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Francese	A1	A1	A1	A1	A1
Portoghese	B2	B2	B2	B2	B2
Spagnolo	C2	C2	C2	C2	C2

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Scuola di Specializzazione in Chirurgia Vascolare

Direttore : Prof. Santi Trimarchi

Tesi di Specializzazione

ENDOVASCULAR TREATMENT IN BLUNT THORACIC AORTIC INJURIES : A 20 YEAR EXPERIENCE IN A SINGLE CENTRE.

Relatore : Chiar.mo Prof. Santi Trimarchi

Correlatore : Chiar. mo Prof. Vicente Riambau (Hospital Clinic, Barcelona-Universidad de Barcelona)

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Vascular access surgery can be safely performed in an ambulatory setting

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Abstract

Introduction: Ambulatory surgery is associated with lower costs, but there is lack of evidence of the safety for ambulatory vascular access surgery. The objective of this study is to substantiate the safety and effectiveness of performing vascular access surgery in an ambulatory setting.

Methods: A review of our prospectively maintained database including all vascular access open surgeries (creations and repairs) performed by our Vascular Access Unit between 2013 and 2017 was compiled. Patient comorbidities, surgery details, hospital admission conditions, and 1-week and 1-month follow-up patency and complications (death, infection, bleeding, and readmission/reintervention) were scrutinized.

Results: In the last 5 years, 1414 vascular access procedures were performed (67.8% access creations, 32.2% previous access repairs) in 1012 patients. Most surgeries were performed under local anesthesia (59.2%) or axillary plexus block (38.4%) and mainly in an ambulatory setting, without overnight hospital stays (90.9%). During the first postoperative week follow-up, 9 cases (0.6%) needed readmission or reintervention; significant infection materialized in 11 (0.8%) and 10 cases (0.7%) showed noteworthy hematoma or bleeding, only three (0.2%) requiring reintervention. The primary composite endpoint of 24-h death and 1 week readmission, reintervention, infection, or bleeding was 1.9% (27 cases); 1-month access failure was 6.2%. After univariate analysis, ambulatory settings were not related to higher rates of complications or readmissions.

Conclusion: Arteriovenous access surgery can be safely performed in an ambulatory setting, in spite of complex cases, comorbidities, or the increasing implementation of axillary plexus blocks. Surgical results and patency are good, and complications necessitating readmission remain very low.

Keywords

Vascular fistula, outpatients, patient safety, renal dialysis

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Introduction

Native arteriovenous fistulas (AVFs), followed by arteriovenous grafts (AVGs), are the methods of choice for achieving vascular access (VA) in chronic hemodialysis patients[1,2] because they are related to higher long-term patency rates and markedly lower risks of infection, healthcare costs, hospitalization, and mortality risks.[3,4]

VA surgery can be technically high demanding, with an extremely high heterogeneity of surgical possibilities, types and configuration of accesses, and surgically very creative, thus a high grade of vascular surgeons who specialize in VAs and a multidisciplinary approach are advocated. However, independent of technical aspects, patency, and maturation rates, VA surgeries are usually brief procedures,

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related to a very low rate of major complications (bleeding, significant pain, or extremity ischemia).[5] Therefore, they can be usually performed in an ambulatory setting (as outpatient surgery, without overnight hospital stays), independent of the type of anesthesia (local, plexus blocks, or general) or extension of surgery (radiocephalic or brachiobasilic with superficialization), decreasing costs and improving efficiency.

Other VA procedures (endovascular procedures of failing AVFs or AVGs, or insertion of central venous catheters) are more widespread, performed in an ambulatory setting (performed in hospitals, but not requiring overnight stays) or even office-based setting (performed in office in work-hours), revealing very low rates of complications (less than 1%)[6] and increased lengths of stay and costs when managed in inpatient settings.[7] But it has been less investigated in VA surgical creations. Indeed, there is a paucity of evidence to buttress this attitude; main guidelines in VA procedures do not allude to it, and there are very few registries analyzing its safety, mainly only in simple radiocephalic or brachiobasilic accesses.[1,2,8–10]

The objective of this study is to demonstrate the safety and effectiveness of creating VA in a mainly ambulatory setting in a highly specialized center and to analyze the complications and readmission/reoperation rates during first-week and first-month follow-ups related to the ambulatory condition.

Materials and methods

Our Vascular Access Unit (Hospital Clinic, University of Barcelona, Barcelona, Spain) offers a multidisciplinary approach (nephrology, vascular surgery, vascular interventional radiology, anesthesiology, nursing, and physiotherapy) for patients requiring VA for hemodialysis in our country and nearby. We, systematically and prospectively register all cases assisted and treated by our unit in a shared database, recording patient information, medical evaluation, systematic physical and ultrasound studies of all cases, proposed and finally performed treatments (surgeries, central venous catheterization (CVC), and endovascular treatments), and close clinical and ultrasound follow-ups (patency, maturation, complications during follow-up, and mortality). Decision making of all procedures is based on a multidisciplinary discussion of every case and usual recommendations of guidelines. Physical and ultrasound exam of the extremity is routinely performed in all cases, and special exams (echocardiography, effort test, and computed tomography (CT)) are performed selectively depending on medical history.

All surgeries are performed in the hospital (Hospital Clinic, Barcelona, Spain), usually in the ambulatory operating room (OR), a preconditioned part of the hospital dedicated to less invasive procedures and ambulatory or outpatient treatment, and ambulatory setting is usually followed. Patient is scheduled 1 h before surgery and discharged after recovery from anesthesia (around 1 h after surgery), without hospital overnight stay. Strict hygienic and sterile conditions are used during surgery, and conventional operative technology is used, as in other vascular surgery operations.

Only cases that need special monitoring (cardiac transplantation and high comorbidities), occasional OR availability, or emergencies are performed in other OR (general OR or emergency OR). And only cases that need close monitoring, due to surgery types (femoral grafts, highly complex reconstructions, previous bleeding, complicated infections, or emergencies) or previous comorbidities in patients without family support, are not performed in an ambulatory setting and admitted in the hospital (short hospital stay of one night: short stay, or hospital admission for more than one night: hospital admission). However, we want to note that the vast majority of VA creations (with local anesthesia or axillary plexus blocks, simple radiocephalic or complex brachiobasilic with superficialization, or previous fistula reconstructions) are performed in an ambulatory setting.

Most procedures are usually done under local anesthesia with 1% plain mepivacaine. This was mainly used for radiocephalic or brachiocephalic AVFs. More complex procedures (obese patients, AVF superficializations, AVGs, and complex previous VA repairs) are usually done under ultrasound-guided axillary plexus blocks with 20 mL of 1% plain mepivacaine. Spinal anesthesia is used for lower limb procedures and general anesthesia for emergencies or selected cases. Independent of the priority or emergency of the cases, or types of anesthesia, most cases are performed in ambulatory settings. Systemic heparin is used selectively (in lower limb accesses or complex VA repairs) and prophylactic antibiotics are administered only in extensive surgeries (brachiobasilic AVFs with venous superficialization and complex VA repairs) or AVGs.

