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Traitement chirurgicaux des fistules atrio-œsophagiennes après ablation percutanée de fibrillation atriale : étude nationale française

Ludovic Dupautet

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UNIVERSITÉ CLERMONT AUVERGNE
UFR DE MÉDECINE ET DES PROFESSIONS PARAMÉDICALES

THÈSE D'EXERCICE

pour le

DIPLOME D'ÉTAT DE DOCTEUR EN MÉDECINE

par

DUPAUTET Ludovic

Présentée et soutenue publiquement le 6 Octobre 2023

TRAITEMENT CHIRURGICAUX DES FISTULES ATRIO-ŒSOPHAGIENNES
APRÈS ABLATION PERŒUVAN ET D'ÉVALUATION À TITRE
NATIONALE FRANÇAISE

Directeur de thèse : Madame Laura FILAIRE, Docteur, Centre Jean Perrin, Service de chirurgie thoracique et endocrinienne

Président du jury : Monsieur Marc FILAIRE, Professeur, UFR de Médecine et des Professions paramédicales de Clermont-Ferrand

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Monsieur Johan GAGNIERE, Professeur, UFR de Médecine et des professions paramédicales de Clermont-Ferrand

Monsieur Grégoire MASSOULIE, Docteur, Service de Cardiologie médicale et médecine vasculaire



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A NOTRE PRESIDENT DE THESE

Monsieur le Professeur Marc FILAIRE

Cher Professeur, c'est un honneur que vous me fâites en présidant ce jury de thèse. Un grand merci pour votre disponibilité et votre aide durant toutes ces années. Soyez assuré de ma reconnaissance et de mon respect.

AUX MEMBRES DU JURY DE THESE

Monsieur le Professeur Lionel CAMILLERI

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Monsieur le Professeur Johan GAGNIERE

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A NOTRE DIRECTEUR DE THESE

Madame le Docteur Laura FILAIRE

Chère Laura, je te remercie grandement pour ton soutien et ta confiance pour préparer cette thèse. J'espère avoir été à la hauteur, et faire honneur à ta première thèse en tant que directrice.

Dédicaces validées le 5 septembre 2023

Le Directeur de thèse, Laura FILAIRE



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2. GLOSSARY OF ABBREVIATION

AEF = atrio-esophageal fistula

AF = atrial fibrillation

APT = antiplatelet therapy

CA = catheter ablation

CPB = cardiopulmonary bypass

CT = computed tomography

DOAC = direct oral anticoagulant

EGD = esophagogastroduodenoscopy

GER = gastroesophageal reflux

GI = Gastro-intestinal

LOS = Length of stay

LVEF = left ventricular ejection fraction

NR = Not reported

PEF = pericardo-esophageal fistula

PPI = proton pump inhibitor

RFCA = radiofrequency catheter ablation

Se = Sensibility

TEE = transesophageal echocardiogram

TTE = transthoracic echocardiogram

VKA = vitamin K anticoagulant

WSES = World Society of Emergency Surgery

3. INTRODUCTION

Catheter ablation (CA) of atrial fibrillation (AF) is a widespread procedure since it has proven its benefit in term of reduction of arrhythmia burden and improvement of quality of life (1). Although many techniques are used to decrease its morbidity, esophageal lesions are reported up to 40% and classified as erythema, ulceration, or perforation (2). The physiopathology is not entirely understood but esophageal lesion seems to be a prerequisite for the development of a fistula from the esophagus towards the atrium (2). Atrio-esophageal fistula (AEF) is the most feared and life-threatening complication, occurring with an incidence of 0.02 to 0.04% (3,4). This incidence is probably underestimated due to the non-specificity of symptoms and delayed diagnosis. Overall mortality has been reported from 55 to 65% (5,6). Many therapeutic options have been described: medical treatment, endoscopic treatment alone or associated with surgery and upfront surgical treatment. Some authors have shown a clear benefit in survival of a surgical management for AEF in comparison to endoscopic or medical treatment alone (3,5,7–9). However, multiple surgical strategies have been reported concerning the management of the esophageal and left atrium perforations, the use of cardiopulmonary bypass (CPB), or a staged surgery. To date, no guidelines are available on the safest and most effective surgical strategies. Thus, we aimed to evaluate the efficacy of different surgical strategies in the management of AEF after CA of AF in French national survey.

4. MATERIEL AND METHODS

a. Ethics

The study is in accordance with the declaration of Helsinki and was approved by the Institutional Review Board of the French Society of Thoracic and Cardiovascular Surgery on the 10th of November 2022 (approval number: CERC-SFCTCV-2023-04-25_28215). A written informed consent was sent to each patient.

b. Population

A retrospective observational cohort study was conducted from January 2010 to April 2023. Inclusion criteria were patients over 18-year-old with a diagnosis of AEF or pericardoesophageal fistula (PEF) after CA of AF who were treated with a surgical approach. Because patient's data were extracted from the French surgical data base EPITHOR, patients treated medically or with endoscopic strategies alone were not included.

c. Data collection

Patient's screening was realized by sending an email to 68 French cardiothoracic surgical units, all participating in the EPITHOR database (10). Twenty-one centers replied (30.8 %) among them, only 6 centers had eligible patients (8.8%).

Baseline characteristics and comorbidities, AF treatment-related variables, AEF subtypes, clinical and paraclinical exams, surgical strategies (surgical approach, used of CBP, management of the esophageal perforation, flap interposition), and follow-up data were collected by each participating center.

The primary outcome was the survival rate after AEF treated surgically. The secondary outcomes were the assessment of the different surgical strategies to highlight risk factors of mortality.

d. Statistical analysis

All statistical analysis was performed using STATA software version 15. Given the exploratory nature of the analysis, no adjustment for Type I error was made. A bilateral Type I error risk of 5% was considered in all analyses.

Categorical variables are described by frequencies and associated percentages, while quantitative variables will be presented as mean and standard deviation or median and interquartile range, depending on their statistical distribution. Normality is assessed through graphical analysis. A survival analysis is conducted on the time before death. A Cox-type model is used to assess the main dependencies of survival time. The center effect is also studied.

5. RESULTS

a. Population

Eighteen patients met eligible criteria. The mean age was 58 ± 13 -year-old. Sixteen patients were male (88.9%). Fifteen patients had a diagnosis of AEF (83.3%), 3 others had a PEF (16.7%). Baseline characteristics are shown in Table I. No difference was observed between centers.

