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Gonçalo Cabral
Cirurgia Vascular – Hospital Beatriz Ângelo, Loures

Congresso SPCCTV 4D Visions 2019 – A consagração da multidisciplinaridade.

SPCCTV 4D Visions 2019 Meeting – The acclamation of multidisciplinarity.

Caros sócios,

Em nome da direcção da Sociedade Portuguesa de Cirurgia Cardio-Torácica e Vascular (SPCCTV), gostaria de agradecer a todos vós pelo sucesso do congresso SPCCTV 4D Visions 2019, que constituiu um motivo de grande orgulho para a direcção em funções. Estou certo que este orgulho será também extensível a todos aqueles que participaram activamente neste evento e que puderam assistir à consagração de um modelo de sociedade científica, que, projectado há mais de 30 anos, se mantém actual e pertinente.

Esta história de sucesso foi possível graças à modernização do conceito de sociedade multidisciplinar e do próprio formato do congresso anual, mas assenta em dois pilares essenciais e inabaláveis: o respeito entre todas as especialidades que a integram e a capacidade de acompanhar a evolução de cada uma das suas componentes, indo sempre de encontro às expectativas dos sócios.

É esta a essência de uma sociedade que respeita as diferenças, potencia as mais-valias e renega o protagonismo de qualquer uma das suas partes em prol de uma instituição coesa, que prospera na força da união.

Este espírito de partilha entre três especialidades distintas, mas afins, promove o pensamento livre, a discussão franca e a isenção que caracterizaram este congresso.

Mas, a medida do sucesso deste evento é facilmente objetivável:

- pelo recorde de participação, com mais de 400 inscritos;
- pela qualidade dos cerca de 100 trabalhos submetidos e apresentados;
- pela excelência dos eventos pré-congresso, incluindo a 5ª edição do prestigiado Thoracic Aorta Lisbon Symposium (TALS), que contou com um painel de convidados de referência;
- pela participação dos clubes de internos de Cirurgia Cardíaca, Torácica e Vascular, com a capacidade de mobilização, criatividade e organização que os caracteriza;
- pelo entusiasmo com que a Sociedade Portuguesa de Cardiologia, o Grupo de Estudos do cancro do pulmão e todos os participantes das sessões dedicadas à Medicina Translacional contribuiram para alargar a multidisciplinaridade;
- pela inovação permanente, com a criação de novos conteúdos que irão seguramente fazer parte da imagem de marca deste congresso no futuro, como é o caso do *Best Science Quiz*;
- e, por último, pelo ambiente de saudável convívio que se viveu ao longo de três dias intensos.

A SPCCTV está a crescer, não só no número de sócios, mas sobretudo na suas dimensões subjectivas, como são a identificação de cada uma das especialidades com a sociedade e a percepção por parte dos sócios de que a SPCCTV é feita por eles e para eles.

Mais do que uma sociedade centrada em individualidades, tenho em crer que, juntos, construimos uma sociedade centrada nos verdadeiros responsáveis pelo dia-a-dia da Cirurgia Cardíaca, Torácica e Vascular nacional. Uma sociedade simples e despretensiosa.

Contamos com todos vós para no novo ano continuarmos a construir uma SPCCTV mais forte.

Gonçalo Cabral | Vice-Presidente da SPCCTV

EDITORIAL

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Health planning – A global perspective

The term health planning can cover a wide range of different activities from long term strategic planning for a whole system to the short-term development of a service and from human resource and financial planning to planning interventions to meet population needs. Moreover, it can be undertaken in very different ways. All methodologies have weaknesses and, in reality, most changes and improvements in health come about through political action, the leadership of clinical and other entrepreneurs, learning by doing and the careful application of improvement science.

Health planning is a term which can be used to describe a multitude of different activities. These include the creation of strategic, operational, budgetary, capacity, service, human resources and technology plans and much more. It can also cover different time scales with, for example, annual plans, 3 years plans and longer strategic plans. Moreover, planning may also be undertaken at local, regional, national or international levels with many countries allocating different planning responsibilities at these different levels and setting out how they relate.

The way planning is undertaken is also very variable. However, a quick overview globally suggests that most health planning is very technocratic in nature and undertaken by specialist trained groups of staff rather than by practicing clinicians and managers and with relatively little engagement of the public and wider stakeholders. Moreover, most planning is concerned with service provision. Health and health care are profoundly affected by other sectors and need to be seen in the context of education, housing, employment, environmental policies and all the other external factors that help determine the health of individuals and populations. An important part of health planning, therefore, is the extent to which it takes account of these wider issues. This has led many planners to aim for a Health in All Policies approach where other sectors are involved in assessing their own policies in order to maximize their health impact.

This breadth of issues also raises questions about governance and accountability and the extent to which external stakeholders are involved in both. Planners need to be thinking about questions such as the following. To what extent are representatives of external sectors, education or social care for example, directly involved in the decision making and governance of health planning and health care delivery and not just consulted for their opinion? How far is the health sector accountable to these wider stakeholders and the public and not just to its funders and patients?

The relationship between planning and implementation is also of fundamental importance and can take a number of different forms. Some plans barely refer to implementation – reflecting the fact that the planners and the implementers in a health system are often two distinct groups - while others offer detailed prescriptions. This latter approach may be equally unpopular with the people who have to implement the plans because it may offer no flexibility and freedom of maneuvers. There is a balance to be struck here between making sure that plans are implementable, piloting or road testing them for example, and leaving the implementers the scope to learn and adapt as they implement. In doing so they will encounter obstacles and discover unforeseen opportunities.

Planning and reality

Plans, even those that are very well conceived and designed, may not be implemented for a variety of different reasons. Sometimes plans are unsuccessful because of problems with the planning process itself. They might, for example, have not been tested properly; people who are key to implementation may not have been consulted and may not cooperate; or the implications for support services may not have been fully understood. There can also be external problems: politics and unexpected events can intrude and mean plans have to be changed; key individuals from the health minister onwards may change and commitment to

the plans can be lost; or other priorities may arise that mean plans are not followed through.

Continuity and long–term commitment are particularly important in health planning where results are often not immediate but require years of determined work. Health care planners in every part of the world can point to examples where these external factors have undone months of hard work. Similarly, there are examples where consistent political will, sticking to the plan and continuity of personnel have led to major improvements. The enormous improvements in health in Portugal since 1974, particularly in child and maternal health, are a testament to the importance of political will, public support and good leadership over many years.

Some of the most impressive improvements in health care have come about through processes which hardly seem to involve any planning at all but, rather, depend on the continuous testing and adapting of ideas until they achieve the desired results. The model breaks down all the rigidities of the traditional system with new roles for professionals and patients, home and community-based care and extensive use of it.

Health planning is at its best when it deals with evidence and priorities, seeks answers to these strategic questions and – something that is sometimes missed – brings people together to build consensus. Planning together can be an enormously important prelude to working together. Planning is at its worst when it deals inadequately with implementation or attempts to prescribe in detail what they need to do to deliver the plans. As health planners with their planning and policy cycles know very well, planning needs to be dynamic, responsive and inclusive.

Looking forward I would argue that health planning needs to develop in two different ways. Firstly, it needs a better understanding of implementation, the role of leadership and the development of relationships. These understandings will help improve and develop the whole doctrine of planning. They need to be built on improved skills and an understanding of the science of improvement. Secondly, the whole agenda needs to be widened and thought about in a different way. This built on the growing understanding of the social and wider determinants of health in recent years which are at last being incorporated into policy and planning globally and beginning to find their way into action on the ground.

Health planning in the future needs to look at these wider aspects as well as at its traditional territory of health need, services, financial flows and the professional workforce.

Miguel Guerra | Editor-in-Chef

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Frozen elephant trunk: The elephant has entered the room, and it´s not leaving

Frozen Elephant Trunk (FET) is a procedure in which the ascending aorta, arch and proximal descending aorta are substituted with a hybrid prosthesis. It's difficult to think of a more extensive surgery in adult cardiac surgery apart from open thoracoabdominal procedures, since all the territories involved are vital to the patients cerebral, spinal and lower body functioning. How, then, can we correct pathologies in these locations, without injuring the heart, the brain, the spine and all that's distal to the diaphragm?

FET has first been described using two separate prosthesis more than 18 years ago, after lessons learned from the fresh elephant trunk experience and the then recent TEVAR. In these first cases, in the setting of type A dissection or Crawford type 2 or 3 aneurysms with additional arch aneurysms, surgeons did an anterograde TEVAR through an open arch and then substituted the arch with a conventional vascular prosthesis. In these first cases there was a clear advantage over fresh elephant trunk technique since the prosthesis on the descending aorta did not thrombose, and was very easy to get a wire into later, in contrast to fresh elephant trunk, for later extension TEVAR.

FET has been growing worldwide, and one of the two available prosthesis (E-VITA open plus, the other being Thoraflex) has now a worldwide registry with more than 450 patients whose results have been published in 2013. This goes to show that FET, despite being a complex operation, is no longer a last resource "rare" operation.

Lareiro *et al* have come forward to show their centre's results with E-Vita Open Plus. Other Portuguese centers have had a larger experience, some with numbers of patients into the dozens. But the article presented in this issue of RPCCTV is especially interesting for some reasons. First, it shows the initial experience of a smaller center that felt they lacked the ability to answer some of their patients needs, acted on it, and were able to deliver good results to their patients. Second, it shows that FET is extending to the national territory from north to south. Third, it raises the question if FET should be extended to all cardiac surgeons or if it should be strongly restricted to a few centres.

The right answer is probably somewhere in the middle. While FET is not a simple operation, with significant risks and a restricted cerebral perfusion time, it still is somewhat reproducible and standardized (in most anatomies). On the other hand, type A and arch dissections continue to exert most of it's early mortality through tamponade and visceral malperfusion, and because index mortality has improved, long term extensive thoracoabdominal aneurysms are on the rise. FET allows an improved control on the proximal descending aorta, depressurizing entry tears in this location, diminishing malperfusion, likelihood of malignant chronic aortic evolution, and greatly facilitating later endovascular treatment.

We have seen a continuous improvement in results of FET in acute dissection, probably due to more extensive experience in elective cases. As elective cases get better results, no doubt surgeons will also feel more at ease with emergent cases. The current paper by Lareiro *et al* shows how planning may help teams avoid having a learning curve fraught with accidents and morbidity/mortality. The authors are to commend for obtaining such good results in a small series with sparse patients over a few years. We believe that FET is an essential tool in the treatment of some subsets of acute type A dissection and extensive aneurysms, and should probably be available in every Center that performs emergent aortic surgery. As we are demanded better results in the future, so our offer to patients will improve, and in public hospitals we believe FET will have a central role and will be widespread (the same cannot be said for fresh elephant trunk probably). The first step is the one that Lareiro *et al* have taken - careful initial experience with patient selection allows excellent results.

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COMENTÁRIO EDITORIAL

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Total arch replacement with hybrid prosthesis – The best solution for a complex problem

The treatment of multisegment aortic pathology, involving the ascending, arch and the descending aorta remains a challenge in the domain of aortic surgery. There have been used multiple approaches to treat these complex patients: sternotomy, left thoracotomy, clam-shell incision or as a two-staged operation with both sternotomy and lateral thoracotomy (elephant trunk procedure and completion). In addition to the surgical approach, deep, and more recently, moderate hypothermic circulatory arrest with antegrade cerebral protection have been key additions to the global operative strategy that greatly improved the outcomes.

Besides these procedural aspects, the available prosthesis to replace the aorta have evolved and after initial experiences with custom made devices, the prefabricated Jotec™, now CrioLyfe™ E-VITA Open Plus™ was introduced. Later, other prefabricated FET hybrid grafts were available in clinical practice.[1,2] The concept of a hybrid prosthesis has turned a staged procedure into a single one but making possible to extend it with an endovascular approach, if needed. Besides, as the prosthesis is a single tube, with a sewing collar in the transition between the "surgical" and the "endovascular" portions, the distal anastomosis is somehow protected from the blood pressure. This single aspect is determinant to avoid bleeding in the distal anastomosis, which was a big problem in the past.

Besides open surgery, the endovascular stent graft technology introduced in 1998[3] has enabled the treatment of the descending aorta. However, a totally endovascular treatment of the aortic arch pathology is challenging because of the supra-aortic vessels. Simultaneous perfusion of all supra-aortic arteries without longer cerebral ischemia time, while trying to avoid cerebral embolization, makes endovascular aortic arch repair with top level of technical complexity and surgical expertise. There are also hybrid options, as the debranching procedures, who still remain a useful alternative, avoiding or reducing extracorporeal circulation time or cardiac arrest, which may be beneficial in high-risk patients that otherwise would be rejected for treatment.[4]

However, endovascular techniques are rapidly developing for ascending aorta and arch repair, as demonstrated by the first endo-Bentall procedure, presented last PCR London Valves, in 2019.[5] Moreover, some cases have reported successfully endovascular treatment of ascending aorta aneurysms in very high risk patients.[6]

In this field of rapid expanding endovascular and transcatheter solutions, as usually, there may not exist only one solution for a given problem. Instead, Cardiac and Vascular Surgery teams dealing with aortic pathology will have an increasingly bigger toolbox, in order to tailor the therapy for each patient.

For now, open repair still stands as the first-line treatment, but the endovascular aortic arch approaches are valuable options for a patient who is high-risk or unfit for open repair.

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COMENTÁRIO EDITORIAL

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Gaps in evidence and role of direct oral anticoagulants

This current issue of Revista Portuguesa de Cirurgia Cardiotorácica e Vascular presents a critical review on the current evidence and clinical utility of Direct Oral Anticoagulants (DOACS). Antunes L.[1] sheds light in areas who are still fuzzy on the literature, as the subject cancer and deep venous thrombolembolism.

The author concludes DOACs are the first option of treatment in cancer patients with low risk of bleeding (exclusion of oesophageal, gastrointestinal and genitourinary cancers), and LMWHs in patients with high risk of bleeding, referring to the randomized trials and guidelines on the subject.[2,3]

In other several indications such as atrial fibrillation, DOACs almost completely replaced VKA for treating and preventing first or recurrent events. However, there seems to be pathologies where DOAC are inferior to VKA, and conditions where a gap in evidence seems deep-seated.

Given the paucity of information regarding the use of DOACs, observational data is vast and should be viewed as hypothesis-generating. Exposing a crippling failure of these drugs, current practice guidelines also stipulate that DOACs are contraindicated in patients with mechanical heart valves largely on the basis of a single phase 2 trial of dabigatran which was stopped prematurely because of excess harm associated with this oral antithrombin.[4]

Conditions such as severe Antiphospholipid syndrome or extreme obesity presumably require more care on the selection of the specific antithrombotic treatment. On this matter, the author addresses specifically the failed TRAPS Trial.[5] The study reports the use of rivaroxaban in high-risk patients with antiphospholipid syndrome was associated with an increased rate of events compared with warfarin, thus showing no benefit and excess risk. Antunes points some of the reasons why the trial failed, regarding the higher levels of anticoagulation practised with warfarin. Perhaps higher doses of DOACs, or a twice daily DOAC could perform differently.

Currently, there are five DOACS in clinical use, including four factor Xa inhibitors (apixaban, edoxaban, betrixaban, and rivaroxaban), and one direct thrombin inhibitor (dabigatran). None of these has EMEA approval for use in children. The preliminary results from EINSTEIN Junior (NCT02234843), revealed equivalent efficacy and safety profile of rivaroxaban vs warfarin in a paediatric population with VTE. The final manuscript is yet to be published, thus the medical community awaits anxiously.

A broad discussion of results within the medical community has been standing out for the past 10 years regarding anticoagulation, and no area has been the target of so much RCTs, fortunately, since anticoagulation is an appealing resource in a panoply of specialties. Science and clinical interests have been correctly blended with pharmaceutical interests, however, the first DOAC patent is going to fall in 2021, which means clinicians will have to make an additional and joint effort to fill the recurring and ever-growing gaps in evidence with quality investigation. More pragmatic randomized trials are necessary, beyond doubt, knowledge comes with experience.

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Spontaneous pneumomediastinum: Recognizing a rare encounter with a benign condition!

The presence of air in the mediastinum is designated pneumomediastinum (PM), and was first described in 1827 by Laenek.[1] The PM may be primary, also called spontaneous or secondary. In contrast to the secondary PM, primary PM is not triggered by trauma or iatrogenic maneuvers.

