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Cardiomyopathie du péri-partum

Groupe USIC – Cœur de Femme

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Dr Sabrina UHRY
Haguenau



DÉCLARATION DE LIENS D'INTÉRÊT POTENTIELS

Intervenant : Sabrina UHRY, Haguenau

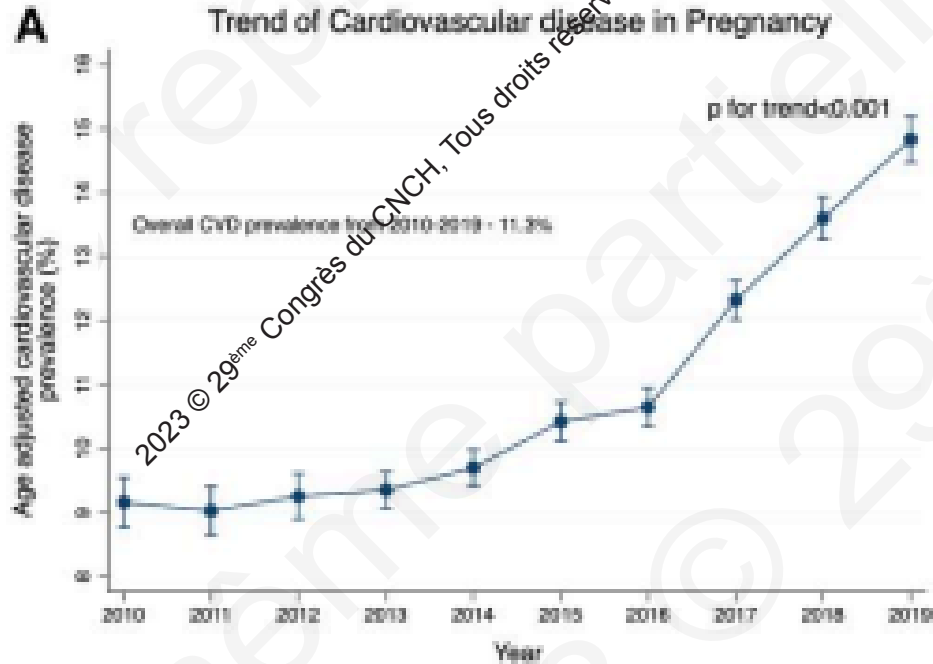
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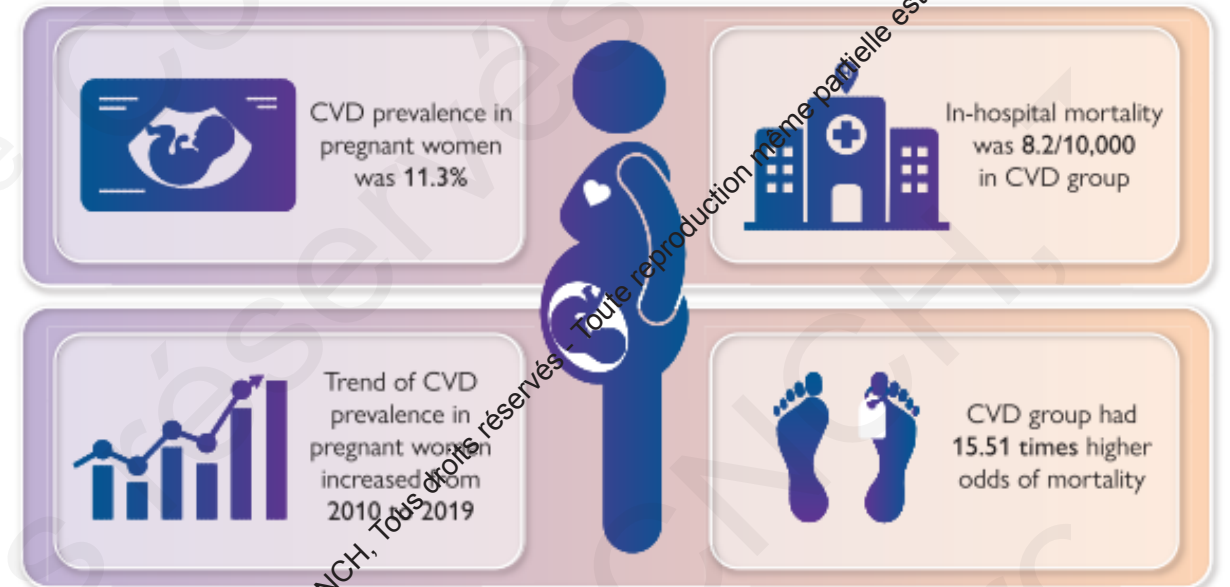
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Introduction



Prevalence, trends and outcomes of cardiovascular diseases in pregnant patients in the United States: 2010 to 2019