Table I : Clinical description of atrio-esophageal fistula cases (n=18)

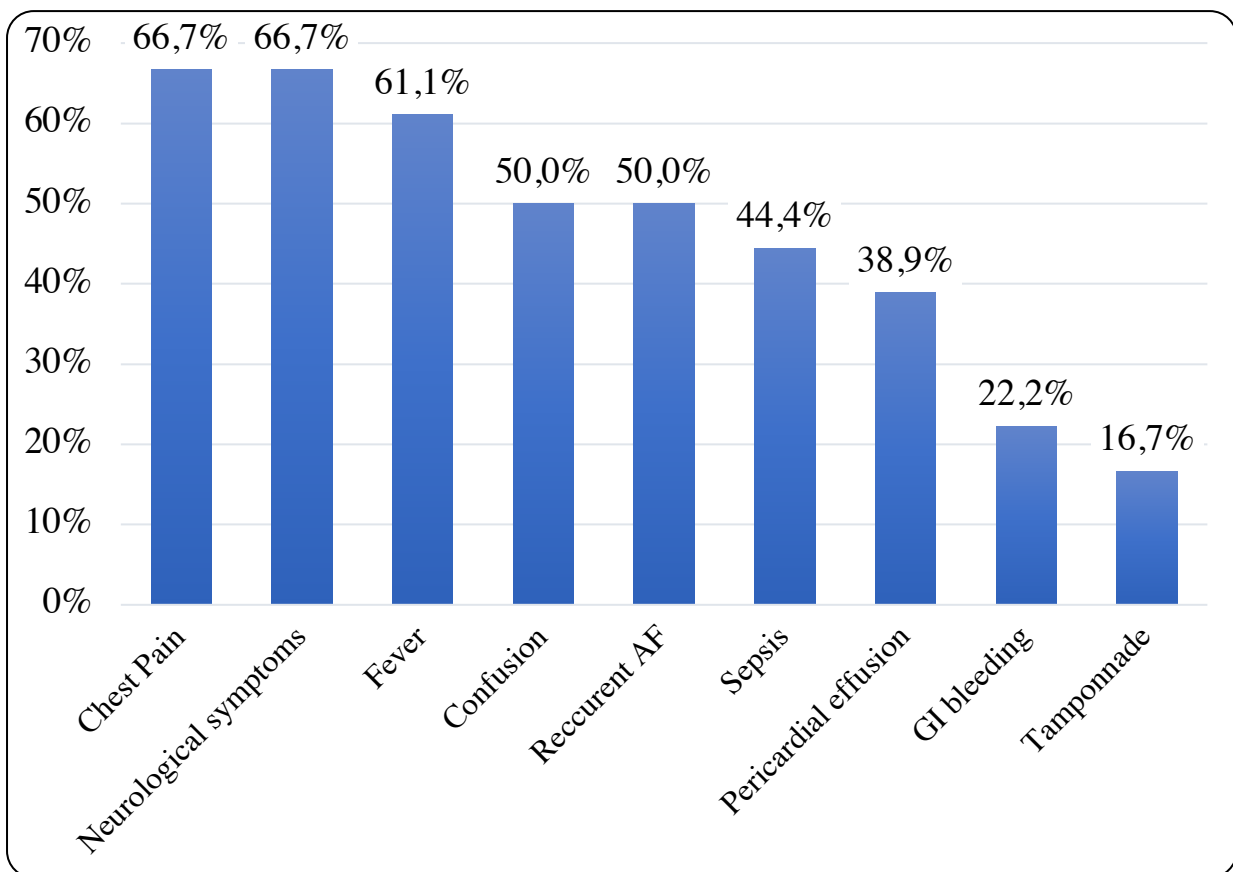
	N (%) or mean \pm SD
Structural Heart disease	
Ischemic	2 (11)
Dilated	2 (11)
Valvular	1 (5.6)
Rhythmic	7 (38.9)
LVEF, %	53.6 \pm 9.1
Comorbidities	
Hypertension	9 (50)
Smoke	5 (27.8)
Diabetes	3 (16.7)
GER	1 (5.6)
Obesity	4 (22.2)
AF subtypes	
Paroxysmal	3 (16.7)
Persistent	8 (44.4)
Permanent	7 (38.9)
Type of AF ablation	
RFCA	17 (94.4)
Cryoablation	1 (5.6)
Perprocedural data	
PPI	16 (88.9)
DOAC	16 (88.9)
VKA	2 (11.1)
APT	1 (5.6)

LVEF: left ventricular ejection fraction; GER: Gastro Esophageal reflux; AF: atrial fibrillation; RFCA: radiofrequency catheter ablation; PPI: proton pump inhibitor; DOAC: direct oral anticoagulant; VKA: vitamin K anticoagulant; APT: antiplatelet therapy.

b. Diagnosis

All diagnosis of AEF were made preoperatively. Figure 1 represents the incidence of the different symptoms. Neurological symptoms were stroke, transient ischemic attack, meningitis, and seizures. Complications occurred in 11 patients (61.1%): one patient (5.5%) presented a heart failure, 5 patients (27.8%) an acute kidney failure, and 11 patients (61.1%) presented a neurological failure. Four patients (22.2%) presented a systemic embolism, defined as embolism in any territory except encephalic (spleen embolism, n =2 (11.1%)).

Figure 1 : Clinical presentation



GI bleeding: gastrointestinal bleeding; AF, atrial fibrillation CA, catheter ablation

Table II details the paraclinical exams. All patients underwent a chest computed tomography (CT) with intravenous contrast and/or contrast esophagogram. Diagnosis of AEF or PEF was made for 10 patients (55.5%) based on the chest CT. Reported abnormalities were free air between the left atrium and the esophagus, or free air within the pericardium associated with pericardial effusion. Transthoracic echocardiogram (TTE) findings were similar to that of chest CT. Cerebral imaging (brain CT or Magnetic Resonance Imaging) found ischemic lesions secondary to systemic embolism. Esophageal endoscopy exams like Transesophageal echocardiogram (TEE) or Esophagogastroduodenoscopy (EGD) were performed in more than one-third of patients and allowed diagnosis in 4 patients (22.2%). No clinical degradation was reported after any endoscopic procedure. Retrospectively, reinterpretation of the first paraclinical exam could have set the diagnosis of AEF in 7 patients (38.9%). Among them, 2 patients (11.1%) had the diagnosis obtained by esophageal endoscopy.