Follow-up is performed depending on every case, usually by our institution, but selectively by referring institutions and dialysis centers, communicating to us all events occurred after surgery. Patency, maturation, and AV utilization are registered. Complications, reinterventions, or secondary procedures that occurred during follow-up, independent if they have been treated in our institution (as in the vast majority of cases occur, as reference center for these patients and referring centers) or elsewhere, are also systematically recorded in our database. Significant infection is described as wound or VA infections needing protracted antibiotic treatment or reintervention. Significant bleeding or hematoma is described as internal or external bleeding needing readmission or reintervention or hematoma necessitating close outpatient follow-up (not superficial, uncompromising hematomas). Hospital readmission for surgical complications (in our own

Table 1. Description of study population (1414 consecutive patients).

Variable		% (or mean)	N (or SD)
Sex (male)		64.7	(915)
Age (years)		66.63 years	±14.16
Hypertension		87.9	(1243)
Diabetes mellitus		41.3	(584)
Dyslipidemia		50.6	(716)
Ischemic cardiopathy		19.6	(278)
Antiplatelet treatment		30.3	(429)
Anticoagulant treatment		9.6	(135)
Stroke		8.7	(123)
Peripheral arteriopathy		11.0	(156)
Nephrological status	Predialysis	29.6	(419)
	Hemodialysis	57.8	(817)
	Functional renal transplant	12.6	(178)
Time in dialysis (of hemodialysis patients, years)		2.64 years	±4.30
Current access	Percutaneous CVC	5.8	(81)
	Tunneled CVC	42.9	(607)
	AVF	20.9	(295)
	AVG	2.0	(29)
	No access	28.4	(402)
Priority	Emergent (<48 h)	2.5	(36)
	Urgent (<1 week)	9.1	(128)
	Routine (more than 1 week)	88.4	(1250)
Time in waiting OR list until surgery (days)		20.75 days	±26.86

AVF: arteriovenous fistula; AVG: arteriovenous graft; CVC: central venous catheterization; OR: operating room; SD: standard deviation.

or other institutions) or reintervention (for malfunctioning VA or complications) is also recorded.

For this particular work, we reviewed the prospectively maintained database of all VA open procedures (creations or repairs) performed by our unit in the last 5 years (between 2013 and 2017); endovascular arteriovenous access treatments and central venous catheters were not included. We reviewed patient comorbidities, initial nephrological status and current VA, time on waiting OR list, and surgical priority (emergent—performed in less than 48 h: bleeding, severe infection, or complications; urgent—less than 1 week: glomerular filtrate <10 mL/min or fast decrease and 10–15 mL/min in diabetic patients or stage IV distal hypoperfusion syndrome; and routine—more than 1 week waiting list: rest of cases). During surgery, we reviewed VA or repair performed, type of anesthesia or OR, side, and admission conditions. During follow-up, access failure (thrombosis), significant infection, bleeding/hematoma, and hospital readmissions or reinterventions for surgical complications (main follow-up variable) were reviewed during the first month follow-up (1-week and 1-month follow-up complications could be attributed to ambulatory conditions, but posterior complications are probably independent). The primary composite endpoint was defined as 24-h death and 1-week readmission, reintervention, infection, or bleeding.

Statistical analysis

Descriptive parameters (described as mean and standard deviations (SDs)) and frequencies from preoperative, intraoperative, and follow-up data (at 1 week and 1 month) were extracted using the Statistical Package for Social Sciences (SPSS), Version 23. Univariate comparisons between dissimilar groups (primary endpoint: 24-h death, readmission, reintervention, and infection or bleeding during first-week follow-up; and type of anesthesia, type of surgery, OR, and admission conditions) were assembled using the Pearson chi-square or Fisher's exact tests. P value <0.05 was deemed to be statistically significant.

Results

In the last 5 years (2013–2017), we performed 1414 VA surgeries (958 VA creations (67.8%) and 456 previous VA repairs (32.2%)) on 1012 patients. Study population is presented in Table 1; 8.6% of preoperative data and 0.2% of intraoperative data were missing in our database and recovered from other institutional registries.

Most surgeries were performed in the ambulatory OR (91.0%), under local anesthesia (59.2%) or axillary plexus block (38.4%), and mainly in an ambulatory setting without overnight hospital stays (90.9%). Type of surgeries, anesthesia, OR, and admission conditions are described in Table 2.

Table 2. Intraoperative data.

Variable		%	N	Performed in ambulatory condition (%)
Vascular access creations		67.8	958	93.6
	Brachiocephalic[a]	39.7	380	97.6
	Radiocephalic[b]	30.3	290	97.9
	Brachiobasilic with superficialization	13.3	127	88.2
	Brachio-axillary AVG	7.4	71	90.1
	Brachio-perforating or basilic	4.4	42	97.6
	Femoral AVG	2.3	22	0.0
	Forearm autogenous loop (cephalic or basilic)	0.8	8	100.0
	Brachiocephalic with superficialization	0.7	7	100.0
	Other[c]	1.1	11	90.9
Previous vascular access repairs		32.2	456	85.1
	AVF ligature	55.5	253	87.7
	Graft interposition	8.8	40	82.5
	Proximal reanastomosis[d]	9.9	45	93.3
	Flow reduction	7.7	35	88.6
	AV revision[e]	7.4	34	73.5
	Superficialization[f]	6.6	30	96.7
	Arterial reconstruction (bypass or patch)	4.2	19	31.6
Side (left)		66.4	929	91.8
Anesthesia	Local	59.2	837	96.9
	Axillary plexus block	38.5	545	87.0
	Spinal	1.6	22	0.0
	General	0.7	10	0.0
OR	Ambulatory OR	91.0	1287	92.9
	General OR	7.6	107	79.4
	Emergency OR	1.4	20	20.0
Admission condition	Ambulatory	90.9	1285	
	Short stay (1 night)	4.4	62	
	Hospital admission (>1 night)	4.7	67	

AVF: arteriovenous fistula; AVG: arteriovenous graft; OR: operating room; SD: standard deviation.
[a]349 conventional brachiocephalic, 22 brachio-external cephalic, and 9 VasQ brachiocephalic.
[b]69 using radiocephalic branch, 42 dorsal branch, and 179 proximal cephalic vein.
[c]Forearm AVG loops, radio-basilic, and prepectoral loops.
[d]36 Radiocephalic and 9 brachiocephalic reanastomosis.
[e]Infected graft removal, bleeding repair, and collateral ligature.
[f]15 Brachiobasilic, 11 brachiocephalic, and 4 radiocephalic.

After surgery, there were no 24-h deaths. During the first postoperative month follow-up, 22 cases (1.6%) required readmission, most of them (21) requiring reintervention, because of hyperacute ischemic steal syndrome (9), bleeding (6), stenosis (3), high flow (2), and infection (1). However, only nine (0.6%) of these readmissions and eight of the reinterventions were during the first week. Significant infection transpired in 14 (1.0%) during first month (11 (0.8%) during first week), and the bulk of them were treated with ambulatory antibiotics (only 2 needed late readmission and VA removal). Referring to bleeding, 13 cases (0.9%) showed noteworthy hematoma or bleeding (10 (0.7%) during first week), and only six (0.4%) needed reintervention because of VA bleeding (Table 3). First month VA creations failure (thrombosis) was 6.2% (59 cases). The primary composite endpoint of 24-h death and readmission, reintervention, and infection or bleeding during first-week follow-up was 1.9% (27 cases).

