

Insuffisance cardiaque à fraction d'éjection préservée (HFPEF)

Comment la diagnostiquer?

Les scores diagnostiques

MF SERONDE

Besançon

Liens d'intérêt

- Au cours des 4 dernières années, j'ai eu une affiliation ou des intérêts (financiers ou de nature non-pécuniaire) avec la ou les société(s) suivante(s) :

Astra-Zeneca
Abbott
Bayer
BMS
Boehringer Ingelheim
Lilly
Novartis
Pfizer

Chère consœur,

J'ai revu en consultation Mme Ch. Cl. née le 15/10/1951 (**73 ans**) suivie pour une **HTA sous trithérapie associant énalapril 20mg, lercan 10 mg et indapamide.**

Elle me rapporte **une dyspnée d'effort de stade 2** qui s'est aggravée ces derniers mois. Il n'y a pas de douleur thoracique, pas de notion de perte de connaissance, pas de palpitations.

La TA est à **150/90 mmHg**. Il n'y a pas de signe congestif.

L'ECG est en rythme sinusal sans particularité,

L'échocardiographie retrouve un VG non dilaté, **discrètement hypertrophié**, la **FEVG est conservée**, il n'y a pas de trouble de cinétique segmentaire. IM minime. **OG modérément dilatée**. Les **pressions VG sont normales**. Le ventricule droit est un peu dilaté avec une IT permettant d'évaluer **les pressions pulmonaires à 47mmHg**. La VCI n'est pas dilatée et le péricarde libre.

Je dispose d'une analyse biologique qui montre **un LDL à 1,26g/l**, une créatinémie à 60 μ mol/l, une glycémie à jeun à 0.91g/l, **le NTproBNP est à 190 pg/ml**, la TSH est normale.

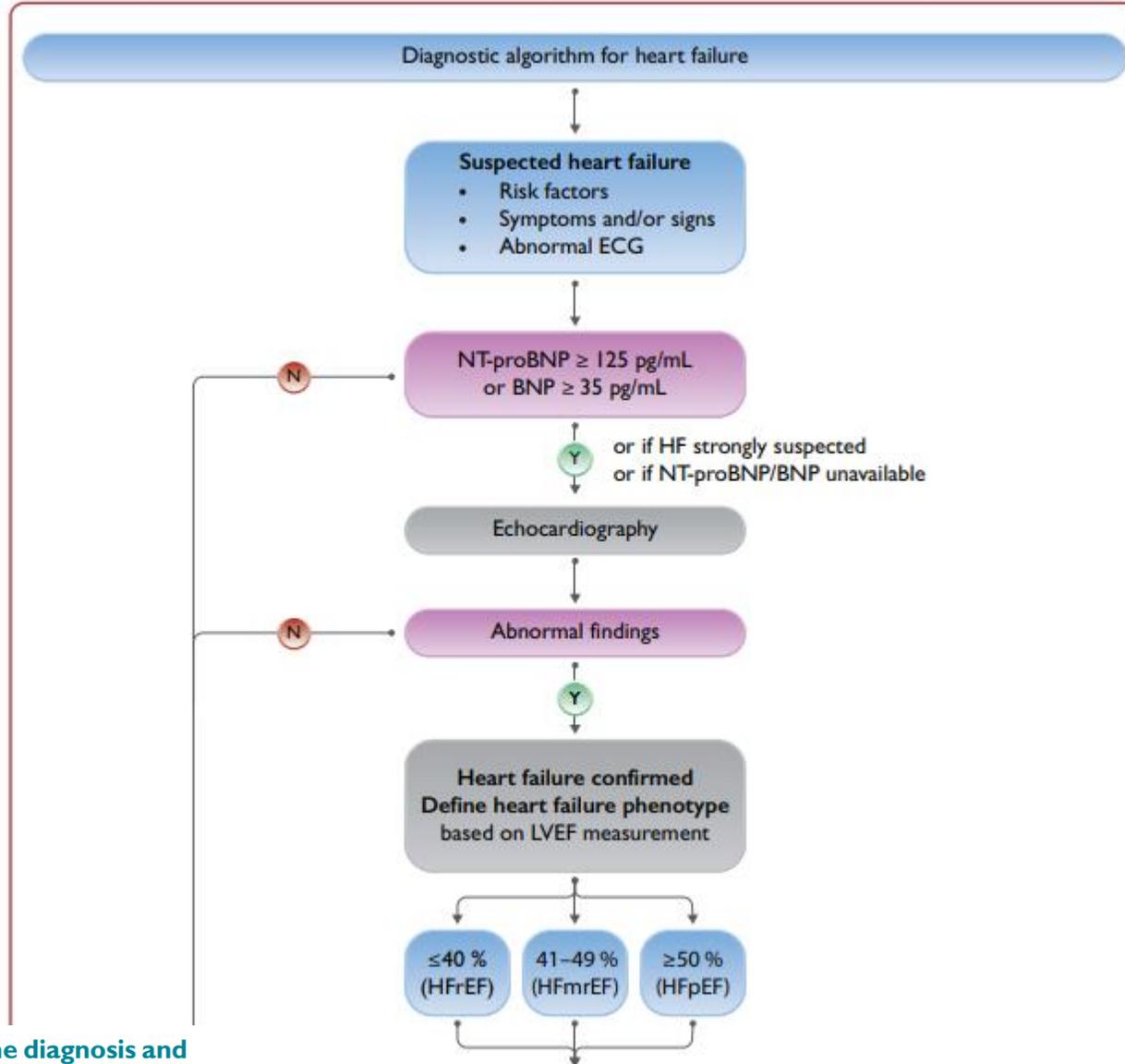
De ce fait, **je suspecte la présence d'une HTAP**, et je débute le bilan par la réalisation d'une scintigraphie pulmonaire, et je compléterai par un angioscanner thoracique et la réalisation d'EFR.

Sur le plan lipidique **je commence ce jour un traitement par rosuvastatine 5mg/j.**

Je vous confie la patiente **pour la réalisation d'un cathétérisme cardiaque afin d'évaluer cette hypertension pulmonaire.**

Bien confraternellement,

Est-ce de l'HTAp ou de l'insuffisance cardiaque?