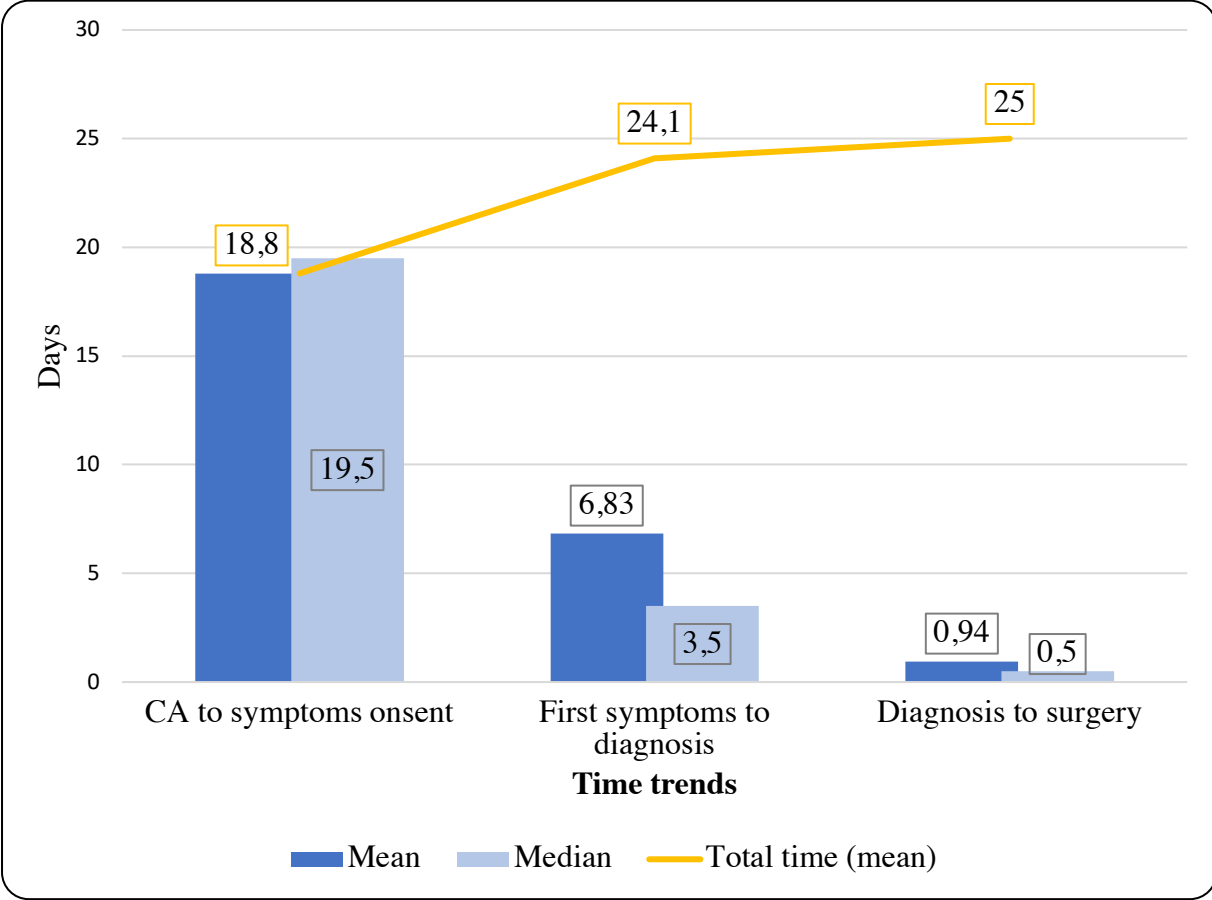
Table II : Paraclinical exams

	n (%)	Se (%)
Chest CT with contrast	17 (94)	65
Chest CT with contrast esophagogram	3 (16.7)	66,6
Cerebral imaging	12 (67)	17
TTE	16 (89)	6
TEE	1 (5.6)	0
EGD	7 (39)	57

Se: sensibility; EGD: Esophagogastroduodenoscopy; TEE: Transesophageal echocardiogram; TTE: transthoracic echocardiography

Figure 2 illustrates the different time laps from CA to surgery. Diagnosis was first evocated in 44.4% of the patients (n = 8). Patients were first admitted in reference center in 66.7% of cases (n = 12).

Figure 2 : Temporal trends from catheter ablation to surgery



c. Surgical outcomes

Surgical strategies for each patient are detailed in Table III. Five patients (27.7%) underwent esophageal stenting. For 2 of them (11.1%) (patients 4 and 13), the diagnosis of AEF was made by EGD. Esophageal stenting was used as bridge to surgery and led to an esophagectomy in 2 patients (11.1%) (patients 13 and 15). Both patients needed a redo surgery for postoperative complications. One patient died, and one is still alive. In patients 4, 5 and 18, esophageal stenting was associated with a left atrium repair and flap interposition. Patients 4 and 18 were both reoperated on but are still alive whereas patient 5 died 15 days later. Seven patients (38.9%) underwent esophagectomy, among which a restorative surgery was performed in five patients (71.4%). Six patients (85.7%) needed to be reoperated on either for complications (n=2) and/or a restorative surgery. Two patients died (28.6%).

Eight patients (44.4%) underwent a surgical treatment with esophageal direct repair and flap interposition. Six of them (75%) had also a left atrium repair either by direct suture, or patch repair. Only two patients (25%) underwent a redo-surgery for complications. Six patients (75%) died postoperatively. Flap interposition was systematically realized in absence of esophagectomy. CPB was used in twelve patients (66.6%) whatever surgical option was considered for esophageal repair.

The mean length of stay (LOS) in the intensive care unit and hospitalization were respectively 27.9 ± 24.6 days and 53.9 ± 46.1 days.

A center effect was observed concerning the different surgical approaches and esophageal perforation management: thoracotomy (p=0.002), sternotomy (p=0.008), clamshell (p=0.0029) and esophagectomy (p=0.002). No center effect was observed concerning the use of CBP (p=0.471), and AEF subtypes (p=0.082). Time to diagnosis was not influenced by a center effect or a suspected diagnosis at admission.

TABLE III : SURGICAL STRATEGIES AND OUTCOMES

N	Age	Sex	AEF sub-types	Imaging for diagnosis	Esophageal stenting	Surgical strategies	Complications	Restorative surgery	Vital Status
1	34	M	AEF	Chest CT	-	Sternotomy, CBP, LA patch repair, Esophagus direct suture, Flap interposition	Re Do surgery	-	Deceased
2	72	M	PEF	EGD	-	Sternotomy, CBP, LA direct suture Esophagus direct suture Flap interposition	Re Do surgery	-	Deceased
3	65	M	AEF	Brain CT	-	Sternotomy, Esophageal direct suture Flap interposition	NR	-	Deceased
4	58	M	PEF	Chest CT	Yes	Sternotomy, CBP, Pericardium direct suture, Esophagus direct suture, Flap interposition	Re Do surgery	-	Alive
5	65	M	AEF	Chest CT contrast esophagogram	Yes	Sternotomy, CBP, LA direct suture, Right thoracotomy, Esophagus direct suture, Flap interposition	NR	-	Deceased
6	64	M	AEF	TTE	-	Right thoracotomy, Esophagus direct suture, Flap interposition	NR	-	Deceased
7	69	F	PEF	Chest CT	-	Thoracotomy, Esophagectomy, Flap interposition	NR	Yes	Alive
8	49	M	AEF	Brain CT	-	Thoracotomy, CBP, LA direct suture, Esophagus direct suture, Flap interposition	NR	-	Deceased
9	55	M	AEF	EGD	-	Clamshell, CBP, LA direct suture, Esophagus direct suture, Flap interposition	NR	-	Alive
10	66	M	AEF	Chest CT	-	Clamshell, CBP, LA direct suture, Esophagus direct suture, Flap interposition	NR	-	Deceased