Univariate analysis showed that ambulatory condition was not related to a higher rate of complications (primary

Table 3. Primary endpoint analysis: 24-h death and 1-week follow-up complications (% and (N)) in all cases and in subgroups of ambulatory condition and type of access.

	All cases	Ambulatory condition		Type of access	
	1414	Ambulatory cases (1285)	Non ambulatory cases (129)	VA creations (958)	Previous VA repairs (456)
24-h death	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Readmission or reintervention	0.6% (9)	0.6% (8)	0.8% (1)	0.7% (7)	0.4% (2)
Significant infection	0.8% (11)	0.5% (7)	3.1% (4)	0.9% (9)	0.4% (2)
Significant bleeding or hematoma	0.7% (10)	0.5% (6)	3.1% (4)	0.3% (3)	1.5% (7)
Primary composite endpoint	1.9% (27)	1.5% (19)	6.2% (8)	1.8% (17)	2.2% (10)

VA: vascular access.
Primary composite endpoint: 24-h death and 1 week readmission, reintervention, infection, or bleeding.

Table 4. Predictor factors in univariate analysis of complications (primary composite endpoint) during first-week follow-up.

	Primary composite endpoint (% and N)[a]	p
Type of surgery		
VA creations	1.8% (17)	*0.678*
Previous VA repair	2.2% (10)	
Anesthesia		
Local	0.8% (7)	*0.002*
Axillary plexus block	3.3% (18)	
Spinal	4.5% (1)	
General	10.0% (1)	
OR		
Ambulatory OR	1.6% (21)	*0.052*
General OR	4.7% (5)	
Emergency OR	5.0% (1)	
Admission condition		
Ambulatory	1.5% (19)	*0.001*
Short stay (1 night)	4.8% (3)	
Hospital admission (>1 night)	7.5% (5)	
Age (years)		
<70	1.5% (11)	*0.251*
>70	2.4% (16)	

OR: operating room; VA: vascular access.
[a]Percentage (%), total number (in parentheses), and significance (Pearson Chi-Square and Fisher Exact tests) of the predictor factors of complications (primary composite endpoint: 24-h death and 1 week readmission, reintervention, infection, or bleeding).

endpoint: 1 week complications); moreover, more complications were observed in patients needing short or longer hospitalization admissions. Type of OR and older age were not related to more complications, and as expected, more complex anesthesia (axillary plexus blocks and peridural and general anesthesia) were related to more complications (Table 4).

Discussion

This study confirms that the VA creation and repair performed in an ambulatory setting (without hospital night admission) are safe and effective. In our series of 1414 consecutive patients, we have seen that this policy is related to a low rate of complications: no 24-h deaths, only 0.6% 1-week readmission or reintervention, and a primary composite endpoint of 1 week complications of 1.9%. Even if this is not a randomized or multicenter comparative registry, the rate of complications is low compared to other publications.

The prognostic factors analysis did not show unanticipated results: ambulatory condition was not related to a higher rate of 1 week complications (primary endpoint). Moreover, more complications were detected in patients needing short or longer hospitalization admissions, probably because these are more complicated cases with higher risks of bleeding and infection (selection bias). Also, axillary plexus blocks and general anesthesia exhibited more complications than local anesthesia, again

probably because of case selection and not due to anesthesia type itself.

The aim of this study was not to depict patency details (primary, assisted primary, and secondary) as only 1 month follow-up was described, thus only access failure (thrombosis) at 1 month was detailed.

There is substantial information regarding the rates of immediate and long-term complications of AVFs.[11–13] However, immediate complications are less precisely described. The rate of bleeding (1%–3%), infection (0.5%–5%), and steal syndrome (0.5%–9%)[5,8,10,14,15] are similar to those described in our study. In addition, definition criteria of complications could deviate between studies. Thus, ambulatory settings do not have the appearance of generally augmenting global AVF complications.

Referring to ambulatory setting, this approach has been widely described in endovascular treatments (fistulogram, angioplasty, thrombectomy, and stent) in an office-based (ambulatory) setting,[6,16–18] related to a low tax of complications and safe and improved costs. However, in VA surgical creation, a paucity of evidence has been published. The Kidney Disease Outcomes Quality Initiative (K-DOQI) guidelines[1] do not allude to it as most guidelines neither do, and the recently published Spanish Clinical Guidelines on Vascular Access describe this possibility but do not support it in any evidence.[9] Limited publications of Medicare registries report good short-term results in performing VA surgeries as office-based surgeries, and these results suggest that they have significantly better patient outcomes and lower mortality rates at significantly reduced costs.[10] Some published studies assert that postoperative complications and primary and secondary patency do not differ from those procured in an inpatient basis.[8] Moreover, lower rates of complications have been related to outpatient basis treatment, probably secondary to a selection bias (lower risk patients are probably treated without hospital stay).

The main limitation of this article is the study design. It is a retrospective review of a prospective database, including patients from a large territory, so some data (patient characteristics, surgery details, and mainly complications during follow-up) could be lost, in spite of our efforts to record all this information. Randomized trials are difficult to perform and comparative trials between centers would also be barren. The main outcome variable was defined as a primary composite endpoint during first-week follow-up; it is difficult to define which complications are due to ambulatory conditions and for how long, so we arbitrarily defined 1-week follow-up period as the time when complications could be in a way blamed on the ambulatory condition. However, we also describe the 1-month complications to get a wider view of the follow-up.

In conclusion, arteriovenous access surgical creation and repair can mainly be performed in an ambulatory basis, in spite of complex cases, several comorbidities of patients, or the increasing use of axillary plexus blocks. Surgical results and access patency are good, and complications needing readmission remain very low.

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References

1. NKF-K/DOQI. 2006 update vascular access. Guideline 2: selection and placement of hemodialysis access. *Am J Kidney Dis*2006; 48(Suppl. 1): S192–S200.
2. Tordoir J, Canaud B, Haage P, et al. EBPG on vascular access. *Nephrol Dial Transplant* 2007; 22(Suppl 2): ii88–117.
3. Dhingra RK, Young EW, Hulbert-Shearon TE, et al. Type of vascular access and mortality in U.S. hemodialysis patients. *Kidney Int* 2001; 60(4): 1443–1451.
4. Rayner HC, Besarab A, Brown WW, et al. Vascular access results from the Dialysis Outcomes and Practice Patterns Study (DOPPS): performance against Kidney Disease Outcomes Quality Initiative (K/DOQI) Clinical Practice Guidelines. *Am J Kidney Dis* 2004; 44(5 Suppl 2): 22–26.
5. Mousa AY, Dearing DD and Aburahma AF. Radiocephalic fistula: review and update. *Ann Vasc Surg* 2013; 27(3): 370–378.
6. Jain K, Munn J, Rummel MC, et al. Office-based endovascular suite is safe for most procedures. *J Vasc Surg* 2014; 59(1): 186–191.
7. Sawant A, Mills PK and Dhingra H. Increased length of stay and costs associated with inpatient management of vascular access failures. *Semin Dial* 2013; 26(1): 106–110.
8. Polo J, Sanabia J, Serantes A, et al. Ambulatory surgery for vascular access for hemodialysis. *Nephron* 1993; 64(2): 323–324.
9. Ibeas J, Roca-Tey R, Vallespín J, et al. Grupo Español Multidisciplinar del Acceso Vascular (GEMAV). Spanish Clinical Guidelines on Vascular Access for Haemodialysis. *Nefrologia* 2017; 37(Suppl 1): 1–191.
10. Dobson A, El-Gamil AM, Shimer MT, et al. Clinical and economic value of performing dialysis vascular access procedures in a freestanding office-based center as compared with the hospital outpatient department among Medicare ESRD beneficiaries. *Semin Dial* 2013; 26(5): 624–632.