Femme 73 ans
Dyspnée stade II
Hypertendue,
hypercholestérolémie, en FA

NT proBNP 190pg/ml

Echocardiographie est anormale

FEVG > 50%



ESC

European Society
of Cardiology

European Heart Journal (2019) **40**, 3297–3317

doi:10.1093/eurheartj/ehz641

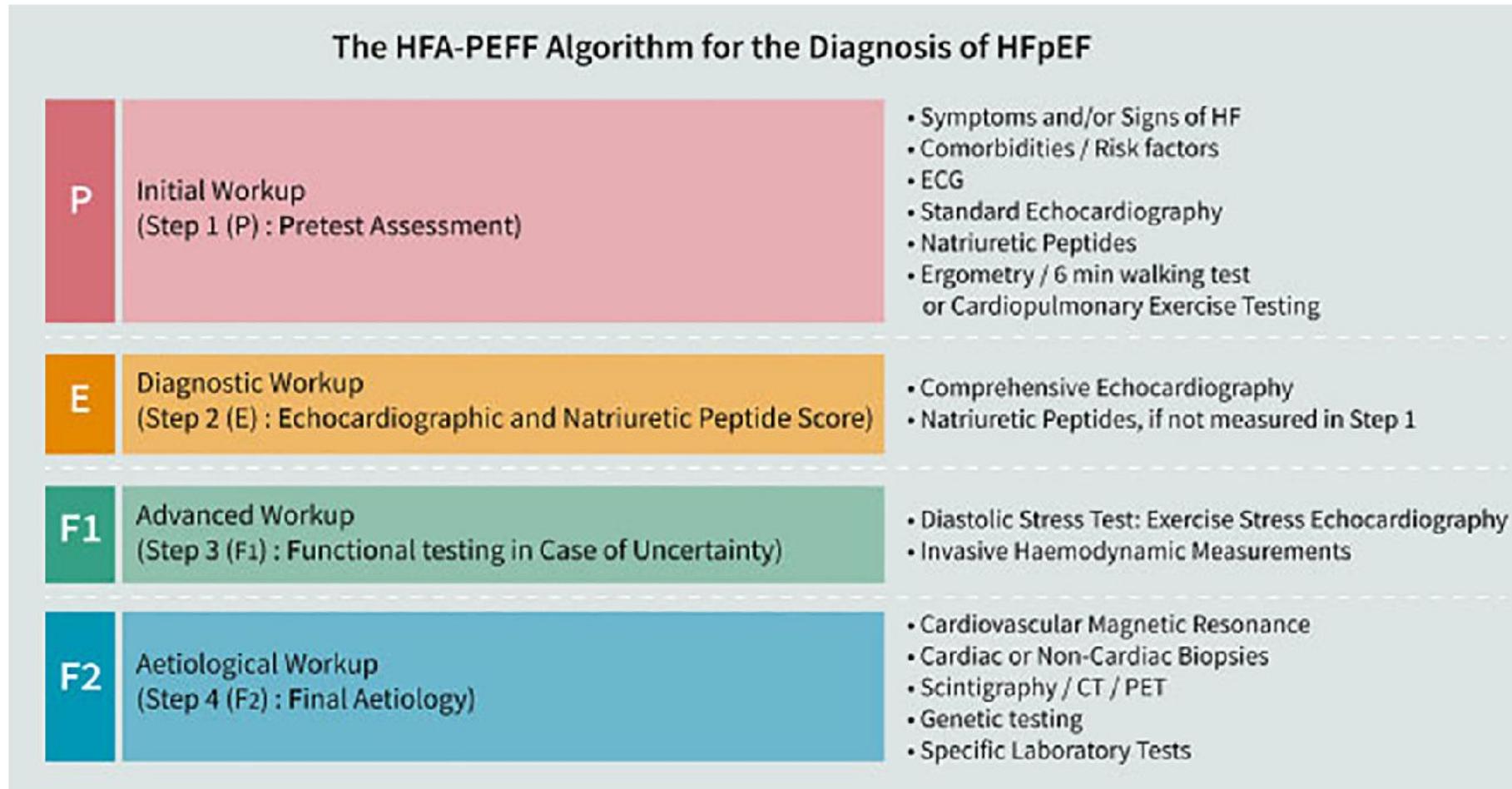
FASTTRACK CLINICAL RESEARCH

Heart failure/cardiomyopathy

How to diagnose heart failure with preserved ejection fraction: the HFA–PEFF diagnostic algorithm: a consensus recommendation from the Heart Failure Association (HFA) of the European Society of Cardiology (ESC)

Burkert Pieske^{1,2,3,4*}, Carsten Tschöpe^{1,2,5}, Rudolf A. de Boer ⁶, Alan G. Fraser⁷, Stefan D. Anker^{1,2,5,8}, Erwan Donal⁹, Frank Edelmann^{1,2}, Michael Fu¹⁰, Marco Guazzi^{11,12}, Carolyn S.P. Lam^{13,14}, Patrizio Lancellotti¹⁵, Vojtech Melenovsky¹⁶, Daniel A. Morris¹, Eike Nagel ^{17,18}, Elisabeth Pieske-Kraigher¹, Piotr Ponikowski¹⁹, Scott D. Solomon²⁰, Ramachandran S. Vasan²¹, Frans H. Rutten ²², Adriaan A. Voors⁶, Frank Ruschitzka²³, Walter J. Paulus²⁴, Petar Seferovic²⁵, and Gerasimos Filippatos^{26,27}

Quatre étapes diagnostiques HFA-PEFF:



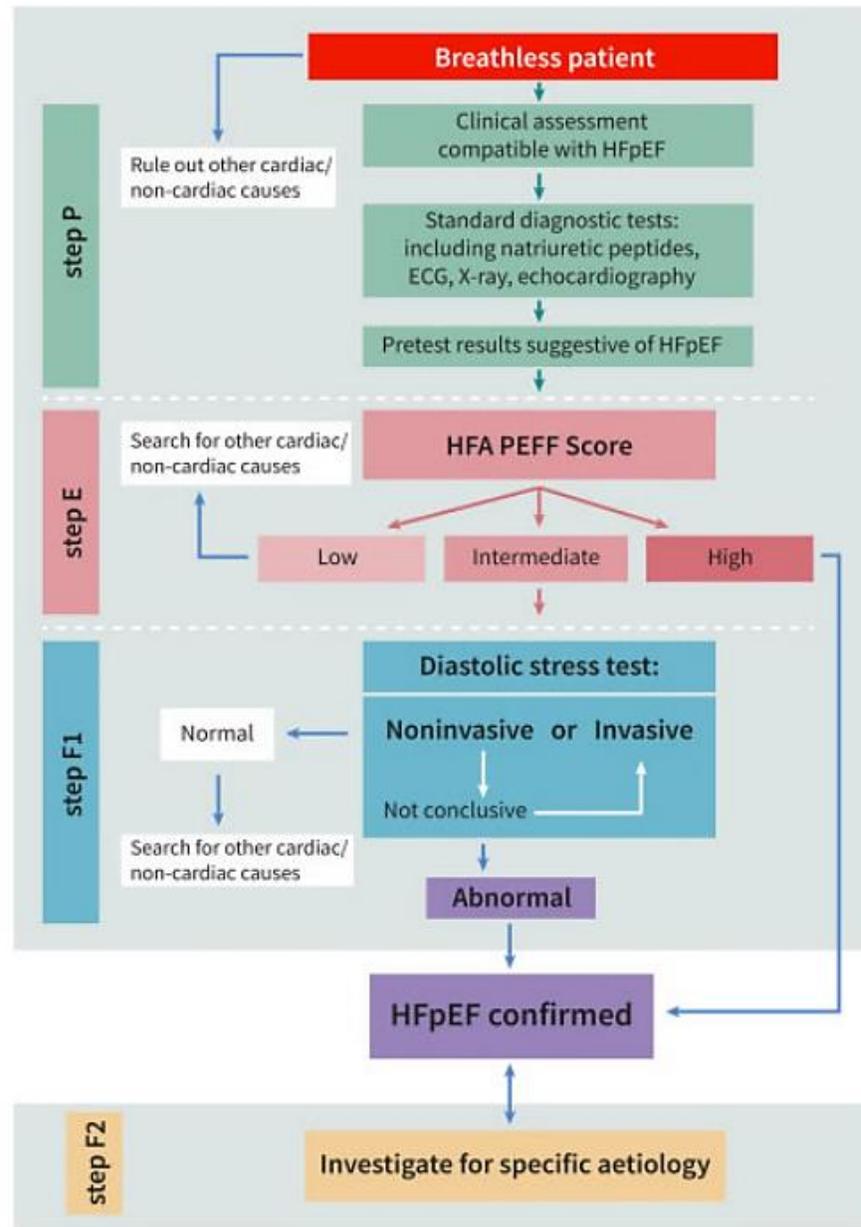


Figure 2 Flowchart of the HFA-PEFF diagnostic algorithm. Step P

Step 1(P): Pre-test assessment

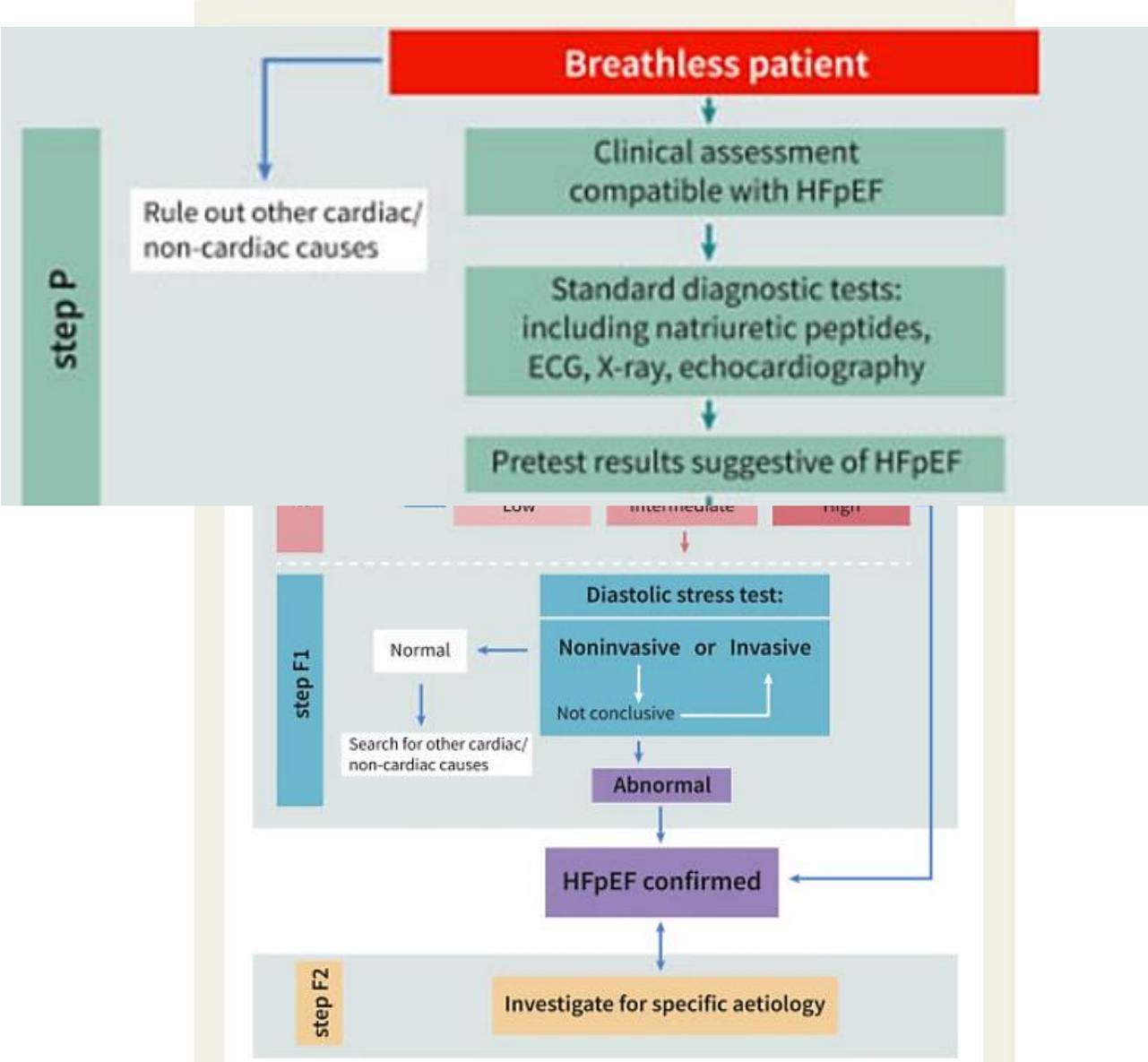


Figure 2 Flowchart of the HFA-PEFF diagnostic algorithm. Step P

Step 1(P): Pre-test assessment

Table I Risk factors and findings consistent with heart failure with preserved ejection fraction in a symptomatic patient

Early (age ≥ 70 in men or \geq in women)
Overweight/obesity
Metabolic syndrome/diabetes mellitus
Physical inactivity/deconditioning
Arterial hypertension
Atrial fibrillation
ECG abnormalities (beyond atrial fibrillation)
Elevated natriuretic peptide levels (if available, BNP ≥ 35 pg/mL or NT-proBNP ≥ 125 pg/mL)

Notre patiente:

- Femme
- Agée de 73 ans
- HTA sous trithérapie
- NTproBNP 190 pg/ml

Step 2(E): Echocardiographic and natriuretic peptide heart failure with preserved ejection fraction diagnostic score

	Biomarker (SR)	Biomarker (AF)
Major	NT-proBNP > 220 pg/ml or BNP > 80 pg/ml	NT-proBNP > 660 pg/ml or BNP > 240 pg/ml
Minor	NT-proBNP 125-220 pg/ml or BNP 35-80 pg/ml	NT-proBNP 365-660 pg/ml or BNP 105-240 pg/ml

Step 2(E): Echocardiographic and natriuretic peptide heart failure with preserved ejection fraction diagnostic score

Evaluation de la fraction d'éjection VG FEVG ≥ 50%

ANOMALIE MORPHOLOGIQUE

ET

ANOMALIES FONCTIONNELLES DU CŒUR

Volume indexé de l'OG

Masse VG indexée ou épaisseur des parois du VG ou RWT

Evaluation de la fonction diastolique

ou Evaluation des pressions pulmonaires

RWT= épaisseur relative du VG
= Epaisseur paroi post/ 2 DTDVG

Septal and lateral mitral annular peak early diastolic velocity (e')