Généralités

Saving Lives, Improving Mothers' Care

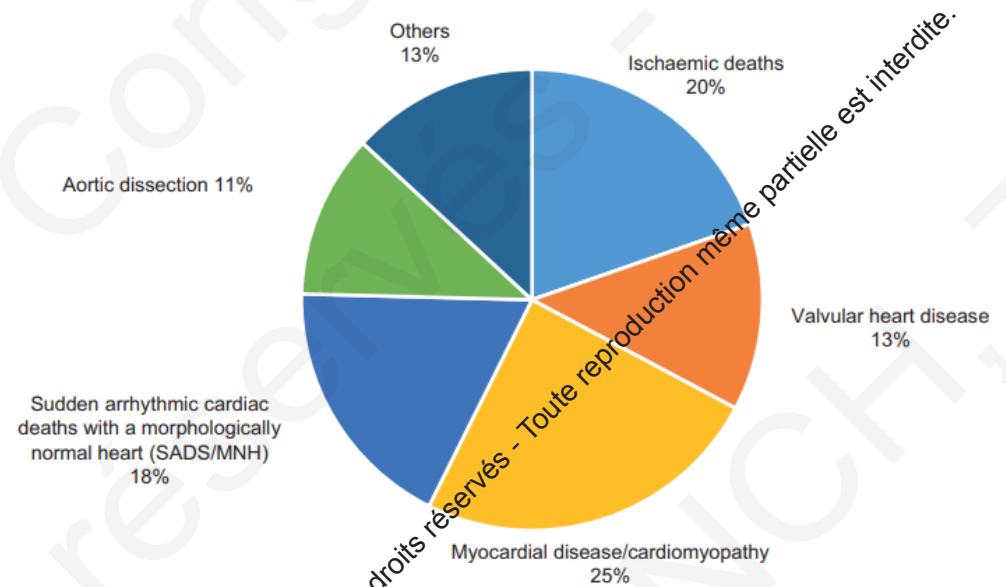
Lessons learned to inform maternity care from the UK
and Ireland Confidential Enquiries into Maternal Deaths
and Morbidity 2018-20

Compiled report including supplementary material



November 2022

Figure 5.2: Causes of cardiovascular deaths, UK and Ireland 2018-20





Définition

Definition of peripartum cardiomyopathy

1. Heart failure secondary to left ventricular systolic dysfunction with a LVEF < 45%
2. Occurrence towards the end of pregnancy or in the months following delivery (mostly in the month following delivery)
3. No other identifiable cause of heart failure

Pathophysiology, diagnosis and management of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of Cardiology Study Group on peripartum cardiomyopathy

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Epidémiologie

Table 1 | Worldwide variation in incidence of peripartum cardiomyopathy

Country/Region	Incidence (per live births)	Reference	Data source
Nigeria	1/102	Isezuo et al ¹⁸	Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria
Haiti	≈1/300	Pelt et al ¹⁹	Hospital Albert Schweitzer PPCM Registry
China	1/346	Huang et al ²⁰	Gaocheng People's Hospital, Shandong Province, China
United States	1/968	Kave et al ²¹	US National Inpatient Sample
South Africa	1/1000	Desai et al ²²	King Edward VIII Hospital, Durban, South Africa
California, US	1/2066	Gunderson et al ²³	Kaiser Permanente Northern California hospitals
Malaysia	1/2941	Chee et al ²²	University Malaya Medical Centre
Sweden	1/5719*	Barasa et al ²³	National Inpatient, Cause of Death, and Medical Birth Registries
Denmark	1/10 149	Ersbøll et al ²⁴	Danish National Birth and Patient Registers
Japan	≈1 in 20 000	Kamiya et al ²⁵	Japanese National Survey of Peripartum Cardiomyopathy

*Heart failure in late pregnancy and the postpartum period.

Pathologie rare

Facteurs prédisposants

Clinical Features Associated with Peripartum Cardiomyopathy Compared with Non-Peripartum Cardiomyopathy Delivering Mothers

	Univariate		Multivariate	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Age				
< 18	1.30 (0.74-2.15)	0.31	0.82 (0.37-1.56)	0.58
18-29	Reference	-	Reference	-
30-39	1.63 (1.45-1.97)	< 0.0001	1.82 (1.48-2.24)	< 0.0001
40-49	2.23 (1.49-3.23)	< 0.0001	1.71 (1.09-2.58)	0.01
Race				
Caucasian	Reference	-	Reference	-
African-American	2.67 (2.09-3.40)	< 0.0001	1.79 (1.37-2.31)	< 0.0001
Hispanic	0.86 (0.68-1.08)	0.20	1.00 (0.78-1.28)	0.99
Other	0.72 (0.50-1.01)	0.07	0.77 (0.53-1.11)	0.19
Comorbid conditions				
Diabetes mellitus	3.52 (1.97-5.75)	< 0.0001	1.42 (0.73-2.49)	0.26
Hypertension	13.1 (11.0-15.5)	< 0.0001	6.41 (4.81-8.44)	< 0.0001
Tobacco use	3.01 (2.08-4.21)	< 0.0001	1.43 (0.89-2.22)	0.12
Anemia	7.60 (6.34-9.07)	< 0.0001	4.89 (3.95-6.03)	< 0.0001
Substance abuse	6.56 (4.62-9.03)	< 0.0001	4.12 (2.71-6.04)	< 0.0001
Asthma	3.90 (2.82-5.26)	< 0.0001	2.23 (1.53-3.15)	< 0.0001
Obesity	5.29 (3.56-7.54)	< 0.0001	1.42 (0.84-2.24)	0.16
Autoimmune disease	5.45 (2.16-11.1)	< 0.0001	3.61 (1.42-7.43)	0.002
Pregnancy characteristics				
Multiple gestation	6.74 (5.10-8.74)	< 0.0001	2.88 (2.07-3.97)	< 0.0001
Preeclampsia	13.60 (11.3-16.4)	< 0.0001	1.99 (1.72-2.69)	< 0.0001
Eclampsia	27.90 (14.4-48.2)	< 0.0001	5.98 (2.88-10.9)	< 0.0001