11. Al-Jaishi AA, Liu AR, Lok CE, et al. Complications of the arteriovenous fistula: a systematic review. *J Am Soc Nephrol* 2017; 28(6): 1839–1850.
12. Lew SQ, Nguyen BN and Ing TS. Hemodialysis vascular access construction in the upper extremity: a review. *J Vasc Access* 2015; 16(2): 87–92.
13. Almasri J, Alsawas M, Mainou M, et al. Outcomes of vascular access for hemodialysis: a systematic review and meta-analysis. *J Vasc Surg* 2016; 64(1): 236–243.
14. Smith GE, Souroullos P, Cayton T, et al. A systematic review and meta-analysis of systemic intraoperative anticoagulation during arteriovenous access formation for dialysis. *J Vasc Access* 2016; 17(1): 1–5.
15. Rose DA, Sonaike E and Hughes K. Hemodialysis access. *Surg Clin North Am* 2013; 93(4): 997–1012.
16. Lin PH, Yang KH, Kollmeyer KR, et al. Treatment outcomes and lessons learned from 5134 cases of outpatient office-based endovascular procedures in a vascular surgical practice. *Vascular* 2017; 25(2): 115–122.
17. Ascher E, Hingorani A and Marks N. Duplex-guided balloon angioplasty of failing or nonmaturing arterio-venous fistulae for hemodialysis: a new office-based procedure. *J Vasc Surg* 2009; 50(3): 594–599.
18. Marks N, Hingorani A and Ascher E. New office-based vascular interventions. *Perspect Vasc Surg Endovasc Ther* 2008; 20(4): 340–345.

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Total endovascular repair of aberrant right subclavian artery aneurysm using the periscope technique: a case report

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ABSTRACT

INTRODUCTION: Aneurysmal degeneration of aberrant right subclavian artery (ARSA) carries a relevant risk of rupture. Timely elective treatment is mandatory. Therapeutic options include open surgery repair or hybrid surgical and endovascular repair. Few reports of total endovascular approach repair have been reported.

PRESENTATION OF THE CASE: We report the first case of total endovascular repair of an aneurysmal ARSA using a thoracic aortic endograft with a "periscope" covered stent into the ARSA itself.

DISCUSSION: The total endovascular approach was considered for patient's age and her poor compliance to the idea of a surgical revascularization of the ARSA, which has to be preserved since the LSA was diseased. The urgent situation did not allow for the use of a custom-made graft, so the idea of a "periscope" covered graft both to preserve the flow of the ARSA and to exclude the aneurysmal lesion seemed to be the best choice.

CONCLUSION: The "periscope" technique allowed the urgent treatment of aneurysmal ARSA with good clinical results.

1. Introduction

Aberrant right subclavian artery (ARSA), or arteria lusoria, is the most common embryologic abnormality of the aortic arch, with a reported prevalence of 0.5–1.5% on autoptic studies [1].

Aneurysmal degeneration, which may involve also the aorta, carries a relevant risk of rupture [2]. So, timely elective treatment is almost mandatory.

Therapeutic options include open surgery repair or hybrid surgical and endovascular repair [3].

Few reports of total endovascular approach repair have been reported using either custom made aortic fenestrated graft with covered stents [4] or triple-barrel stent grafts to keep patent both common carotid arteries while covering the origin of the ARSA with a thoracic endograft [5].

To our knowledge, this is the first report of total endovascular repair of an aneurysmal ARSA using a thoracic aortic endograft with a "periscope" covered stent into the ARSA itself.

2. Presentation of the case

An 86 years-old woman complained of a left subscapularis pain since few days. Her medical history included hypertension and recurrent left popliteal vein thrombosis on oral anticoagulation therapy. She underwent a thoracic computed tomography angiography (CTA) scan, which revealed an aneurysmal ARSA 32 mm in diameter with Kommerel's diverticulum (Fig. 1). The aortic arch was not dilated (29 mm). Collaterally, there was a short severe stenosis of the left subclavian artery (LSA), in the pre-vertebral segment.

Lower limb pulses were present on both sides, while radial pulse was present only on the right forearm, but the patient was asymptomatic. A duplex scan of the supra-aortic vessels showed no carotid stenosis, a normal flow in a dominant right vertebral artery, and a reversed flow in the left vertebral artery, which was very small in caliber. The ARSA had a three-phasic flow, while a post-stenotic flow was detected in the LSA, with good compensation by collateral vessels. Echocardiography revealed an ejection fraction of 45%.

Based on the symptoms, and on the patient's high surgical risk, endovascular repair was indicated.

Under local anesthesia, surgical right femoral and right brachial accesses and a percutaneous left femoral access were obtained. A Lunderquist®Extra-Stiff 0.035" guidewire (Cook Medical Inc.,

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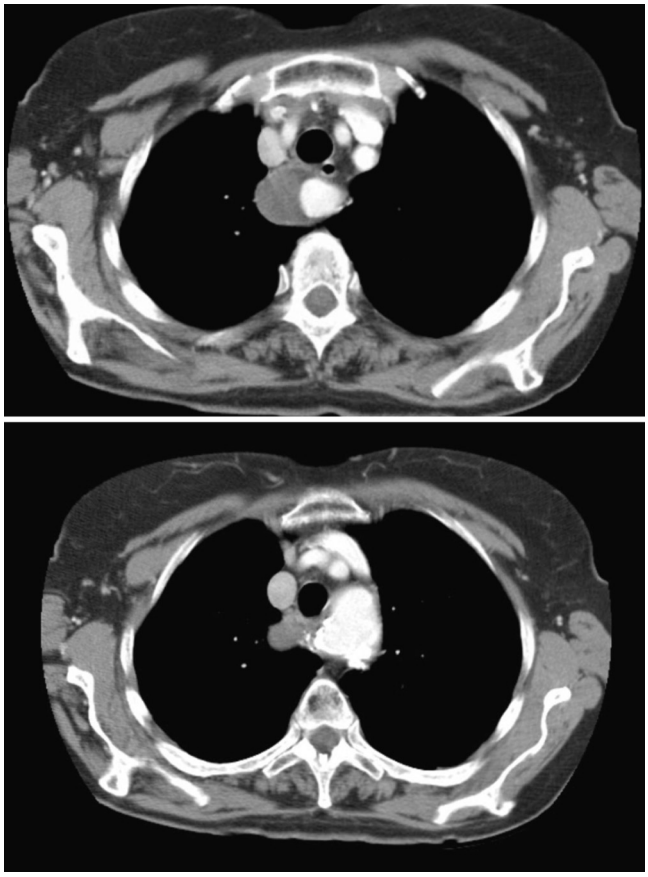

Fig. 1. Pre-operative angio-CT scan showing the aneurysmal ARSA 32 mm in diameter with Kommerel's diverticulum.