The spontaneous pneumomediastinum (SPM), is also known as Hamman's syndrome for it was first described in 1939 by Louis Hamman.[2] It arises by the increased intra-thoracic pressure which triggers cellular rupture and dissection of the interstitial space and bronchovascular sheaths towards the mediastinum (Macklin effect).[3] About 76% of the patients are male (7/10 cases), with an incidence of 1/25000 between 5-34 years old.[1]

Typically, the patient has underlying disease (asthma, COPD, interstitial diseases, smoking habits, inhalation of illicit drugs), which makes him more susceptible, or events may occur which precipitate the onset of pneumomediastinum (vomiting, cough, respiratory infection, valsava maneuver defecation, labor, and rarely ARDS, balloon filling or use of wind instruments).[4]

The patients can present with a wide range of symptoms, from cervical and/or thoracic subcutaneous emphysema (70%), chest pain, dyspnea, Hamman's sign in cardiac auscultation (synchronous clicks with heartbeat) up to signs of cardiogenic shock and respiratory failure.[1,5]

The non-specificity of the symptoms can lead to other diagnoses, so the incidence of SPMs may be undervalued.[1]

In the absence of obvious signs and symptoms and history, the distinction between primary and secondary pneumomediastinum becomes difficult. Since the secondary PM can quickly lead to complications, it becomes imperative to exclude secondary causes.[1,6] To this end, it may be necessary to perform upper endoscopy and bronchoscopy beyond the chest X-ray and / or thoracic CT to exclude tracheobronchial tree or esophageal perforation.[1,4]

Spontaneous PM is considered a benign entity with an excellent prognosis, and its approach is mostly conservative. The patient will be admitted for observation, and usually progresses with imaging and clinical improvement in 24 to 48 hours.

The diagnosis of spontaneous PM should be taken into account in the emergency room, especially in younger patients presenting with chest pain and / or suggestive underlying pathology, even in the absence of other obvious symptoms. Often, the presence of chest pain (60-100%) is assumed as muscle pain or other diagnostic.[1]

The discussion of PM should be multidisciplinary, including thoracic surgeons. This is essential not only because PM is infrequent, but also because the decision to have a conservative approach or to have a more exhaustive approach to exclude secondary causes, performing more invasive tests, is not always easy.

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ARTIGO ORIGINAL ORIGINAL ARTICLE

TOTAL AORTIC ARCH REPLACEMENT WITH E-VITA OPEN PLUS™ HYBRID PROSTHESIS – INITIAL EXPERIENCE FROM A SINGLE SURGICAL CENTER

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Abstract

Background: *Complex pathology of the Thoracic Aorta constitutes a challenge, needing a complex and multidisciplinary approach. The hybrid stent graft prosthesis E-vita OPEN PLUS™ avoids a two-stage surgical approach in the surgical treatment of complex thoracic aortic disease. The E-vita Open Plus™ is estimated to generate cost savings compared with current two-stage repair from about 2 years after the procedure.*

Methods: *Between February 2017 and July 2019, a total of 6 patients, underwent one stage surgery for treatment of multisegmental thoracic aortic disease with hybrid stent graft prosthesis E-vita OPEN PLUS™*

We collected the data from our records and compared them to the International E-vita Open Registry (IEOR), regarding ischemic and operative times as well as adverse events monitored during follow-up.

Results/Discussion: *The average patient age was 56 years (range: 36-76 years). The average Cardiopulmonary Bypass, Aortic Cross Clamping and Circulatory Arrest times where 204, 86 and 63 minutes respectively.*

The recovery after procedure had fewer complications and the length stay was less than described in literature. There was no in-hospital mortality.

In all patients there was a reduction of aneurysm sac size and positive aortic remodeling and all where asymptomatic in regard to cardiovascular symptoms.

Conclusions: *The use of E-vita OPEN PLUS™ seems a safe and efficient option for patients with complex aortic arch pathology. In our experience, surgery allowed treatment of extensive thoracic aortic diseases with satisfactory short- and mid--term results.*

INTRODUCTION

Type B aortic dissection (TBAD) with arch involvement (also called a non-A non-B aortic dissection) is a severe, life-threatening condition. By combining open surgical and endovascular techniques, the hybrid approach has emerged as the preferred treatment option for this challenging disease. The hybrid concept entails reimplantation or bypass of all epiaortic vessels to create an adequate proximal landing zone suitable for thoracic endovascular aortic repair (TEVAR). However, the outcome of patients with TBAD treated with complete surgical debranching in the native ascending aorta and subsequent TEVAR is unsatisfactory, resulting in a mortality rate of 27-70%.[1,2] Consequently, the therapeutic management of complicated TBAD by open arch replacement with Frozen Elephant Trunk (FET) placement is becoming the first line treatment in many leading centers for aortic surgery.

E-vita OPEN PLUS™ is one of the FET prosthesis available, it is a hybrid stent-graft system, used in the treatment of Aortic dissections Stanford type A, Complex Stanford type B, Aortic arch aneurisms and chronic extensive thoracic aortic dissections. Available evidence suggest that E-vita OPEN PLUS™ for treating complex aneurysms and dissections of the thoracic aorta could remove the need for a second procedure and the associated risk of serious complications.[3] The E-vita OPEN PLUS™ is estimated to generate cost savings compared with current two-stage repair from about 2 years after the procedure.[3]

METHODS

The purpose of this article is to present the initial experience of the CHVNG/E Cardiac Surgery Department in the use of the E-vita OPEN PLUS™ in the treatment of multisegmental thoracic aortic disease. Between February 2017 and July 2019, 6 patients underwent E-vita OPEN PLUS™ implantation in our department.

Surgery was performed with cardiopulmonary bypass, total circulatory arrest, moderate hypothermia (24ºC), Bretschneider's HTK anterograde or retrograde cardioplegia, selective anterograde cerebral perfusion and noninvasive neuromonitoring.

The selective bilateral anterograde cerebral perfusion was performed by direct cannulation of the arterial brachiocephalic trunk and the left carotid, with temporary occlusion of left subclavian artery. The perfusion was set to 10mL/kg/min @ 40-80mmHg and then adjusted accordingly the neuromonitoring.

Anesthetic management include noninvasive neuromonitoring in all patients using a Near Infrared Spectroscopy (NIRS): an INVOS® monitor is able to provide information about the regional oxygen saturation within the microcirculation. It is applied to the forehead and reflects the trend of median oxygen saturation of the frontal lobes bilaterally so we can access the quality of the anterograde selective cerebral perfusion in both sides, in real time. Bispectral Index (BIS) monitor was also used to access depth of anesthesia using electroencephalogram activity. This monitor can also act as a surrogate to access ischemia as electroencephalogram activity diminishes or even disappears when blood flow is insufficient or absent. We use the information provided by these monitors to adjust cerebral perfusion or detect any complication throughout the procedure.

We collected the data from our records and compared to the International E-vita Open Registry (IEOR) that was initiated in 2008 to study the principles of this treatment algorithm. The IEOR represents the first database to evaluate aortic disease after hybrid stent-grafts.

RESULTS

In the 30-month period 6 patients were submitted to the procedure. From the data collected from our records we produce 4 tables, in 2 of them we compare our results with the International E-vita Open Registry (IEOR). The Table 1 shows the baseline characteristics of our patients.

The indications were:
- Chronic Stanford type A aortic dissection (2);
- Multisegmental thoracic aneurysmal disease (3);
- Ascending aorta, aortic arch and right subclavian artery aneurism in tertiary syphilis.

Table 1 **Baseline characteristics of CHVNG/E and International E-vita Open Registry.[4]**

Baseline characteristics	CHVNG/E, Portugal		IEOR
	n patients	%	%
Age - (Mean ± SD)	56 ± 14		57 ± 13
Age > 70 years	1	17	17
Male	3	50	77
BMI (kg/m2) - (Mean ± SD)	24,5 ± 4.4		26 ± 4
ASA physical status ≥ 3	5	83	n.a.
Coronary artery disease	1	17	12
Ejection Fration < 60%	3	50	41
Previous cardiovascular surgery	3	50	36
Hypertension medication	4	67	78
Diabetes mellitus	1	17	5
Creatinine > 2mg/dL	1	17	13
Chronic Obstructive Lung Disease	1	17	20
History of Stroke	1	17	5
Loeys-Dietz Syndrome	1	17	n.a.
Syphilitic aortitis	1	17	n.a.

The mean and SD age of the patients was 56±14 years, 3 males and 3 females.

All where elective procedures: 2 of them were reoperations and 4 surgeries had concomitant procedures (aortic valve replacement, aortic prosthesis replacement and extra-anatomic bypass of aorta to right subclavian artery and right carotid artery, tricuspid valve repair).

Mean Cardiopulmonary Bypass (CPB), Aortic Cross Clamping (ACC) and Circulatory Arrest times where 204, 86 and 63 minutes respectively. There was no in-hospital mortality.

There was a patient that had an increase in creatine level after surgery but resolved with medical treatment, and did not require dialysis.

One of the patients had heparin resistance, so we had to administer Fresh Frozen Plasma (FFP) to maintain the Activated Clotting Time (ACT) above 400 seconds during CPB which justifies the greater range of FFP on Table 2.

We only gave red blood cells to one patient, all the other procedures did not require red blood cells transfusions.

One of the patients had his aneurysmal disease discovered when being studied for upper right limb paresthesia. The patient had an aneurysmal disease, due to syphilitic aortitis, involving ascending and aortic arch including brachiocephalic trunk (till distal segments of the right subclavian) and until emergence of left subclavian artery. Five months after the procedure where an extra anatomic bypass was made from the aorta to the right subclavian and carotid arteries (Figure 1) the patient maintained hypoesthesia in territory C6-T2 and distal brachial monoparesis grade 5, wrist dorsiflexion and finger grip grade 2, (that was the only peripheral neurologic complication considered on Table 2).

After discharge morbidity: we have one patient with endoleak type III with TEVAR correction with

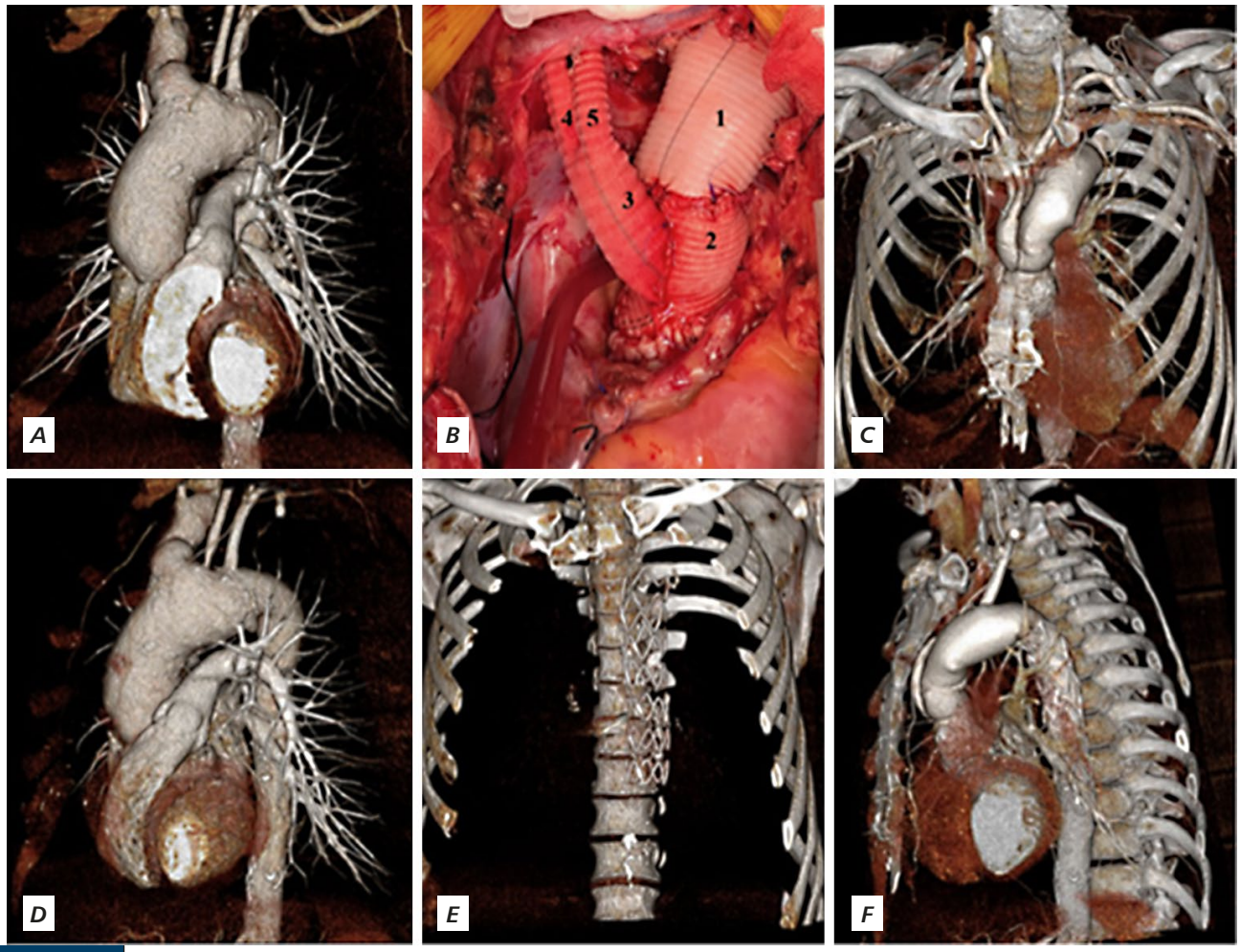

Figure 1

*Total arch replacement Evita Open Plus® #30 (1) + ascending aorta replacement Hemashield® #30 (2) + Aortic valve replacement SJM Regent® + extra-anatomic ascending aorta to right carotid and subclavian arteries Hemagard Knitted® #14*7 (3) + ligation of Innominate artery + island reimplantation of the right subclavian (4) and right common carotid (5) arteries.*
A and D – Preoperative computed tomography image showing ascending aorta and brachiocephalic trunk aneurysm due to syphilitic aortitis
B – Intraoperative photo showing extra anatomic bypass from the aorta to the right subclavian and carotid arteries
C and F – Postoperative computed tomography image showing surgical correction
E – Postoperative computed tomography image showing E-vita OPEN PLUS™ prosthesis

Table 2 **Surgical and postoperative characteristics**

Operative		Number	%
Indications	Aortic Dissection: Stanford Type A	2	33
	Aortic Dissection: Stanford Type B	1	17
	Aortic Aneurism	3	50
Concomitant surgery	CABG	0	0
	AVR	4	67
	None	1	17
Surgical data		**Minutes (mean)**	**Range**
Total Surgical time		429	(203-600)
Cardiopulmonary Bypass time		204	(135-310)
Aortic Cross Clamp time		86	(68-115)
Circulatory Arrest time		63	(22-82)
Blood Product usage		**Units (mean)**	**Range**
Red Blood Cell (250ml)		0.67	(0-4)
Fresh Frozen Plasma (200ml)		5	(2-11)
Platelets (60ml)		7	(0-14)
Fibrinogen		1.67	(0-4)
Prothrombin Complex Concentrate		0.33	(0-2)
Complications		**Number**	**%**
Supraventricular tachycardia		1	17
Recurrent laryngeal nerve palsy		0	0
Pleural effusion		0	0
Renal failure (acute, non-dialysis)		1	17
Peripheral neurologic complications		1	17
Pneumonia		0	0
ARDS		0	0
Stroke		0	0
Tracheostomy (prolonged ventilation)		0	0
Re-exploration		0	0
Readmission		1	17
Death		0	0
Length of stay		**Days (mean)**	**Range**
UCI		4	(3-6)
Total		**10**	**(6-18)**

CABG - Coronary Artery Bypass Grafting | AVR - Aortic Valve Replacement

subsequent low flow type II endoleak; and a pericardiocentesis for pericardial effusion. There have been no other readmissions for cardiac related morbidity.

DISCUSSION

The case for adopting the E-vita OPEN PLUS™ for treating complex aneurysms and dissections of the thoracic aorta, in a carefully selected group of people, is supported by the evidence.[6] Using the E-vita OPEN PLUS™ has advantages: this approach can simplify the surgical procedure, could remove the need for a second procedure and the associated risk of serious complications, and it should therefore be considered for people: who would otherwise need a two-stage repair procedure because their aortic disease extends into or beyond the distal part of their aortic arch (into the proximal descending aorta), but who would not need additional intervention (such as stent grafting) in the descending aorta.

The largest series published on E-vita is the International E-vita Open Registry (IEOR).[5]

Our results (Table 4) reveal slightly lower average patient age. The times found in our cases was similar to the ones found on literature, or even shorter. Our center adopted the island technique for arch vessel re-implantation, as we think is the best compromise between functional outcome and reduced circulatory arrest time. This technique could justify the shorter circulatory arrest times.

