshot wound: a case report. *Cureus*, *15*(8). Available from: /pmc/articles/PMC10461598/
4. Álvarez Velasco, C. M., & S Jiménez, G. (2020). Firearm Injuries: Surviving Gun Violence in Ecuador. *Estado & comunes, revista de políticas y problemas públicos*, *1*(10), 119-140. Available from: http://scielo.senescyt.gob.ec/scielo.php?script=sci_arttext&pid=S2477-92452020000200119&lng=en&nrm=iso&tlng=es
5. Huang, J., Pandey, V., Shah, R., Yedavalli, V., Joshi, A., Stimpson, R., ... & Zuiderveld, L. (2016). Popliteal artery embolism of bullet after abdominal gunshot wound. *Radiology Case Reports*, *11*(4), 282-286.
6. Smith, D. A., & Lilie, C. J. (2023). Acute Arterial Occlusion. StatPearls [Internet]. 2023 Jan 2 [cited 2024 Jan 28]; Available from: https://www.ncbi.nlm.nih.gov/books/NBK441851/
7. Chao, J., Barnard, J., deJong, J. L., & Prahlow, J. A. (2018). A case series of anterograde and retrograde vascular projectile embolization. *Academic Forensic Pathology*, *8*(2), 392-406. Available from: /pmc/articles/PMC6490119/