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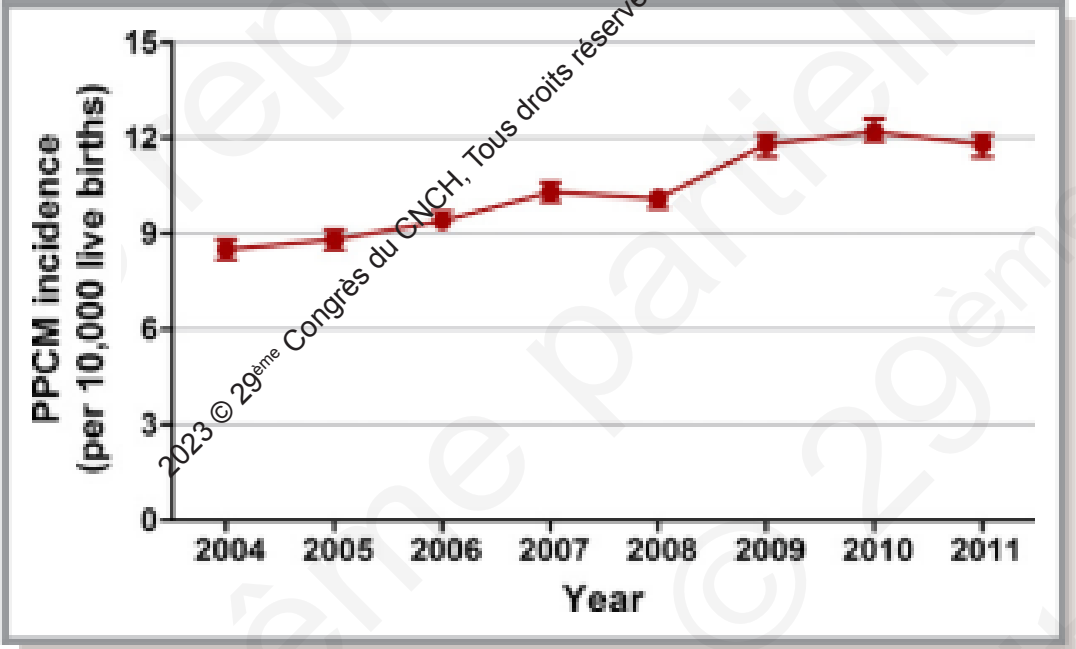
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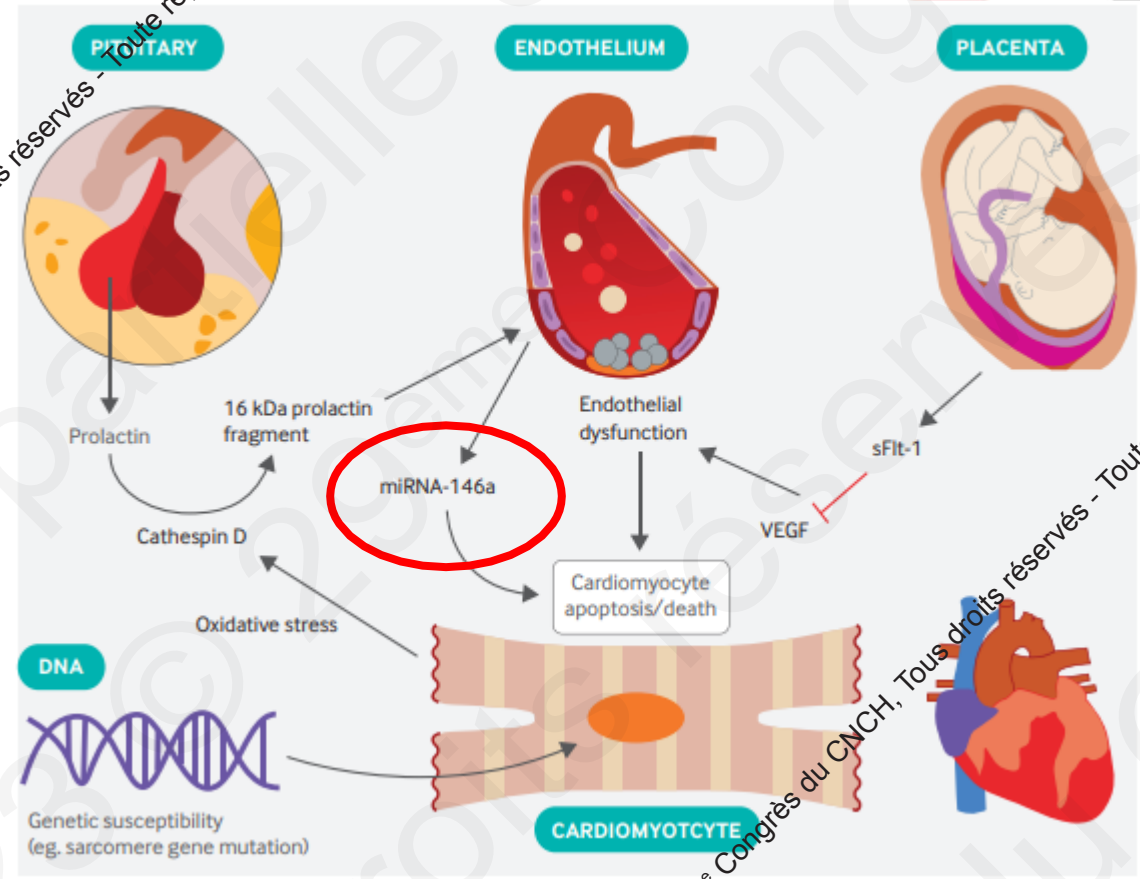
Incidence augmente