Regarding neuroprotection, in all patients, we provided moderate hypothermia (24ºC) with bilateral anterograde cerebral perfusion and a very careful de--airing. An important part of the procedure, to obtain good outcomes, is anesthetic management, in this respect neuromonitoring is vitally important. In all patients a BIS and an INVOS® monitor were used to access the trend of median oxygen saturation in the brain bilaterally, so we can access the quality of the anterograde selective cerebral perfusion in both sides, in real time. All this measures can help justify the absence of central neurological complications and the good neurologic outcomes, in our series.

None of the patients required more than 72h of ventilatory support.

Only one patient required aminergic support more than 24 hours and only one required red cell transfusion.

The recovery after procedure had fewer complications and the length of stay was less than described in literature.

Table 3 **Data recorded from intra and postoperative periods**

Intraoperative		n patients	%
Aminergic support	Noradrenaline	1	17
	Dobutamine	1	17
Blood Product usage	Red Blood Cell	1	17
	Fresh Frozen Plasma	6	100
	Platelets	5	83
	Cryoprecipitate	0	0
	Fibrinogen	3	50
	Prothrombin Complex Concentrate	1	17
Sinus Rhythm at end of surgery		5	83
Postoperative		**n patients**	**%**
Aminergic support > 24h		1	17
Intubation > 72h		0	0
Renal failure (acute, non-dialysis)		1	17
Re-exploration		0	0
Low output syndrome		0	0
Visceral ischemia		0	0
Stroke		0	0
Spinal cord injury		0	0

Table 4 **Comparison of CHVNG/E experience with International E-vita Open Registry[5]**

Comparative Table	CHVNG/E	IEOR
Age (years)	56	60
Male patients (%)	50	74
CPB time (min)	204	235
Circulatory Arrest Time (min)	63	134
Renal failure (%)	17	26
Stroke (%)	0	6
Re-exploration (%)	17	14
Spinal cord injury (%)	0	8
Prolonged ventilation (%)	0	33
Mortality (total) (%)	0	27
Mortality (hospital) (%)	0	14
Mortality (30 day) (%)	0	12
Length of stay (days)	10	19

In all patients there was a reduction of aneurism sac size and positive aortic remodeling and all where asymptomatic in regard to cardiovascular symptoms.

CONCLUSIONS

The use of E-vita OPEN PLUS™ seems a safe and efficient option for patients with complex aortic arch pathology, providing for a technically easier surgery in comparison to the conventional prosthesis.

In our experience, surgery allowed treatment of multisegmental thoracic aortic disease with satisfactory short- and mid-term results. Despite the short follow-up period, patients are asymptomatic and have evidence of aneurysmal sac involution and positive aortic remodeling.

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ARTIGO ORIGINAL ORIGINAL ARTICLE

THE PERIPHERAL ARTERY QUESTIONNAIRE: VALIDATION OF THE PORTUGUESE VERSION

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Abstract

Peripheral Arterial Disease (PAD) is a prevalent condition that predisposes the patients to major cardiovascular events. The majority of patients are asymptomatic, however PAD has a great impact in the patients' lifestyle due to its chronic nature. The Peripheral Arterial Questionnaire (PAQ) is a validated tool to quantify the patients' subjective experience of the disease. The aim of this work is to validate the Portuguese version of PAQ.

A retrospective study of 59 patients with aortoiliac disease Trans-Atlantic Inter Society Consensus (TASC) type D from two centers in Portugal was conducted. Only 36 patients were able to answer the PAQ and two Portuguese validated questionnaires – a disease-specific (Walk Impairment Questionnaire – WIQ) and a generic one (EuroQol 5 dimensions – 5 level EQ5D-5L). Convergent validity of the PAQ was evaluated by correlating the extracted PAQ subscales and Summary score with the WIQ subscales and summary score, as with EQ5D-5L Summary score and EQ5D-5L index by calculating the covariance.

The Portuguese version of the peripheral artery questionnaire presented a Cronbach's α for the Summary scale of 0.913. Mean inter-item correlation for the Physical Function domain was 0.471, 0.551 for the Perceived Disability, and 0.464 for Treatment Satisfaction.

In summary, the Portuguese version of PAQ demonstrated a good level of discrimination between patients with or without symptomatic PAD and its severity and was sensitive to the presence of risk-factors relevant for PAD.

INTRODUCTION

Peripheral Arterial Disease (PAD) is a chronic condition with a total disease prevalence of 15% to 20% in population over 70 years[1-3], in which the underlying atherosclerotic process narrows the arteries, predisposing the patient to serious cardiovascular events, such as myocardial infarction and stroke.[4] Intermittent claudication is the cardinal symptom of PAD and the primary target of its therapy.[5] Despite the majority of patients are asymptomatic, they often suffer mentally and physically from the chronic nature of the disease.[5] Therefore, its treatment focuses almost exclusively in the improvement of health status and in the relief of pain, rather than survival or limb preservation.[6] For that reason, and considering the wide variety of treatment options now available to the patient, it is understandable that PAD has a great need, perhaps the greatest need of all cardiovascular diseases, for a disease-specific heath status measure.[7] The measurement of health status is particularly important, given that other outcomes such as limb amputation and death are relatively rare in the current era.[8]

Therefore, in order to characterize patients' health status in a valid, reliable and responsive way to the clinical change, several disease-specific outcome measures have been created. Several questionnaires focus predominantly on the registration of limitations instead of the subjective experience of the disease.[9] This work employs the Peripheral Arterial Questionnaire (PAQ), which has been proved to be useful in the quantification of the health status improvement after peripheral endovascular revascularization.[7,10] This questionnaire was developed for the US population, and it has already been translated and validated for Dutch and Korean populations.[5,9,10] It now consists of a self-administered 20-item health status measure for PAD, that quantifies the symptoms (frequency, severity, and recent change over time), function and quality of life (QoL) of these patients.[7,9] Besides being useful in health status outcomes research, PAQ can be used as a disease management tool in pursuance of patients who are at higher risk for adverse outcomes, and that might benefit from a closer follow-up.[11]

The aim of this work is to validate a Portuguese version of the PAQ in order to promote comparisons of PAD

management and outcomes across different countries. In this way, beyond its translation to Portuguese, PAQ's validity and reliability were analyzed.

METHODS

Between October and November 2017, 47 patients with aortoiliac disease Trans-Atlantic Inter Society Consensus (TASC) type D were contacted in 2 centers in Portugal (Centro Hospitalar São João, EPE (CHSJ) and Centro Hospitalar entre Tâmega e Sousa (CHTS) from a previous retrospective cohort. Out of the original 59 patients of the cohort, 12 had died at the time of the survey.[12] All the remaining 47 survivors were transversely contacted in November 2017 and 36 willingly answered the questionnaire in person. All patients included in this study were evaluated at the participating vascular surgery departments and had undergone lower limb revascularization surgery due to PAD (18 endovascular, 18 open procedures). Endovascular procedures included aortoiliac stenting and open procedures included exclusively aortobifemoral bypass graft. The contact was made by a supervised medical student (AF), specifically trained for the purpose. Furthermore, two language validated questionnaires were simultaneously applied to the population, a disease-specific - the Walking Impairment Questionnaire (WIQ) - and a generic - the EuroQol 5 dimensions – 5 level (EQ-5D-5L) questionnaire.[13,14] At the contact date, patients' median follow-up from surgery was 47,25 (Interquartile Range (IQR) 17,45 – 70,58) months.

The translation was made by two different translators (JRN and AF) whose native language is Portuguese. These translations were combined for making a first agreed-upon translation. Two other members of the bilingual group (MN and JS) then evaluated the quality of this first version regarding clarity and readability and checked for further inconsistencies in the translation. Adaptations upon this evaluation were amended when appropriate. A Pilot study with 10 patients was performed and further adjustments were added. The final version of the Portuguese translation is presented in appendix 1.

Trained research assistants (CHSJ - JRN and JS; CHTS - JRN and AN) obtained data on patient characteristics, cardiac treatments, and the surgical procedure from the patients' hospital files.

The Portuguese version of the EQ-5D-5L was used as a standardized generic instrument for describing and valuing health.[13] This instrument has been used to assess health status across a wide range of chronic conditions, including PAD.[15] A single summary index (EQ-5D index) representing the patients' self-rated health was calculated by the Spanish EQ5D5L index calculator.[16] The results of the EQ-5D in this study were presented using the 5-dimensional descriptive system (EQ-5D index), the weighted index and using the EQ Visual Analogic Scale (VAS) as a measure of overall self-rated health status.[16]

The walking impairment questionnaire (WIQ) has been extensively used in results evaluation in PAD providing detailed information about patient mobility (17). This questionnaire is composed by three domains with a Likert Scale Questions: distance (WIQDistance 2), velocity (WIQVelocity 3) and stairs (WIQStairs 4).[18]

Baseline characteristics were described for the total sample and differences between responders and non-responders regarding these variables were examined using Student's t-tests for continuous variables and Chi-square tests for dichotomous variables to assess for potential selection biases.

Principal components analysis (PCA) was applied to determine the number of factors present in the PAQ. Factors with an eigenvalue of 1.0 or more were retained for further analysis. Oblimin rotation was used to interpret the pattern of loadings on the identified factors. Internal consistency of the factors was examined using Cronbach's α coefficient.

Convergent validity of the PAQ was evaluated by correlating the extracted PAQ subscales and Summary score with the WIQ subscales and summary score, as with EQ5D-5L Summary score and EQ5D-5L index by calculating the covariance.

The analysis was performed using SPSS 25.0 (IBM Corp., released 2017. IBM SPSS Statistics for Windows, version 25.0, Armonk, NY, USA)

The study protocol was approved by the local Ethics Committee (protocol 246 -18) and is in accordance with the Declaration of Helsinki.

RESULTS

A total of 36 (74%) patients answered the questionnaire, 18 who had been previo aortobifemoral bypass graft, and 18 were submitted to aortoiliac stenting. The baseline demographics did not differ, exception for smoking history (P=0.016) (Table 1). Sensivity analysis was performed, responders did not differ from non-responders regarding baseline characteristics (Table 2). The total of missing items in the PAQ was inferior to 1%.

Factor analyses were performed on all PAQ items (except for the first item that indicates the most symptomatic leg). Three factors explained most of the variance in the observed data (using the criterion of eigenvalues above 1.0) and therefore two factors could be retained in the final model (Physical Function; Perceived Disability; Treatment Satisfaction). The first factor explained 51%, the second 12.89%. A more than two factor solution did not add significant value to the interpretability of the data. Items are presented and numbered according to the order of the original instrument. All PAQ items had factor loadings ranging from 0.45 to 0.90.

Internal reliability was documented using Cronbach's α and Inter-item correlation; Cronbach's α for the Physical Function domain was 0.799, for the Perceived Disability domain 0.917, and for the Treatment Satisfaction domain 0.741 (Table 4). The Cronbach's α for the

Table 1 **Demographics considering revascularization**

	ABF (n=18)	Endovascular (n=18)	P=
Sex	100% (18)	94.4% (17)	0.309
Age (mean)	62..5 ± 7.1	66.1 ±10.4	0.241
HTA	83.3% (15)	77.8% (14)	0.674
Smoking	100% (18)	72.2% (13)	0.016
CKD	11.1% (2)	22.2% (4)	0.371
DM2	27.8% (5)	38.9% (7)	0.480
Dislipidemia	50% (9)	77.8% (14)	0.083
CAD	22.2% (4)	22.2% (4)	1.0
CHF	0% (0)	16.7% (3)	0.070
COPD	11.1% (2)	11.1% (2)	1.0
SFA disease	72.2% (13)	72.7% (12)	0.717
Critical ischemia	44.4% (8)	72.2% (13)	0.091
Rutherford classification (mean)	3.72±0.9	4.17±0.9	0.152

ABF: aortobifemoral bypass graft; CAD: coronary artery disease; CHF: chronic heart failure; CKD (creat>1.5mg/dl); COPD: chronic pulmonary obstructive disease; DM2: diabetes mellitus type 2; SFA disease: superficial femoral artery hemodynamically significative atherosclerotic disease.

Table 2 **Sensivity analysis from participants and non-participants**

	No Answer (n=11)	Answer (n=36)	P value
Sex			
Age (mean)	61.45	64.28	0.528
HTA	54.5% (6)	80.6% (29)	0.083
Smoking	100% (11)	86.1% (31)	0.191
Chronic Kidney disease	0% (0)	16.7% (6)	0.147
Diabettes	45.5% (5)	33.3% (12)	0.464
Dislipidemia	81.8% (9)	63.9% (23)	0.264
Coronary artery disease	36.4% (4)	22.2% (8)	0.347
Chronic heart faillure	0% (0)	31.3% (10)	0.099
COPD	18.2% (2)	11.1% (4)	0.539
Femoral superficial artery disease	54.5% (6)	69.4% (25)	0.361
Critical limb ischemia	36.4% (4)	58.3% (21)	0.201
Rutherford classification (mean)	3.55	3.94	0.55

CKD: chronic Kidney disease (creat>1.5mg/dl); COPD: chronic obstructive Pulmonary disease; Femoral superficial artery disease – superficial femoral artery hemodynamically significative atherosclerotic disease.

Summary scale was 0.913. Mean inter-item correlation for the Physical Function domain was 0.471, for the Perceived Disability 0.551, for Treatment Satisfaction 0.464.

DISCUSSION

PAD is a chronic condition with a significant impact in the patients' daily life and overall status. This study sought to translate and validate the PAQ questionnaire for the Portuguese population, which is a useful tool to evaluate the health status after revascularization surgery. The main finding is that PAQ has good clinical validity, discriminating well for the severity of the disease and for the presence of symptoms and risk factors among PAD patients.

Unlike the original instrument, three factors were discerned in the Portuguese version of the PAQ, explaining most of the variance in the observed data (89%). The other

original domains (Symptom, Symptom Stability, Social Limitation, and Quality of Life) were combined in a domain labeled the Perceived Disability domain. The three domains identified in this study were internally reliable. Previous validations found similar results.[9] A two domain approach would also be valid, due to the result, future validation could be performed, although with few practical implications.

The strongest associations of PAD symptoms here observed were with pain and physical limitations, i.e., the PAQ sub-domains of Physical Functioning and Perceived Disability. The correlation and linear correlation between the scores and the Ankle-Brachial index were weak, specially above >0.5. Previous studies have demonstrated a better discriminative ability of disease-specific vs generic questionnaires to detect changes in QoL in PAD patients congruent with the findings of our study, which demonstrated that the PAQ discriminated better between the clinical indices than the generic EQ-5D index.[19]

The convergent validity was established using two questionnaires, a well standardized generic health status questionnaire, the EQ-5D, and a previously language validated disease-specific questionnaire – WIQ (Table 4). Although the EQ-5D index and EQ VAS scale could differentiate between asymptomatic and symptomatic disease, the EQ indices were not able to display the clear dose-response relationship between the number of risk factors and worsening of health status.

Convergent validity of the PAQ domains was documented by medium to large correlations with the EQ-5D and WIQ and by comparisons of the mean scores of the PAQ scales with the stratified EQ-5D and WIQ domains. Both the inter-correlations of the PAQ domains and the correlations of the Treatment Satisfaction domain with the EQ-5D scales pointed to the uniqueness of the Treatment Satisfaction domain.

Inter-correlations of the PAQ domains Perceived Disability and Physical Function were all high, indicating that the domains were strongly related to the construct that the questionnaire purported to measure, namely disease-specific health status (Table 4).

