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SUMMARY

ORIGINAL ARTICLE

TRAUMATIC LESIONS OF THE POPLITEAL ARTERY: OPEN SURGERY CONTINUES TO BE THE GOLD STANDARD

ABSTRACT

Introduction: Despite the great development of endovascular therapy even in trauma, open vascular surgery continues to be the most appropriate alternative in popliteal artery trauma due to its more frequent presentations such as hemorrhage and ischemia of the limb. The objective of this article is to reaffirm our concept in the open management of these injuries. **Material and method:** Retrospective study between the years 2016-2020, identifying 10 patients with traumatic injuries of the popliteal artery (PA) treated at the Hospital de Urgencia Asistencia Pública, a trauma referral center in Chile. **Results:** The injury mechanism was penetrating trauma in 50% of the cases and blunt in the other 50%. A complete section was found (n= 4), a partial section (n= 4) and in 2 patients there was thrombosis due to an intimal lesion. To repair these lesions, inverted saphenous vein or primary repair was performed. The mean time of ischemia was 10 hours. The fasciotomy rate was 60% in this series and there was one death. The limb salvage percentage was 100%. **Discussion:** Popliteal artery lesions represent a great challenge due to their complexity and low frequency. Early diagnosis and surgery decrease the period of ischemia and the rate of amputations. Regarding repair, primary repair or interposition with an inverted contralateral saphenous vein is recommended. Likewise, we believe that fasciotomy of the compartments plays an important role in the final result, as well as the presence of an orthopedic surgeon in case of associated bone injuries and the availability of other specialists to deal with coverage defects or nerve injury.

Keywords: *popliteal artery, open repair, amputation*

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INTRODUCTION

Peripheral vascular trauma accounts for approximately 4-6% of major traumas[1]. Although popliteal vessel trauma is infrequent, accounting for 0.2% of cases, it is associated to high morbidity and mortality if not early diagnosed and treated[1].

In general, popliteal vessel lesions are associated to significant concomitant lesions, such as soft tissue loss, fractures and nervous lesions, representing up to 65% probability of limb amputation[2]. It has been proven that limb recovery in patients with popliteal artery lesions is affected by prolonged ischemia[3]. For this reason, the fundamental principle in the treatment of traumatic popliteal artery lesions is avoiding prolonged ischemia in order to reduce the risk of irreversible ischemia and morbidity.

Open vascular surgery continues to play a significant role in the repair of these lesions, since most of them start with ischemia or hemorrhage. Although endovascular surgery is now available, it cannot be applied in cases of lesions with the presence of ischemia or hemorrhage and no long-term results are available. We are presenting here our series of popliteal artery repair with an open or traditional surgery technique.

MATERIAL AND METHODS

Retrospective study involving the period 2016-2020 using electronic records data (protocol) and written records and using as inclusion criteria: search by "popliteal artery lesion associated to reperfusion syndrome" diagnosis[4].

Ten patients with traumatic lesions of the popliteal artery were identified. Patients with superficial femoral artery and primary traumatic amputation were excluded.

Demographic variables and specific data related to the lesion and its management were analyzed, including gender, age, hemodynamic status at admission, lesion mechanism, type of vascular lesion, time of ischemia, type of vascular repair, performance of fasciotomy and complications.

In most cases the diagnosis was established by angio CT and clinical findings based on the presences of signs of vascular lesion, i.e. pulsatile bleeding, expansive hematoma and signs of ischemia. All patients were operated by a vascular surgeon.

Assessed results were: mortality, range of amputation and range of limb salvage, type of trauma, duration of ischemia, associated lesions and need of fasciotomy, management method, associated venous lesion and vascular complications.

RESULTS

Ten patients were treated during this period with the diagnosis of popliteal artery lesion, 8 men and 2 women. The average age was 32.5 years.

The specific lesion mechanism was penetrating trauma in 5 patients and blunt trauma in 5 patients. Within the blunt trauma group, the reason for consultation in 3 patients was traffic accidents (run down), one case of attack with penetrating object and one case of iatrogenesis following orthopaedic intervention. Penetrating mechanisms were gunshot lesion in 4 patients and stabbing in one case.

In our patients, 90% of cases were confirmed by angio CT of the lower limbs and angiography has been used only to revise the repair *(Figure 1)*.

FIGURE 1. Angio CT: Knee dislocation associated to popliteal artery lesion.

As for associated lesions, 7 out of 10 patients had sustained fracture or fracture-dislocation, 3 patients loss of soft tissues. Four cases presented associated lesion of the popliteal vein and 2 a nervous lesion. Ninety percent (90%) of the patients with popliteal artery lesion had significant associated lesions.

The popliteal artery presented a complete section in 4 cases, partial section in 4 cases and the remaining 2 presented thrombosis with intima lesion. The lesion was in the first portion of the artery (P1) in 4 patients, in the second portion (P2) in 5 and in the third portion (P3) in one case. In the four cases with popliteal vein lesion, the lesion presented complete section.

Reverse saphenous vein interposition was performed in 6 cases for the management of arterial lesions and primary repair in 4 cases.

Four patients required multiple surgical toilettes and dermoepidermal grafts to cover the cutaneous defect resulting from the soft tissue loss related to the trauma or the fasciotomy, with adequate results in all cases.

The average time of ischemia, defined as the time from the lesion to the reestablishment of flow after definitive arterial repair was 10 hours.

Fasciotomy was performed in 6 of the 10 cases as a prophylactic measure based on the significant soft tissue loss, prolonged ischemia and concomitant venous lesion. In the case of popliteal vein lesion, ligation was performed in 3 cases and 1 primary repair. During the postoperative period, 30% developed reperfusion syndrome and both groups of patients evolved favorably.

One patient died. This patient was admitted with a stabbing wound in the lower limb, with severe hemodynamic instability and irreversible hypovolemic shock. At the time of admission the patient presented acidosis, hypothermia and coagulopathy. Primary popliteal artery and vein was performed and the patient died during the immediate postoperative period.

The percentage of limb salvage, excluding the patient who died was 100% and only 1 patient required minor amputation (tarsometatarsal).

Average ischemia time for patients that required care as a result of a traffic accident was 10 hours, whereas in those who sought care as a result of a penetrating lesion it was 4 hours.

DISCUSION

Popliteal vascular trauma, although infrequent, continues to be a challenge due to its complexity and low frequency. The most common cause of vascular lesions in the limbs is penetrating trauma, the second is closed trauma, including traffic accidents, falls from heights and crushing lesions[5]. Vascular lesions may have devastating consequences for patients since irreversible ischemia may occur in the course of only 6 to 8 hours. Ischemia may lead to long-term morbidity or even amputation of the affected limb. It is estimated that a closed lesion of the popliteal artery results in an amputation rate of 30 to 60%[6].

Most patients in the sample are males; this may be due to the higher probability of this group of facing gunshot, stabbing scenarios or traffic accidents. Even so, results do not suggest a significantly different response based on age or sex. Most of the individuals in the study (7 patients) were hemodynamically stable at admission.

Closed trauma, due to the initial presentation, is often difficult to diagnose, for which reason a high rate of suspicion and serial clinical examination are essential, at least during the first 48 hours. Physical examination may be complemented with Doppler pressure measurements and ankle-brachial pressure index[7].

As for repair, if primary repair is not possible, it is recommended to use the reverse contralateral saphenous vein as replacement, since prosthetic grafts have generally proven to have lower patency rates and higher infection rates in penetrating trauma[8]. As for the time of vascular reconstruction with bone fixation, the literature is controversial since some authors advocate that vascular reconstruction should precede ortophaedic intervention in vascular and skeletal lesions at distal and popliteal level in trauma[9]. However, our center performs bone fixation prior to vascular repair *(Figures 2 and 3)*. Further, popliteal vascular lesions are associated with high rates of compartmental syndrome. Predominant risk factors include ischemia (> 6 hours), unrepaired vein lesions and skeletal lesions combined[10]. However, the decision to perform fasciotomy is generally of a clinical or prophylactic nature, for which reason its liberal use has been broadly advocated by some groups[10]. Our institution applies the deferred closure technique by means of vascular elastics, the Shoelace technique *(Figure 4)*. With respect to the latter, the fasciotomy rate was 60%, slightly higher than that reported by the National Trauma Data Bank which amounts to 50%[2]. The liberal use of fasciotomies seems to be associated with lower amputation rates. In this series only one patient required transmetatarsal amputation. In this way, all patients in the series preserved their limb, which may be attributed to the fact that they were managed by a vascular surgeon experienced in vascular trauma.

FIGURE 2. Gunshot popliteal artery injury. The picture shows regularization of ends prior to repair with contralateral reverse saphenous vein.