Tricuspid regurgitation peak velocity or pulmonary arterial systolic pressure

Average septal-lateral *E/e'* ratio

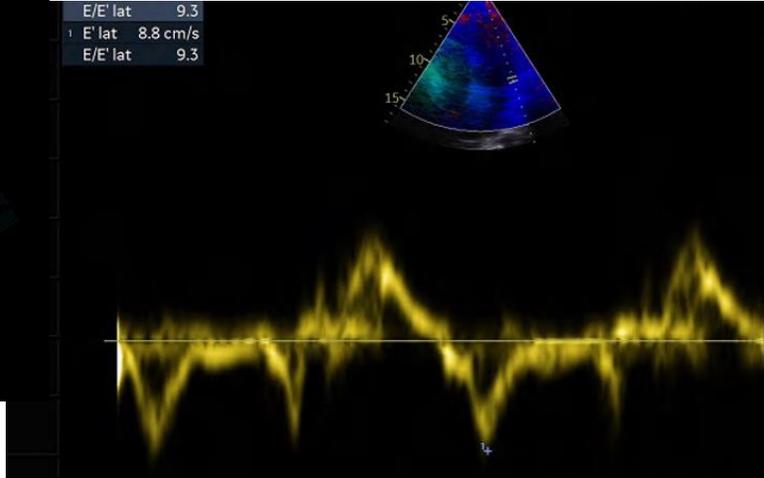
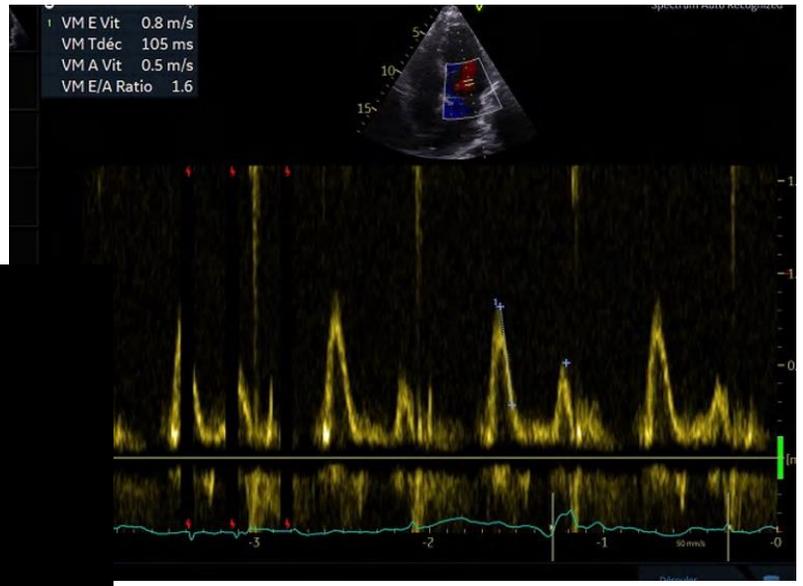
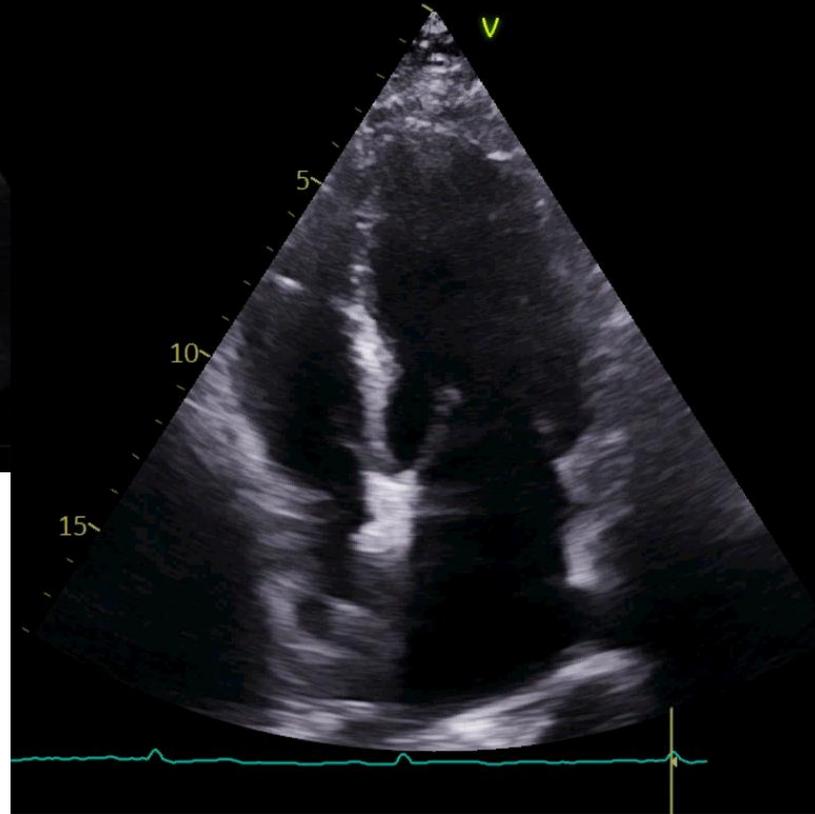
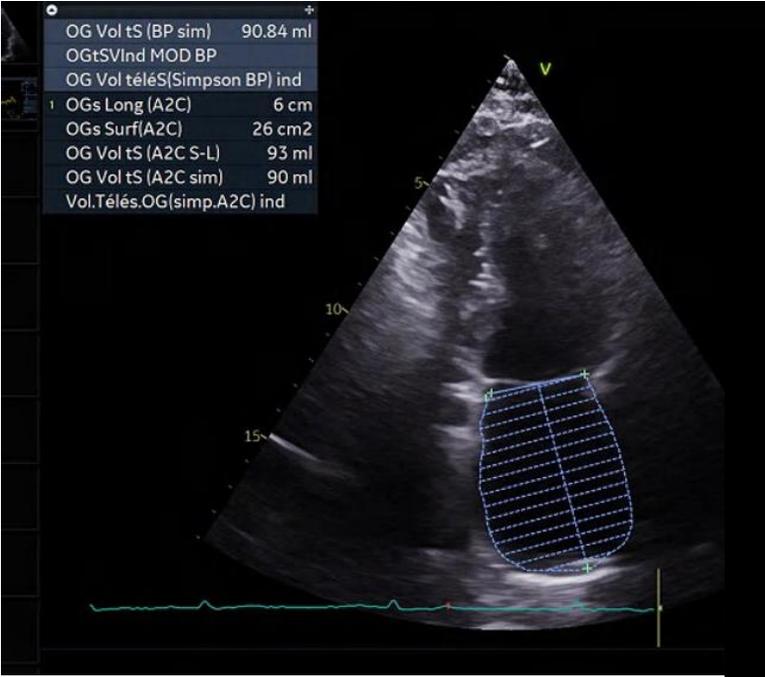
Left ventricular global longitudinal systolic strain

	Functional	Morphological	Biomarker (SR)	Biomarker (AF)
Major	septal $e' < 7$ cm/s or lateral $e' < 10$ cm/s or Average $E/e' \geq 15$ or TR velocity > 2.8 m/s (PASP > 35 mmHg)	LAVI > 34 ml/m ² or LVMI $\geq 149/122$ g/m ² (m/w) and RWT $> 0,42$ #	NT-proBNP > 220 pg/ml or BNP > 80 pg/ml	NT-proBNP > 660 pg/ml or BNP > 240 pg/ml
Minor	Average $E/e' 9-14$ or GLS $< 16\%$	LAVI $29-34$ ml/m ² or LVMI $> 115/95$ g/m ² (m/w) or RWT $> 0,42$ or LV wall thickness ≥ 12 mm	NT-proBNP $125-220$ pg/ml or BNP $35-80$ pg/ml	NT-proBNP $365-660$ pg/ml or BNP $105-240$ pg/ml
Major Criteria: 2 points		≥ 5 points: HFpEF		
Minor Criteria: 1 point				

Figure 3 Step 2 (E): Echocardiographic and natriuretic peptide heart failure with preserved ejection fraction workup and scoring system (diagnostic workup).