Generic health status instruments are not sensitive enough to provide clinicians and researchers with

Table 3 **Results from Peripheral Artery Questionnaire**

	Mean (±±SD)	Median [percentile 25-75]
PAQLado	1.53 ±(1.298)	1 [0 - 3]
PAQ2.1	3.39±.934	4 [3 - 4]
PAQ2.2	3.06±1.286	4 [2 - 4]
PAQ2.3	2.11±1.369	2 [1 - 3]
PAQ2.4	2.64±1.775	4 [0 - 4]
PAQ2.5	1.69±1.721	1 [0 - 2.75]
PAQ2.6	2.17±2.348	1 [0 - 5]
PAQ3	2.14±1.125	2 [2 - 2]
PAQ4	3.89±1.924	4 [2 - 6]
PAQ5	2.81±1.091	3 [2 - 4]
PAQ6	3.25±1.273	4 [3 - 4]
PAQ7	3.47±.971	4 [3 - 4]
PAQ8	3.44±.735	4 [3 - 4]
PAQ9	3.25±1.131	4 [3 - 4]
PAQ10	2.97±1.055	3 [2 - 4]
PAQ11	2.86±1.073	3 [2 - 4]
PAQ12	3.00±1.095	3 [2 - 4]
PAQ13.1	3.28±0.974	4 [2.25 - 4]
PAQ13.2	3.11±1.166	4 [2 - 4]
PAQ13.3	3.11±1.063	3.5 [2 - 4]

Table 4 **Inter-item correlation Peripheral Artery Questionnaire to Walking Impairment Questionnaire and EQ-5D-5L**

		correlation	P value
PAQ Summary	WIQ 1b score	0.539	0.001
	WIQ 2 score	0.416	0.012
	WIQ 3 score	0.384	0.021
	WIQ 4 score	0.510	0.001
	EQ5D5L index Median	0.839	0.000
	EQ6 (Visual scale)	0.457	0.005
PAQ Physical	WIQ 1b score	0.269	0.113
	WIQ 2 score	0.333	0.047
	WIQ 3 score	0.299	0.077
	WIQ 4 score	0.421	0.011
	EQ5D5L index Median	0.579	0.000
	EQ6 (Visual scale)	0.162	0.342
PAQ Satisfaction	WIQ 1b score	0.136	0.43
	WIQ 2 score	0.037	0.831
	WIQ 3 score	0.297	0.078
	WIQ 4 score	0.342	0.041
	EQ5D5L index Median	0.417	0.012
	EQ6 (Visual scale)	0.234	0.169
PAQ Perceived	WIQ 1b score	0.636	0.000
	WIQ 2 score	0.396	0.017
	WIQ 3 score	0.372	0.026
	WIQ 4 score	0.476	0.003
	EQ5D5L index Median	0.868	0.000
	EQ6 (Visual scale)	0.589	0.000

useful information that makes adequate evaluation of PAD treatments possible.

The main limitation of this study is the sample size and the transversal application of the questionnaire, which did not enable to access the test-retest reliability.

CONCLUSION

In conclusion, this study demonstrated good clinical validity of the PAQ as the instrument discriminated well between patients with or without symptomatic PAD and its severity and was sensitive to the presence of relevant risk factors for PAD.

Furthermore, it should be noted that the assessment of the validity of questionnaires is not straightforward as there is no gold-standard for outcome measurement in PAD patients. PAQ is now a useful tool, to be used as a mean for measuring health status and physical functioning in the Portuguese patients with PAD.

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ANNEX 1

PERIPHERAL ARTERY QUESTIONNAIRE – PORTUGUESE VERSION
QUESTIONÁRIO DE DOENÇA ARTERIAL PERIFÉRICA

O questionário que se segue é dirigido a obstruções arteriais do seu corpo, particularmente das suas pernas, e de como pode afetar a sua vida. Por favor leia e complete as seguintes questões. Não há respostas certas ou erradas.

Por favor marque aquela que se adequa à sua situação.

1 As obstruções arteriais, habitualmente chamadas de doença arterial periférica, afetam cada pessoa de forma particular. Qual das suas pernas ou nádegas lhe causa mais desconforto, cansaço, dor, aperto ou cãibra?

☐ Direita ☐ Esquerda ☐ Ambas ☐ Nenhuma

2 Por favor reveja a lista abaixo apresentada e indique o grau de limitação derivado da sua doença arterial periférica (desconforto, cansaço, dor, aperto, cãibra nas nádegas ou "barriga" da perna) nas últimas 4 semanas.

ACTIVIDADES	Extremamente limitado	Bastante limitado	Moderamente limitado	ligeiramente limitado	Sem qualquer limitação	Limitado por outros motivos/ Não realizou a actividade
Andar nas imediações de sua casa	☐	☐	☐	☐	☐	☐
Andar 100-200 m em plano horizontal	☐	☐	☐	☐	☐	☐
Andar 100-200 m em plano inclinado	☐	☐	☐	☐	☐	☐
Andar 300-400 m em plano horizontal	☐	☐	☐	☐	☐	☐
Andar em passo acelerado	☐	☐	☐	☐	☐	☐
Exercício vigoroso	☐	☐	☐	☐	☐	☐

3 Comparando com há 4 semanas, os seus sintomas de doença arterial periférica (desconforto, cansaço, dor, aperto, cãibra nas nádegas ou "barriga" da perna) mudaram de características?
Os meus sintomas ficaram...

Muito pior	Lireiramente pior	Sem alteração	Ligeiramente melhor	Muito melhor	Não tive sintomas nas últimas 4 semanas
☐	☐	☐	☐	☐	☐

4 Nas últimas 4 semanas, com que frequência tem sentido desconforto, cansaço, dor, aperto, caibra nas nádegas ou "barriga" da perna?

Todo o tempo	Diversas vezes ao dia	Pelo menos uma vez por dia	3 ou mais vezes por semana	Uma ou duas vezes por semana	Menos de uma vez por semana	Nunca nas últimas 4 semanas
☐	☐	☐	☐	☐	☐	☐

5 Nas últimas 4 semanas quantifique o grau de incómodo causado pelo desconforto, cansaço, dor, aperto ou caibra nas nádegas ou "barriga" da perna.

Extremo	Bastante	Moderado	Ligeiro	Não incomodou
☐	☐	☐	☐	☐

6 Nas últimas 4 semanas com que frequência tem sido acordado com desconforto, cansaço, dor, aperto ou caibra nas nádegas ou "barriga" da perna.

Todas as noites	Três ou mais noites por semana	Uma a duas vezes por semana	Menos de uma vez por semana	Nunca nas últimas 4 semanas
☐	☐	☐	☐	☐

7 Relativamente a tudo o que se tem feito tudo no tratamento da sua doença arterial, qual é o seu nível de satisfação?

Muito Insatisfeito	Ligeiramente insatisfeito	Pouco satisfeito	Bastante satisfeito	Completamente Satisfeito
☐	☐	☐	☐	☐

8 Quantifique o seu grau de satisfação com a informação que lhe foi dada pelo seu médico em relação à doença arterial periférica.

Muito Insatisfeito	Ligeiramente insatisfeito	Pouco satisfeito	Bastante satisfeito	Completamente Satisfeito
☐	☐	☐	☐	☐

9 Na generalidade, quantifique o seu grau de satisfação com o seu tratamento da doença arterial periférica.

Muito Insatisfeito	Ligeiramente insatisfeito	Pouco satisfeito	Bastante satisfeito	Completamente Satisfeito
☐	☐	☐	☐	☐

10 Quantifique, nas últimas 4 semanas, o quanto a doença arterial periférica tem limitado o seu prazer em viver.

Extremamente	Bastante	Moderadamente	Ligeiramente	Não limitou
☐	☐	☐	☐	☐

11 Se tivesse de viver o resto da sua vida com a doença arterial periférica como ela se apresenta neste momento, como se sentiria?

Muito Insatisfeito	Ligeiramente insatisfeito	Pouco satisfeito	Bastante satisfeito	Completamente Satisfeito
☐	☐	☐	☐	☐

12 Nas últimas 4 semanas, com que frequência se sentiu desencorajado ou desmotivado devido aos sintomas da doença arterial periférica?

Todo o tempo	A maioria do tempo	Ocasionalmente	Raramente	Nunca
☐	☐	☐	☐	☐

13 Quantifique quanto a doença arterial periférica influencia a sua vida diária. Por favor indique como desconforto, cansaço, dor, aperto, caibra nas nádegas ou "barriga" da perna possa ter interferido na realização das seguintes tarefas nas últimas 4 semanas.

ACTIVIDADES	Extremamente limitado	Bastante limitado	Moderamente limitado	Ligeiramente limitado	Sem qualquer limitação	Não se aplica ou não realizado por outros motivos
Hobbies e atividades recreativas	☐	☐	☐	☐	☐	☐
Visitar familiar e amigos fora de sua casa	☐	☐	☐	☐	☐	☐
Trabalhar ou realizar tarefas de casa	☐	☐	☐	☐	☐	☐

ARTIGO ORIGINAL ORIGINAL ARTICLE

NEW ORAL ANTICOAGULANTS (NOACS) ARE THE GOLD STANDARD IN VENOUS THROMBOEMBOLISM

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Abstract

Introduction: *Venous Thromboembolism (VTE) is an important cause of morbidity and mortality. The risk of recurrence could be very high without thromboprophylaxis. New oral anticoagulants (NOACs or DOACs) represent a new step in anticoagulation.*

Material and Methods: *We searched for papers with trials, systematic reviews and meta-analysis involving NOACs in the treatment and secondary prevention of VTE. We also searched for guidelines of two medical societies (American College of Chest Physicians and International Society of Thrombosis and Haemostasis - ISTH).*

Results: *Six RCT (randomized controlled trial) comparing NOACs with Warfarin shew a non-inferiority in relation with recurrent VTE and major bleeding. Two RCT (SELECT-D and Hokusay cancer) and one meta-analysis shew low recurrence rate of VTE in cancer patients and higher rate of bleeding, mainly in gastrointestinal and genitourinary cancers. There are two RCTs involving NOACs in treatment of patients with Antiphospholipid Syndrome (APS).*

Discussion: *NOACs shew non-inferiority over AVK. Guidelines of CHEST 2016 recommend NOACs for VTE treatment in no cancer patients, and Low Molecular Weight Heparin (LMWH) for cancer patients. ISTH suggest NOACs as the first option in VTE cancer patients with low risk of bleeding. A recent RCT shews no benefit and increased risk of vascular events in APS patients treated with NOACs. NOACs are the gold standard for VTE treatment and secondary prevention in no cancer patients. They could be the first option in cancer patients with low risk of bleeding.*

INTRODUCTION

Venous Thromboembolism (VTE), which includes Deep Venous Thrombosis (DVT) and Pulmonary Embolism (PE), is an important cause of morbidity and mortality. It is the third cause of cardiovascular death after myocardial infarction and stroke.[1] The incidence varies between[1-2] cases/1000/year for DVT and 0.5/1000/year for EP.

VTE is the number one preventable cause of death in hospitalized patients, and one of the most important causes of death related with the reason for hospitalization.[2]

After the first episode of VTE, the risk of recurrence could be of 30% after ten years without thromboprophylaxis. Most cases occur in first years after the event.[3]

There are several causes for VTE. Some of them are "provoked". In these cases, are included immobilization, cancer, surgery, trauma, thrombophilia acquired or genetic and hormonal supplementation. In other cases, there are no cause for the VTE (unprovoked).

History of cancer or active cancer is responsible for 10-20% of VTE cases[4], and cancer patients have an increased risk of bleeding related with anticoagulation compared with patients without cancer.[5]

During several decades, vitamin K antagonists (VKA) remained the only oral anticoagulant type. They are effective for treatment and prevention of VTE but have a high interpatient variable dose-response and high interactions with food and other drugs.[6] Dose of VKA are adjusted according to international normalized ratio (INR).

Low molecular weight heparins (LMWHs) solved some of the problems related with VKA, but have the disadvantage of parenteral administration.

New oral anticoagulants (NOACs or DOACs) represent a new step in anticoagulation. There are two groups of NOACs - Direct oral thrombin inhibitor (Dabigatran) and Direct oral factor Xa inhibitors (Rivaroxaban, Apixaban, Edoxaban and Betrixaban). They have the advantage of oral administration and a stable interpatient dose-response.

Recently were approved the reversal agents of NOACs. Idarucizumab is a direct inhibitor of Dabigatran and Andenaxet an antidote for factor Xa inhibitors.

The purpose of this paper is doing a revision of the latest evidence about the NOACs in the treatment of DVT and PE, and show the indications and contraindications of this drugs.

MATERIAL AND METHODS

In this non-systematic review, we searched for papers with trials involving NOACs in the treatment and secondary prevention of deep venous thrombosis or pulmonary embolism. We also searched for guidelines of two medical societies (American College of Chest Physicians and International Society of Thrombosis and Haemostasis) in this theme, meta-analysis and systematic reviews about NOACs in the treatment and prevention of VTE.

We analysed the evidence of NOACs in cancer patients, thrombophilia with antiphospholipid syndrome (APS), paediatric population, chronic kidney disease (CKD), obese patients, pregnancy and breast feeding.

Finally, we did a summary of the indications of NOACs in the treatment and secondary prevention of VTE.

RESULTS

The guidelines of CHEST 2016 recommend for VTE and no cancer a long-term treatment with NOACs with a Grade 2B over VKA and Grade 2C over LMWH.[7] This grade of recommendation was based in six randomized controlled trials (RCT) comparing NOACs with Warfarin, nine systematic reviews and six meta-analysis.[7] The RCTs involved Dabigatran (RE-COVER I and RE-COVER-II), Rivaroxaban (EINSTEIN DVT and EINSTEIN PE), Apixaban (AMPLIFY) and Edoxaban (HOKUSAY VTE)[8] with a non-inferiority in relation with recurrent VTE and major bleeding for all cases (Table 1). These trials involved a total of 26993 patients. The authors said that the risk reduction for VTE appears to be similar between NOACs and VKA, and seems to be similar between all NOACs. They also concluded that the risk of bleeding, particularly intracranial bleeding was inferior with NOACs comparing with VKA. Finally, they concluded that the risk of bleeding may be lower with Apixaban comparing with the other NOACs.[7] The sample size necessary for a superiority analysis would be overwhelming.

In terms of extension treatment in patients without cancer (after 3-6 months of VTE treatment), we have results of one RCT comparing Dabigatran vs Warfarin (REMEDY) that involved 2856 patients. This trial shewed that Dabigatran is effective as VKA in extended treatment for prevention of recurrent VTE and it has lower risk of major and clinically relevant non-major bleeding (CRNMB).[9]

There are more three RCTs (involving a total of 4208 patients) comparing NOACs with placebo in extended treatment for prevention of VTE. RESONATE study (Dabigatran 150mg twice-daily or placebo), EINSTEIN Extension (Rivaroxaban 20mg daily or placebo) and AMPLIFY-EXT (Apixaban 2.5mg twice-daily or placebo) shew that NOACs are effective in preventing recurrent VTE (reduction at least of 80%) without being associated with high risk of bleeding.[7]

Another RCT comparing Rivaroxaban or Aspirin in extended treatment for secondary prevention of VTE shew similar results with a dose of 10mg daily versus 20mg daily of rivaroxaban.[10]

The guidelines of CHEST 2016 recommend for VTE and cancer a LMWH over VKA (Grade 2B) and NOACs (grade 2C).[7] The different RCT involving NOACs versus VKA in VTE treatment included a very low number of patients with cancer (between 2 and 9%) and so they did not have power to show a non-inferiority of NOACs in cancer patients.

In 2018 were published two trials with NOACs in cancer. SELECT-D (406 patients) comparing Rivaroxaban 20mg daily or Dalteparin in treatment of VTE patients (symptomatic or incidental) with active cancer[11] shew a 6-months lower recurrence rate of VTE with Rivaroxaban (4% vs. 11% - with Hazard Ratio [HR] 0.43; 95% CI, 0.19 to 0.99) and higher rate of CRNMB (13 vs 4% with [HR]

Table 1 **Summary of RCT studies with NOACs vs. VKA in VTE acute Treatment**

NOAC	Studies	Patients	Outcomes (relative effect 95% CI)		
			All-cause mortality	Recurrent VTE	Major Bleeding
Dabigatran	RE-COVER I RE-COVER II	5107	RR 1.0 (0.67-1.5)	RR 1.12 (0.77-1.62)	RR 0.73 (0.48-1.10)
Rivaroxaban	EINSTEIN-DVT EINSTEIN-PE	8281	RR 0.97 (0.73-1.27)	RR 0.90 (0.68-1.2)	RR 0.55 (0.38-0.81)
Apixaban	AMPLIFY	5365	RR 0.79 (0.53-1.19)	RR 0.84 (0.6-1.18)	RR 0.31 (0.17-0.55)
Edoxaban	Hokusay-VTE	8240	RR 1.05 (0.82-1.33)	RR 0.83 (0.57-1.21)	RR 0.85 (0.6-1.21)

(Adapted from CHEST Guidelines 2016)[7]

3.76; 95% CI, 1.63 to 8.69). In this study, the most major bleedings or CRNMB were gastrointestinal and urologic and were more frequent in oesophageal and gastroesophageal cancers.

The Hokusay VTE Cancer study (1046 patients) comparing Edoxaban 60mg daily after 5 days with LMWH or Dalteparin in treatment of acute symptomatic or incidental VTE shew a non-inferiority in composite VTE recurrence and major bleeding during 12-months (12,8% vs. 13,5% [HR] 0.97; 95% CI, 0.7 to 1.36).[12] Major bleeding was significantly higher with Edoxaban, due to the higher rate of bleeding in patients with gastrointestinal cancer.