- ↗ âge maternel
- ↗ diagnostic
- ↗ grossesses multiples
- ↗ pré-éclampsie
- ↗ comorbidités (HTA, obésité, diabète)



Physiopathologie

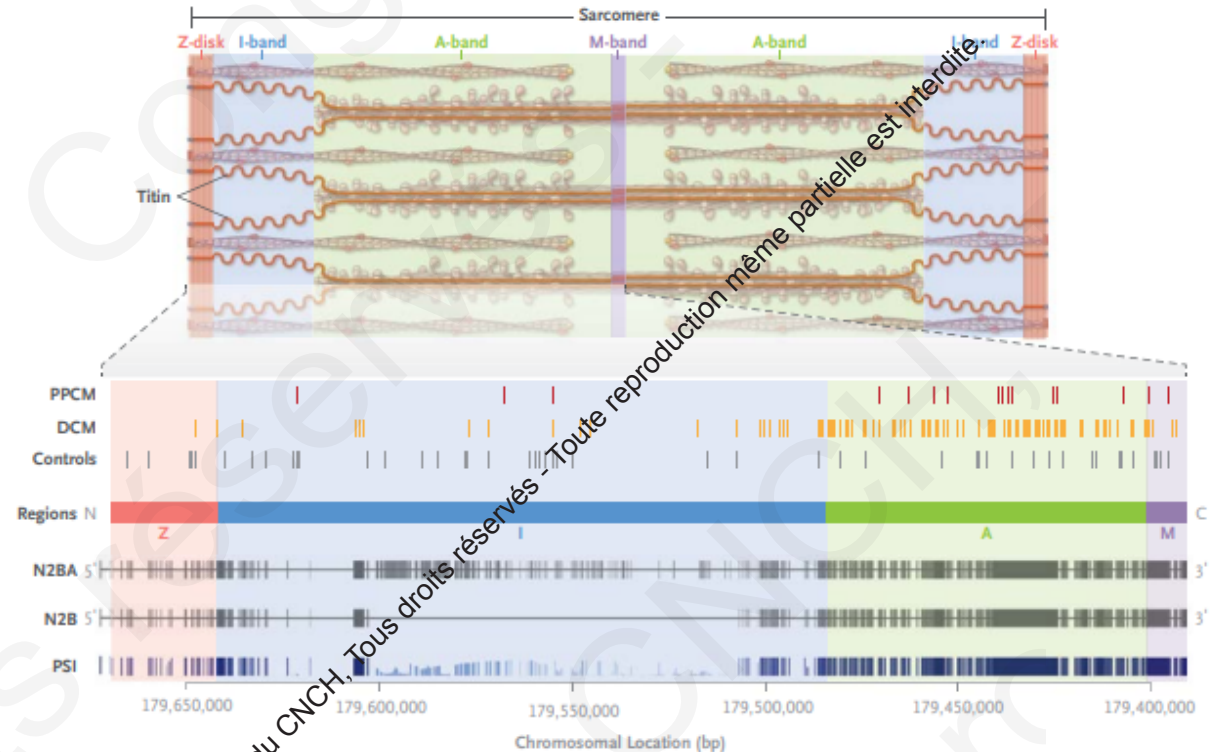


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Prédisposition génétique

- Registre CMPP : 15% histoire familiale
- Etudes génétiques : 15% ont variants tronqués dans gènes CMD; 2/3 dans TTN