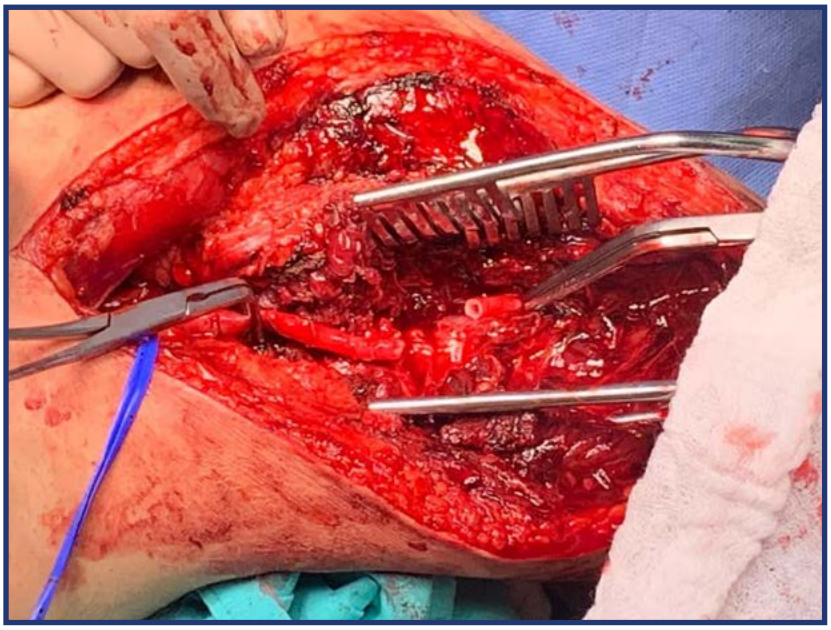
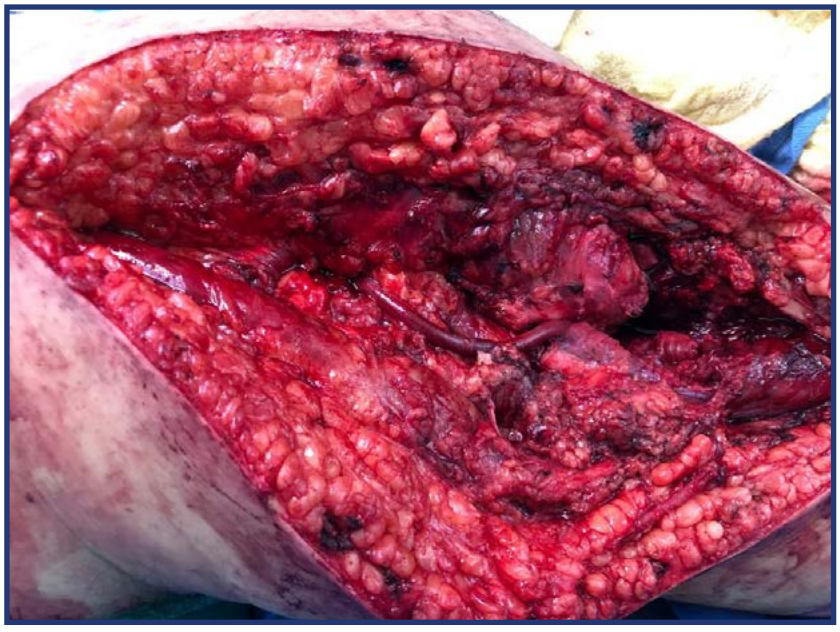


FIGURE 3. Popliteal artery lesion associated to tibial plateau fracture and fracture-dislocation of the knee. The picture illustrates the repair with contralateral saphenous vein interposition.



Some of the associated factors that lead to limb loss may be delay in vascular repair greater than 7 hours, arterial section, associated bone fracture and compartmental syndrome.

Morbidity and prolonged hospital stay is determined by fasciotomy and associated soft tissue lesions; 40% of patients required multiple surgical toilettes and dermo epidermal grafts *(Figure 5)*.

Mortality in our site amounted to 10% (penetrating lesions), similar to the rate reported in the literature that ranges from 1 to 9%[11].

As for the patient that died, we are aware of an error by having repaired artery and vein in an exsanguinated patient and we believe that we should have implemented a damage control strategy, in other words, vein ligation and the use of shunt in the artery.

As for the above described endovascular approach, it was not the choice in any patient in this case series, since some of the contraindications are active external hemorrhage, expanding hematoma, exposed artery, suspicion of complete section and time of evolution of the lesion longer than 6 hours. However, in a series published by the author in 2003, when we did not have Doppler ultrasound, angiography or angio CT available, our results were similar to these[12] and diagnosis was basically clinical.

FIGURE 4. Fasciotomy closure with Shoelace technique.

FIGURE 5. Coverage with demoepidemal fasciotomy graft performed in the context of compartmental syndrome in popliteal artery trauma.

It should be noted that these lesions required long hospitalizations, most particularly in the presence of associated lesions, mainly fracture-dislocations and soft tissue injuries. The risk of amputation increases proportionally to the time of ischemia, for which reason it is extremely important to proceed to early repair of the lesion in order to reestablish blood perfusion in the limb, preferably by means of the use of grafts with interposition of reverse autologous saphenous vein and fasciotomies as determined by the clinical evaluation of the surgeon. It is important to stress the importance of the experience of the vascular surgeon in the management of these patients; in our center exclusive management was a key factor to obtain good results.

Conflicts of interest
The authors have no disclosures to declare.

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ORIGINAL ARTICLE

CACCV SURVEY "REAL WORLD" CARDIOVASCULAR SURGERY TRAINING IN ARGENTINA. RESULTS

(Cardiovascular Surgery, Vascular Surgery and Pediatric Cardiovascular Surgery)

ABSTRACT

Objective: To identify the needs and demands of cardiovascular surgery trainee population in Ar-gentina in order to enhance quality of learning. **Methods:** A voluntary, anonymous survey was created by Argentinian College of Cardiovascular Surgeons and distributed to members and non-members enrolled in different accredited cardiovas-cular surgery training pathways across Argentine. **Results:** A total of 83 trainees completed the survey (56.6% male). Fifty-one per cent chose for a combined training in cardiac and vascular surgery (cardiovascular), 34.9% only vascular and 14.5% pediatric cardiovascular surgery. The majority was part of an accredited training residency (59%). Most of respondents belonged to a public education system (49%). Prior general surgery training was informed by 67 (80.7%) surveyed. Endovascular training experience revealed that 17% per-formed > 50 annual procedures. However, 39.8% of participants reported not receiving endovascu-lar training. Open surgery experience showed that 40% of responders performed > 50 cases annually (16% > 100 cases). Almost one-third of participants (27.7%) indicated no having academic development time. The choice of specialty and training paradigm option (residence, concurrence or fellowship) was highly considered for employability (47% and 60.2% respectively). The majority expressed to be pleased with overall training. **Conclusions:** More academic development time, increasing the number of endovascular procedures and assessing mentoring must be seriously considered. An independent, not-for profit, physician-led organization that sets and monitors standards for successful training programs is necessary.

Keywords: *Cardiovascular surgery, medical education, surgical training, residency programs*

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INTRODUCTION

Cardiac and vascular surgery training has undergone tremendous changes in the last years. The advent of endovascular therapies and minimally invasive techniques have led to redefine educational programs to better meet the evolving needs of young vascular specialists as they prepare to enter practice in a rapidly changing field[1,2,3].

In Argentina, there are various training pathways[4-6] with the goal of providing to graduated doctors the knowledge and essential practical skills to function as qualified practitioners with clinical judgment for the management of cardiovascular surgical patients. However, the level of education obtained is quite heterogeneous.

The purpose of this survey leading by the Argentinian College of Cardiovascular Surgeons (CACCV) was to know "real-world" cardiovascular surgery training in Argentina, identify the critical issues, demands and level of satisfaction of current trainee population.

METHODS

A 22 - electronic, voluntary, anonymous, multiple choice survey created by Google Form was distributed to CACCV members and nonmembers enrolled in a cardiovascular training programs (cardiac, vascular and pediatric) across Argentine Republic. The survey was available from July 11, 2020 through October 11, 2020 *(Figure 1. https://raccv.com.ar/uploads/encuesta_residentes_formacion_cirugia_vascular-formularios_Google.pdf)*.

The responses were compiled and then analyzed. Data will be presented as a descriptive and not by statistical analysis.

RESULTS

The survey was answered by 83 trainees from different training paradigms (56.6%: male). Of the total of respondents, 49% belonged to a public education system. Fifty-one point six per cent chose for a combined training in cardiac and vascular surgery (cardiovascular), 34.9% only vascular and 14.5% pediatric cardiovascular surgery. Among all the respondents, 59% was part of an accredited training residency and 26.5% of a fellowship. An alternative training pathway called "Concurrence" (with a variation of workload and no financial remuneration) was reported in a 14.5% of surveyed.

Prior training in general surgery (GS) was reported in 80,7% of cases. The majority (90%) chose a GS residency pathway. The length of training was between 4 and 5 years (69.8%) and only 14.5% were trained 1 year or less. Almost two-thirds of the surveyed reported they felt their previous GS training provided an advantage on performing future vascular procedures.

Looking at the overall cardiovascular operative experience and case volume recorded annually, our study revealed that a 39.8% of participants do not receive endovascular training. Among those who may access any endovascular teaching, the majority (67.8%) trained within own educational institution and during a period longer than 12 months. Seventeen per cent (n=14) performed > 50 annual procedures but only 3.8% (n=3) recorded > 100 cases.