Echocardiographie

OG Vol tS (BP sim) 90.84 ml
OGtSV/Ind MOD BP
OG Vol téléS(Simpson BP) ind
OGs Long (A2C) 6 cm
OGs Surf(A2C) 26 cm²
OG Vol tS (A2C S-L) 93 ml
OG Vol tS (A2C sim) 90 ml
Vol.Téles.OG(simp.A2C) ind



FEVG 57%
Volume OG 45 ml/m²
Masse VG 120g/m²,
Epaisseur PP, Septum à 11 mm
E' latérale 8cm/s, E/E' moyen 9,
PAPs 40mmHg

Mme Ch. CI

ETT

Volume OG 45 ml/m² **2 POINTS**

Masse VG 120g/m², **1 POINT**

épaisseur paroi post et septum à 11 mm

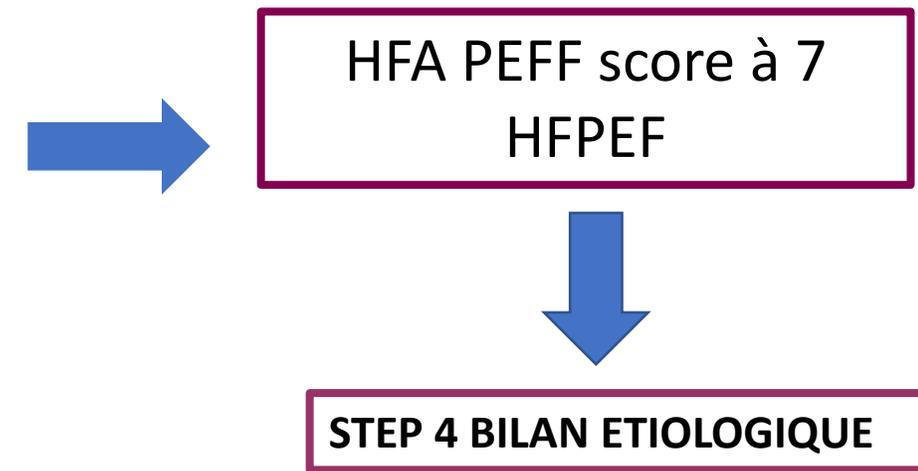
E' latérale 8cm/s, E/E' moyen 9, **1POINT**

PAPs 40mmHg **2 POINTS**

NT proBNP 190 pg/ml **1 POINT**

	Functional	Morphological	Biomarker (SR)	Biomarker (AF)
Major	septal e' < 7 cm/s or lateral e' < 10 cm/s or Average E/e' ≥ 15 or TR velocity > 2.8 m/s (PASP > 35 mmHg)	LAVI > 34 ml/m ² or LVMI ≥ 149/122 g/m ² (m/w) and RWT > 0,42 #	NT-proBNP > 220 pg/ml or BNP > 80 pg/ml	NT-proBNP > 660 pg/ml or BNP > 240 pg/ml
Minor	Average E/e' 9 -14 or GLS < 16 %	LAVI 29-34 ml/m ² or LVMI > 115/95 g/m ² (m/w) or RWT > 0,42 or LV wall thickness ≥ 12 mm	NT-proBNP 125-220 pg/ml or BNP 35-80 pg/ml	NT-proBNP 365-660 pg/ml or BNP 105-240 pg/ml
Major Criteria: 2 points		≥ 5 points: HFpEF		
Minor Criteria: 1 point		2-4 points: Diastolic Stress Test or Invasive Haemodynamic Measurements		

Figure 3 Step 2 (E): Echocardiographic and natriuretic peptide heart failure with preserved ejection fraction workup and scoring system (diagnostic workup).