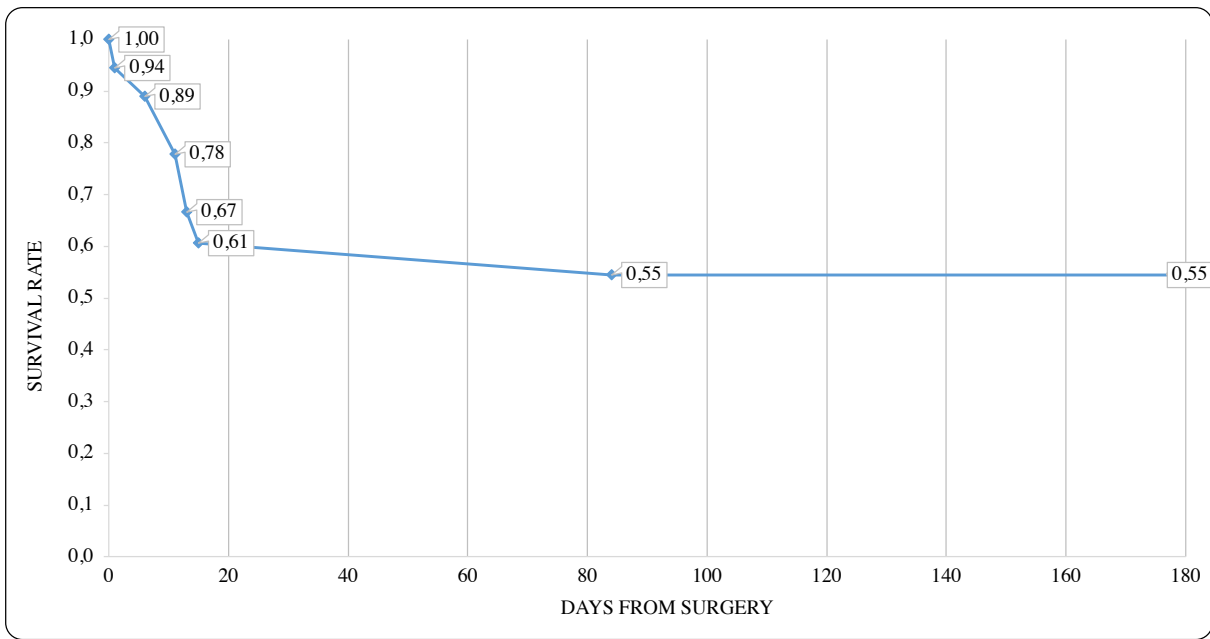
11	70	F	AEF	EGD	-	Clamshell, CBP, LA patch repair, Esophagus direct suture, Flap interposition	NR	-	Alive
12	44	M	AEF	Chest CT	-	Right thoracotomy, CBP, LA patch repair, Esophagectomy	NR	Yes	Alive
13	65	M	AEF	EGD	Yes	Right thoracotomy, LA patch repair, Esophagectomy	Re Do surgery	-	Deceased
14	52	M	AEF	Chest CT	-	Right thoracotomy, LA patch repair, Esophagectomy,	NR	Yes	Alive
15	31	M	AEF	Chest CT	Yes	Right thoracotomy, CBP, LA patch repair, Esophagectomy	Re Do surgery	Yes	Alive
16	64	M	AEF	Chest CT	-	Right thoracotomy, CBP, LA patch repair, Esophagectomy	NR	Yes	Alive
17	42	M	AEF	Chest CT	-	Right thoracotomy, CBP, LA patch repair, Esophagectomy	Neurological failure	-	Deceased
18	80	M	AEF	Chest CT with contrast esophagogram	Yes	Right thoracotomy, Esophagus direct suture, Flap interposition	Re Do surgery	-	Alive

AEF: Atrio-esophageal fistula; PEF: pericardo-esophageal fistula; EGD: esogastroduodenoscopy; TTE: Trans Thoracic echocardiogram; CBP: Cardiopulmonary By-pass; LA: Left Atrium; NR: Not reported