Experience with open surgery was slightly better, with 40% (n=33) of responders reporting having performed up to 50 or greater than 100 cases annually.

Of all participants, 72.3% reported having research protected time and education including teaching conferences, vascular lab interpretation, hands-on or meeting participation. No academic development provided by educational institution was informed in 27.7% of surveyed.

As regards overall satisfaction, most of them stated that the impact of current trainings was positive. More than 70% expressed to be pleased with it. Only 10% answered to be unsatisfied.

The majority of learners reported that the choice of specialty as well training paradigm options were seriously taken into account for employability and future job opportunities (47% and 60.2% respectively). It was not considered in only 14.4% and 6.1% respectively.

When asked what could enhance their current trainings, the top responses included: increased cases volume (mainly endovascular procedures), simulation programs and external rotations in specialized centers, structured academic development time, assigned mentoring and supervised of training programs by accredited colleges or universities to assure an appropriate learning curve and met the specific educational goals and requirements for board certification exam.

The results of the survey are summarized in *Table I*.

ANALYSIS / CONCLUSIONS

Teaching and learning cardiovascular surgery undoubtedly are going through a transition. The endovascular revolution of the last years has created the need for additional specific training for the next generation of surgeons. The advent of new technologies and minimally invasive techniques (EVAR, TEVAR, TAVR or hybrid procedures) have led to restructure classical training programs[1,2,3].

TABLE 1. Results of the survey.

QUESTIONS	OPTIONS	RESULTS (%)
GENDER	MALE	56.6
	FEMALE	43.4
SPECIALITY	CARDIOVASCULAR	63.9
	VASCULAR	34.9
	PEDIATRIC	14.5
GENERAL SURGERY TRAINING	YES	80.7
	RESIDENCY	90.1
	CONCURRENCE	9.9
	NO	19.3
YEARS OF GENERAL SURGERY TRAINING	1	14.5
	2	5.2
	3	10.5
	4	47.4
	5	22.4
CONSIDER A PRIOR GENERAL SURGERY TRAINING NEEDED?	YES	68.7
	NO	16.9
	INDIFFERENT	14.4
REQUIREMENT OF GS IN CURRENT VASCULAR TRAINING INSTITUTION?	YES	79.5
	NO	20.5
TYPE OF VASCULAR TRAINING INSTITUTION	PUBLIC	51.8
	PRIVATE	54.2
TRAINING PATHWAY	RESIDENCY (1/2+3)	59
	CONCURRENCE (1+4)	14.5
	FELLOWSHIP (5+2/3)	26.5
YEARS OF VASCULAR TRAINING	1	0
	2	8.4
	3	25.3
	4	45.8
	5	20.5
ENDOVASCULAR TRAINING	YES	60.2
	NO	39.8
LENGTH OF ENDOVASCULAR TRAINING	< 6 months	39.2
	6 - 12 months	13.7
	> 12 months	47.1
ENDOVASCULAR ROTATIONS	Inside own educational institution	67.5
	Outside own educations institution	32.5

OPEN VASCULAR CASE VOLUME	< 30	39.7
	30 - 50	20.4
	50 - 100	24
	> 100	15.9
ENDOVASCULAR CASE VOLUME	< 30	62.6
	30 - 50	20.4
	50 - 100	13.2
	> 100	3.8
ACADEMIC DEVELOPMENT	YES	72.3
	NO	27.7
DEGRE OF SATISFACTION WITH ACADEMIC DEVELOPMENT	VERY SATISFIED	10.8
	SATISFIED	59
	LESS SATISFIED	22.9
	UNSATISFIED	7.3
DEGREE OF SATISFACTION WITH OPERATIVE EXPERIENCE	VERY SATISFIED	25.3
	SATISFIED	48.2
	LESS SATISFIED	22.9
	UNSATISFIED	3.6
JOB SEARCH - SPECIALITY	HIGHLY CONSIDERED	47
	LESS CONSIDERED	38.6
	NO CONSIDERED	14.4
JOB SEARCH - TRAINING PATHWAY	HIGHLY CONSIDERED	60.2
	LESS CONSIDERED	33.7
	NO CONSIDERED	6.1

In Argentina, independent educational institutions (public or private) and regional medical associations offer diverse cardiovascular training programs and certification application conformed to own considered requirements[4-7].

Nowadays, various pathways to become a board certified cardiovascular or vascular surgeon in our country exist.

We may cite:

- 1-2+3: 1 or 2 years of core surgery training followed by 3 years of advanced cardiovascular or vascular training.
- 1+4: An alternative pathway called "Concurrence" which involves less workload without financial remuneration and include 1 year of core general surgery followed by 4 years of advanced cardiovascular or vascular training.
- 5+2/3: Another paradigm is to complete general surgery training (5 years) followed by 2-3 year of cardiovascular surgery. Board certification in general surgery is required. Nevertheless, this pathway is less and less offered by institutions.

In pediatric cardiovascular surgery, although training programs are very heterogeneous, most of them are grouped as residencies or fellowships. We may cite:

- 0+4: 5 years (4 years of pediatric cardiovascular surgery + 1year Chief-of-Resident).
- 2+4: 2 years of pediatric general surgery + 4 years of pediatric cardiovascular surgery.
- 4/5+4: 4 or 5 years of core surgery training followed by 4 years of advanced pediatric cardiovascular fellowship. Board certification in core surgery is required.

The results of our survey yielded several important findings regarding current cardiovascular training in our country. First of all, it is clear from our survey that prior core surgery training is not debatable to get basic surgical skills. But the question is: How should general surgery training be integrated

into the cardiovascular career? Although, all current training programs include one or two year on learning core surgery, perhaps the topic of discussion should not be the duration of such training but how do we focus on teaching the necessary requirements for qualification to a cardiovascular specialization in a shorter period of time.

This survey also demonstrated that operative experience seems to be limited. Overall volume of procedures performed annually by trainees are quite low and even a significant number of students do not have access to endovascular training. Besides, most of them are obliged to rotate outside of own institutions.

In Argentina operative experience for cardiovascular, vascular or pediatric trainees is highly variable in terms of overall case requirements. There is not specific number of major cases defined for each year/training. Only operative requirements may be determined at individual training centers. Stablishing and performing minimum numbers of cases should be necessary for appropriate competency. A comprehensive and standardized protocol would allow documenting the level of training among students and comparing results between training centers.

Simulation has emerged as a radical innovation in the traditional medical teaching methods in the last years. These new training models assure the trainees the acquisition of elemental surgical skills allowing them to achieve mastery and sufficient confidence prior to contact with the patient. Since these advantages, including competence assessment, it is desirable that this method be used to teach and evaluate resident doctors with the aim to improve the quality of learning. In our country, some training and teaching centres have already started to use this educational tool.

As regards academic development, an alarming 30% of respondents indicated that their training programs have not dedicated research and educational time. This is a matter of big concern. Comprehensive clinical learning of the global cardiovascular system, guidedresearch development and lessons learned to manage complex cases are fundamental to acquire an appropriate surgical judgment and become a well-rounded and a proficient specialist. These results illustrate a greatly opportunity for educators to enhance academic quality and research time for young trainees. The validation of the educational programs should be approved and supervised by a government and academic entity.

The CACCV was born in 1975 with the aim of promoting and improving the dissemination of knowledge concerning all aspects of cardiovascular diseases and becoming the primary source of cardiovascular surgeon advice and advocacy in social, economic, ethical and legal issues related to their specialty[8,9]. Together with the Ministry of Health, CACCV provides Board Certification in Cardiovascular, Vascular or Pediatric cardiovascular surgery to those trainees who have met the basic set of standards (requirements), skills, knowledge and attitudes necessary to take personal responsibility for the individual care of patients.

Futhermore, our College actively participates teaching trainees doctors. Various training courses on either cardiac, vascular or pediatric surgery including "Hands-on" focussed on surgical skills devel-opment are offered. However, due to these are non-mandatory activities, a great diversity and heterogeneity of levels of education and training may be noted.

In 3 years (2017, 2018 y 2019), CACCV provided 44 Board Certifications in cardiovascular (27) and vascular surgery (17). However, we have appreciated a continuous decrease in the amount of applicants.

Finally, we may conclude that the development of a structured theoretical-academic program associated with a further access to surgical procedures and rotations in specialized centers especially in endovascular techniques are the key points to examine and improve in order to meet young surgeons `s demands and improve cardiovascular surgery teaching.

It seems to be relevant the creation of an independent, not-for profit, physicianled organization that sets and monitors the minimum and uniform standards to ensure the best practice in the field achieving an equal educational level around our country.

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Conflicts of interest

The authors have no disclosures to declare.

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SCIENTIFIC LETTER

EXTRACTION OF PERICARDIUM RETAINED MISSILE

ABSTRACT

Penetrating precordial trauma is a high-mortality condition that requires a trained multidisciplinary team to guide its management.

The context of the hemodynamically unstable patient is well understood and accepted. However, there is a knowledge gap when a hemodynamically stable patients present with a missile retained in cardiac structures. Currently, there are no guidelines on the surgical indication or surgical approach. These continue to be variable.