Si HFPEFF SCORE <5

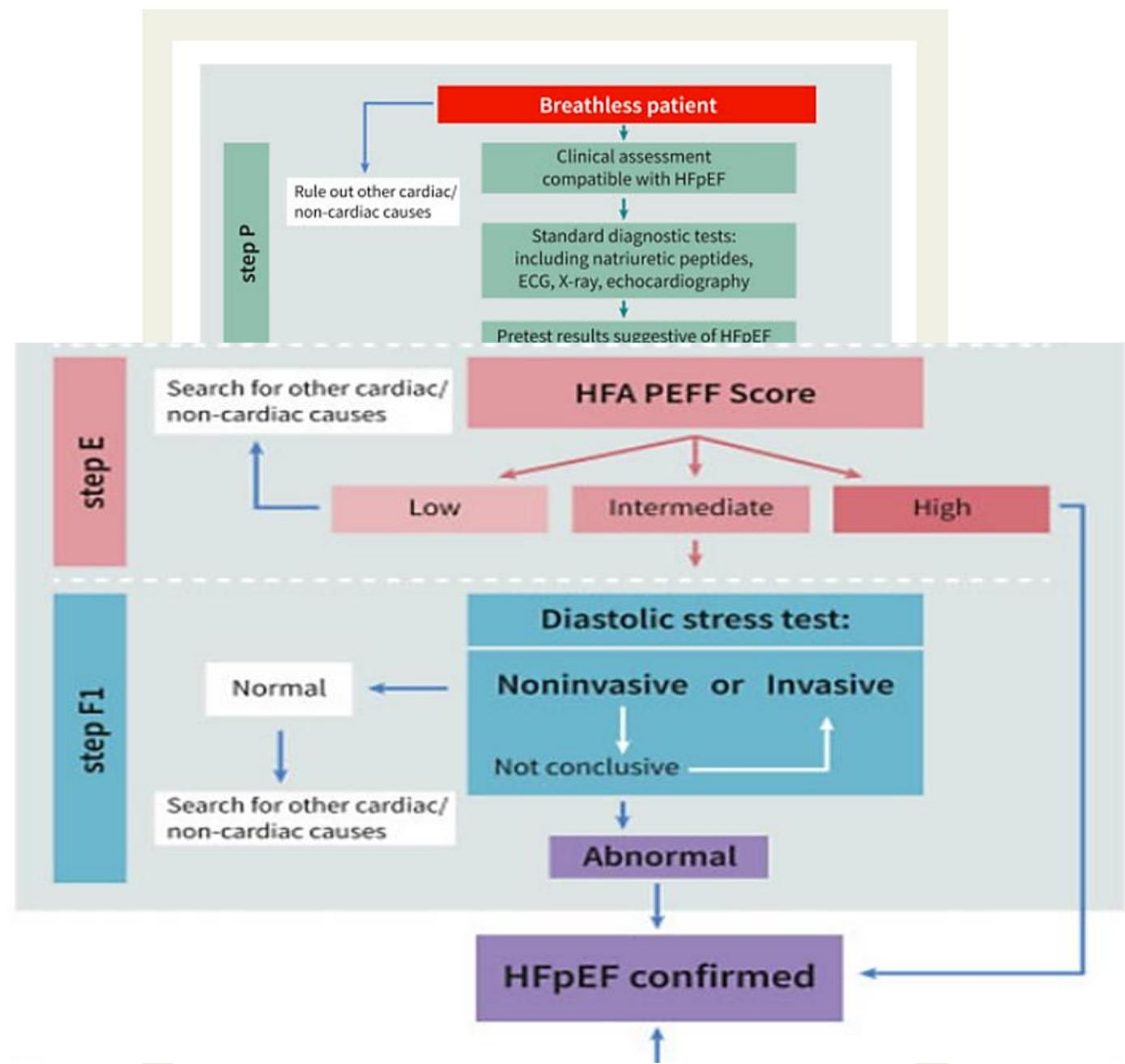


Figure 2 Flowchart of the HFA-PEFF diagnostic algorithm. Step P

Step 3 (F1): Functional testing

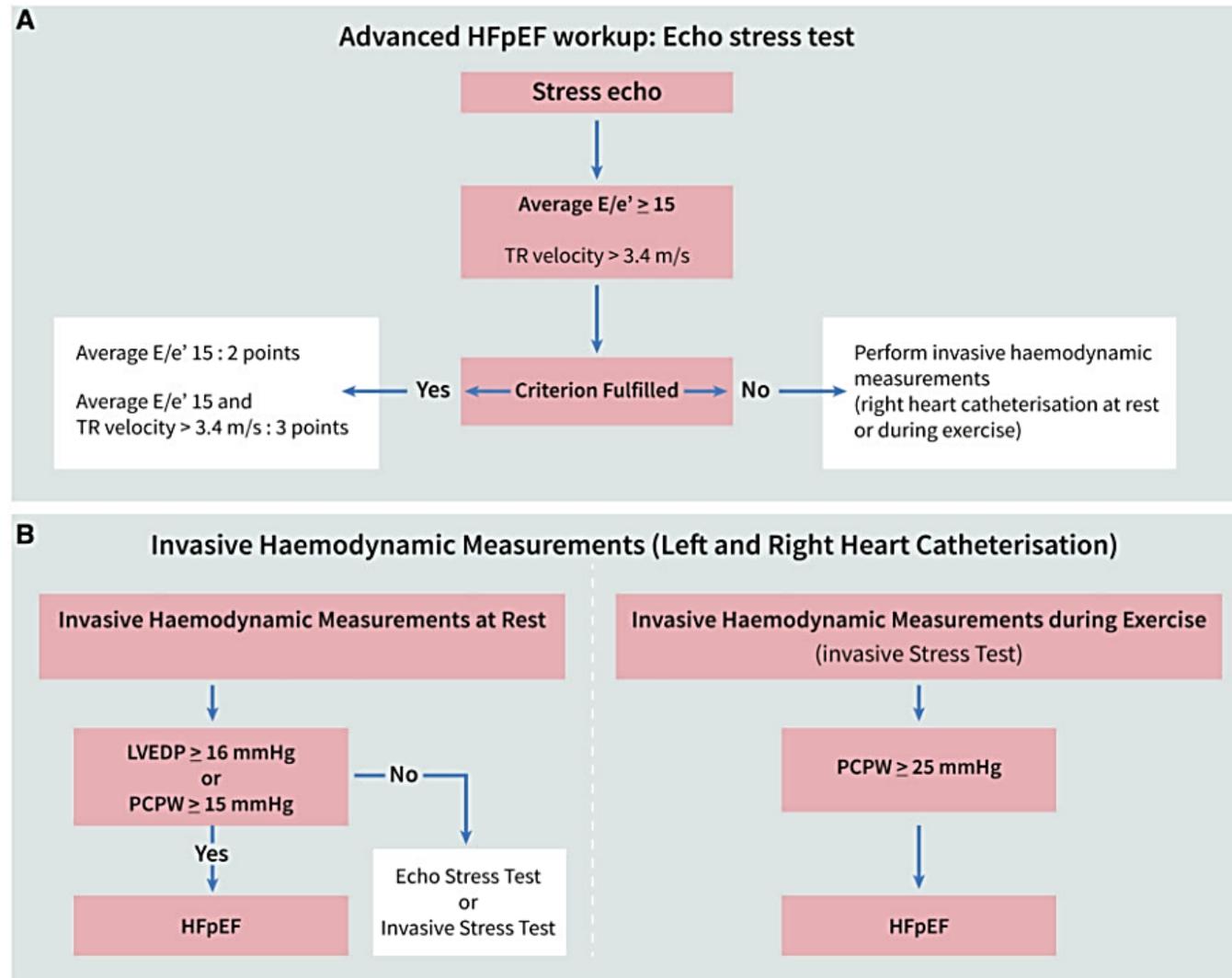
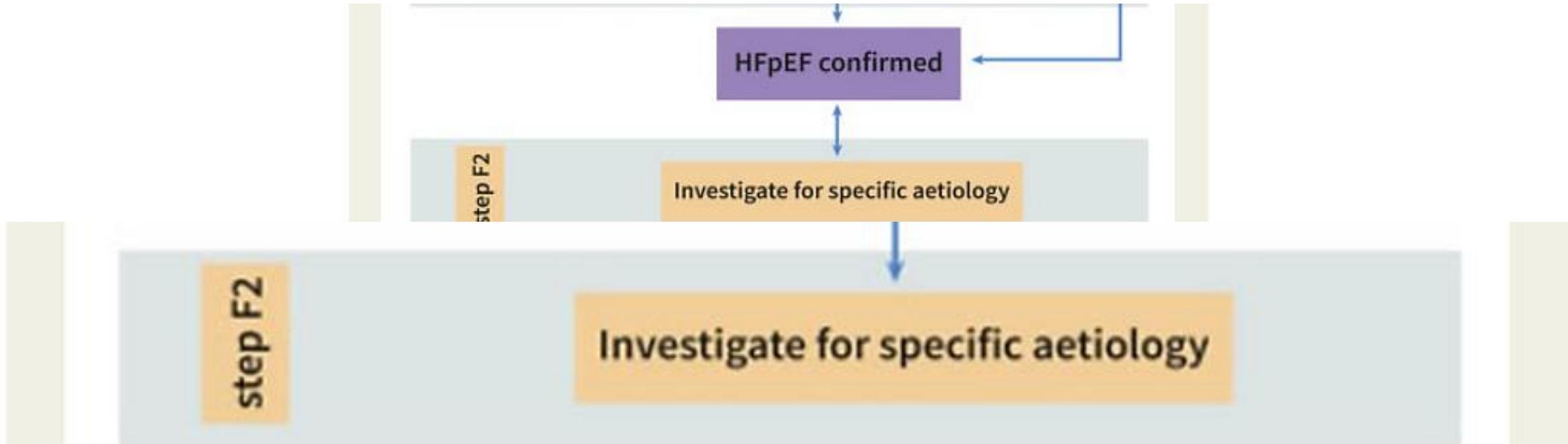


Figure 4 Step 3 (F): Functional tests in cases of diagnostic uncertainty. (A, upper panel) It shows the diastolic stress test workup with exercise echocardiography is shown. If key haemodynamic abnormalities are identified, a definite heart failure with preserved ejection fraction diagnosis can be made. (B, lower panel) It shows the invasive haemodynamic measurements at rest (left) or during exercise (right) that may complement stress echocardiography and are recommended in cases with remaining diagnostic uncertainty.