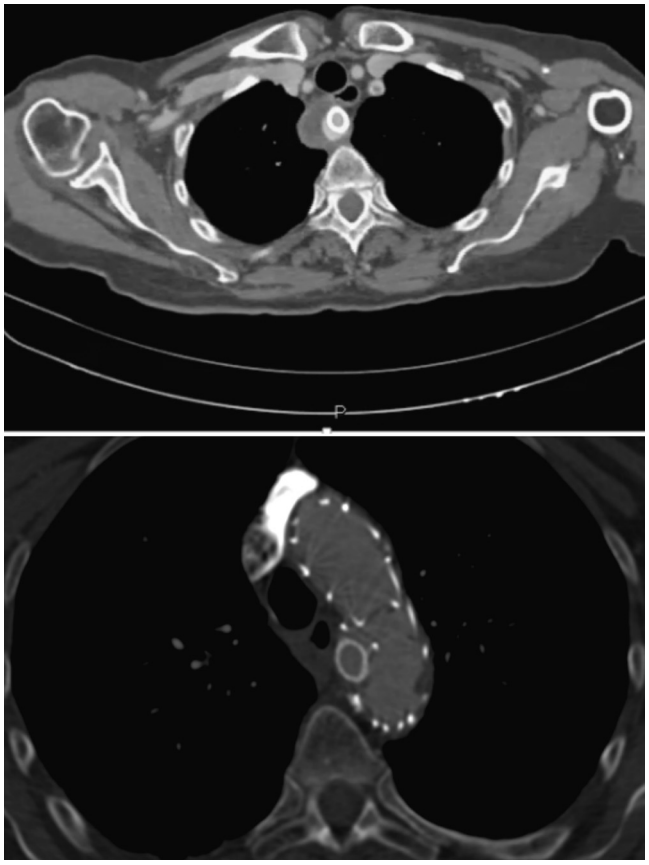

Fig. 2. Angio-CT scan before discharge with a slow endoleak due to the "gutters".

Bloomington, IN, USA) was advanced from the right femoral artery to the ascending aorta and an Amplatz Super Stiff™ 0.035" guidewire (Boston Scientific) from the brachial access to the aorta, under fluoroscopic guidance.

Under controlled hypothension, a Cook ZTA 32-32–109 mm endograft (Cook Medical Inc., Bloomington, IN, USA) was then advanced via right common femoral artery to the thoracic aorta, just distal to the origin of the left common carotid artery. The origin of the LSA was covered to achieve an optimal proximal landing zone. The ARSA was kept patent while excluding the aneurysm through the deployment of three imbricated covered stent Gore Viabahn 10–100 mm, 11–100 mm, and 10–50 mm (WL Gore and Associates, Inc., Flagstaff, AZ, USA) using the periscope technique, with a proximal landing zone just at the origin of the vertebral artery.

The postoperative course was regular. A CTA before discharge showed a little refill of the aneurysmal sac due to the "gutters" between the endoprosthesis and the periscope grafts (Fig. 2). The patient was discharged 7 days later in good clinical condition, under a low dose of acetyl-salycilic acid (ASA, 100 mg/daily) and her previous oral anticoagulant therapy. A CTA at 6 months showed the complete disappearance of the endoleak (Fig. 3).

3. Discussion

The ARSA is often found during autopsy or incidentally during diagnostic procedures, being mostly asymptomatic [6]. Aneurysmal degeneration carries a relevant risk of rupture [2], so proper diagnosis and treatment are mandatory. However, its best treatment is still a challenging point of discussion.

Even in experienced hands, total open surgical repair is burdened by high mortality and complication rates, due to the need of either thoracotomy or sternotomy with extracorporal circulation, according to the underlying pathology of the aortic arch. Kieffer and Coll. reported about 33 patients surgically treated by either a cervical approach, median sternotomy, or left/right-sided thoracotomy, for a symptomatic or aneurysmal ARSA [7], with a perioperative mortality rate of 23.5%.

The development of endovascular techniques has offered a valid alternative to total surgical repair, first with hybrid procedures and then towards a total endovascular approach.

The combined endovascular occlusion of the aortic origin of the lusorian artery with surgical subclavian artery transposition or reconstruction through a right carotid-subclavian artery bypass has been reported in few case series with good early and mid-term results [3].

The evolution of endovascular techniques and materials however has progressively pushed the limit towards the total endovascular approach for the treatment of diseases of the aortic arch involving the supra-aortic vessels. Gaafor and Coll. [4] were the first to describe a total percutaneous repair of an ARSA and thoracic aneurysm using a custom made aortic fenestrated graft with covered stents for the left subclavian and lusoria arteries. However, the use of fenestrated endoprostheses is limited by the wait time for the customization of the graft, which precludes its employment in an emergent setting.

In our case report, the total endovascular approach was considered for patient's age and her poor compliance to the idea of a surgical revascularization of the ARSA, which has to be preserved since the LSA was diseased. The urgent situation did not allow for the use of a custom-made graft, so the idea of a "periscope" cov-

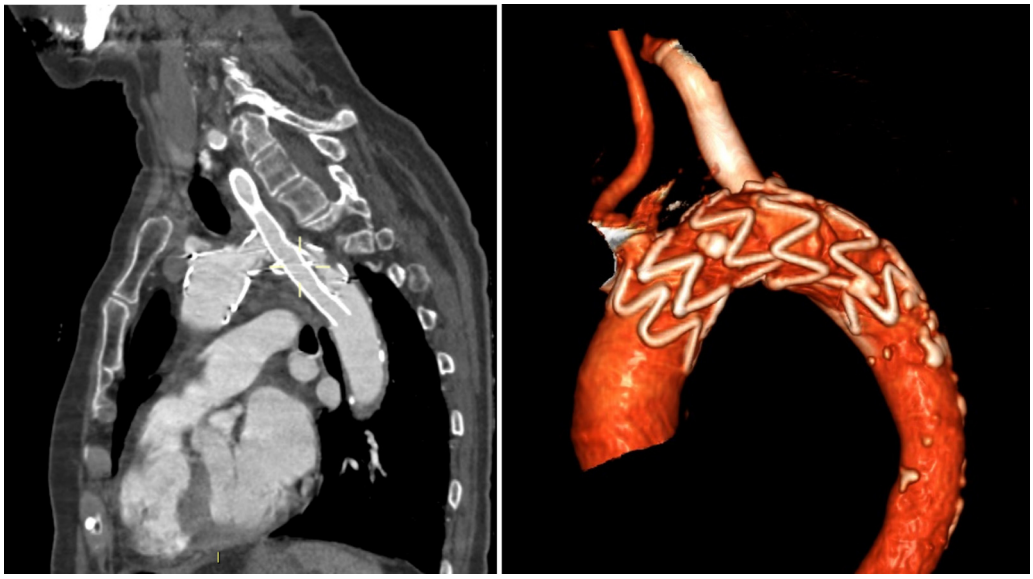

Fig. 3. Angio-CT scan at six months, with no signs of endoleaks and patency of the periscope grafts in the ARSA.

ered graft both to preserve the flow of the ARSA and to exclude the aneurysmal lesion seemed to be the best choice.