A systematic review and meta-analysis involving over 5000 patients with two RCT (SELECT-D and Hokusay VTE cancer study) and eleven cohort studies, most of them involving rivaroxaban, shewed that NOACs comparing with LMWH had lower 6-month recurrent VTE (risk ratio [RR] 0.65 (0.42-1.01)), higher CRNMB ([RR] 2.31 (0.85-6.28)) and major bleeding ([RR] 1.74 (1.05-2.88)) and no difference in mortality ([RR] 1.03 (0.85-1.26)).[13]

Venous Thromboembolism related with Thrombophilia is another important topic to review. There are two RCTs involving NOACs in treatment of patients with Antiphospholipid Syndrome (APS). RAPS Trial, comparing Rivaroxaban with Warfarin in patients with APS, recruited 116 patients and shew a higher endogenous thrombin potential (ETP) and a lower peak thrombin generation in rivaroxaban group. No thrombosis or major bleeding occurred.[14]

Recently was published TRAPS trial comparing Rivaroxaban (20mg daily) with Warfarin in high-risk patients with APS (triple positive antiphospholipid antibody test) and history of arterial or venous thrombosis.[15] This study was designed to enrol 537 patients but was stopped earlier (after 120 patients). There was an increased rate of arterial events (12% vs 0%) and major bleeding (7% vs 3%) in Rivaroxaban group. There were no venous events, but three of arterial events occurred in patients with previous VTE.

DISCUSSION

NOACs represent a new step in treatment of VTE. When we are talking about gold standard treatment, it is not just important to think in relevant scientific evidence that we have about the topic, but also the clinical judgment that we do and the patients values and preferences – Evidence Based Medicine.[16]

In terms of patients values and preferences, NOACs are effective, generally safe with low risk of bleeding, friendly with oral intake and, depending of countries, with low costs. In terms of clinical judgment, NOACs are effective, safe and allow long treatment with low risk of bleeding. In relation to relevant scientific evidence, as we said before, they have a non-inferiority to VKA and they have the advantage of no interpatient variable dose-response and low interactions with food and other drugs, as it was shown in different RCTs, systematic reviews and meta-analysis. So, in terms of VTE treatment in patients without cancer, NOACs are the gold standard.

VTE treatment in patients with cancer is not consensual. The guidelines of CHEST 20167 recommend LMWH as the first choice of treatment. In 2018 they were published two RCTs (SELECT-D and Hokusay VTE Cancer) and one meta-analysis that shew a lower or non-inferiority in rate of recurrent VTE with a higher rate of bleeding. The risk of bleeding was higher in oesophageal, gastrointestinal and genitourinary cancers.[11-13] In last year, International Society on Thrombosis and Haemostasis (ISTH) suggested NOACs as the first option in VTE cancer patients with low risk of bleeding, and LMWHs in patients with high risk of bleeding.[17] Also, they said that Rivaroxaban and Edoxaban are the only with RCT comparing NOACs with LMWH in cancer patients. Recently was presented in American Society of Hematology 60th Annual Meeting by Robert D. MacBane *et al*., the ADAM VTE Trial. This study included 300 patients with cancer and acute VTE (Apixaban vs. Dalteparin) and it shews a significantly lower VTE recurrence and similar rate of bleeding (major plus CRNMB) in Apixaban group.[18]

For the prevention of VTE in cancer patients, there are two trials with recent presentation results. The AVERT Trial included 574 patients receiving chemotherapy. It compared Apixaban (2.5mg twice-daily) with placebo for preventing VTE in high-risk ambulatory patients. It shews a significant lower rate of VTE episodes and higher major bleeding rate on Apixaban group.[19] The CASSINI Trial results were presented recently in American Society of Hematology 60th Annual Meeting by Khorana AA *et al*, and randomize 841 patients to compare rivaroxaban (10mg daily) with placebo for preventing VTE in high-risk patients.[19]

In terms of posology, we have two different groups of NOACs in initial treatment of VTE. Dabigatran and Edoxaban need an initial treatment of five to ten days with LMHW, and after that, a switch to NOAC (dabigatran 150mg twice daily or Edoxaban 60mg daily). Rivaroxaban and Apixaban do not need an initial treatment with LMHW, but have different doses in first days. VTE treatment with Rivaroxaban begins with 15mg twice daily during 21 days and switch to 20mg daily after that, while Apixaban begins with 10mg twice-daily during 7 days and switch to 5mg twice-daily after that. These doses are recommended for patients with normal renal function and weight (Table 2). Different schemes of posology are related with pharmacokinetic profile of medications and manufacturer believe that one daily regimen have better adherence than two daily. Related with this topic, recently was published a retrospective population-based cohort analysis involving 15254 that shew a decreased risk of recurrent VTE ($p<0.0001$) and major bleeding events ($p=0.0031$) in favour of Apixaban versus Rivaroxaban. Authors refer that this could be related with pharmacokinetic profile and posology regimen.[20]

After initial treatment (3 months), extended treatment should be evaluated in each case, based in the type

Table 2 **Summary of NOACs dose regimens in VTE Treatment**

NOAC	Initial Treatment	Long Treatment (at least 3 months)	Extended Treatment (more than 3-6 months)
LMHW initially then switch			
Dabigatran	LMWH 5-10 days	150mg 2id	150mg 2id
Edoxaban	LMWH 5-10 days	60mg id (>60kg) 30mg id (≤60kg)	60mg id (>60kg) 30mg id (≤60kg)
Single oral			
Rivaroxaban	15mg 2id (21 days)	20mg id	20mg id 10mg id (after 12 months)?
Apixaban	10mg 2id (7 days)	5mg 2id	2.5mg 2id

Doses need to be adjusted in function of Creatinine Clearance

of VTE (provoked or unprovoked), risk of recurrence VTE, risk of bleeding (low, moderate and high) and patient preferences.[7] Dose regimens are the same as in acute treatment for Dabigatran, Rivaroxaban and Edoxaban, and half of dose for Apixaban. As said previously, after twelve months of treatment, a trial shews similar results with Rivaroxaban 10mg or 20mg daily in thromboprophylaxis.[10]

Another point of discussion is the use of NOACs in thrombophilia (APS). Despite some good results of RAPS Trial, with no thrombosis or major bleeding episode, recently TRAPS Trial was prematurely terminated because of higher incidence of arterial events and major bleeding with Rivaroxaban. There were three patients with arterial thrombotic events and previous VTE. These results are opposite with some statements of other authors, in which recurrence happened in the same type of vessels (arteries or veins).[21] The authors of TRAPS Trial concluded that Rivaroxaban showed no benefit and increased risk.[15] One of the reasons appointed for this increased risk was a necessity of higher level of anticoagulation in patients with APS high risk.

One of the first concerns about NOACs was the lack of specific agents for reversal of direct oral anticoagulants. The nonspecific agents include prothrombin complex concentrate, recombinant activated factor VII and haemodialysis for dabigatran. In the last years was approved by FDA (Food and Drug Administration) and EMA (European Medicines Agency) a reversal direct agent of Dabigatran (Idarucizumab), and by FDA a reversal direct agent of direct oral factor Xa inhibitors (Andexanet alfa). The indications for use are restricted to patients with life threatening bleeding (eg, intracranial), critical organ or closed-space bleeding (eg, retroperitoneal, pericardial) and ongoing bleeding despite measures, or situations at high risk of bleeding like patients that need an emergent procedure or patients with expected long delay in spontaneous restoration of haemostasis (eg acute or chronic renal failure).

It is important refer some special populations. NOACs are contra-indicated in pregnancy, breast feeding, and chronic kidney disease in haemodialysis, and should not be used in extreme obese patients (Body Mass Index -BMI >40kg/m2 or >120kg).[22] Data regarding safety and efficacy are very limited in paediatric population.

We will have new data in the future about NOACs in cancer and thrombophilia.

The Caravaggio Study will randomize 1168 patients to show a non-inferiority of Apixaban versus Dalteparin for the treatment of acute VTE in patients with cancer.[23] Primary outcome will be recurrent VTE and primary safety outcome will be major bleeding after 6-months of treatment.

There is one trial in phase of recruitment in thrombophilia. ASTRO-APS will randomize patients with APS to compare Apixaban (2.5mg twice-daily) with Warfarin for the secondary prevention of thrombosis.

NOACs are the gold standard for VTE treatment and secondary prevention in no cancer patients, and in patients with weight inferior to 120kg and BMI inferior to 40kg/m^2.

NOACs could be the first option of treatment in cancer patients with low risk of bleeding (exclusion of oesophageal, gastrointestinal and genitourinary cancers). Probably could be a good option in paediatric population, but at this moment data regarding safety and efficacy are very limited.

In patients with Chronic Kidney Disease (CKD) with Clearance Creatinine (ClCr) of 15-30mg/dl, NOACs could not be the gold standard. In case of use, Rivaroxaban and Apixaban should be preferred and used with dose reduction. It patients with thrombophilia (APS) and VTE (without arterial thrombosis) could be used with caution.

NOACs are not indicated in patients with cancer and high risk of bleeding (oesophageal, gastrointestinal and genitourinary cancers), in patients with thrombophilia (APS) and arterial thrombosis with or without VTE and in extreme obese patients (weigh >120kg and BMI <40kg/m^2).

NOACs are contra-indicated in patients with CKD in haemodialysis or with ClCr <15mg/dl, in pregnancy and breast feeding.

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SPONTANEOUS AORTOESOPHAGEAL FISTULA AND RUPTURED AORTIC ANEURYSM – A CASE REPORT ON COMBINED AORTIC AND ESOPHAGEAL PROSTHESIS PALLIATIVE TREATMENT

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Abstract

Aortoesophageal fistulas are uncommon, dreadful vascular events, most frequently found in the setting of thoracic aorta aneurysms. Patients usually present with thoracic pain, dysphagia and sentinel hematemesis - the Chiari triad - followed by life threatening hematemesis. Emergent open surgery with debridement of necrotic tissue and in situ aortic graft repair is currently the best strategy. However, in patients which cannot withstand surgery, endovascular repair is currently gaining acceptance as a palliative treatment or as a bridge to surgery. We present a case of a 55-year-old female with a past of heavy alcohol abuse and a previously unknown massive aortic aneurysm, who presented to the emergency department complaining of acute dysphagia and epigastric pain. An abdominal ultrasound revealed left pleural effusion and suspected clots in the pleural space. A thoracic CTA was promptly done, where a spontaneous ruptured aortic aneurysm with aortoesophageal fistula was discovered. The team, fearing open surgery due to poor cardiac function, opted for a thoracic endovascular aortic repair. The aortoesophageal fistula dissected the esophageal wall in all of its thickness without rupture into the lumen. This was complicated with esophageal ischemia, aneurysmal sac infection and mediastinitis. Because the patient was in shock, in order to help control the infection, an esophageal prosthesis was placed, followed by proximal esophagostomy, distal esophageal closure and gastrostomy. Six months after initial presentation, the patient died at the emergency room, shortly after reentering with massive hematemesis and hypovolemic shock of undetermined origin.

CASE REPORT

Aortoesophageal fistulas are unusual thoracic emergencies, where a communication between the descending aorta and the esophagus is established. In more than 50% of cases they occur spontaneously in the setting of an aortic aneurysm and are mostly asymptomatic until presentation.[1] Other common causes are generally secondary to foreign body perforation of the esophagus, esophageal malignancy, iatrogenic perforation of the aorta during endovascular repair or perforation of the esophagus during endoscopic procedures.[1,2,3] Other less common causes include infections such as syphilitic or tuberculous aortitis, lung cancer, chemical ingestion, gastroesophageal reflux, trauma, and gunshot wound.[1,2,3]

These patients can present with the triad described by Chiari in 1914, which comprises mid thoracic pain, dysphagia and a sentinel hematemesis, followed by an interval period from hours to days before torrential hematemesis and frequent exsanguination.[1,4]

If hematemesis is controlled, the patients are still at risk for developing sepsis due to esophageal lesion or mediastinitis.[3] Hence, emergent repair is vital. Currently three groups of patients are defined: the low comorbidity patients with or without sepsis signs, the high surgical risk patients that show no septic signs and, in the third group, those who would not tolerate surgery and are with overt sepsis signs.[2,3,5,6] The first group is generally managed with open surgical replacement of the aortic defect/aneurysm, esophageal defect closure or debridement and bowel graft, and omental pedicle graft in both instances. This last step contributes for improved lymphatic drainage and infection prevention. The second group is preferably treated with endovascular aneurysm

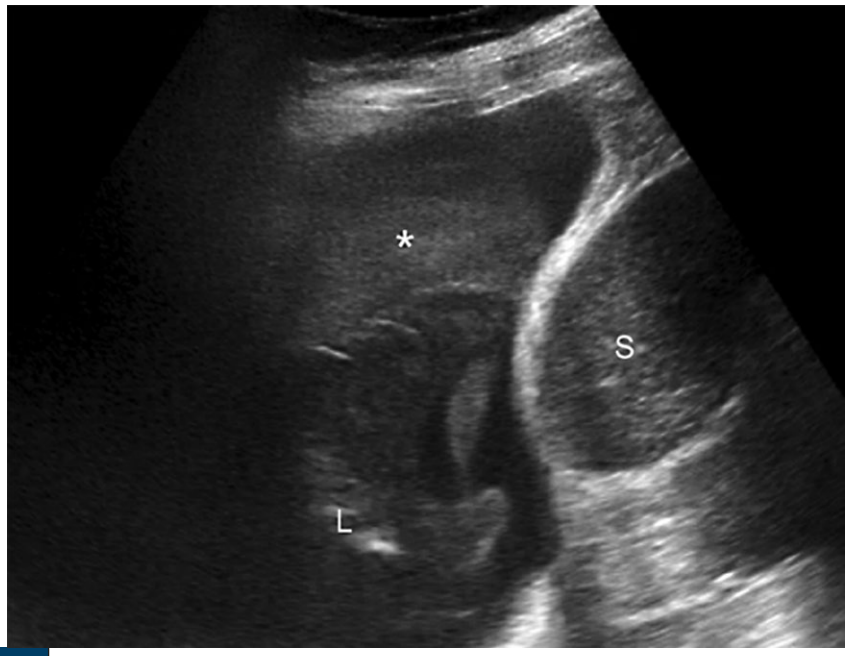

Figure 1

B-mode abdominal ultrasound over the left hypochondrium (coronal intercostal plane). In the pleural space, there is fluid and an echogenic collection (*), compatible with a clot. Notice the collapsed lung (L) and the diaphragm bordered by fluid and the Spleen (S).

repair (EVAR) as a bridge for open surgery. For the third group the treatment is considered palliative, with EVAR placement, esophageal endoscopic prosthesis if significant necrosis and lifelong antibiotics.[2,3,5,6]

We present a case of a 55-year-old female with a past of heavy alcohol abuse and a previously unknown massive aortic aneurysm, presented to the emergency department complaining of acute dysphagia and epigastric pain. On blood analysis there was no elevation of inflammatory markers and her hemogram was unremarkable besides mild anemia (10g Hgb/dL) with acute characteristics.

An abdominal ultrasound revealed left pleural effusion, with partial collapse of the left lung and low echogenicity amorphous material disperse in the pleural space (Figure1).

Suspecting the presence of clots in the pleural space, a thoracic computed tomography angiography was promptly done, where a primary aortoesophageal fistula and a ruptured aortic aneurysm with left hemothorax were discovered (Figure 2A). The aortoesophageal fistula dissected the esophageal wall without rupture into the lumen (Figure 2B).