We present the case of a 47-year-old male patient with a gunshot chest trauma, hemodynamically stable with a missile retained in the pericardial sac that underwent videothoracoscopy with successful extraction. In addition, we made a review of the literature of cases with similar characteristics reported in recent years.

Keywords: *gunshot wounds, pericardium, thoracoscopy, heart injuries, foreign-body migration*

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INTRODUCTION

Twenty five percent of deaths in trauma patients involve cardiothoracic injuries. More specifically, mortality rates for penetrating cardiac trauma are as high as 70-80%[1,2].

Generally, in cases of gunshot lesions, patients require immediate maneuvers to correct underlying lesions. A gunshot chest trauma with the missile retained in the mediastinum in a hemodynamically stable patient is an extremely unusual clinical situation[3].

A missile may reach the cardiac structures or pericardium by two different mechanisms, namely, indirectly by embolization from distant sites or directly after impacting the thorax; in these cases the missile may be lodged in the myocardium, free in cardiac chambers, or in the pericardial space where it may lodge[4].

As this is an infrequent occurrence, there are no established guidelines at present and management continues to be controversial; it is accepted that a free missile in the pericardial sac must be removed as there is a risk of complications such as pericarditis, myocardial erosion and even embolization[5].

We are presenting here the case of a patient with a missile retained in the pericardium that was successfully removed with a minimally invasive procedure by videothoracoscopy. We also made a literature review of similar cases reported in recent years.

CASE REPORT

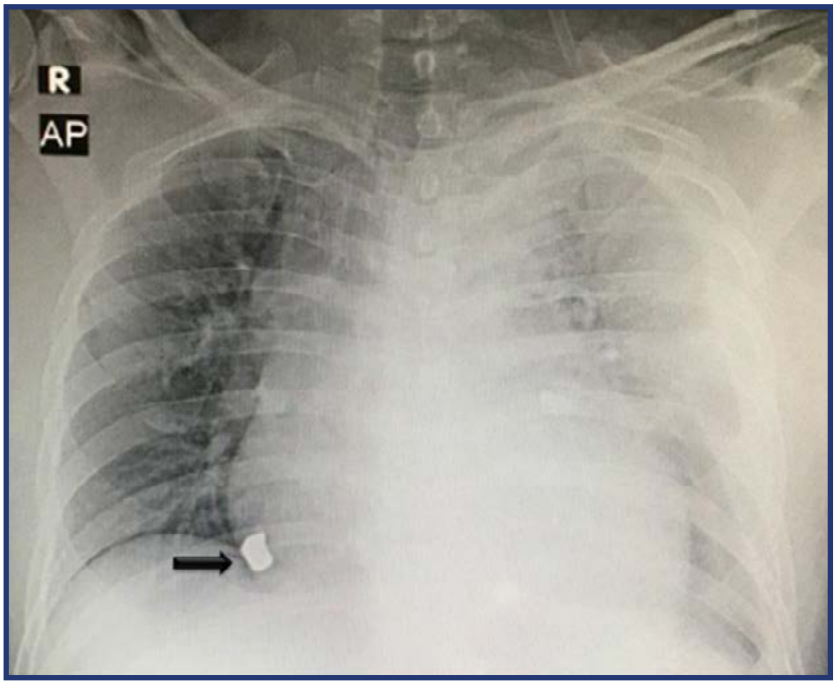
We are presenting the case of a 47-year-old man that arrived at the emergency service with a gunshot wound. At admission, with vital signs within the normal range, the physical examination revealed three wounds: in the mesogastrium, in the second intercostal space with left mid-clavicular line and in the left scapular region.

At the same time, a reduction of respiratory sounds was identified in the left hemithorax with signs of peritoneal irritation. A left closed thoracostomy was performed collecting 400 ml of bloody fluid, and an exploratory laparotomy with Grade III trauma findings in the ascending colon. Following surgery, the patient evolved satisfactorily. Three days later we performed a thorax x-ray that showed the presence of a missile within the cardiac silhouette *(Figure 1)*. The finding was confirmed with contrast CT. In light of these findings, a transthoracic echocardiography was performed evidencing a moderate amount of pericardial effusion with no hemodynamic impact and a missile lodged in the pericardial sac.

Before initiating the procedure, the open surgery team was set up as well as the extracorporeal circulation machine in such a way that, in case of hemodynamic decompensation, cardiopulmonary *bypass* could be initiated.

It was decided to proceed to videothoracoscopy; 10 mm trochars were inserted in the fifth left intercostal space with axillary line and in the seventh intercostal space with left anterior axillary line, and a 5 mm

FIGURE 1. Missile observed within the cardiac silhouette (black arrow). Radiopacity in left hemithorax compatible with hemothorax.



trochar in the third intercostal space with left mid-clavicular line. A clotted hemothorax was drained and then a broad longitudinal pericardiotomy was performed, draining 400 ml of hemopericardium. A gunshot missile lodged in the pericardial sac towards the base of the heart on the atrioventricular sulcus was removed *(Figure 2)*; pericardioscopy was done without observing evident myocardial or large vessels lesion. Lavage of the pericardial sac was performed with no active bleeding. Finally, the thorax tube was placed in the left pleural space. Post-op evolution was satisfactory, and the control echocardiography reveled no alteration. The patient was discharged without complications.

DISCUSSION

A missile retained in the mediastinum in a hemodynamically stable patient is a very unusual condition and it should be suspected when identifying the presence of a foreign body in the mediastinal region by image studies as part of the initial approach[4,5]. In spite of this, due to the difficulty involved in finding the exact location of the missile with these methods, a large number of cases will require transthoracic or transesophageal ultrasonography to confirm its location and possible physiological impact[5].

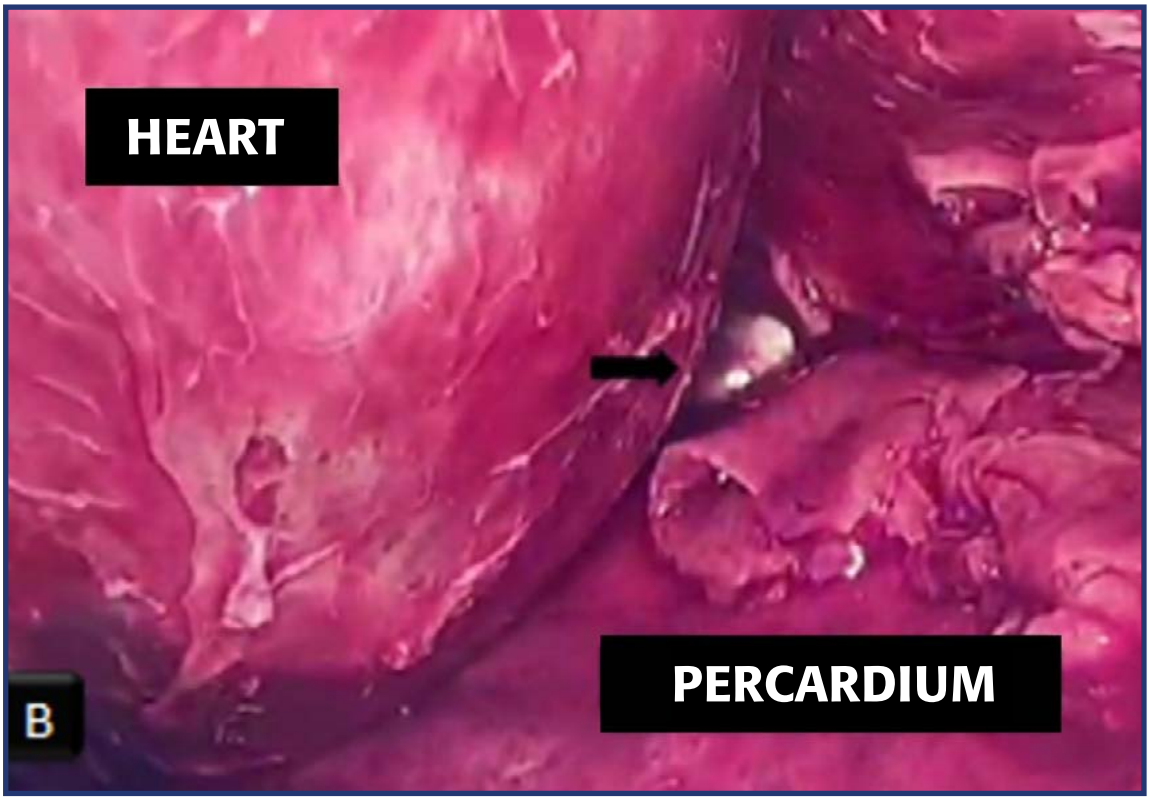
Immediate surgery indication for patients with precordial wound an hemodynamic instability is well established, however, at present there are no management guidelines for the clinical situation under discussion; as a result and according the literature review conducted by our group of similar cases reported during the last two decades *(Table 1)*, there is great variability[6,7,8].