The use of the "triple-barrel technique", first developed as a bailout technique in the juxtarenal aortic district, has progressively become an increasingly common treatment approach also for complex aortic arch pathologies, often combined with surgical revascularization of the supra-aortic trunks, as proposed by Schwein and Coll. [5]. The chimney technique in fact allows the use of devices which are usually available in an endovascular suite and do not need a custom-made process, with high technical success and low perioperative mortality rates [5]. Taakahashi and Coll. [8] proposed the use of a chimney graft to preserve the flow of the left common carotid artery, in adjunct of bilateral carotid artery-to-subclavian artery bypasses and a thoracic stent to treat an arch aneurysm with ARSA.

To our knowledge, this is the first report of total endovascular repair of an aneurysmal ARSA using a thoracic aortic endograft with a "periscope" covered stent into the ARSA itself.

Some concerns however remains about the occurrence of "gutter" endoleaks due to an inadequate seal between the grafts and the aortic wall. In our case, however, the initial "gutter" endoleak had disappeared after 6 months, maybe due to the correct oversizing of the stent-grafts.

Graft thrombosis may also occur, as reported by the larger experience of elective chimney in the juxtarenal/thoraco-abdominal aortic repair. However we still have a little knowledge about the consequences of these implications, for both the renal district and even more for the aortic arch region, where the experiences reported about chimney/periscope TEVAR are limited to a few cases.

4. Conclusion

The "periscope" technique should be considered as a valid solution for the urgent endovascular treatment of aneurysmal ARSA in high surgical risk patients.

Conflict of interest statement

All Authors disclose any conflicts of interest.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Funding

No funding was obtained for the study.

Ethical approval

The case is reported in accordance with the internal ethical guidelines. No ethical judgement was needed as in our Research Hospital (IRCCS Policlinico San Donato), each patient on admission signs a consent to use his anonymous health data for research purposes.

Authors' contribution

Daniela Mazzaccaro: study concept, data collection, writing the paper, critical revision of the paper.
Teresa Maria Derosa: data collection, writing the paper.
Erika De Febis: data collection, writing the paper.
Paolo Righini: data collection.
Giovanni Nano: study concept, critical revision of the paper.

Guarantor

Daniela Mazzaccaro, M.D., is the Guarantor of the study. The work has been reported in line with the SCARE criteria [9].

References

[1] D.A. Epstein, J.R. Debord, Abnormalities associated with aberrant right subclavian arteries – A case report, Vasc. Endovasc. Surg. 36 (2002) 297–303.
[2] P.O. Myers, J.H. Fasel, A. Kalangos, P. Gailloud, Arteria lusoria: developmental anatomy, clinical, radiological and surgical aspects, Ann. Cardiol. Angeiol. (Paris) 59 (3) (2010) 147–154.
[3] H. Shennib, E.B. Diethrich, Novel approaches for the treatment of the aberrant right subclavian artery and its aneurysms, J. Vasc. Surg. 47 (2008) 1066–1070.

[4] S. Gafoor, W. Stelter, S. Bertog, H. Sievert, Fully percutaneous treatment of an aberrant right subclavian artery and thoracic aortic aneurysm, Vasc. Med. 18 (3) (2013) 139–144.
[5] A. Schwein, Y. Georg, M. Ohana, C. Delay, A. Lejay, F. Thaveau, N. Chakfe, Treatment of aneurysmal aberrant right subclavian artery with triple-barrel stent graft, Ann. Vasc. Surg. 29 (3) (2015) e1–e3, 595.
[6] J. Godlewski, T. Widawski, M. Michalak, Z. Kmieć, Aneurysm of the aberrant right subclavian artery – a case report, Pol. J. Radiol. 75 (4) (2010) 47–50.
[7] E. Kieffer, A. Bahnini, F. Koskas, Aberrant subclavian artery: surgical treatment in thirty-three adult patients, J. Vasc. Surg. 19 (1994) 100–109.
[8] Y. Takahashi, Y. Sasaki, Y. Kato, M. Motoki, Y. Bito, A. Morisaki, M. Miyabe, G. Inno, Less-Invasive endovascular treatment of arch aneurysm with aberrant right subclavian artery, Ann. Thorac. Surg. 100 (3) (2015) 1089–1091.
[9] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, D.P. Orgill, SCARE Group, The SCARE Statement: Consensus-based surgical case report guidelines, Int. J. Surg. 34 (2016) 180–186.

RADIOLOGIA VASCOLARE E INTERVENTISTICA

Trattamento endovascolare di IMH e PAU di tipo B complicate: risultati a lungo termine

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Riassunto

Scopo. L'ematoma intramurale (IMH) e l'ulcera aortica penetrante (PAU), quando complicate, rientrano nel capitolo delle sindromi aortiche acute e necessitano di trattamento. L'elevata morbi-mortalità della chirurgia e l'affinamento delle tecniche endovascolari, con un basso indice di mortalità e di complicanze a breve termine, determinano un ruolo sempre piu' importante della terapia endovascolare (TEVAR). I dati di letteratura nel follow up a lungo termine, tuttavia, sono ancora scarsi. Lo scopo del lavoro è valutare i risultati a lungo termine di TEVAR in IMH e PAU complicate di tipo B in termini di sopravvivenza e di complicanze.
Materiale e Metodi. Dal gennaio 2005 all'agosto 2015 sono stati valutati retrospettivamente 123 pazienti sottoposti a TEVAR, di questi in 21 pazienti per esclusione di IMH e PAU complicate di tipo B. I pazienti sono stati seguiti con follow-up a lungo termine: in media 35,7 mesi (range: 16-96 mesi). La scelta delle endoprotesi è stata valutata in ogni singolo caso sulla base delle caratteristiche anatomiche e alle caratteristiche dei devices utilizzati.
Risultati. E' stato osservato successo tecnico immediato in tutti i casi. Non sono state necessarie conversioni chirurgiche né sospensioni dell'intervento per complicanze intra-operatorie. La maggior parte degli interventi sono stati eseguiti in elezione (16/21). In 2 pazienti (9,5%) è stato effettuato un by-pass carotido-succlavio data l'assenza di un colletto prossimale. Sono state osservate due complicanze immediate di tipo chirurgico (9.5%): una lesione dell'arteria iliaca esterna ed una dissecazione dell'arteria succlavia sinistra a livello del bypass carotido-succlavio, trattate durante il posizionamento dell'endoprotesi. Si è verificata una complicanza maggiore post procedurale (4.7%) precoce: evento ischemico cerebrale con successivo parziale recupero delle funzioni. Non si sono evidenziati endoleak o migrazione della protesi. Si sono verificati due decessi durante il follow-up non correlati alla patologia aortica.
Conclusione. L'esclusione endovascolare delle PAU e degli IMH di tipo B complicati rappresenta un trattamento efficace e sicuro, anche in regime di urgenza, a lungo termine. E' cruciale che l'equipe multidisciplinare abbia esperienza nella gestione delle Sindrome Aortiche Acute e nel trattamento endovascolare.