Due to poor cardiac function, fearing open

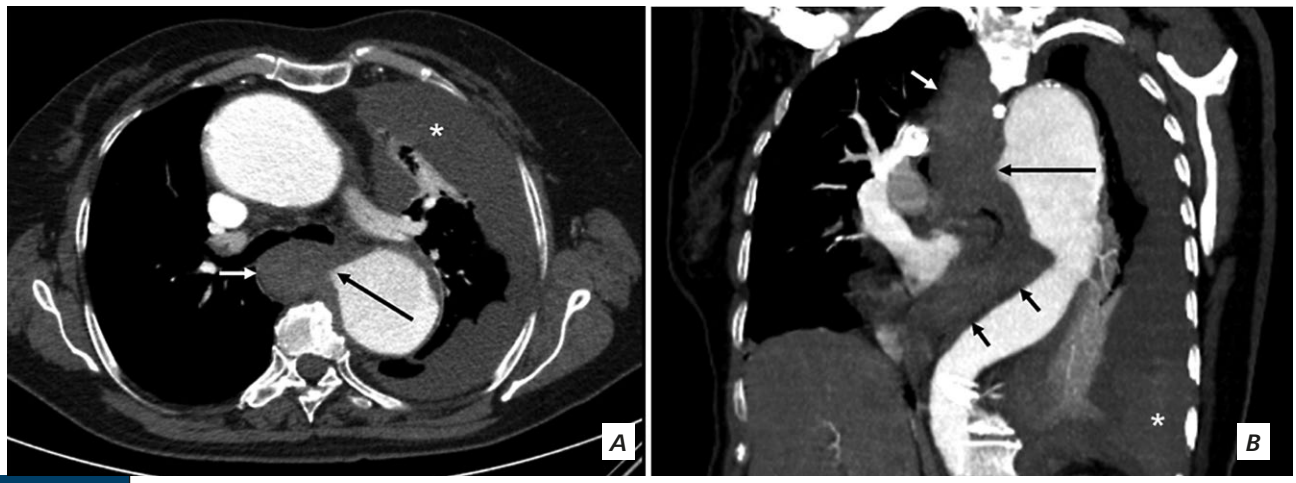

Figura 2

*Contrast enhanced thoracic CT (arterial phase) in the axial (**A**) and coronal oblique (**B**) planes, representing the aorto-esophageal fistula and hemothorax. The large arrows point to a "beak" shaped communication between the descending aorta and the diffusely thickened esophageal wall (small arrows). The esophagus density is homogeneous and the typical wall stratification is lost. Notice the high density pleural fluid (*) at a nondependent position, compatible with a clot secondary to hemothorax.*

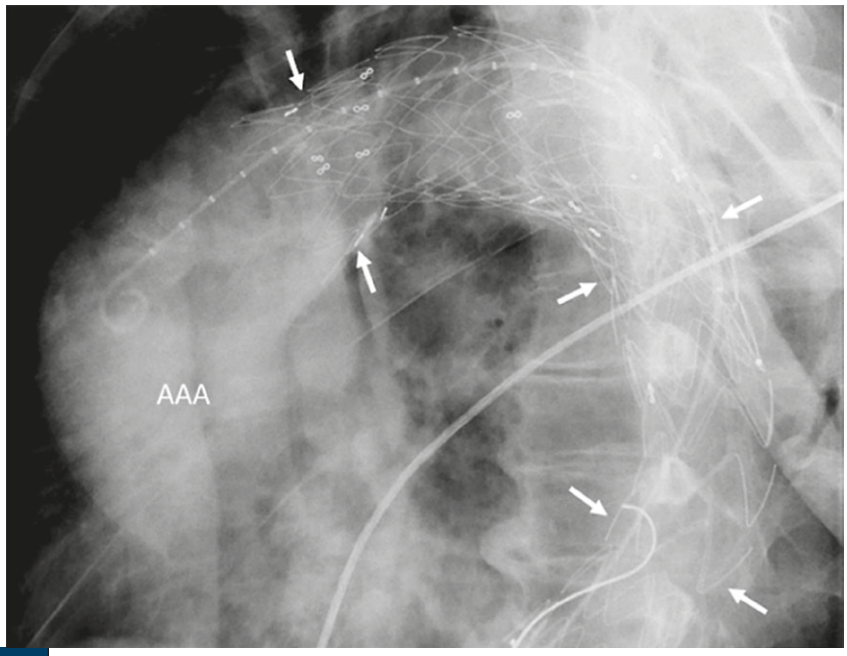

Figure 3 *Angiographic image demonstrating successful endovascular aneurysm repair (EVAR). The prosthesis can be easily identified by the high attenuation of the metallic mesh (between arrows). AAA – Ascending aorta aneurysm.*

surgery, the team opted for a thoracic endovascular aortic repair (Figure 3).

On the following days, esophageal ischemia, aneurismal sac infection and mediastinitis developed (Figure 4A). In order to help control the infection, an esophageal prosthesis was placed (Figure 4B), followed by proximal esophagostomy, distal esophageal closure and gastrostomy.

Six months after initial presentation, the patient reentered the emergency room with massive hematemesis and hypovolemic shock. Despite transfusional support, the patient deceased at the emergency room.

The cause of the bleeding was undetermined but aortoesophageal fistula relapse or esophageal variceal bleeding were suspected.

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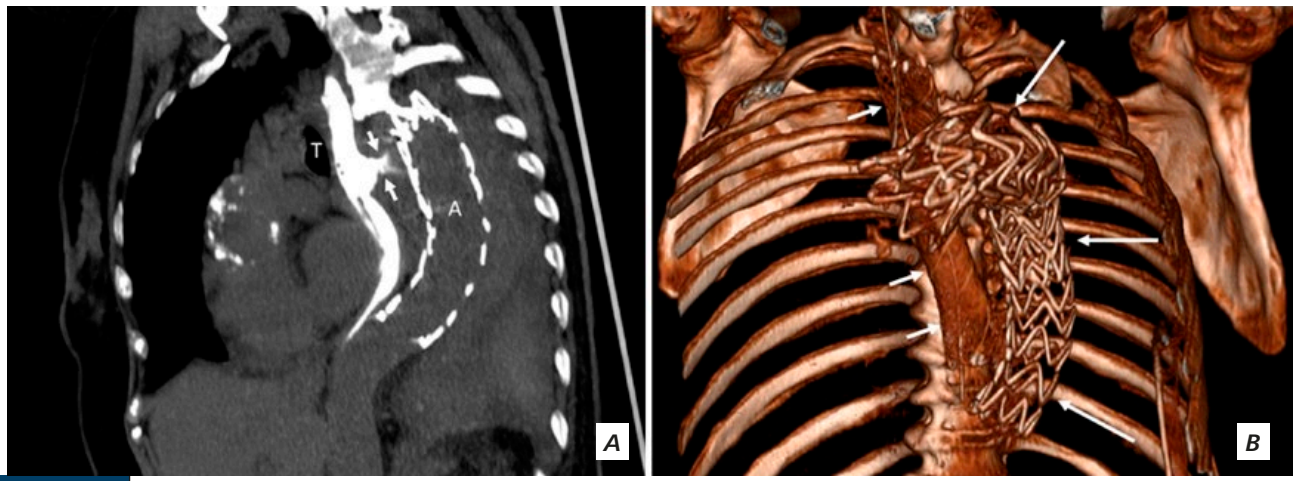

Figura 4 ***A*** *– Nonenhanced thoracic CT with a maximum intensity projection in the coronal oblique plane, after oral contrast, demonstrating a fistulous path from the esophagus to the aneurismal sac (between arrows). The treated aorta is also represented (A). (T) Represents the trachea at the level of the carina.* ***B*** *– Volume rendering technique (VRT) image of the thorax, after the placement of an esophageal prosthesis (short arrows), paralleling the aortic endovascular prosthesis (long arrows).*

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HAMMAN'S SYNDROME (SPONTANEOUS PNEUMOMEDIASTINUM)

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Resumo

Os autores apresentam o caso de um jovem de 22 anos, previamente saudável, que recorreu ao serviço de urgência por dor torácica. Apresentava história com dois dias de evolução de odinofagia, tosse produtiva, febre e dispneia. A radiografia de tórax apresentava uma linha contornando o coração e o sinal do diafragma contínuo. Realizou tomografia computorizada do tórax que revelou a presença de pneumomediastino e enfisema do tecido subcutâneo. O caso foi discutido em equipa multidisciplinar, tendo sido rejeitada a hipótese de intervenção cirúrgica. Optou-se por tratamento conservador com resolução completa do pneumomediastino.

Abstract

The authors present the case of a previously healthy, 22-year-old male nonsmoker who sought emergency room treatment complaining of retrosternal pain. He reported a history of odynophagia two days before, followed by productive cough, fever and dyspnea. On chest radiography, a line could be observed surrounding the heart and the continuous diaphragm sign. The chest computed tomography scan confirmed the presence of pneumomediastinum and soft tissue emphysema. The case was discussed in a multidisciplinary team, and the possibility of surgical intervention was rejected. Conservative treatment was decided with complete resolution of the pneumomediastinum.

INTRODUÇÃO

O Síndrome de Hamman consiste num pneumomediastino espontâneo, não causado por trauma ou cirurgia. É definido como a presença de ar livre no mediastino.[1]

Com uma incidência de cerca de 1 por 30.000 doentes de emergência,[2] o síndrome de Hamman afecta sobretudo indivíduos do sexo masculino na segunda década de vida, muitos dos quais com asma. A tríade de sintomas clássica descrita, consiste em dor torácica (usualmente retroesternal e de natureza pleurítica), enfisema subcutâneo e dispneia. Outros sintomas incluem tosse, febre, disfonia, odinofagia e disfagia.[3]

O tratamento do síndrome de Hamman permanece controverso. A maioria dos estudos recomenda tratamento conservador incluindo repouso e analgesia se necessário.[1]

CASO CLÍNICO

Os autores apresentam um caso de um doente do sexo masculino de 22 anos, com antecedentes de eczema atópico, não fumador, que recorreu ao serviço de urgência com queixas de dor torácica retroesternal com início cerca de 4 horas antes de recorrer ao hospital. Apresentava um quadro com início dois dias antes de odinofagia, seguido de tosse produtiva, febre e dispneia.

À observação estava febril (T38,5ºC), tensão arterial de 151/85 mmHg com frequência cardíaca de 120 bpm. À auscultação pulmonar apresentava sibilância à auscultação pulmonar, sem outras alterações ao exame objectivo.

Do estudo analítico efectuado apresentava leucocitose (15000/μL) com neutrofilia (90,2%) e elevação da proteína C reactiva (41.8 mg/L), sem outras alterações, nomeadamente elevação dos marcadores de necrose miocárdica (Creatinina-quinase 153 U/L e Troponina I de alta sensibilidade 8,1pg/mL). A gasimetria arterial revelou hipoxemia com pO2 67 mmHg, saturação de oxigénio 96,4%, sem outras alterações.

O electrocardiograma apresentava ritmo sinusal, com frequência cardíaca de 107 bpm, sem alterações do segmento ST. Fez colheita para pesquisa de antigénios urinários para *Streptococcus pneumoniae* e *Legionella pneumophila*

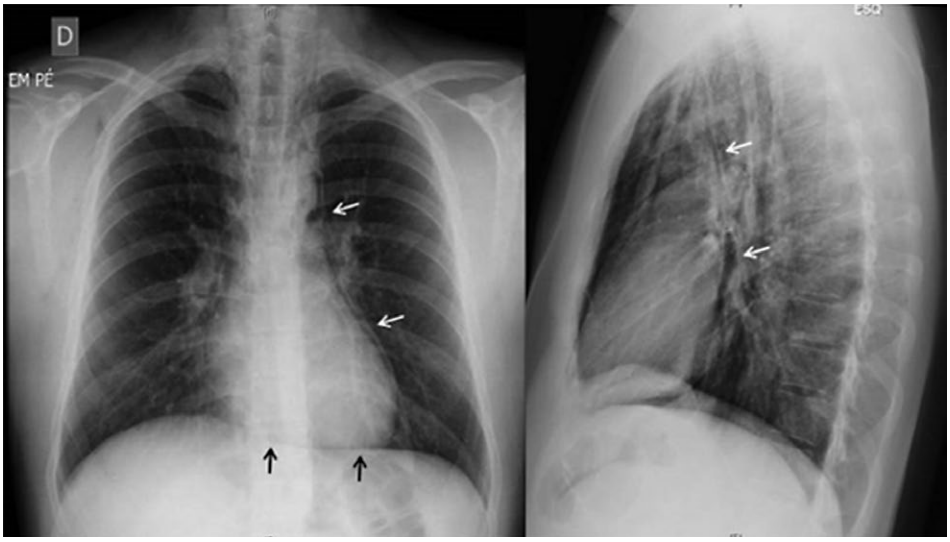

Figura 1 *Radiografia tórax mostrando pneumomediastino. As setas a branco mostram uma linha radiotransparente que contorna a silhueta cardíaca. As setas a negro identificam o sinal de diafragma contínuo – linha radiotransparente que atravessa a linha média acima do diafragma.*

que foram negativos e pesquisa por cadeia de polimerase de vírus Influenza A, B e H1N1 que também foi negativa. As hemoculturas foram negativas.

Na radiografia de tórax observou-se uma linha radiotransparente que contornava a silhueta cardíaca bem como o sinal de diafragma contínuo - linha radiotransparente que atravessa a linha média acima do diafragma na radiografia de tórax póstero-anterior (Figura 1).

Para melhor esclarecimento e confirmação do diagnóstico realizou tomografia computorizada do tórax que confirmou a presença do pneumomediastino e enfisema subcutâneo na região cervical e na região torácica à direita (Figura 2). Traqueia e esófago aparentemente íntegros.

Foi assumido episódio de asma inaugural, exacerbada por traqueobronquite aguda, pelo que foi iniciada terapêutica com oxigénio, broncodilatadores e antibioterapia com amoxicilina e ácido clavulânico. No que concerne ao pneumomediastino, foi consultada a cirurgia torácica, que considerou que não existia indicação para abordagem invasiva, pelo que foi optado por tratamento conservador, com repouso e analgesia caso necessário.

O doente apresentou melhoria clínica e os exames de imagem repetidos após oito dias mostravam resolução completa do pneumomediastino (Figura 3).

DISCUSSÃO

O pneumomediastino espontâneo é uma entidade rara caracterizada por ar livre no mediastino. Existem dados que apontam para 25% dos doentes com esta patologia apresentarem combinação de asma e acessos de tosse.[4]

Esta patologia pode complicar-se com pneumotórax, pneumomediastino sob tensão, pneumopericárdio e

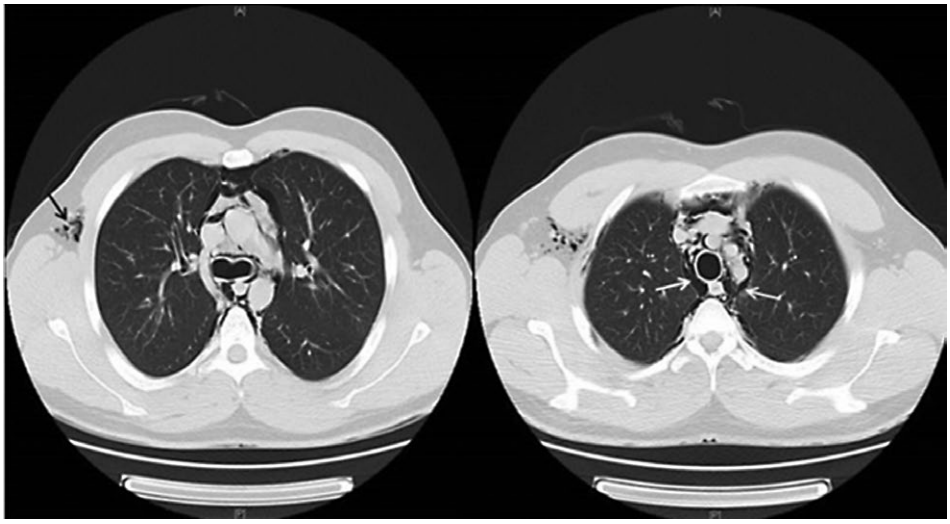

Figura 2 *Imagens da Tomografia Computorizada do Tórax que mostram pneumomediastino (ar livre na região do mediastino médio em torno das estruturas vasculares (setas brancas)) e enfisema subcutâneo no tórax (seta preta).*

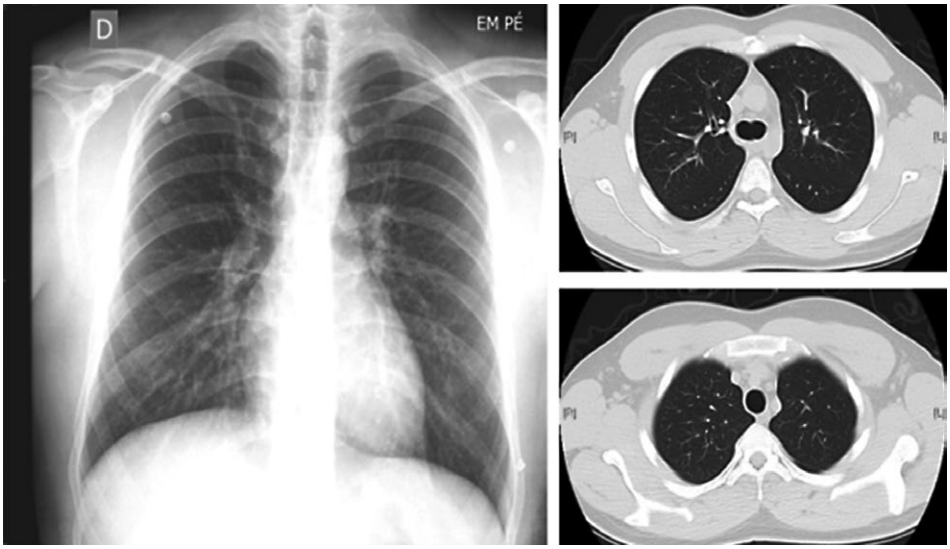

Figura 3 *Imagens de Radiografia de Tórax e de Tomografia Computorizada do Tórax que mostram completa resolução do pneumomediastino.*

tamponamento cardíaco, pelo que os doentes devem ser mantidos sob observação.[4]

Uma série de casos na literatura sugerem uma evolução benigna apesar de não existirem até à data normas de orientação no que diz respeito a intervenções diagnósticas e terapêuticas necessárias no pneumomediastino espontâneo.[5] Por se tratar de uma patologia com curso benigno, a maioria dos doentes devem seguir tratamento conservador, evitando manobras que aumentem a pressão intratorácica.[4]

No caso apresentado foi assumido o diagnóstico de asma agudizada por traqueobronquite. Com a terapêutica instituída para esta patologia e tratamento conservador para o pneumomediastino apresentou melhorias sem complicações. Não foi realizado estudo adicional dado o doente apresentar melhoria clínica e não ter sinais compatíveis com rotura esofágica.