At present, the use of videothoracoscopy is more and more frequent in certain acute trauma conditions[9] and in trauma management following thoracic trauma[10]; however, the possibility of sustaining a cardiac or any mediastinal structure lesion was until recently considered a contraindication given the high risk involved[11].

In our case, the patient required surgical intervention because of the penetrating abdominal trauma and signs of peritoneal irritation without significant cardiothoracic clinical signs. Then, further studies confirmed the presence of a foreign body in the pericardial sac, which, due to the hemodynamic instability and given the availability of physical resources and skilled staff, it was decided to remove the foreign body by a minimally invasive approach, having the necessary equipment at hand in case of requiring converting to open approach as well as an extracorporeal circulation unit.

Removal route and removal vs. non-removal indication remain controversial and are subject to broad discussion; in spite of this, we believe that given the high risk of unnoticed complications with vital

FIGURE 2. Missile lodged in pericardial sac towards the heart base on the atrioventricular sulcus (black arrow).



structures[7,8,12], it is recommended, when technically feasible, to proceed to removal of the foreign body through the route that best suits the practical and structural possibilities of the attending team.

Finally, we stress the importance of videothoracoscopy as a well-founded technique to manage thoracic trauma in well-selected patients, including extraction of mediastinal foreign bodies.

TABLE 1. Clinical case reports of patients with missile retained in the mediastinum during the period 2000-2021 in English and Spanish language literature.

Authors	Year	Sex	Age (years)	Localization	Initial diagnostic method	Management	Complication	Complication time	Result
Muñoz et al.	2021	M	19	Pericardium	X-ray	Videothoracoscopy (VATS)	None	NA	Survived
Coleman et al.	2020	M	39	Left ventricle	X-ray	Conservative	None	NA	Survived
Volpe et al.	2018	M	34	Intracavitary (RV)	X-ray	Extraction through sternotomy	Pulmonary thrombo-embolism	ND	Survived
Lapa et al.	2017	M	26	Septum	CT	Extraction through sternotomy	Embolization towards RECA	Intraoperative	Survived
Mishra et al.	2017	M	26	Pericardium	X-ray	Conservative	Erosion of the left inferior pulmonary vein + tamponade	31 days	Died
Imbert et al.	2016	M	59	Left pulmonary artery	X-ray	Unsuccessful extracction through sternotomy	Migration to basal segmentary artery	3 months	Survived
Xiao et al.	2015	M	46	Aortic root	CT	Conservative	None	NA	Survived
Mills et al.	2014	M	20	Left atrial wall	X-ray	Extraction through sternotomy	None	NA	Survived
Maffei et al.	2010	M	30	Lateral wall of LV	X-ray	Unsuccessful extraction through open sternotomy	Extra cardiac migration (not defined); possible migration to left pulmonary vein was assumed	Perioperative	Survived
DeBlois et al.	2006	M	26	Left ventricular wall	X-ray	Conservative	None	NA	Survived

Conflicts of interest
The authors have no disclosures to declare.

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SCIENTIFIC LETTER

AORTIC SUBVALVULAR STENOSIS IN ADULTS: A CLINICAL CASE

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ABSTRACT

We present the clinical case of a 55-year-old patient, with deterioration of her functional class, subvalvular aortic stenosis caused by the presence of a subvalvular aortic ridge was diagnosed. The definitive treatment was surgical resection with preservation of the aortic valve, which ensures a satisfactory long-term post-surgical result. In addition, a brief bibliographic review of the disease is carried out.

Keywords: *Aortic stenosis; aortic subvalvular stenosis; aortic subvalvular ridge*

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INTRODUCTION

Aortic subvalvular stenosis, also known as subaortic stenosis, is infrequent in adults, although more frequent in males. The etiology of this pathology is unclear and its clinical presentation is variable. It accounts for 10-20% of obstructions of the left ventricle outflow tract, with a prevalence of up to 6.5% of congenital cardiopathies in adults[1]. It may present itself as an isolated lesion in 50% of cases, along with other congenital malformations (interventricular communication, bivalve aorta, aortic coarctation, persistent ductus arteriosus and pulmonary stenosis)[2].

We present here the case of a female 55-year-old patient with a personal history of hypertension and dyslipidemia, who sustained 4 months of functional class deterioration with dyspnea on moderate exertion that increased after minor efforts and accompanied by oppressive precordial pain during physical activity for less than 5 minutes that improved with rest.

During 20 prior to hospitalization the patient continued to present dyspnea, chest pain and a syncope episode that lasted less than 1 minute. Physical exploration revealed no particular signs or typical facies; synchronic, symmetric carotid pulses were visible with palpable thrill, and systolic murmur at auscultation.

The thorax examination revealed the presence of precordium with apex beat; auscultation in aortic focus presented II/IV expulsive murmur extending to the suprasternal and supraclavicular notch, peripheral, symmetric pulses of reduced intensity. Laboratory results were normal. Electrocardiographic findings were sinus rhythm, heart rate of 73 bpm, ++P wave, v1 0.1mv 80 ms, PR 160 ms, QRs 90 ms, QRS axis 0 degrees in horizonal position, levorotated with no ischemic lesion data.

Transesophagic echocardiogram reported mild tricuspid insufficiency, dilated left atrium, mild mitral insufficiency, left ventricle hypertrophy with a LVEF of 62%, trivalve aortic valve and outflow tract obstruction by a 0.93 cm^2 subvalvular aortic ridge *(Figure 1)*.

The coronary angio CT showed the presence of a subvalvular aortic ridge, creating a valvular area of 0.98 cm^2, and accessory mitral tissue with a 0,68 cm^2 reduction of the left ventricle outflow tract *(Figure 1)*. With these findings we established the diagnosis of

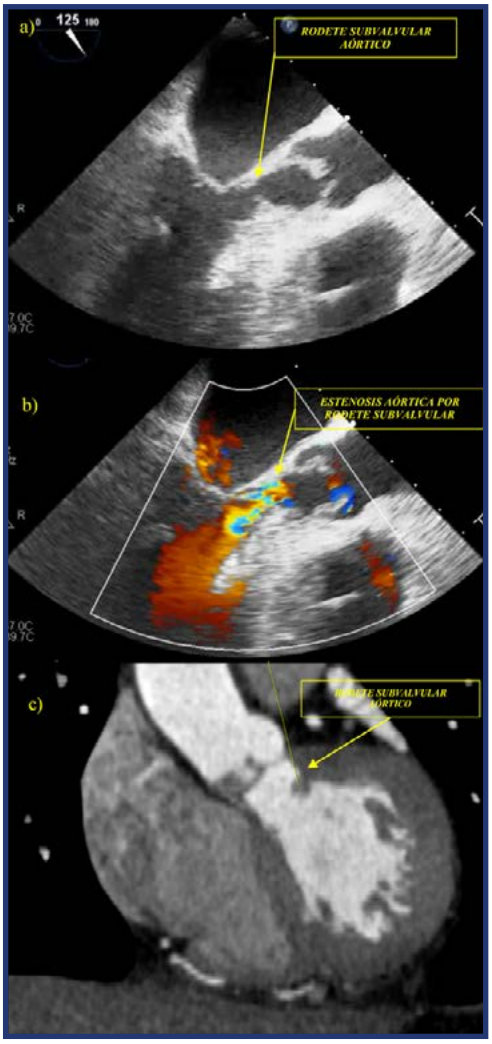

FIGURE 1. **Transesophagic echocardiography: A)** Aortic subvalvular ridge with aortic outflow obstruction; aortic ring 0.93 cm. **B) Doppler:** aortic subvalvular ridge is observed creating stenosis. **C) Thorax angio CT:** evidence of aortic subvalvular ridge with a valvular area of 0.98 sq. cm, accessory mitral tissue, reduction of left ventricle outflow tract of 0.68 cm^2.

"subvalvular aortic stenosis", for which reason it was decided to proceed to surgical treatment by resection of the subaortic ridge with preservation of the aortic valve by median sternotomy.

The procedure was performed with a clamping time of 46 minutes and extracorporeal circulation time of 59 minutes. Findings were the following: trivalve aortic valve with normal appearance veils, adequate coaptation and membranous subvalvular aortic ridge *(Figure 2)*.

The patient had a favorable evolution with extubation at 12 hours, hemodynamically requiring no vasopressor or inotropic support in sinus rhythm; thoracic drains were removed at 48 hours, and discharge from the intensive care unit took place on day 2 post-op. Transthoracic ultrasound showed preserved LVEF with no data of subaortic gradients and no aortic valvular insufficiency. The patient was discharged from hospital at 6 days of hospitalization without complications.

Aortic subvalvular stenosis is defined as an obstruction of the left ventricle outflow located under the aortic valve; this may be induced by fixed stenosis or have a dynamic component, mainly due to the genetic hypertrophic myocardiopaty (previously known as idiopathic hypertrophic subaortic stenosis)[1].

Most of these cases are considered as acquired lesions due to their evolution and progress in time. A hypothesis regarding its genesis has been proposed, based on the fact that a structural distortion of the left ventricle outflow tract produces turbulence and mechanic stress that in turn lead to cell proliferation with thickening, fibrosis and tissue scarring.