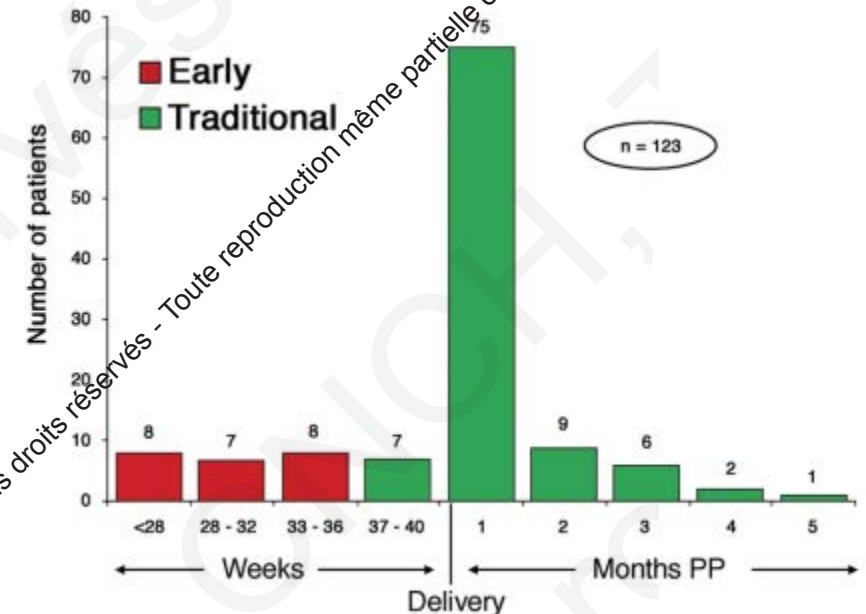
Genetic counselling and testing should be considered in patients with peripartum cardiomyopathy.

IIa

C

Mode de présentation

- Insuffisance cardiaque gauche → Choc cardiogénique
- Mort subite
- Tachycardie ventriculaire
- Complication thrombo-embolique : AVC, IDM
- 1^{er} mois post-partum typiquement