O pneumomediastino apesar de ser um fenómeno raro, deve ser considerado quando são avaliados doentes jovens com sintomatologia cardiorrespiratória. O diagnóstico atempado e uma elevada suspeição clínica previnem complicações posteriores.

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PERCUTANEOUS PERICARDIAL DRAIN: A DEADLY EMBRACE OF THE HEART

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Abstract

Pericardial effusions have multiple causes and when significant percutaneous drainage is standard. Usually removal is a simple and quick procedure with reduced risks. Still, the authors present a case were the drain surrounded the heart and great vessels, causing severe pain, bradycardia and hypotension when pulled, forcing a surgical removal of the same.

CASE REPORT

A 58 year old man with an undifferentiated oesophageal carcinoma, cT3, N+, M0, previously submitted to concurrent chemo and radiotherapy followed by adjuvant chemotherapy, was admitted due to uncontrolled dorsal pain, with cervical irradiation.

During the hospital stay a CT-scan was performed and a pericardial effusion was identified.

An echocardiogram confirmed the effusion, without cardiac tamponade.

A percutaneous pericardial drain was placed and 550 mL of serous liquid were drained.

Serial echocardiograms were performed to document the effusion.

On the third day, due to no further significant drainage and no effusion on the echocardiogram a removal of the drain was attempted.

It did not move, with the patient developing an intense chest pain, severe hypotension and bradycardia. The procedure was halted and the patient recovered.

The Thoracic Surgery department was contacted.

It was assumed that the drain had become caught within the chest wall and the pain had caused a vagal reaction. A new attempt was performed, with a new episode of chest pain, extreme bradycardia and hypotension, with spontaneous recovery upon release of the drain.

An emergency chest CT was performed (Figure 1), showing the drain crossing the transverse sinus on the posterior wall of the heart, emerging on the obtuse border and passing just anterior the root of the aorta and pulmonary artery, before passing the acute border into the inferior wall of the heart.

A medial sternotomy is performed (Figure 2). The pericardium was thickened and completely adherent to the heart, with no visible pericardial metastasis, leaving only a small tunnel through which the drain traversed.

The drain was removed uneventfully and the patient made a full recovery.

DISCUSSION

To the best of our knowledge, this complication had not been previously described in the literature.

In a patient with an advanced stage oesophageal carcinoma and *a de novo* pericardial effusion, either a pericardial progression of the primary disease or metastasis were assumed.

Still, other possible causes include infections, inflammatory connective tissue disease, vasculitis, drug induced, postcardiotomy/thoracotomy, postmyocardial infarction, trauma, dissecting aortic aneurysm, iatrogenic, anticoagulants, radiation therapy, chronic renal failure, chylopericardium, stress-induced cardiomyopathy, hyperthyroidism or hypothyroidism.

Given the previous chemo and radiotherapy, the most likely diagnosis was a malignant or a postchemo-radiotherapy effusion.

Even thought there was no cardiac tamponade, a pericardiocentesis and the placement of a small-bore drain is advisable. Unfortunately, the effusion was not sent for cytological examination.

As the drain had no significant drainage, either it had occluded or no more effusion was present. The echocardiogram showed no effusion, so it was possible to safely remove the drain.

Possible causes for a drain not being able to be removed without force usually include being caught in a suture line or between hard structures in the body, such as bony surfaces.

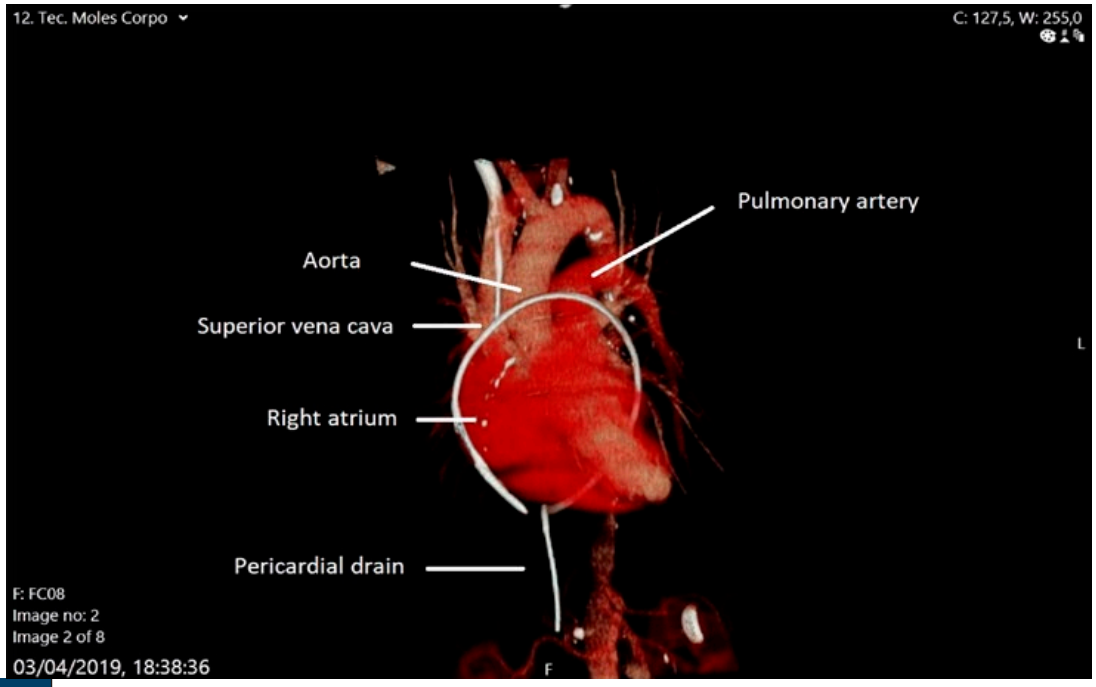

Figure 1 *CT reconstruction showing the drain crossing the transverse sinus on the posterior wall of the heart, emerging on the obtuse border and passing just anterior the root of the aorta and pulmonary artery, before passing the acute border into the inferior wall of the heart.*

Still, in most of these cases, the pulling of the drain does not induce pain, much less hemodynamic instability.

At this point it must be asked what to do next?

Either a new echocardiogram or a CT-scan was warranted. As the hospital had no Cardiologist on call, a CT scan was performed, showing the complete surrounding of the root of the great vessels. As such, as the drain was pulled, it compressed the roots, diminished the cardiac output, leading to pain and hemodynamic instability.

Given that the effusion was significant only 24 hours earlier and had been drained within the same time period, the pericardial thickening and adherence to the myocardium was unexpected, implying a greater surgical risk.

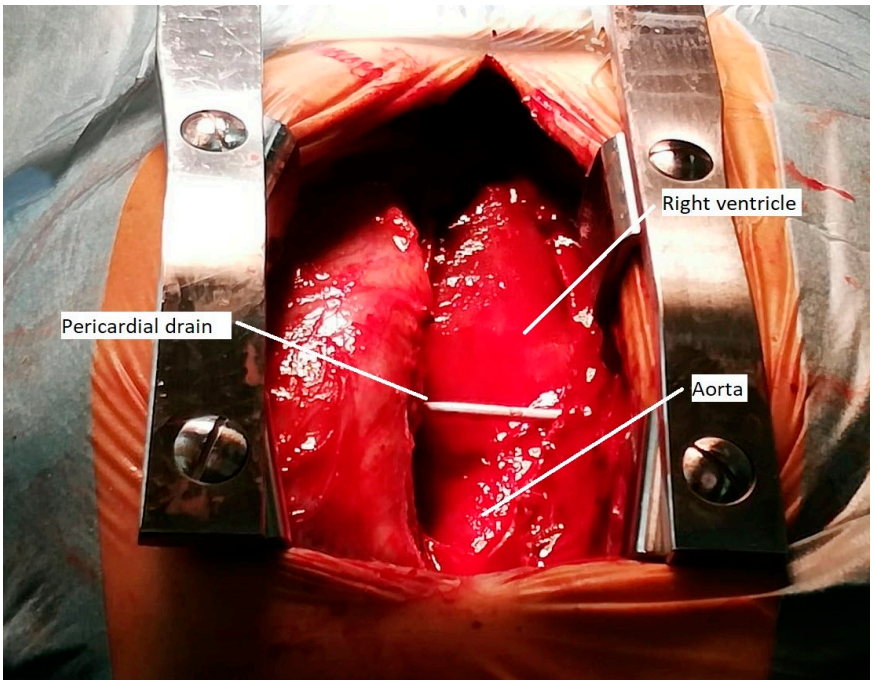

Figure 2 *Medial sternotomy showing a thickened pericardium completely adherent to the heart. The drain is visible crossing in front of the aorta and right ventricle.*

LONG ABDOMINAL AORTIC STENOSIS – A CASE OF TAKAYASU ARTERITIS

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A 77-year-old female Caucasian patient with known Takayasu's arteritis diagnosed at 20 years of age was admitted to the emergency department due to diffuse sudden-onset abdominal pain. On physical examination, femoral pulses were feeble. Laboratory results were unremarkable. Abdominal CT angiography showed a long abdominal predominantly infra-renal aortic stenosis (Figures 1 and 2).

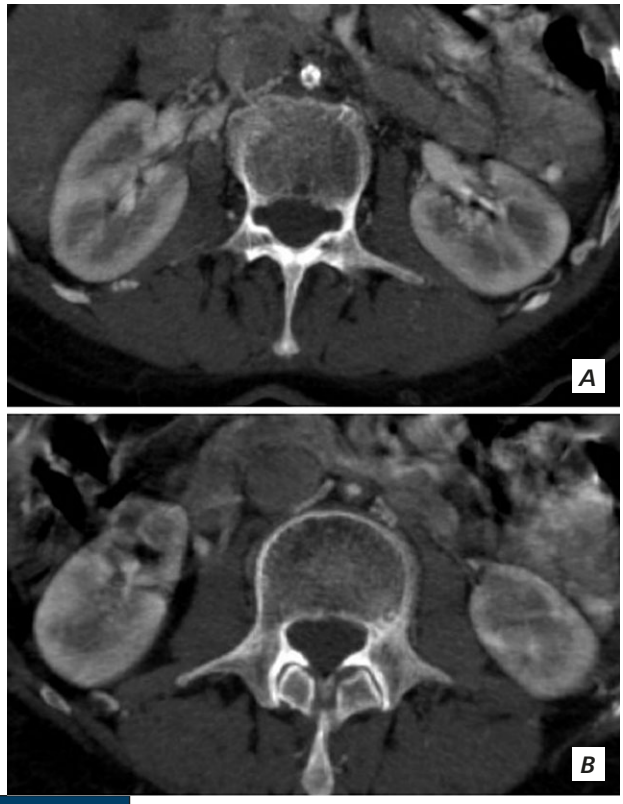

Figure 1 *Multislice computed tomography angiography. Thin maximum intensity projection (MIP) axial images. **A** – markedly reduced lumen of the abdominal infra-renal aorta, with a maximum diameter of less than 1cm, with circumferential extensive calcifications. **B** – At a lower level, marked luminal reduction with peripheral and circumferential hypodense thickening of the aortic wall can be seen in keeping with the diagnosis of Takayasu Arteritis.*

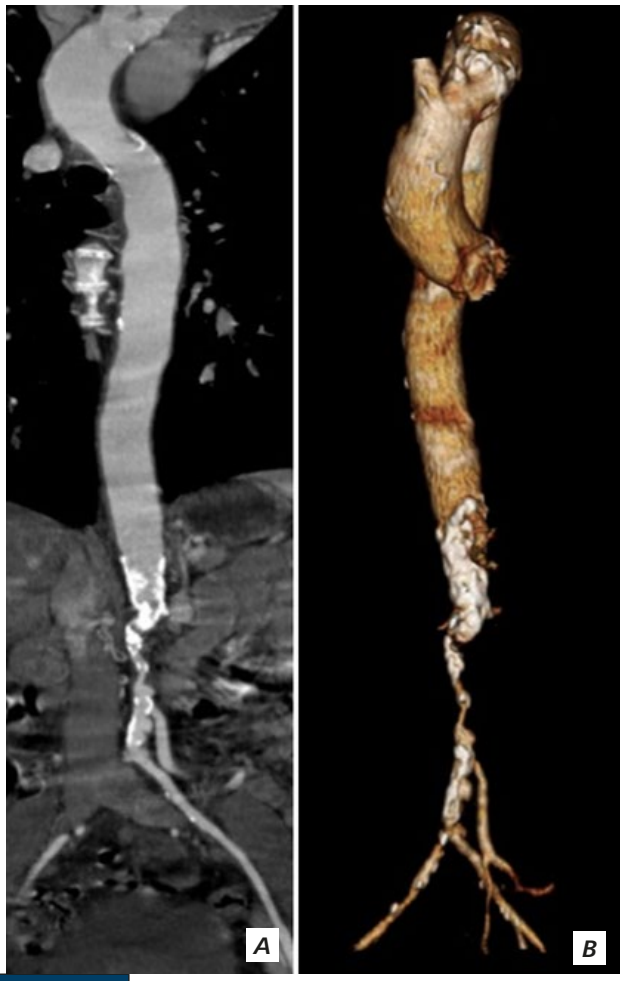

Figure 2 ***A** – 2D curved reformatted thin MIP coronal image shows collateral circulation and the inferior mesenteric artery with a larger calibre than usual. **B** – 3D volume-rendered (VR) reformatted image shows the long stenosis extending from the infra-renal aorta to the iliac arteries with extensive calcifications. The large calibre of the inferior mesenteric artery and aortic arch involvement can also be appreciated.*

COMBINED PERICARDIECTOMY AND BEATING HEART CORONARY ARTERY BYPASS GRAFTING

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50-years-old male with three vessels coronary lesions. Intraoperatively thickened constrictive pericardium with multi-loculated hematic effusion. Ante-phrenic pericardiectomy was performed and the heart released posteriorly, allowing mobilization. Off-pump LITA to LAD and SVG to PD anastomosis were performed. Post-operative uneventful. Histology confirmed chronic, idiopathic inflammation. A rare and challenging surgical procedure.