Parole chiave: *Ematoma Intramurale, Ulcera Aortica Penetrante, Sindrome Aortiche Acute, Trattamento Enovascolare, TEVAR.*

Introduzione

L'ematoma intramurale (IMH) e l'ulcera aortica penetrante (PAU), quando complicate, rientrano nel capitolo delle sindromi aortiche acute e necessitano di trattamento. L'IMH è l'ematoma della tonaca media dell'aorta in assenza di una lacerazione intimale. Il termine PAU descrive l'ulcerazione di una placca ateromasica che penetra nella lamina elastica della media. La PAU è definita di pertinenza della tonaca intima, per distinguerla dall'IMH e dalla dissezione aortica che sono considerate patologie della tonaca media (1-6). La diagnosi è fatta con angioTC e la prevalenza cambia notevolmente a seconda delle serie pubblicate, variando tra il 5 e il 48% di tutte le sindromi aortiche acute (7-12). I sintomi di queste patologie sono simili a quelli della dissezione aortica e possono essere indistinguibili, anche se i pazienti con PAU ed IMH

hanno meno probabilità di evolvere verso una sindrome di malperfusione viscerale, midollare o periferica. L'obiettivo principale del trattamento dell'IMH e della PAU è quello di impedire la rottura o la progressione verso la dissezione classica (4-7). Un approccio conservativo con terapia medica e stretto monitoraggio nella PAU e IMH di tipo B sembra essere attualmente la strategia più sicura. Tuttavia in alcuni casi la malattia può progredire nonostante la terapia medica ottimale. Le indicazioni al trattamento di IMH e PAU rimangono controverse e l'approccio generale è quello di trattarli come dissezione aortica. I fattori di rischio per la progressione di IMH includono una maggiore dimensione della aorta (diametro assiale superiore a 5 cm), la presenza di ulcere penetranti, la sindrome di Marfan, assenza di beta-blocco, versamento pleurico e dolore persistente (9-12). L'elevata morbi-mortalità della chirurgia e l'affinamento delle tecniche endovascolari, con un basso indice di mortalità e di complicanze a breve termine, determinano un ruolo sempre piu'importante della terapia endovascolare. Attualmente l'esclusione endovascolare (TEVAR) di IMH e PAU complicate rappresenta una valida alternativa al trattamento chirurgico (5). I dati di letteratura nel follow up a lungo termine, tuttavia, sono ancora scarsi. Lo scopo del lavoro è valutare i risultati a lungo termine di TEVAR in IMH e PAU complicate di tipo B in termini di sopravvivenza e di complicanze.

Materiali e metodi

Nel periodo compreso tra gennaio 2005 ed agosto 2015 sono stati valutati retrospettivamente 123 pazienti sottoposti a procedure di TEVAR in una Struttura Complessa di Radiologia Interventistica di un Centro di emergenza/urgenza cardio-vascolare di III livello. Di questi, in 21 pazienti (18 maschi e 3 femmine; età media di 66 anni (range 55-84) sono state posizionate endoprotesi dell'aorta toracica per esclusione di IMH e PAU complicate di tipo B. Tutti presentavano PAU o IMH complicati, definiti dalla presenza di instabilità emodinamica, dolore persistente nonostante terapia medica massimale, segni di danno d'organo (cervello, cuore, reni), segni di rottura imminente, ematoma periaortico o segni di progressione in due esami angioTC successivi. I dati sono stati raccolti dalle cartelle cliniche elettroniche e gli esami di imaging rivalutati dall'archivio PACS (Picture Archiving and Communication System) del nostro Centro. Tutti i casi sono stati discussi da un team multidisciplinare. Il planning pre-operatorio è stato effettuato con angio-tomografia computerizzata multistrato (angioTC) con ricostruzioni multiplanari (MPR) e 3D per valutare l'integrità e i diametri delle zone di atterraggio, e la pervietà dei vasi epiaortici. Nei casi in cui la landing-zone prossimale non è stata considerata ottimale, è stato eseguito un bypass carotido-succlavio, così da poter permettere un adeguato sealing prossimale. La scelta delle endoprotesi è stata valutata in ogni singolo caso sulla base delle caratteristiche anatomiche e alle caratteristiche dei devices utilizzati (TAG Gore in 15 casi, Relay Bolton in 3 casi e Talent Medtronic in 3 casi).

Follow-up e valutazione delle complicanze

Dalle cartelle cliniche elettroniche sono state ricavate le eventuali complicanze: immediate, entro 30 giorni (precoci) ed oltre 30 giorni (tardive). Sono stati segnalati i casi in cui un re-intervento chirurgico o endovascolare per le suddette complicanze sono stati necessari. Sono state valutate le visite successive di controllo e gli esami di imaging (AngioTC). I pazienti non seguiti nel nostro Centro sono stati contattati telefonicamente; nei casi in cui l'imaging non era disponibile è stato richiesto.

Analisi statistica

I dati a distribuzione normale sono stati descritti come mediana e deviazione standard e i dati non parametrici con mediana e range. Le curve di sopravvivenza sono state valutate con le curve di Kaplan-Meier. Tutti i calcoli sono stati eseguiti con il software Stata/SE 13.1 (StataCorp, Inc. College Station, Tx); la significatività statistica è stata assunta per $p < 0.05$.

Risultati

E' stato osservato successo tecnico immediato in tutti i casi, definito come esclusione dell'IMH e della PAU di tipo B con posizionamento endovascolare di endoprotesi. La maggior parte dei pazienti erano di sesso maschile (86%) con un'età media di 66 anni (range 55-84) (Tabella 1). I pazienti sono stati seguiti con follow-up a lungo termine: in media 35,7 mesi (range: 16-96 mesi).

Tabella 1 *Caratteristiche della popolazione in studio.*

Caratteristiche	**n=21**
Età (anni)	
Media	66
Range	55-84
Causa	
PAU	12 (57,1%)
IMH	9 (42,9%)
Sesso	
Maschile	18 (85,7%)
Femminile	3 (14,3%)
Tipo di intervento	
Elezione	16 (76,2%)
Urgenza	5 (23,8%)
Bypass carotido-succlavio	
Sì	2 (9,5%)
No	19 (90,5%)
Modello endoprotesi	
TAG Gore	15 (71,4%)
Realy Bolton	3 (14,3%)
Talent Medtronic	3 (14,3%)

L'accesso chirurgico femorale è stato eseguito in tutti i casi. Non sono state necessarie conversioni chirurgiche né sospensioni dell'intervento per complicanze intra-operatorie. La maggior parte degli interventi sono stati eseguiti in elezione (16/21) (solo il 23,8% dei trattamenti è avvenuto in regime d'urgenza). In 2 pazienti (9,5%) è stato effettuato un by-pass carotido-succlavio data l'assenza di un colletto prossimale. Sono state osservate due complicanze immediate (Tabella 2) di tipo chirurgico (9.5%): una lesione dell'arteria iliaca esterna, trattata chirurgicamente con legatura e bypass femoro-femorale, ed una dissecazione dell'arteria succlavia sinistra a

livello del bypass carotido-succlavio, trattata con stenting durante il posizionamento dell'endoprotesi.