d. Survival

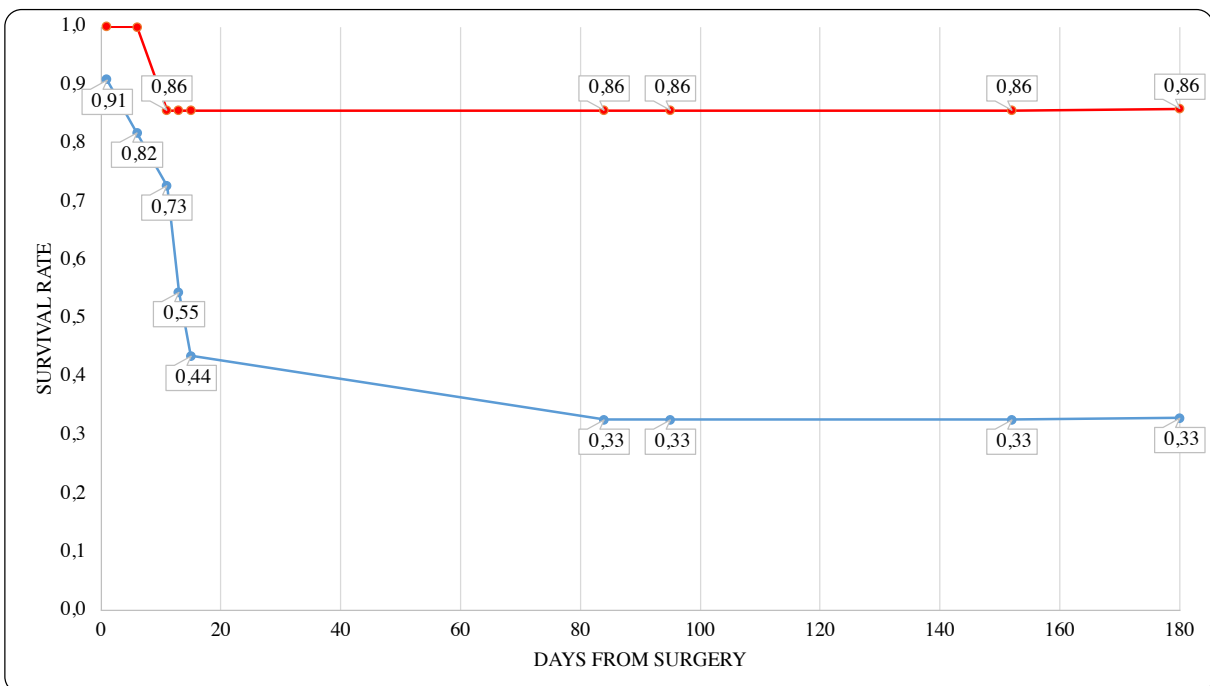
The mean follow-up time was 768.2 days with a median of 89.5 days. Overall survival rate was 50% (n = 9). The survival rate at 15 days was 60%, and 55% at 84 days. As almost half of the event happened during the first 90 days, we decided to analyze the survival rate during the first 180 days for more relevancy. Figure 3 illustrates the overall survival rate at 180 days and figure 4 the survival rate according to the esophageal perforation management at 180 days. No differences in survival rate were seen among the different surgical approaches. The use of an esophageal stent tends to improve overall survival (HR 0.258; 95% CI 0.03-2.1; p=0.2) whatever the surgical management. Esophagectomy tended to be associated with an improved survival (HR 0.163, 95% CI 0.019-1.340; p=0.092) with 86% rate of survival at 180 days (Figure 4). The use of CBP did not impact survival (HR 1.953, 95% CI 0.392-9.719; p=0.413). Overall survival tended to be better in case of PEF than AEF (HR 1.9; 95% CI 0.23-15.81; p=0.54). In univariate analysis for risk factors for death, only 2 symptoms were statistically relevant: sepsis (HR 6.398, 95% CI 1.265-32.359; p=0.025) and neurological failure (HR 4.905, 95% CI 0.954-25.218; p=0.0057). GI bleeding (HR 0.453, 95% CI 0.056-3.70; p=0.46), pericardial tamponade (HR 1.593, 95% CI 0.321-7.918; p=0.569), mediastinitis (HR 0.552, 95% CI 0.111-2.747; p=0.468) were not identified as risk factors.

Figure 3 : Overall survival curve at 180 days



The overall survival rate at 180 days was 55%.

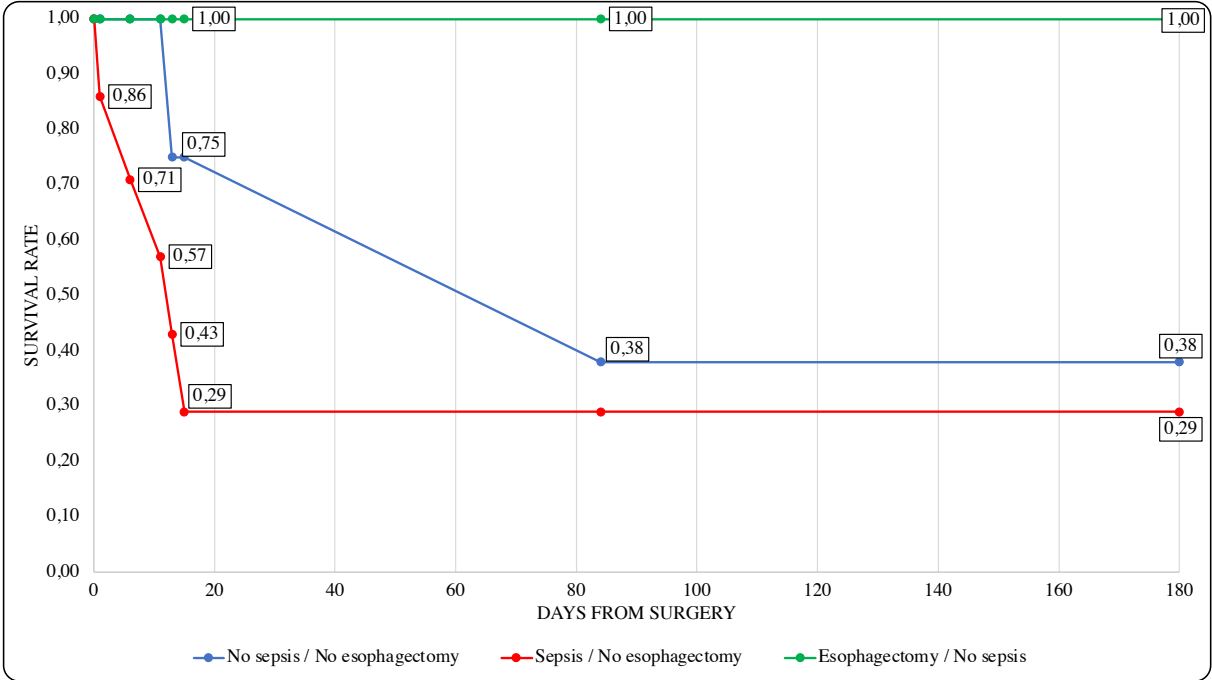
Figure 4 : Survival curve according to the esophageal perforation management



Survival at 180 days after esophagectomy is 86% versus 33% in case of other surgical treatments for esophageal perforation. The red line represents the survival curve of patients who underwent an esophagectomy and the blue line represents the survival curve of patients treated with another surgical options. There was no statistical difference in terms of survival at 180 days ($p=0.092$).