Aortic subvalvular stenosis presents different varieties: membranous (the most common lesion), fibromuscular collar, abnormal connections of the mitral valve, and occasionally accessory tissue of the endocardial cushion[3].

Clinically, they remain asymptomatic for long periods in the form of silent disease in children, and in most cases the diagnosis is reached as a result of studies for other cardiopathies; symptoms are related directly with the degree of obstruction and start in moderate-severe or severe stages of the disease.

Patients may present dyspnea, dizziness, precordial pain and syncope. Cases of hemodynamic progression in adult age are scarce[4,5]. In the physical examination a notable finding is a systolic ejective murmur that is more audible at the level of the left parasternal line.

The diagnosis is confirmed with echocardiography, which shows the anatomy of the subaortic lesion as well as its dimensions, function of the left ventricle, mitral-aortic valve integrity, the degree of involvement of the left ventricle outflow tract, the degree of left ventricular hypertrophy and poststenotic aortic dilatation. Further, associated congenital lesions and non-obstructive membranes may be identified.

Thin fibrous membranes are typically found close to the junction of the aortic root with the septum. The angle between the outlet of the aorta and the long axis of the interventricular septum has been found by echocardiography to have a predictive value in the development of aortic subvalvular stenosis[6].

Surgical correction of the obstruction, which can be from the exeresis of the membrane or the extensive surgical resection of the ring with or without myomectomy, seems to be the effective treatment for aortic subvalvular stenosis; however, reported recurrence rates have been of up to 55% of cases, especially when early intervention is performed, requiring intervention in up to 30% of patients[6,7].

FIGURE 2. Surgical treatment: macroscopic view of aortic subvalvular ridge following surgical resection.

Conflicts of interest
The authors have no disclosures to declare.

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SCIENTIFIC LETTER

AORTIC LEFT VENTRICULAR TUNNEL. A CASE REPORT OF EARLY PRESENTATION

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ABSTRACT

The aorto ventricular tunnel is a rare congenital malformation, consisting of the communication between the left ventricle (90% of cases) and the aorta, leading to the paravalvular level above the aortic ring. It usually occurs in childhood and is clinically manifested with signs of severe aortic insufficiency and heart failure. Surgery is the appropriate treatment for this pathology. We present a patient with early clinical manifestations of aortic left ventricular tunnel, in which we successfully performed the surgical treatment by direct closure.

Keywords: *Aortic ventricular tunnel; Aortic insufficiency; Congestive heart failure*

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INTRODUCTION

Aorto-ventricular tunnel is a rare congenital malformation consisting of a paravalvar communication between the aorta and the left ventricle (in over 90% of cases), or between the aorta and the right ventricle[1].

The usual clinical presentation is characterized by cardiac failure and marked cardiomegaly in a presentation that mimics severe aortic insufficiency[2]. The very low incidence of this pathology in the general population makes it difficult to diagnose; a thorough clinical evaluation and complementary methods are required for a correct treatment.

CLINICAL CASE

Patient with a left aorto-ventricular tunnel of early presentation (2 months of age and 5 kg of weight), in whom interventricular communication associated to dilated myocardiopathy was suspected. At admission the patient presented signs of cardiac insufficiency with bounding pulses and a systo-diastolic murmur was audible at the aortic focus. The thorax x-ray showed marked cardiomegaly and a wide superior mediastinum shadow.

A color Doppler ultrasound was performed, which led to the diagnosis of left aorto-ventricular tunnel [3]. The tunnel had a proximal opening in the left ventricle, with 5 mm diameter, close to the aortic valve ring, and a 7 mm distal opening in the ascending aorta, distal to the sinotubular junction. The trajectory of the tunnel was between the right and left coronaries. The aortic ring had a diameter of 10 mm (z-score +2), with a severely dilated ascending aorta and mild aortic insufficiency *(Figure 1)*.

Diagnosis was complemented with a computerized angiotomography with digital reconstruction.

Once the diagnosis was established, reparative surgery was performed. The thorax was approached under general anesthesia to proceed to median sternotomy followed by extracorporeal circulation using aortic bicaval cannulation. Under mild hypothermia the aorta was clamped and Del Nido antegrade cardioplexia was administered. The tunnel did not involve any of the coronaries (with normal trajectory) nor did it affect the aortic valve that appeared intact. The proximal hole of the tunnel was inside the left ventricle, 2 mm below the aortic ring *(Figure 2)*. The direct closure technique was used, starting with the proximal hole, in which a circular suture was performed with polypropylene 5-0. Then, the distal hole was closed in the same way. After completing closure, it was confirmed that the aortic valve presented no deformities or structural alterations. The intraoperatory transesophagic echocardiogram evidenced correct closure of the tunnel.

FIGURE 1. Color Doppler echocardiography. References: **A.** Left ventricular tunnel leading to severe aortic paravalvular insufficiency. **B.** Intact, competent aortic valve.

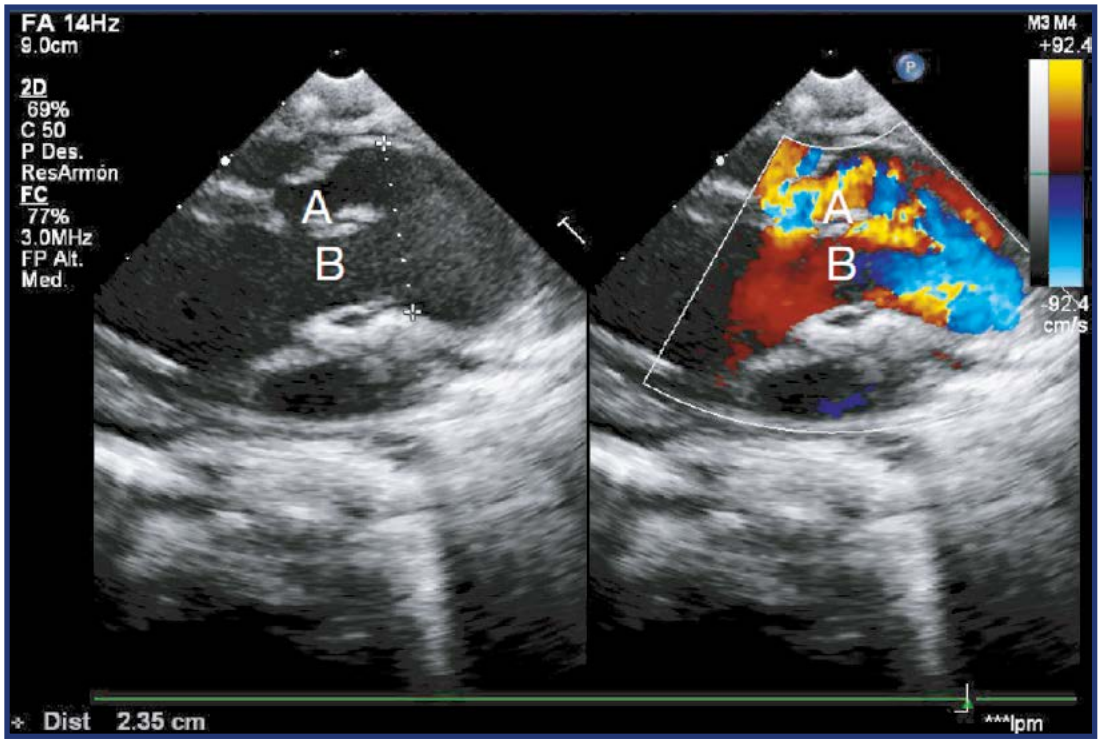
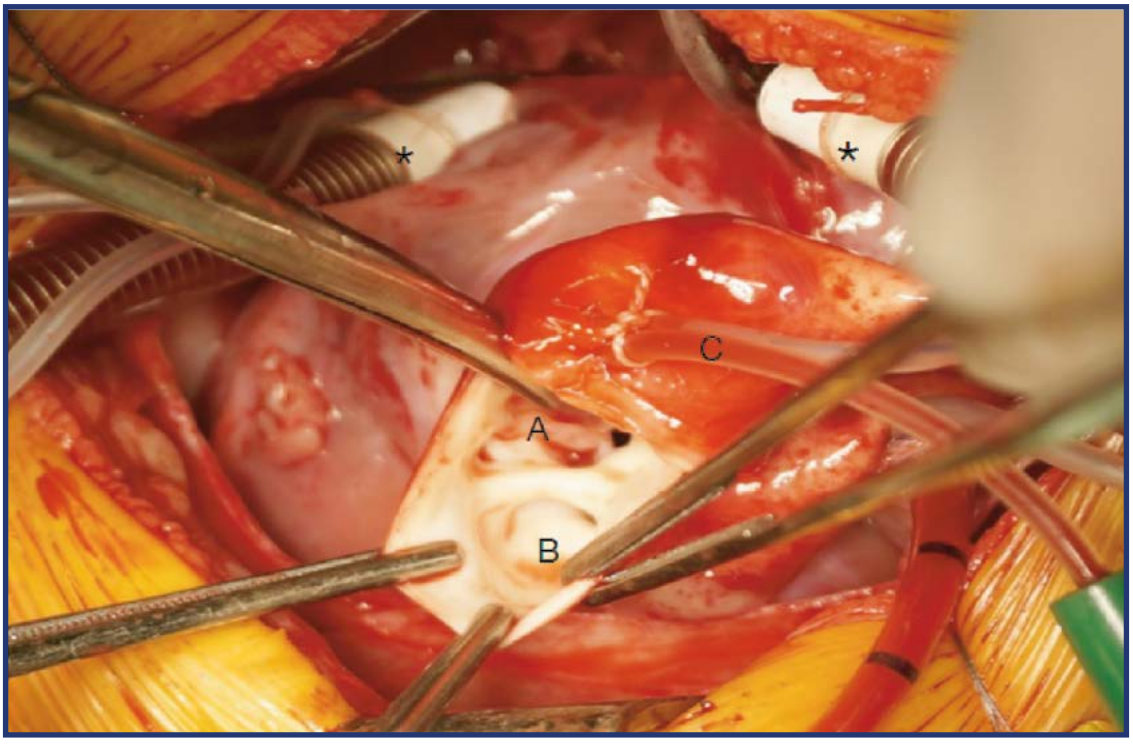