Tabella 2 *Tasso di complicanze.*

Immediate	2 (9.5%)
Precoce (<30 giorni)	1 (4.7%)
Tardive (>30 giorni)	0

Durante i primi 30 giorni di follow-up si è verificata una complicanza maggiore post procedurale (4.7%): evento ischemico cerebrale con successivo parziale recupero delle funzioni e necessità di assistenza durante la deambulazione, disfonia. Non si sono verificati complicanze a lungo termine (oltre i 30 giorni dopo l'intervento), non si sono evidenziati endoleak, migrazione della protesi né altri tipi di problematiche legati ad essa. Non sono stati necessari re-interventi di tipo chirurgico o endovascolari. Si sono verificati due decessi durante il follow-up non correlati alla patologia aortica. In un caso per progressione di malattia cirrotica in paziente HCV positivo e in un secondo caso per riacutizzazione di leucemia linfatica cronica; entrambe le patologie erano già presenti al momento del trattamento con TEVAR.

Discussione

L'incremento dell'utilizzo della angioTC nella pratica clinica ha determinato una maggior diagnosi dei IMH e delle PAU. L'ematoma intramurale e l'ulcera penetrante sono attualmente monitorati e trattati come la dissezione vera e propria. È fondamentale riconoscere se l'aorta ascendente è coinvolta (tipo A) oppure no (patologia limitata alla sola aorta discendente, tipo B), perchè la prognosi e il trattamento sono molto diversi, costituendo il tipo A un'emergenza chirurgica.
Il trattamento conservativo con terapia medica e monitoraggio appare la prima scelta nei casi di IMH di tipo B non complicati. In alcuni casi, nonostante la terapia medica ottimale, l'IMH e la PAU possono evolvere in sindromi aortiche acute complicate, e conseguente approccio endovascolare come strategia terapeutica primaria (3, 6-9). Inoltre l'identificazione di un sottogruppo di pazienti con IMH di tipo B asintomatico a rischio di evoluzione acuta potrebbe aprire un nuovo capitolo nel trattamento di questa patologia. Nel nostro centro il 17% dei casi di endoprotesi dell'aorta toracica sono stati per IMH o PAU di tipo B sintomatici, il 10% per IMH e il 7% per PAU. Il trattamento chirurgico è gravato da elevati tassi di mortalità e complicanze, per cui ogni sforzo deve esser fatto per la prevenzione primaria. I dati della letteratura sulla TEVAR seppur ridotti appaiono incoraggianti. Le linee guida ESC 2014 per il trattamento delle PAU e degli IMH di tipo B complicati indicano il trattamento con TEVAR con una classe di raccomandazione IIA e livello di evidenza C. Interrogativi sorgono talora circa le condizioni preoperatorie che potrebbero controindicare la procedura d'emergenza sia chirurgica che endovascolare (età avanzata, scadenti condizioni cliniche e neurologiche) e particolarmente nel caso della TEVAR difficoltà anatomiche determinanti la necessità di un bypass succlavio-carotideo o di un debranching dei tronchi sovra-aortici che possono condizionare una maggiore morbi-mortalità post operatoria. Nel nostro studio non sono state osservate durante il follow up morti legate alla patologia PAU o IMH di tipo B complicate nei pazienti sottoposti a TEVAR. Importante evidenziare, pur con i limiti del campione in studio, che le complicanze osservate non si sono verificate nei trattamenti in urgenza, avvalorando l'utilizzo della TEVAR in questi pazienti.

Conclusioni

L'esclusione endovascolare delle PAU e degli IMH di tipo B complicati rappresenta un trattamento efficace e sicuro, anche in regime di urgenza, a lungo termine. E' cruciale che l'equipe multidisciplinare abbia esperienza nella gestione delle Sindrome Aortiche Acute e nel trattamento endovascolare.

BIBLIOGRAFIA

1. Corvera JS. Acute aortic Syndrome. Ann Cardiothorac Surg 2016;5(3):188-193.
2. Pepper J. Differential aspects of the disease and treatment of Thoracic Acute Aortic Dissection (TAAD)-the European experience. Ann Cardiothorac Surg 2016;5(4):360-367.
3. Tan G, Tang W , Chen J. Enlightenment from a small but rapidly evolving penetrating aortic ulcer. Int J Cardiovasc Imaging (2016) 32:1143–1144.
4. Chou AS, Ziganshin BA, Charilaou P, Tranquilli M, Rizzo JA, Elefteriades JA. Long-term behavior of aortic intramural hematomas and penetrating ulcers. J Thorac Cardiovasc Surg. 2016 Feb;151(2):361-72, 373.
5. D'Annoville T, Ozdemir BA, Alric P, Marty-Ané CH, Canaud L. Thoracic Endovascular Aortic Repair for Penetrating Aortic Ulcer: Literature Review. Ann Thorac Surg 2016;101:2272–8.
6. Patel HJ, Williams DM, Upchurch GR Jr, Dasika NL, Deeb GM. The challenge of associated intramural hematoma with endovascular repair for penetrating ulcers of the descending thoracic aorta. J Vasc Surg. 2010 Apr;51(4):829-35.
7. Evangelista A, Czerny M, Nienaber C, Schepens M, Rousseau H, Cao P, Moral S, Fattori R. Interdisciplinary expert consensus on management of type B intramural haematoma and penetrating aortic ulcer. European Journal of Cardio-Thoracic Surgery 47 (2015) 209–217.
8. Maraj R, Rerkpattanapipat P, Jacobs LE, Makornwattana P, Kotler MN. Meta-analysis of 143 reported cases of aortic intramural hematoma. Am J Cardiol. 2000;86:664–8.
9. Sawhney NS, DeMaria AN, Blanchard DG. Aortic intramural hematoma: an increasingly recognized and potentially fatal entity. Chest. 2001;120:1340–6.
10. Kevin M. Harris, Jip L. Tolenaar, Kim A. Eagle, and Santi Trimarchi . Intramural Hematoma of the Descending Aorta—Natural History and Treatment. In R.S. Bonser et al. (eds.), *Controversies in Aortic Dissection and Aneurysmal Disease*, Springer-Verlag London 2014 pag 397-411.
11. Joshua N. Baker and Thoralf M. Sundt . Penetrating Atherosclerotic Ulcer—Who Should Be Treated? In R.S. Bonser et al. (eds.), Controversies in Aortic Dissection and Aneurysmal Disease, Springer-Verlag London 2014. pag 413-421.
12. Pier Luigi Stefàno, Claudio Blanzola, Eusebio Merico. Il punto sulle sindromi aortiche acute. G Ital Cardiol 2012;13(5):337-344.