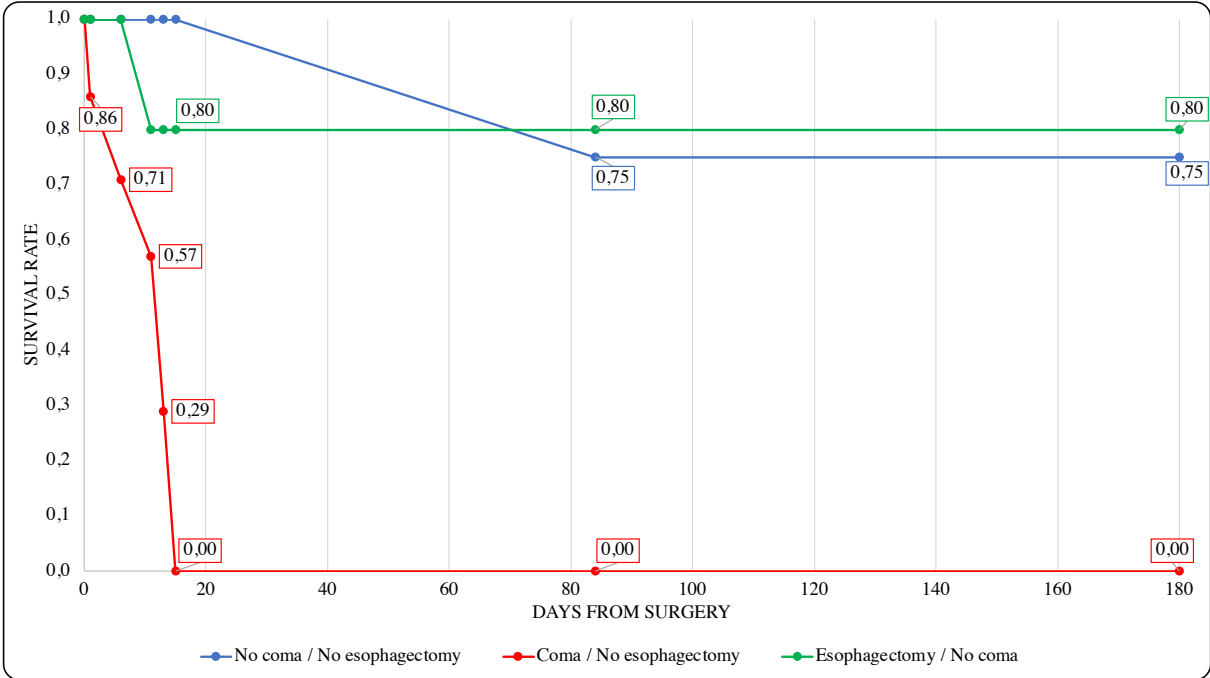
In multivariate analysis, significant independent risk factors for death were sepsis (HR 6.25, 95% CI 1.17-33.3; p=0.032) and coma (HR 4.81, 95% CI 0.85-27.12; p=0.075). According to symptoms at diagnosis (sepsis and/or coma) and surgical management (esophagectomy or not), patients who underwent esophagectomy still tended to have a better survival than patients with sepsis and/or coma who did not underwent esophagectomy (Figure 5 and 6).

Figure 5 : Survival curve according to the presence of sepsis and the use of esophagectomy



Most patients died in the first 20 days postoperatively whatever the surgical treatment and the presence or absence of sepsis. The green line illustrates the survival curve of patients without sepsis who underwent esophagectomy. The red line represents the survival curve of patients with sepsis treated by another surgical treatment than esophagectomy. The blue line represents the survival curve of patients without sepsis treated by another surgical treatment than esophagectomy.

Figure 6 Survival curve according to the presence of coma and the use of esophagectomy



Most patients died in the first 20 days postoperatively whatever the surgical treatment and the presence or absence of coma. The blue line represents the survival curve of patients without coma treated by another surgical treatment than esophagectomy. The green line illustrates the survival curve of patients without coma who underwent esophagectomy. The red line represents the survival curve of patients with coma treated by another surgical treatment than esophagectomy.

6. DISCUSSION

This study aimed to evaluate the different surgical strategies available in the management of AEF after CA for AF in France. To the best of our knowledge, this is the largest cohort on this topic in the literature. Our main findings were: (i) surgical management varied from one center to another; (ii) aggressive treatment of the esophageal perforation (esophagectomy) tended to offer the best survival benefit; (iii) the use of cardiopulmonary by-pass did not worsen the mortality rate; (iv) sepsis and/or neurological failure at the initial clinical presentation were poor prognostic factors affecting the risk of death.

AEF incidence is 0.025% over a 13-year period that includes 93% of French center (3). From 2010 to 2023, we identified a theoretical number of 33.4 cases of AEF, with 50% eligible to a surgical treatment. Our cohort of 18 patients appears to be true-to-life representation of reality.

Diagnosis of AEF is challenging as clinical and biological presentation are non-specific. A high degree of suspicion is needed by the medical team to avoid or limit the delay in the treatment which is known to increase mortality rate. In our cohort, clinical presentation was in accordance with other studies, chest pain, fever, and neurological symptoms were the most frequent (3,5,9). Neurological symptoms was associated with a latter AEF onset compared to other patients (11) and a higher risk of mortality (6). It highlights that AEF with initial neurological symptoms are the most severe and deadly esophageal perforation secondary to potential systemic embolism and major inflammatory reaction.

Mean time onset from CA to first symptoms was 18.8 days and even longer to surgery (25 days) which is in line with literature (6,7,9,12). AEF are iatrogenic esophageal perforation managed lately, as reflected by these delays. This should be kept in mind to adapt the surgical treatment. All patients underwent chest CT allowing the diagnosis of AEF in 61%, which was inferior to other studies where chest CT had a sensibility around or over 80% (3,5,9,11) enhanced if repeated. After retrospective chest CT reinterpretation, diagnosis was missed in 7 patients. Retrospective chest CT sensibility could have been 77.7%. The low sensibility of chest CT for AEF diagnosis might be explained by the high incidence of EGD (more than one-third of patients) with a sensibility of 57%. Although, EGD can allow esophageal perforation diagnosis and potential endoscopic treatment, it is not a recommended diagnosis tool in case of suspected AEF as it can increase systemic air emboli through the fistula, and increase clinical symptoms in 28% (6). Repeated chest CT and a better knowledge of AEF by radiologist could reduce the time to diagnosis and ensure an urgent management.

AEF are esophageal perforation not eligible for non-operative management according to Pittsburgh classification (13) despite a few case reports or short series (14). Many reviews have shown a clear survival benefit of surgical management (3,5,7–9). Although many reviews on AEF are available, studies focusing on their surgical management are rare. Surgical approaches differed from patients to another and center from another but had no consequences on mortality (9). From a surgical standpoint, these results were logical as surgical approach is only a way to have the best exposure, allowing surgeon to realize their surgical plan and fix surgical issue.

In our study, CPB was used in two-third of patients and did not significantly impact survival contrary to Amirkhosravi et al. who have shown that the CPB were associated with better survival (84.8% vs 15.2%; $p < 0.001$) (9). In AEF, CBP allows a good exploration and

reparation of the left atrium perforation either through a left atrium opening technique or through a posterior approach of the left atrium after cardiac mobilization. Benefits of CPB in AEF rely on the prevention of air or septic emboli during surgical repair and manipulation, cross-clamping (9) and resection of necrotic left atrium tissue to avoid secondary septic emboli or endocarditis (15). In our study, cannulation strategies were not significantly different between centers and were not found as risk factor for mortality. Cannulation strategies depend on surgical approaches, patient's hemodynamic instability, and surgeon's preferences (9,15). Groin cannulation at the beginning of the procedure allows correction of hemodynamic instability, an easy fistula dissection by minimizing the risk of hemorrhage and can be converted into central cannulation.