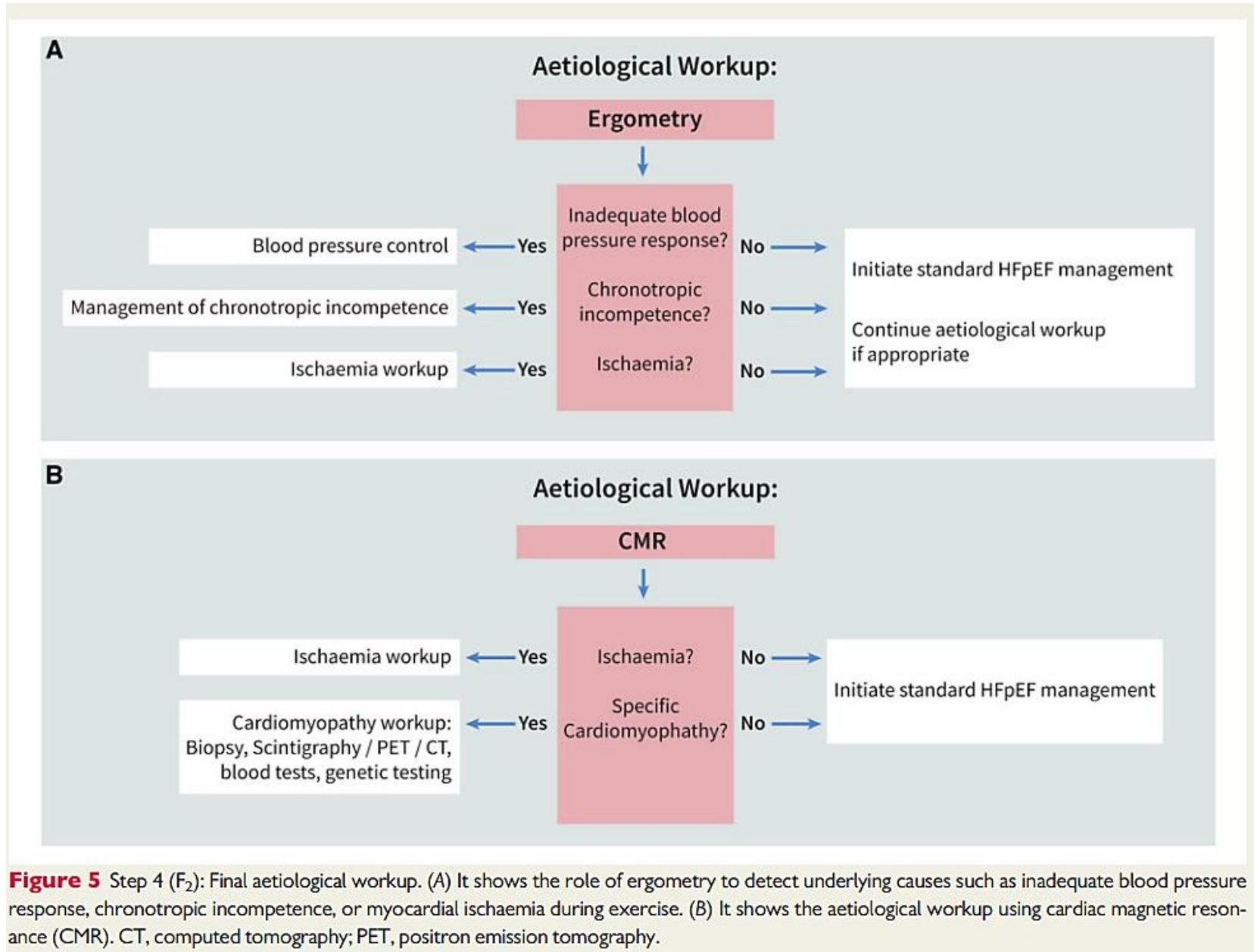


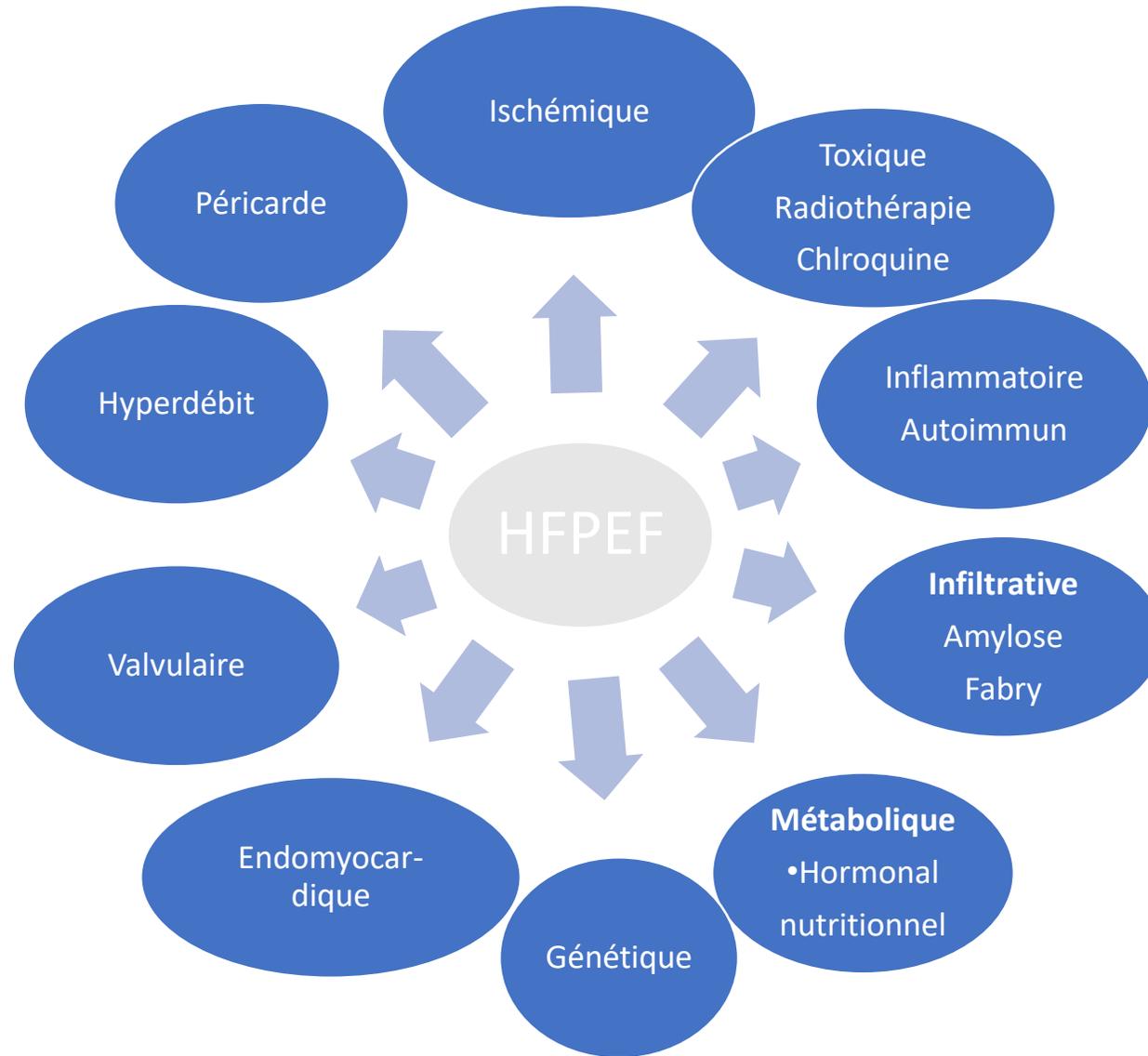
Figure 5 Step 4 (F₂): Final aetiological workup. (A) It shows the role of ergometry to detect underlying causes such as inadequate blood pressure response, chronotropic incompetence, or myocardial ischaemia during exercise. (B) It shows the aetiological workup using cardiac magnetic resonance (CMR). CT, computed tomography; PET, positron emission tomography.