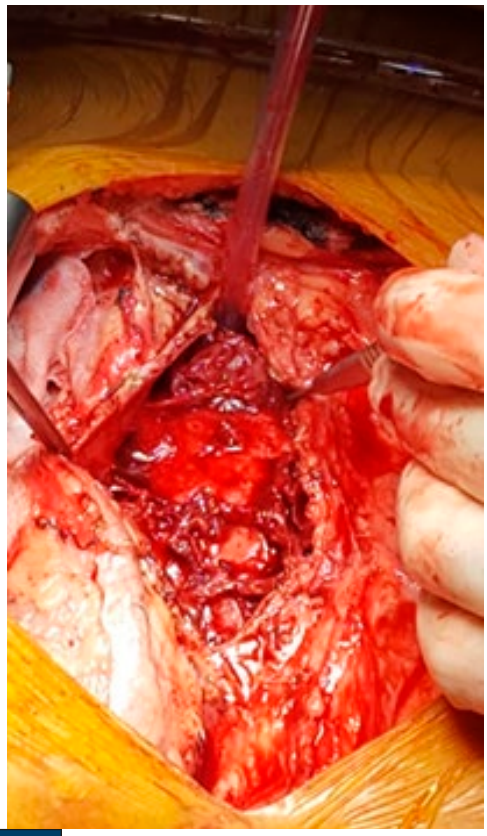

Figure 1 *Thickened constrictive pericardium with multi-loculated hematic pericardial effusion.*

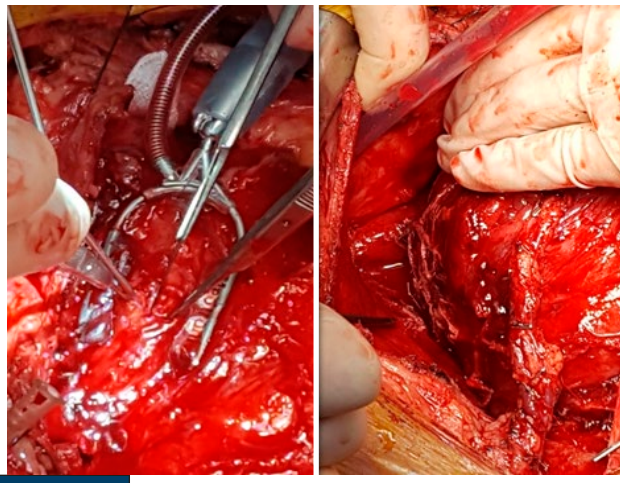

Figure 2 *LITA to LAD anastomosis.*

SUPERIOR VENA CAVA SYNDROME – BLOOD CHANGES ITS ROUTE

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Fourty-eight years old woman with history of non-Hodgkin's lymphoma, treated with chemoradiotherapy. Mammary MRI shows multiple varicose veins along the breast parenchyma. CT angiography showed superior SVC obliteration at the azygos vein with marked subcutaneous collateral circulation. This is a superior vena cava syndrome due to non-Hodgkin's lymphoma.

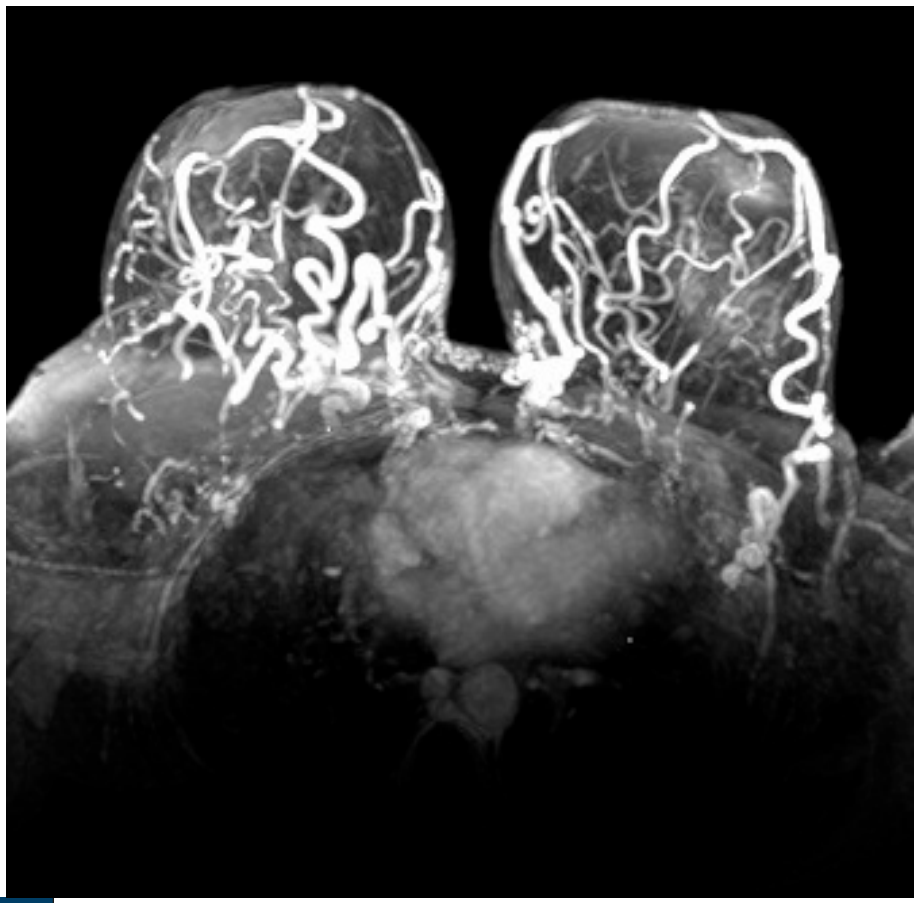

Figure 1 *Superior Vena Cava Syndrome due to radiotherapy for a lymphoma - image from a mammary MRI showing the collateral veins in the subcutaneous tissue from the breast.*

FOREIGN BODY IN THE BRONCHIAL TREE: ABOUT A CLINICAL CASE

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Healthy man with a history of accidental aspiration of a screw into the bronchial tree. Evolution with unappreciated cough and sputum, with late diagnosis of pneumonia. He underwent therapeutic rigid bronchoscopy, evolving with extensive necrotizing pneumonia, hypertensive pneumothorax and pneumomediastinum requiring venous venous ECMO. Death on D6 of ECMO.

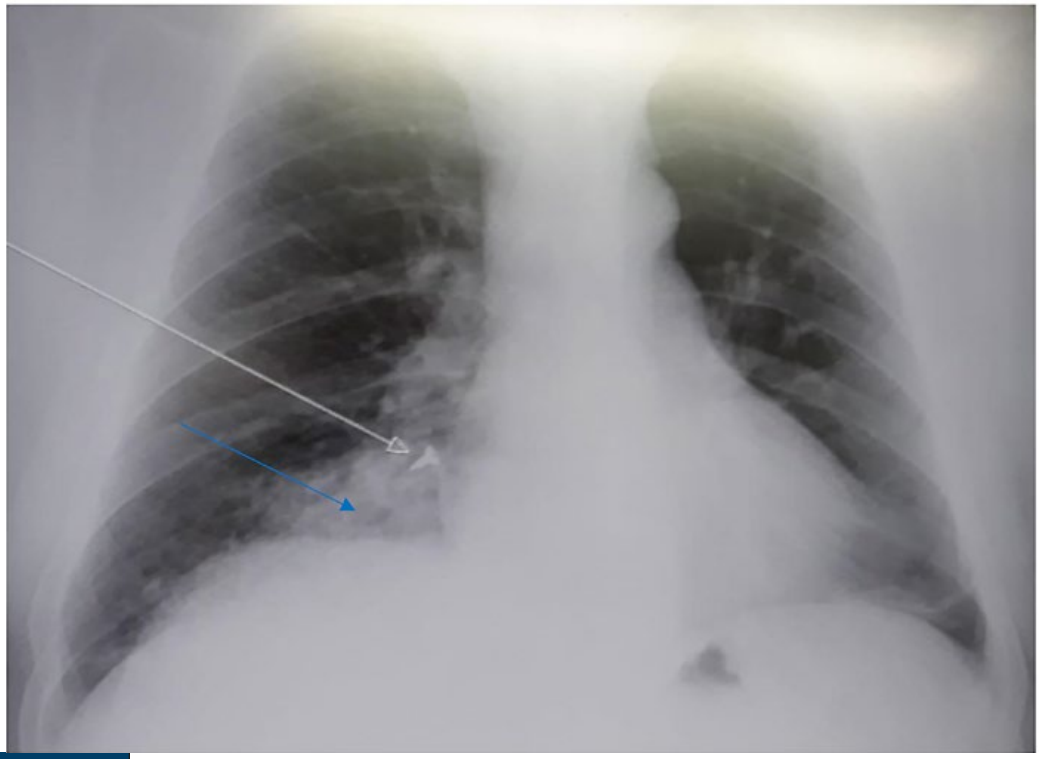

Figure 1 *Thoracic x-ray showing the presence of a foreign body (screw) lodged in the right lower lobar bronchus (white arrow). Right inferior para-hilar condensation (blue arrow) suggestive of parenchymal complication.*

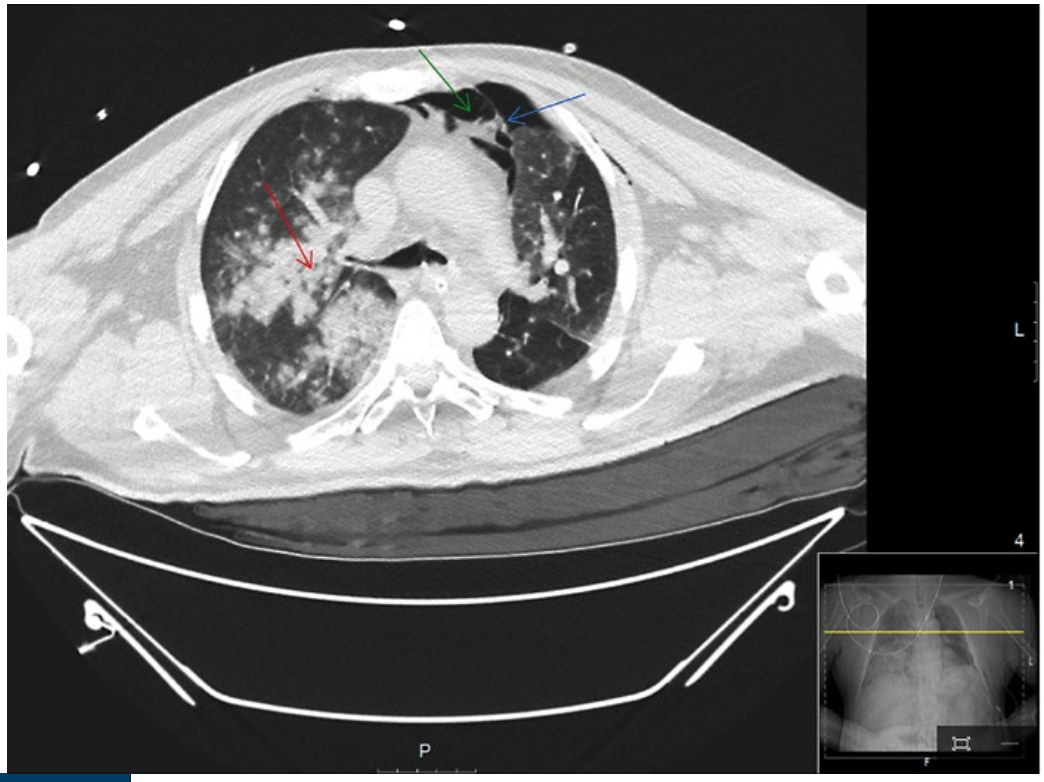

Figure 2

Thoracic computer tomography immediately after removal of the foreign body showing multiple parenchymal pulmonary densities in the context of extensive necrotizing pneumonia (red arrow), left pneumothorax (blue arrow) and associated pneumomediastinum (green arrow).

PNEUMATOCELE AFTER THORACIC TRAUMA

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A 20-year old male patient presented at the emergency department with occipital headache, chest pain and hemoptysis, following an accident while playing sports (fall after impact with another player). There was no known relevant patient history or usual medication.

Initial work-up revealed an occipital hematoma and right lumbar pain, in the absence of rib fracture or subcutaneous emphysema. Crackles at the lower-third of the right hemithorax were noted at auscultation. No abnormalities were found on the cranial computed tomography (CT) or chest x-ray.

Due to a new onset of hemoptysis, a chest CT was carried out showing a pulmonary subpleural, para-vertebral, air-filled lesion, measuring 1.2 x 7cm (axial x longitudinal diameter). Given the recent traumatic injury, a pneumatocele was suspected secondary to a discrete parenchymal laceration. An adjacent 5cm ground-glass opacity was seen, suggesting an associated alveolar hemorrhage (figure 1).

Owing to clinical stability, the patient was not submitted to an emergency bronchoscopy and was admitted for a two-day surveillance. There was a complete symptomatic relief on the discharge day and re-evaluation following one month showed a total filling of the pulmonary parenchymal lesion (figure 2).

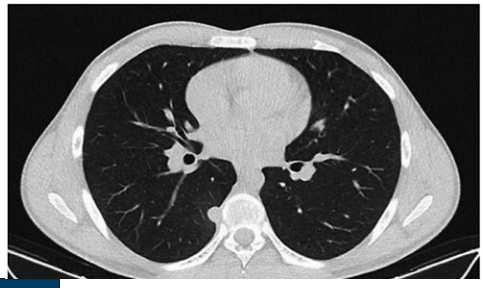

Figure 2 *Chest CT scan for reassessment.*

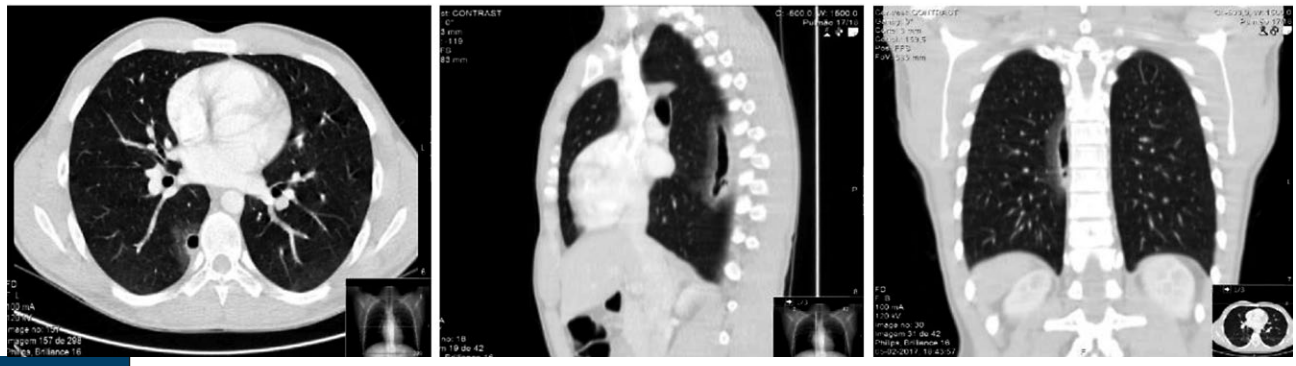

Figure 1 *Admission chest CT scan.*

RARE COMBINATION OF ANATOMICAL VARIATIONS

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Congenital variation of right aortic arch (prevalence 0.05%), aberrant left subclavian artery (posterior to the oesophagus) and 28*26mm diameter Kommerell diverticulum (prevalence 0.4-2.3%), with tracheal deviation and extrinsic esophageal compression. Symptomatic or >55mm diameter Kommerell's diverticulum should be considered for repair due to their risk of rupture.

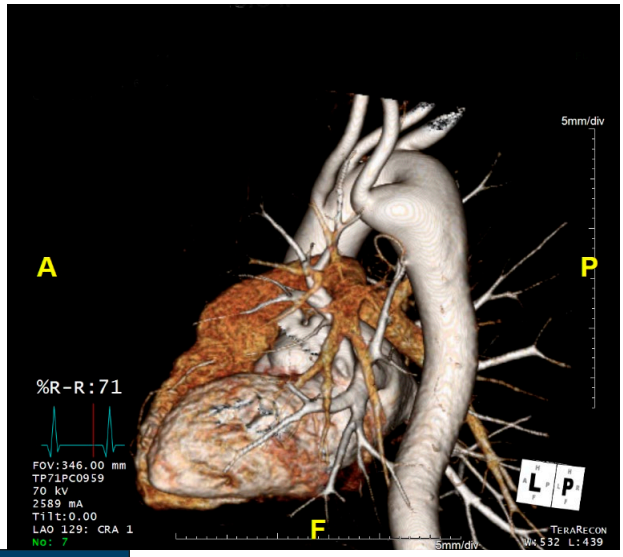

Figure 1 *CTA – posterior view.*

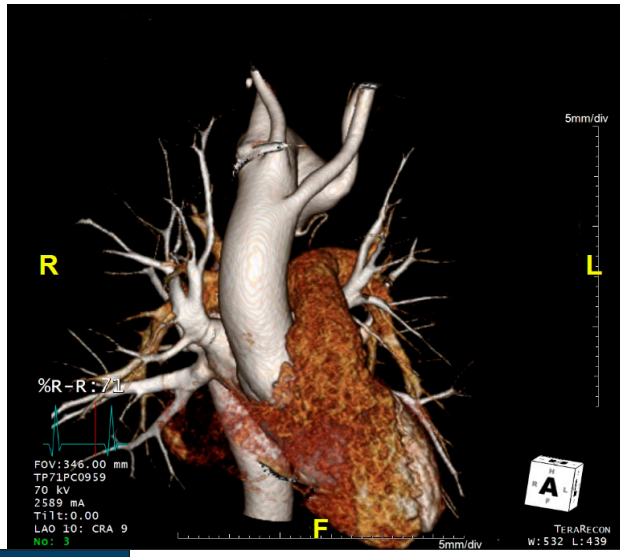

Figure 2 *CTA – anterior view.*


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