Over 18 patients, eight (44,4%) had a primary tension-free esophageal repair reinforced by flap interposition. Only two of them (25%) underwent redo surgery but six patients died (75%). Although general principal of esophageal perforation recommends a first tension-free direct (13) repair, this technique might not be appropriate for AEF. Indeed, AEF are secondary to thermic or ischemic lesion in patients with cardiovascular comorbidities and delayed as shown by the time laps between the first symptoms' occurrence and treatment (around 7 days; Figure 2). Micro vascularization might be of poor quality and necrotic tissue around the fistula impaired a direct repair with good tissues quality. Thus, in our opinion, primary repair should be attempted only on patient with non-delayed surgical management, in patient without hemodynamic instability and a minor sepsis.

All patients, except those who underwent an esophagectomy, had a flap interposition. Flap interposition allows to buttress the esophageal repair, to bring viable tissue, and to make a separation between the esophageal repair and the left atrial repair avoiding secondary fistula. Flap interposition in the surgical management of AEF relies on general surgical principal to

protect or reinforced suture. Thus, primary esophageal repair should be associated with flap interposition.

Esophageal stenting was used in 5 patients (27,8%) either as bridge-to-esophagectomy or in association with esophageal repair. Two patients died (40%). Three patients (60%) are still alive but needed a redo-surgery for complications. Esophageal stenting was not associated with an increased risk of mortality. Recently, in the POTTER-AF study, patients receiving an interventional treatment (stenting and/or surgery) had a lower mortality rate and less stroke during clinical course (5). However, worse survival were reported after esophageal stenting alone (3,6,7,9,11). No difference in survival rate was found between endoscopic treatment in association with surgery in comparison to surgery alone. Thus, if esophageal stenting is performed, it should be associated with a surgical management.

Esophagectomy was realized in 7 patients (38,9%), among them 5 (71,4%) underwent a restorative surgery and are all still alive, the two other patients (28,4%) died. Three patients (42,8%) needed a redo-surgery in addition to the restorative surgery. Although, more reinterventions were found in the group of patients with esophagectomy, esophagectomy tended to improve survival. In fact, as AEF are potentially late esophageal perforation with a high inflammatory reaction in patients with hemodynamic instability, esophagectomy might be a good option as recommended by the World Society of Emergency Surgery (WSES) guidelines (13). Restorative surgery is required 6 –12 months after complete diversion or resection of the thoracic esophagus by colonic interposition. This radical procedure has a certain impact on the quality of life but most of patients had a restorative surgery (71,4%) within 6 months. In our cohort, four patients underwent esophagectomy under CPB with left atrial repair, there was no postoperative mortality, and 3 patients were still alive during follow-up, with a mean follow-up of 5.8 years. Amirkhosravi et al. did not find any difference in survival according to esophageal perforation management but esophagectomy and esophageal direct repair had the lower

mortality rate (15.4%) (9). Thus, esophagectomy appears to be the best damage control surgery in the management of esophageal perforation in AEF with the best chance of survival although it is a radical option with the need for further surgery.

Overall survival rate was 50% which is in line with the literature (5,9). However, a higher mortality rate was reported in the first 90 postoperative day as shown by the survival rate at 15 days (60%) and 84 days (55%). Risk factors of mortality were sepsis and neurological symptoms. In our series, only esophagectomy tended to influence positively the survival. Others risk factors of death have been found: stenting alone and medical management alone (5,11,11), the absence of CBP (9), gastro-intestinal bleeding, coma, and age over 60 year-old (7).

7. STRENGTH AND LIMITATIONS

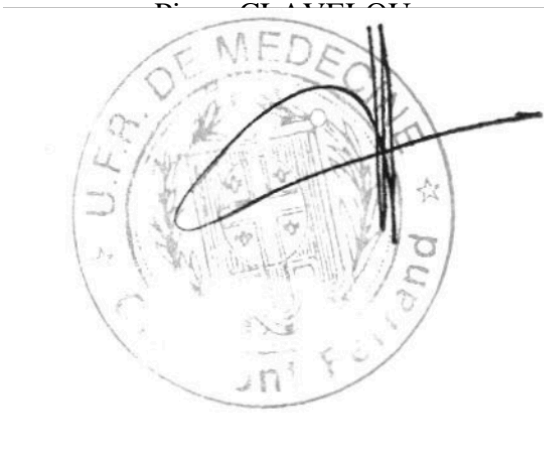
This study has some limitations: only 18 patients were included which can be explained by the rare incidence of AEF. Many surgical strategies were assessed with only few patients in each group, decreasing statistical power and limiting statistical analysis. Comparison of surgical results on quality of life was not possible as no data were available for patients who were still alive. However, apart from review of literature, our study is the largest nationwide cohort on atrio-esophageal fistula.

8. CONCLUSION

Atrio-esophageal fistula should be highly suspected in patients readmitted after catheter ablation of atrial fibrillation as diagnosis and treatment is a race against time. Information of the patient and medical staff on AEF by interventional cardiologist might reduce the delay and improve survival.

Surgical treatment offers the best chance of survival. Among the different surgical strategies, esophagectomy should be considered as first strategy especially in patients with hemodynamic instability, sepsis, or neurological symptoms. The use of cardiopulmonary bypass can be reasonably recommended. As an alternative, primary direct esophageal repair might be attempted in less severe patients with or without esophageal stenting, in association with flap interposition.

Le Doyen de l'UFR de Médecine,



Le Président du Jury,

Marc FILAIRE

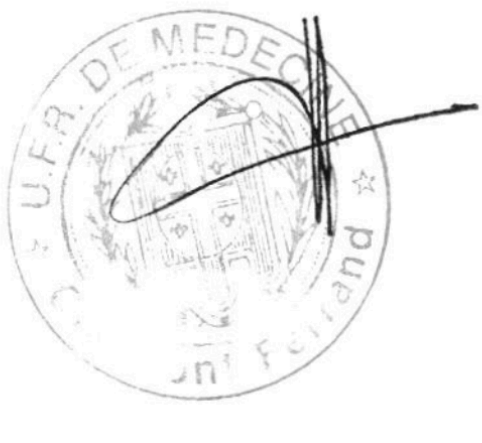
A handwritten signature in black ink, appearing to be 'Marc Filaire', written over a horizontal line.