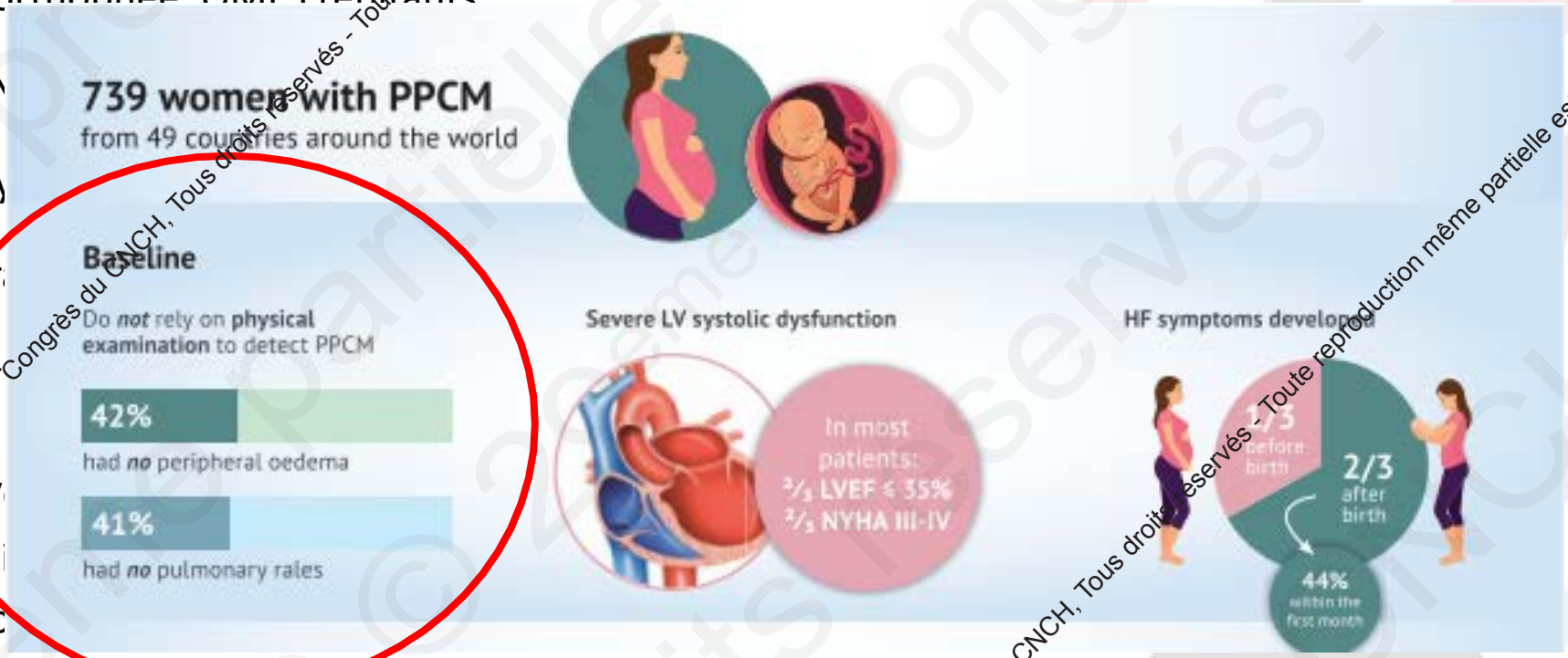


Time of Diagnosis of PPCM in 123 Patients



Diagnostic

- Clinique : orthopnée OMI crénitants
- Biologie : N
- ECG : tachy
- Radio thor
- ETT : Fôle
- FEVG < 45%
- Dilatation V
- Dilatation b
- Régurgitatic
- Hypertension pulmonaire
- Thrombus intra-cardiaque

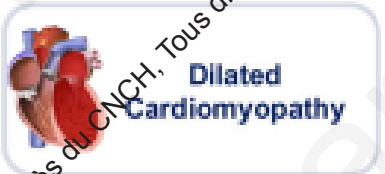


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Diagnostic d'élimination

Differential diagnosis of peripartum cardiomyopathy



**Dilated
Cardiomyopathy**

H&P, ECG, Echo, CMR



**Valvular Heart
Disease**

H&P, ECG, Echo, CMR



**Congenital Heart
Disease**

H&P, ECG, Echo, CMR



**Hypertensive
Disorders**

H&P, ECG, Echo, CMR



**Takotsubo
Cardiomyopathy**

H&P, ECG, Echo, CMR



Myocarditis

H&P, biomarkers, ECG,
Echo, CMR, EMB



**Pulmonary
Embolism**

H&P, ECG,
biomarkers, Echo, CT



**Acute
Coronary
Syndromes**

H&P, biomarkers,
Echo, CCA



HIV

H&P, biomarkers,
Echo, CMR



Traitement



Figure 1 The BOARD therapies for acute peripartum cardiomyopathy (PPCM). The treatment of PPCM, should consists of Bromocriptine, Oral heart failure therapies, Anticoagulation, vasoRelaxing agents, and Diuretics. Non-invasive ventilation should be added in patients with pulmonary congestion.

Médicaments , grossesse et allaitement

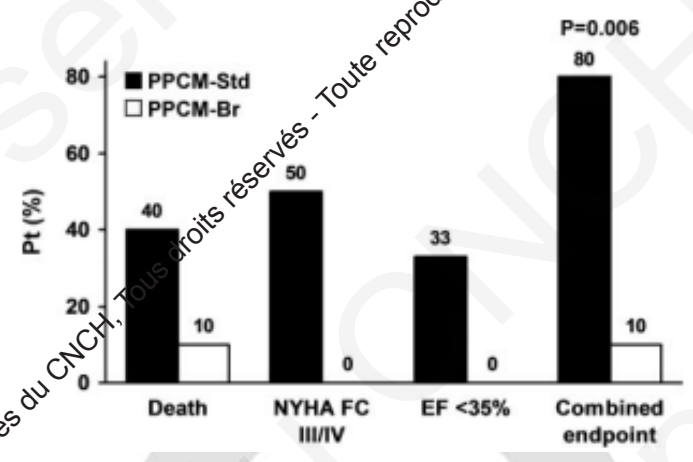
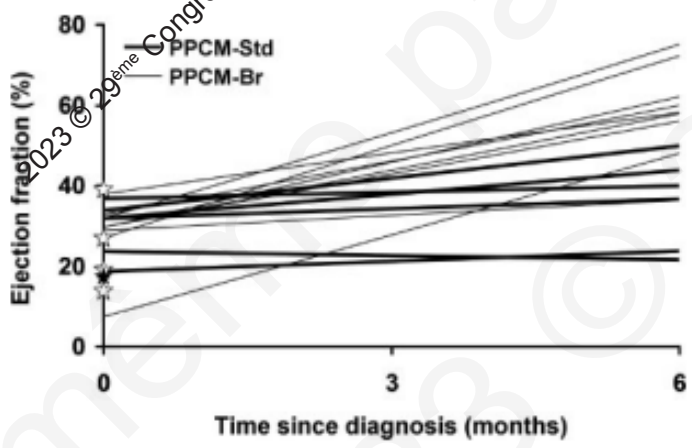
Drug	Use during pregnancy	Potential adverse effects	Use during lactation
Loop diuretics	Compatible (most experience with furosemide)	Maternal hypovolemia and hypotension, resulting in uterine hypoperfusion	Compatible (overdiuresis may decrease breast milk production)
β blockers	Compatible	Fetal bradycardia, fetal hypoglycemia	Compatible
ACE inhibitors and ARBs	Incompatible	Renal agenesis, oligohydramnios, malformations, fetal demise	Compatible (captopril, enalapril, quinapril, benazepril)
Mineralocorticoid receptor antagonists	Incompatible	Undervirilization of the fetus	Compatible
Sacubitril-valsartan	Incompatible	Same as ACE inhibitors/ARBs	Unknown (lack of data)
Hydralazine/nitrates	Compatible	Maternal hypotension, resulting in uterine hypoperfusion	Compatible
Ivabradine	Not recommended (worrying results in animal studies, no studies in humans)	Unknown	Unknown (lack of data)
Digoxin	Compatible	Low birth weight	Compatible