FIGURE 2. Surgical view of the left aorto-ventricular tunnel through a transverse aortotomy at the leve l of the sinotubular junction. References: **A:** aortic valve and *ostium* of the right coronary artery. **B:** aortic tunnel, aortic opening, it is possible to identify the trajectory and the ventricular hole. **C:** ascending aorta with cardioplegia cannula. ***:** venous drainage cannula (bicaval).



COMMENTS

The aorto-ventricular tunnel is a rare entity with an incidence of approximately 0.001% of congenital cardiopathies. It consists of an aortic paravalvular communication, just above the sinotubular junction, related on the one had with the origin of the right coronary artery, and on the other with the left ventricle (in 90% of cases). Its etiology is unknown, and to date approximately 150 cases have been reported in English language bibliography since the first description by Levy et.al. in 1963[1].

Reparative surgery is the treatment of choice and must be performed soon after establishing the diagnosis, even if the patient presents mild symptoms, in order to avoid greater dilation of the left ventricle, the aortic root and the aortic ring. Currently there are two repair techniques. The first is direct closure of both tunnel openings through an aortotomy, using underlying tissue to support the sutures. The second option is using synthetic patches (ePTFE, Dacron, etc.) to occlude both openings. It is possible to perform a ventriculotomy to access the ventricular opening of the tunnel if necessary[4]. So far none of the techniques has shown superiority in terms of effectiveness or risk of complications. In spite of the good results reported in different publications, some complications have been described, mostly related to aortic valve lesions[5].

Conflicts of interest

The authors have no disclosures to declare.

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METASTATIC STERNAL TUMOR IN A PATIENT OPERATED FOR MYOCARDIAL REVASCULARIZATION

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Seventy-year-old male patient operated for myocardial revascularization ten years before, with mediastinitis as a complication, that required surgical reintervention. Fifteen days before admission the patient sustained thoracic trauma as a result of deacceleration in a motor vehicle accident and developed pain and progressive swelling of the presternal region. As the patient showed no improvement with analgesics, hospitalization was indicated for evaluation and treatment *(Figure 1)*.

Ultrasound: volume enlargement at the level of the *manubrium sterni* with the presence of a T mass that creates an extensive osteolytic lesion of the lower 2/3 and calcifications. The lesion is in close contact with the aortic junction wall.

Thorax CT: There is a mass at the level of the anterior mediastinum in the retrosternal region that produces osteolysis of the sternal body and surrounds the sternotomy sutures. The lesion measures 77 mm long, 63 mm AP diameter and 66 transverse diameter with a density of 32 UH; no enhancement is evidenced in the arterial phase nor in the venous phase, where enhancement was 92 UH *(Figures 2 and 3)*.

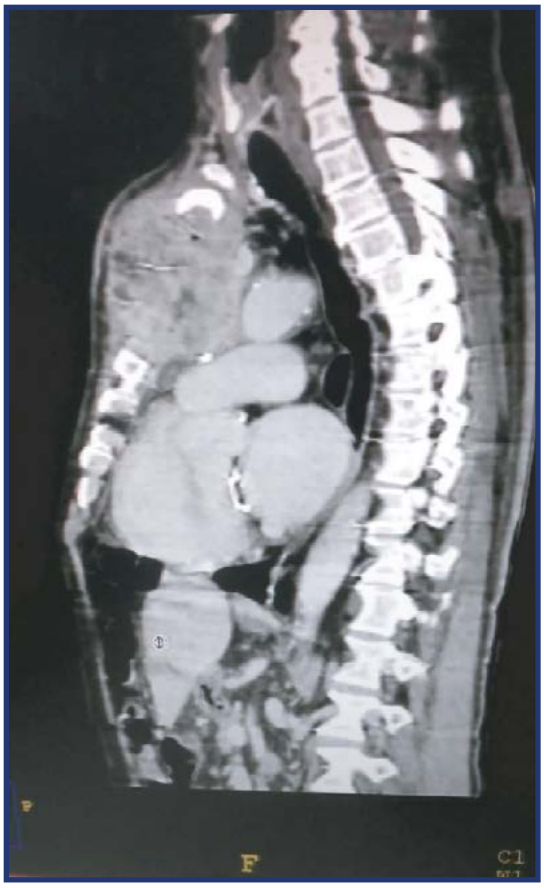
Numerous hypodense areas can be seen inside that produce osteolysis of the *manubrium sterni*, and this, in turn, generates compression of the superior vena cava and left subclavian artery. There are mediastinal para aortic adenopathies.

Biopsy: Soft tissue infiltration by moderately differentiated squamous cell carcinoma. It is suggested to evaluate the respiratory system to explore possible primary origin.

FIGURE 1. Clinical presentation.

FIGURE 2. Contrast CT, arterial phase.

FIGURE 3. Contrast CT, venous phase.



SELECTED ARTICLES

We hereby present comments on a selection of articles recently published in internationally acclaimed medical journals. We believe these papers deserve special attention due to the quality and importance of the conclusions reached by the studies. Our objective is to keep an open look on new aspects of scientific research or review articles that may, in turn, update aspects of our own medical specialty.

Also, the Editorial Committee will consider suggestions on recent articles that the readers think deserve to be commented in this section (revista@caccv.org.ar).

TYPE A AORTIC DISSECTION: RESULTS OF THE DARTS TRIAL

BOZSO SJ, NAGENDRAN J, CHU MWA, KIAII B, EL-HAMAMSY I, OUZOUNIAN M, KEMPFERT J, STARCK C, MOON MC, MIDTERM OUTCOMES OF THE DISSECTED AORTA REPAIR THROUGH STENT IMPLANTATION TRIAL

The Annals of Thoracic Surgery (2020), 111(2), 463-470
https://doi.org/10.1016/j.athoracsur.2020.05.090

Acute DeBakey I aortic dissection is a high-morbidity and high-mortality condition. The objectives of the surgical treatment, as stated by Boszo SJ and associates from Canadian and German centers, are eliminating the primary intimal tear, sealing the false lumen to decompress it and maintaining pressurization of the true lumen. Although conventional repair is a life-saving procedure, the incapacity to seal the false lumen may lead to the creation of a new entry, distal to the anastomosis, acting in fact as a new entry with pulsed flow, pressurization of the false lumen, malperfusion, early mortality, reinterventions and shorter survival in the long term. The hybrid AMDS (Ascyrus Medical Dissection Stent) prosthesis has been designed to seal the false lumen and maintain pressurization of the true lumen. Initial positive results have been published, for which reason this paper presents immediate and medium-term results. This is a prospective, non- randomized study that enrolled 46 consecutive patients from several Canadian centers and one German center from March 2017 to January 2019. The mean follow-up was 631 days.

Primary intimal tear was identified in all participants, with hemiarch repair in 45 cases and total aortic arch replacement in one patient. The authors report that this is the largest prospective study known in patients with this type of aortic dissection, with excellent results in this critical patient population and mortality rates of 13% at 30 days and 19.6% at one year in spite of the fact that 60% of the participants presented malperfusion. The 6.5% cerebrovascular accidents rate is low as compared to patients in a similar condition, in whom the literature reports rates of 11% to 46.7%. Postoperative medullary ischemia in this study was 0% and complete reversal of preoperative paralysis in all 3 patients with medullary malperfusion was evidenced. Remodelling of the proximal descending artery was proven in 77% of patients at one year, with 53% of cases presenting complete obliteration or thrombosis.

The main limitation of the study according to the authors is its non-randomized, single-arm design. No comparisons were made with the results of the standard surgical repair in the same sites. The results of the study support the safety and efficacy of the AMDS hybrid prosthesis for the treatment of type I DeBakey aortic dissection.

DOPPLER ULTRASOUND EXAMINATION FOR DIAGNOSIS OF TEMPORAL ARTERITIS EVALUATION OF TEMPORAL ARTERY DUPLEX ULTRASOUND FOR DIAGNOSIS OF TEMPORAL ARTERITIS GIELIS JF Y COLS.