CONCLUSION DE LA THESE

Les fistules atrio-œsophagiennes sont des complications rares mais mortelles, qui devraient être systématiquement évoquées devant tout patient réadmis à l'hôpital à la suite d'une ablation de fibrillation atriale. Dès l'apparition des premiers symptômes, il s'agit d'une urgence à la fois diagnostique et thérapeutique. Une meilleure information et sensibilisation du patient et du personnel médical sur cette complication pourrait réduire le délai diagnostique et ainsi améliorer la survie.

Concernant les différentes possibilités thérapeutiques médicales et/ou chirurgicales, le traitement chirurgical offre les meilleures chances de survie. Parmi les différentes stratégies chirurgicales étudiées, nous retenons que l'utilisation de la circulation extracorporelle peut-être raisonnablement recommandée. L'œsophagectomie devrait être considérée comme le traitement de référence, en particulier chez les patients présentant une instabilité hémodynamique, un sepsis sévère ou des symptômes neurologiques. En alternative, une réparation directe de l'œsophage peut être tentée chez les patients les moins graves, avec ou sans endoprothèse œsophagienne de couverture, en association avec l'interposition d'un lambeau.

Clermont-Ferrand, le 12/09/2023



Clermont-Ferrand, le 06/09/2023

Le Président du Jury
Marc FILAIRE

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(Conseil national de l'ordre des médecins)

SERMENT D'HIPPOCRATE

Au moment d'être admis(e) à exercer la médecine, je promets et je jure d'être fidèle aux lois de l'honneur et de la probité.

Mon premier souci sera de rétablir, de préserver ou de promouvoir la santé dans tous ses éléments, physiques et mentaux, individuels et sociaux.

Je respecterai toutes les personnes, leur autonomie et leur volonté, sans aucune discrimination selon leur état ou leurs convictions. J'interviendrai pour les protéger si elles sont affaiblies, vulnérables ou menacées dans leur intégrité ou leur dignité. Même sous la contrainte, je ne ferai pas usage de mes connaissances contre les lois de l'humanité.

J'informerai les patients des décisions envisagées, de leurs raisons et de leurs conséquences.

Je ne tromperai jamais leur confiance et n'exploiterai pas le pouvoir hérité des circonstances pour forcer les consciences.

Je donnerai mes soins à l'indigent et à quiconque me les demandera. Je ne me laisserai pas influencer par la soif du gain ou la recherche de la gloire.

Admis(e) dans l'intimité des personnes, je tairai les secrets qui me seront confiés. Reçu(e) à l'intérieur des maisons, je respecterai les secrets des foyers et ma conduite ne servira pas à corrompre les mœurs.

Je ferai tout pour soulager les souffrances. Je ne prolongerai pas abusivement les agonies. Je ne provoquerai jamais la mort délibérément.

Je préserverai l'indépendance nécessaire à l'accomplissement de ma mission. Je n'entreprendrai rien qui dépasse mes compétences. Je les entretiendrai et les perfectionnerai pour assurer au mieux les services qui me seront demandés.

J'apporterai mon aide à mes confrères ainsi qu'à leurs familles dans l'adversité.

Que les hommes et mes confrères m'accordent leur estime si je suis fidèle à mes promesses ; que je sois déshonoré(e) et méprisé(e) si j'y manque.

Nom, Prénom

Signature

SERMENT D'HIPPOCRATE

En présence des Maîtres de cette FACULTE et de mes chers CONDISCIPLES, je promets et je jure d'être fidèle aux lois de l'Honneur et de la Probité dans l'exercice de la Médecine.

Je donnerai mes soins gratuits à l'indigent et je n'exigerai jamais un salaire au-dessus de mon travail. Admis dans l'intérieur des maisons, mes yeux ne verront pas ce qui s'y passe, ma langue taira les secrets qui me seront confiés et mon état ne servira pas à corrompre les mœurs ni à favoriser le crime.

Respectueux et reconnaissant envers mes MAÎTRES, je rendrai à leurs enfants l'instruction que j'ai reçue de leurs pères.

Que les HOMMES m'accordent leur estime si je suis fidèle à mes promesses. Que je sois couvert d'OPPROBRE et méprisé de mes confrères si j'y manque.

Nom, Prénom

Signature

TRAITEMENT CHIRURGICAUX DES FISTULES ATRIO-ŒSOPHAGIENNES APRES ABLATION PERCUTANEE DE FIBRILLATION ATRIALE : ETUDE NATIONALE FRANCAISE

Rationnel : Les fistules atrio-œsophagiennes (FAO) sont des complications rares mais mortelles après ablation percutanée de fibrillation atriale (FA). Bien que le traitement chirurgical apporte un bénéfice en termes de survie, aucune recommandation existe concernant ces modalités.

Objectif : L'objectif de notre étude est d'évaluer, à partir d'une cohorte nationale française, l'efficacité des différentes stratégies chirurgicales utilisées dans la prise en charge des FAO après ablation percutanée de FA.

Méthode : Entre 2010 et 2023, les patients de plus 18 ans avec un diagnostic de FAO ou de fistule péricardo-œsophagienne après ablation percutanée de FA, traités chirurgicalement ont été rétrospectivement sélectionnés par contact mail des centres participants à la base de données EPITHOR.

Résultats : 18 patients ont été inclus, 15 avec un diagnostic de FAO et 3 avec un diagnostic de fistule péricardo-œsophagienne. Cinq patients ont bénéficié d'un stenting œsophagien en association à une chirurgie (réparation directe ou œsophagectomie), dont deux sont décédés (40%). Sept patients (38,9%) ont bénéficié d'une œsophagectomie dont cinq avec chirurgie de rétablissement à 6 mois. Deux patients sont décédés (28,6%). Une réparation directe de l'œsophage en association avec un lambeau d'interposition a été réalisé chez huit patients dont six sont décédés (75%). Un effet centre est observé sur la voie d'abord chirurgicale et la réalisation d'une œsophagectomie ($p=0,002$). Le suivi médian était de 89,5 jours avec une survie à 90 jours de 55%. L'œsophagectomie semble être associée à une meilleure survie (HR 0,163; 95% IC 0,019-1,340; $p=0,092$). En analyse univariée, les facteurs de risques de décès étaient le sepsis (HR 6,398 ; 95% IC 1,265-32,359; $p=0,025$) et les symptômes neurologiques (HR 4,905 ; 95% IC 0,954-25,218; $p=0,006$).

Conclusion : La prise en charge chirurgicale des FAO est un vrai challenge où la réalisation d'une œsophagectomie semble apporter les meilleures chances de survie, notamment chez les patients en sepsis et présentant des signes neurologiques. La réparation directe de l'œsophage avec ou sans stenting préalable doit être réserver aux patients les moins sévères.

Mots clefs : fistule atrio-œsophagienne, perforation œsophagienne, fibrillation atriale, Œsophagectomie, stenting œsophagien