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Bromocriptine

Echocardiographic parameters	PPCM-Br Baseline (n=10)*	PPCM-Br 6 Months (n=9)*	PPCM-Std Baseline (n=10)*	PPCM-Std 6 Months (n=6)*	P†
LVEDD, mm	55±10	51±9	59±5	56±12	0.50
LVESD, mm	46±9	34±10	52±6	45±11	0.18
LVEF, %	27±8	58±11	27±8	36±11	0.0007



Bromocriptine

In patients with PPCM, bromocriptine treatment may be considered to stop lactation and enhance recovery (LV function).

IIIb

B

- 2,5 mg /j pendant minimum 1 semaine si CMPP non compliquée
- 2,5 mg x2 /j pendant 2 semaines puis 2,5 mg/ j pendant 6 semaines si FEVG \leq 25% et/ou choc cardiogénique (recos ESC 2018)
- + anticoagulation systématique (HNF ou HBPM)

Bromocriptine treatment should be accompanied by prophylactic (or therapeutic) anticoagulation.

IIa

C



Débat sur la bromocriptine

- Pour :

- modèle murin
- Étude pilote sur 20 femmes
- études, avec limites

→ recommandation IIb ESC 2018
→ Pas en routine, preuve supplémentaire nécessaire (AHA, CCS)

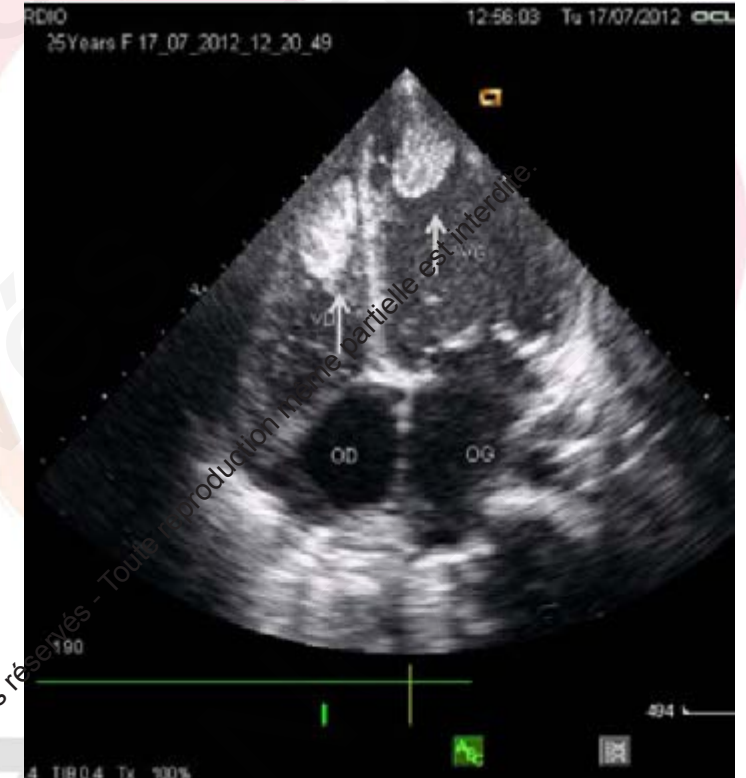
- Contre :

- complications thrombotiques :
AVC, thrombus intra-VG, IDM
- impossibilité d'allaiter :
Accès eau potable nécessaire et coût financier



Anticoagulation

- CMPP est associée à des taux plus élevés de thrombo-embolisme que les autres formes d'IC :
 - Etat hypercoagulable durant le péripartum
 - Dilatation cardiaque, dysfonction endothéliale et immobilité
 - Thrombo-embolisme complication la plus fréquente 6-7%
- Recommandations ESC :
 - si FEVG très altérée, dose prophylactique
 - en association avec bromocriptine
 - indications standard : FA, thrombus intra-VG, embolie



Yaméogo NV et al. Journal of Cardiology 2017

Anticoagulants

Drug	Use during pregnancy	Potential adverse effects	Use during lactation
Heparin (unfractionated and low molecular weight)	Compatible	Does not cross placenta	Compatible
Warfarin	Avoid if possible owing to teratogenicity	Warfarin embryopathy (skeletal deformities), intracranial hemorrhage, spontaneous abortion, stillbirth	Compatible
Direct-acting oral anticoagulants (eg, rivaroxaban, apixaban, edoxaban, dabigatran)	Incompatible	Limited data suggest possible malformations growth restriction	Currently discouraged owing to lack of data