Table 2 Potential specific aetiologies underlying heart failure with preserved ejection fraction-like syndromes in Step 4 (F₂)

Abnormalities of the myocardium		
Ischaemic		Myocardial post-infarction/scar ⁴⁹ Myocardial stunning ⁵⁰ Epicardial coronary artery disease ⁵¹ Microvascular and endothelial dysfunction ^{52,53-55}
Toxic	Recreational substance abuse	Such as alcohol, ⁵⁶ cocaine, ⁵⁷ and anabolic steroids ⁵⁸
	Heavy metals	Such as iron, ⁵⁹ lead, ⁶⁰ cadmium, ⁶⁰ cobalt, ⁶¹ copper (M. Wilson) ⁶²
	Medications	Such as chloroquine, ⁶³ ergotamine, ⁶⁴ cytostatic drugs (e.g. anthracyclines), ⁶⁴ immunomodulating drugs (e.g. interferons monoclonal antibodies such as trastuzumab, cetuximab) ⁶⁴
Immune and inflammatory	Radiation	Mean cardiac radiation doses > 3 Gy ^{65,66}
	Related to infection	Such as cardiotropic viruses, ^{67,68} HIV, ⁶⁹⁻⁷¹ hepatitis, ⁷² helminths, ⁷³ parasites (e.g. Chagas' disease ⁷⁴)
Infiltrative	Not related to infection	Lymphocytic myocarditis, ⁷⁵⁻⁷⁹ autoimmune diseases (e.g. rheumatoid arthritis, ⁸⁰ connective tissue disorders like scleroderma, ⁸¹ M. Raynaud, ⁵⁵ systemic lupus erythematosus, ⁸² dermatomyositis, ⁸³ and hypersensitivity and eosinophilic myocarditis ^{73,84-87}
	Related to malignancy	Direct infiltrations and metastases ⁸⁸⁻⁹⁰
Metabolic	Not related to malignancy	Amyloidosis, ^{91,92} sarcoidosis, ^{92,93} primarily and secondary haemochromatosis, ⁹⁴⁻⁹⁶ storage diseases ⁹⁷ (e.g. Fabry disease, ^{98,99} Danon disease, ¹⁰⁰⁻¹⁰² Pompe disease, ^{99,102} PRKAG2 deficiency, ⁹⁹ Gaucher's disease ^{99,103,104,105,106})
	Hormonal	Such as thyroid diseases, ^{107,108} parathyroid diseases, ¹⁰⁹ acromegaly, ¹¹⁰ GH deficiency, ¹¹¹ Cushing disease, ¹¹² Conn's disease, ¹¹³ Addison disease, ¹¹⁴ pheochromocytoma, ¹¹⁵ pathologies related to pregnancy and peripartum ^{116,117}
Genetic	Nutritional	Such as deficiencies in thiamine, ¹¹⁸ L-carnitine, ¹¹⁹ selenium, ¹²⁰ (functional) iron, ^{121,122} complex malnutrition (e.g. AIDS, infections, ⁷³ anorexia nervosa ^{73,123,124})
	Diverse forms	Such as HCM, ^{97,125,126} restrictive cardiomyopathies, ^{103,104,106} hypertrophic form of non-compaction cardiomyopathy, ^{127,128} early forms of muscular dystrophies (Duchenne/Becker disease ¹²⁹).
Endomyocardial		HES, ⁸⁴ EMF, ^{71,127} endocardial fibroelastosis, ¹²⁸ carcinoid, ^{130,131} endocardial calcification (Paget's disease ¹³²)
Abnormalities of loading conditions		
Hypertension		Primary and secondary forms of hypertension ^{112,113,115,130,131}
Valvular and structural defects	Acquired	Heart valve diseases ^{133,134}
	Congenital	Septal defects ^{132,135,136}
	Pericardial and endomyocardial pathologies	Constrictive pericarditis and pericardial effusion ^{137,138}
High output states	Pericardial	HES, ⁸⁶ EMF, ^{73,139} endocardial fibroelastosis, ¹⁴⁰ carcinoid, ^{141,142} endocardial calcification (Paget's disease ¹⁴³)
	Endomyocardial	
Volume overload		Severe anaemia, ¹⁴⁴ sepsis, ¹⁴⁵ thyrotoxicosis, ¹⁰⁵ arteriovenous fistula, ¹⁴⁶ and pregnancy ¹⁴⁷
Abnormalities of the cardiac rhythm		Renal failure and fluid overload ^{148,149,150}
Rhythm disorders		Atrial/ventricular arrhythmias, pacing, conduction disorders ^{38,151-153}

EMF, endomyocardial fibrosis; GH, growth hormone; HCM, hypertrophic cardiomyopathy; HES, hypereosinophilic syndrome (formerly known as Löffler's endocarditis); HIV, AIDS, human immunodeficiency virus/acquired immune deficiency; LV, left ventricular; PRKAG2, protein kinase AMP-activated non-catalytic subunit gamma 2.

Etiologies



H2FPEF Score for Heart Failure with Preserved Ejection Fraction ☆

Estimates probability of underlying heart failure in patients with preserved ejection fraction on echo.

When to Use ▾	Why Use ▾
Age	<input type="text" value="68"/> years
BMI	<input type="text" value="24"/> kg/m ²
Early mitral inflow velocity/mitral annular early diastolic velocity (E/e') ratio	<input type="text" value="9"/>
Pulmonary artery systolic pressure As estimated from echo	<input type="text" value="40"/> mm Hg
Atrial fibrillation From clinical history and EKG	<input checked="" type="radio"/> No <input type="radio"/> Yes

46.6 %
Probability of heart failure with preserved EF

[Copy Results](#) [Next Steps >>>](#)

<https://www.mdcalc.com/calc/10105/h2fpef-score-for-heart-failure-with-preserved-ejection-fraction>

[» Next Steps](#) [Evidence](#) [Creator Insights](#)

ADVICE
Consider alternate causes of dyspnea if low probability, and consider empiric treatment for HFpEF if high probability. For intermediate probability patients additional testing.

Borlaug. Circulation. 2018;138:861–870

Take Home messages

- L'IC à fraction d'éjection préservée est fréquente environ 50% de la population des patients atteints d'IC
- Le diagnostic doit être évoqué devant des symptômes et la présence de comorbidités
- Le dosage des peptiques natriurétiques est très utile et son interprétation doit tenir compte de la présence ou non d'un trouble du rythme auriculaire
- L'ETT diagnostique doit comprendre une analyse structurelle du cœur (volume OG, masse VG) et une analyse fonctionnelle (fonction diastolique VG, pressions pulmonaires)
- L'échographie d'effort doit être envisagée dès que le diagnostic est incertain
- En dernière recours une approche hémodynamique peut être envisager
- Enfin penser au diagnostic étiologique

Je vous remercie pour votre attention !