Journal of Surgical Research 2021 (261) p. 320-325
https://doi.org/10.1016/j.jss.2020.12.036

Temporal arteritis or giant cell arteritis is a form of systemic inflammatory vasculitis closely associated with polymyalgia rheumatica. It may have serious systemic, neurologic, and ophthalmic consequences as it may lead to blindness if the inflammatory process involves the ophthalmic arteries. Early diagnosis is of great importance to avoid serious complications, whereas a false positive diagnosis may expose the patient to unnecessary high doses of steroids. Definitive diagnosis is made after a surgical biopsy of a superficial temporal artery (TA). JF Gelis et.al. from the Department of Thoracic and Vascular Surgery of the Antwerp University Hospital in Belgium, conducted a study to determine whether a non-invasive technique could replace histopathological analysis. Although the superficial temporal artery biopsy is a low-risk and low-morbidity procedure, usually conducted under local anesthesia, the procedure is not free of complications, which in 0.5% of cases may be serious (i.e. visual sequelae, facial nerve lesions, skin necrosis, infections and cerebrovascular accidents). Further, the segmental nature of these lesions implies a high risk of false negatives (44% of negative reports in patients with clinical symptoms of the disease). For these reasons, the possibility of conducting a non-invasive study with a similar specificity rate as that of the biopsy has been explored. Duplex ultrasound of the superficial temporal artery in these cases reveals a hypoechoic halo, compatible with arterial wall edema, and less frequently with stenosis or occlusion. Eighty patients above 50 years of age with clinical symptoms were referred for superficial temporal artery biopsy, who were first screened with Duplex ultrasound for a surrounding halo or occlusion of the TA. Patients presented at least three symptoms according to the American College of Rheumatology criteria (visual disturbances and unilateral pain (headache and/or tongue/jaw claudication, increased erythrosedimentation rate). Thirteen patients were receiving high doses of steroids prior to the study. All examinations were conducted by technicians experienced in the use of 18 MHz probes. The presence of halo was considered when detecting periarterial hypoechoic areas measuring over 0.5 mm in the sagittal diameter. Then the biopsy was performed. The correlation between ultrasound findings, clinical symptoms and pathological diagnosis was determined by the Spearman rho test. Results for the presence of periarterial halo and arterial occlusion showed a sensitivity of 53.3% and 20.0% and specificity of 91.9% and 100% respectively. Also, high sensitivity and specificity values were found in relation to clinical symptoms. From the results it is concluded that in patients that do not present 3 or more symptoms and have a negative ultrasound test, the attending physician may be certain that there is no temporal arteritis. At the same time, the presence of highly suspicious symptoms along with positive data in the image study suggest the possibility of initiating treatment without performing a biopsy. These results support the argument against performing a biopsy as a first step when giant cell arteritis is suspected, and investigators add that the study may be highly beneficial in the follow-up to document regression of the arteritis with steroid treatment. The authors suggest further multicenter studies of a larger scale to confirm the findings.

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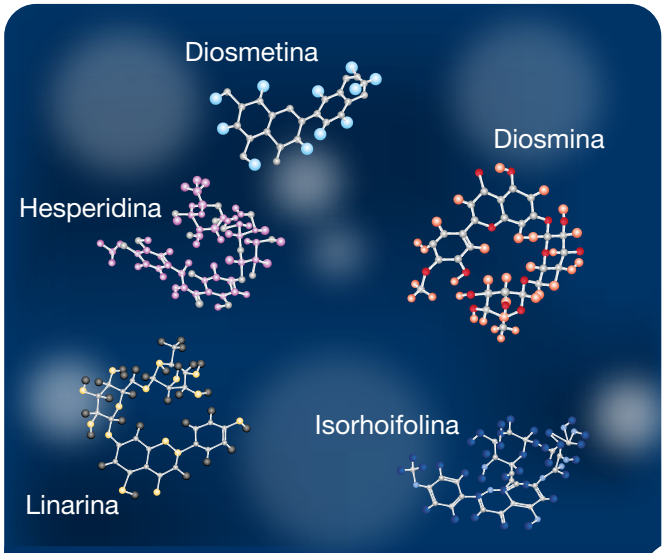

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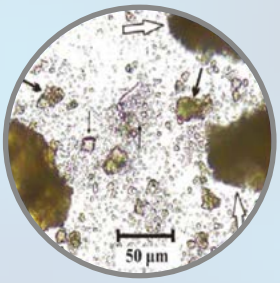

Presencia total de gránulos:
10-20 micras (flecha angosta negra) - 20-30 micras (flecha ancha negra) más de 50 micras (flechas huecas) - X400

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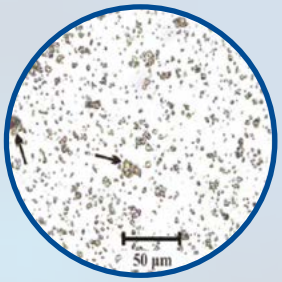

2 µm
Mayor número de gránulos con un tamaño no mayor a 5 micras. Ausencia de gránulos con tamaño mayor a 10 micras. - X400

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*Estudio realizado por el Dpto. de Farmacología Clínica y Farmacia Clínica, Universidad Nacional de Farmacia, Jarkov, Ucrania comparando dos productos similares a Daflon en dicho país.

DAFLON 1000 mg comprimidos recubiertos y DAFLON 1000 mg Suspensión Oral
Composición Daflon 1000 mg comprimidos recubiertos: Cada comprimido recubierto de Daflon 1000 mg contiene: Fracción flavonoide purificada y micronizada: 1000 mg (Correspondiendo a: Diosmina 90 %: 900 mg y Flavonoides expresados en hesperidina 10%: 100 mg). **Excipientes**: Carboximetilalmidón sódico, celulosa microcristalina, gelatina, estearato de magnesio, talco. **Recubrimiento:** dióxido de titanio (E 171), glicerol, laurilsulfato de sodio, macrogol 6000, hipromelosa, óxido de hierro amarillo (E 172), óxido de hierro rojo (E 172), estearato de magnesio. **Composición DAFLON 1000 mg Suspensión Oral:** Cada sachet de 10 ml de Daflon 1000 mg contiene: Fracción flavonoide purificada micronizada: 1000 mg (Correspondiendo a: Diosmina 90%: 900 mg y Flavonoides expresados en Hesperidina 10%: 100 mg). **Excipientes:** Malitol en polvo, goma xantan, benzoato de sodio, aromatizante de naranja, ácido cítrico, agua purificada. **Acción terapéutica:** Vasculoprotector. **Indicaciones:** Tratamiento de las manifestaciones de la insuficiencia venosa crónica de los miembros inferiores, funcional y orgánica. Sensación de pesadez, dolor, calambres nocturnos. Tratamiento de los signos funcionales relacionados con la crisis hemorroidal. Contraindicaciones: Hipersensibilidad a las sustancias activas o a alguno de los excipientes. **Advertencias y precauciones de empleo:** La administración de este producto no imposibilita el tratamiento específico de otras enfermedades anales. Si los síntomas no disminuyen rápidamente, debe practicarse un examen proctológico y el tratamiento debe ser revisado. Embarazo: No hay datos o estos son limitados relativos al uso de fracción flavonoide purificada micronizada en mujeres embarazadas. Los estudios realizados en animales no han mostrado toxicidad para la reproducción. Como medida de precaución, es preferible evitar el uso de Daflon durante el embarazo. Lactancia: Se desconoce si el principio activo/los metabolitos se excretan en la leche materna. No se puede excluir el riesgo en recién nacidos/niños. Se debe decidir si es necesario interrumpir la lactancia o interrumpir el tratamiento tras consideran el beneficio de la lactancia para el niño y el beneficio del tratamiento para la madre. **Reacciones adversas:** Trastornos del sistema nervioso: Raras: mareos, dolor de cabeza, malestar. Trastornos gastrointestinales: Frecuentes: diarrea, dispepsia, náuseas, vómitos. Poco frecuentes: colitis. Frecuencia no conocida: dolor abdominal. Trastornos de la piel y del tejido subcutáneos: Raras: erupción cutánea, prurito, urticaria. Frecuencia no conocida: edema aislado de la cara, labios y párpados. Excepcionalmente, edema de Quincke. P**osología y forma de administración:** Posología usual: un comprimido recubierto/ sachet por día preferiblemente por la mañana. Crisis hemorroidal: 3 comprimidos recubiertos/ sachets al día durante los primeros cuatro días y después 2 comprimidos recubiertos/sachets al día durante tres días. La ranura sirve únicamente para fraccionar y facilitar la deglución pero no para dividir en dosis iguales. MAMS Cert Nº 40.987. Daflon 1000 comprimidos: Elaborado en Les Laboratoires Servier Industrie, Gidy, Francia. Daflon 100 mg suspensión oral: Elaborado en 1-3 allée de la Neste - COLOMIERS Francia. Importado por: SERVIER ARGENTINA S.A. Av. Castañares 3222 (C1406IHS) C.A.B.A. - Tel.: 0800-777-SERVIER (7378437) Directora Técnica: Nayla D. Sabbatella - Farmacéutica. Versión: Enero/2020

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