Complications rythmiques

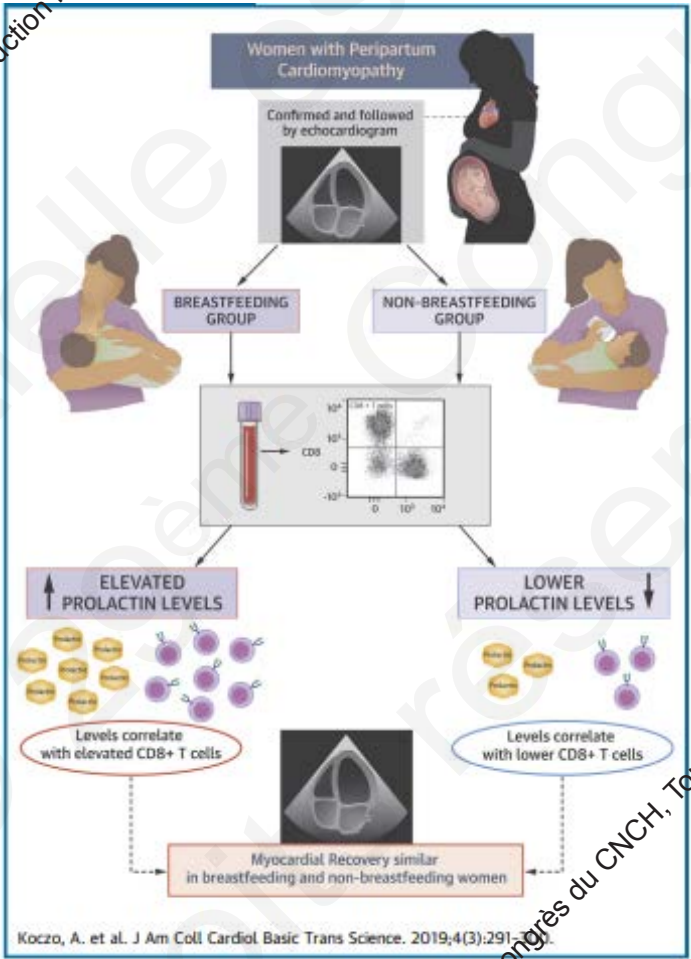
- Cardioversion et défibrillation sont considérées sûres tout au long de la grossesse
 - Sans délai en urgence
 - Monitoring fœtal peut être considéré dans situations non urgentes
- Recos AHA : considérée port de gilet défibrillateur pour CMPP avec FEVG $\leq 35\%$ comme « bridge » jusqu'à la récupération VG ou implantation DAI 3 à 6 mois plus tard (niveau de preuve B)

Assistances cardiaques et transplantation

- Inotropes, BCPIA, assistance VG ou biV, ECMO doivent être utilisés si altération sévère FEVG et choc cardiogénique
- Traitement agressif recommandé car taux récupération sont élevés
- Assistances cardiaques peuvent être utilisées comme bridge à la transplantation

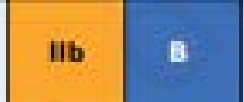
Allaitement ?

- Non :
- rôle de la prolactine dans la physiopathologie
- Travail cardiaque augmenté ?
- médicaments (mais beaucoup peuvent être utilisés)



- OUI :
- Pas de preuve d'un moins bon pronostic
- augmente survie chez enfants dans pays en voie de développement
- bénéfices cardiovasculaires maternels : ∇ diabète, cancers sein et ovaires, dépression post-partum, maladies cardiovasculaires

Due to the high metabolic demands of lactation and breastfeeding, preventing lactation may be considered in patients with severe HF.³⁴





Contraception

- AHA 2016 : si CMPP et pas récup FEVG, CI grossesse (niveau de preuve B)
- Risque thrombo-embolique majoré : éviter oestrogènes
- Implants SC Progestérone ou DIU levonorgestrel Mirena ou DIU cuivre recommandés





Mortalité

Table 3 | Evolution of reported mortality in peripartum cardiomyopathy*

Author	Sample	Mortality	Year of publication
Demakis et al ¹⁹	Single center series of 27 women with PPCM in Illinois, USA	48% at 7.6 years	1971
Burch et al ²⁰	Single center series of 34 women with PPCM in Louisiana, USA	35% at 5 years	1971
O'Connell et al ²¹	Single center series of 14 women with PPCM in Illinois, USA	43% at 6 weeks	1986
Wilin et al ⁴	Single center series of 28 women with PPCM in Tennessee, USA	18% at ~4 years	1990
Elkayam et al ³	100 women with PPCM identified by survey of ACC members	9% at 2 years	2005
Harper et al ¹¹	Women who delivered in North Carolina, USA (85 cases in 235 599 live births)	16.5% at 7 years	2012
Haghikia et al ²²	German PPCM registry (115 women with PPCM)	2% at 6 months	2013
Kolte et al ¹²	US Nationwide Inpatient Sample (34 219 women with PPCM identified)	1.3% in-hospital mortality	2014
McNamara et al ⁷⁶	Investigations in Pregnancy-Associated Cardiomyopathy cohort (100 women in North America with PPCM)	4% at 12 months	2015

*Abbreviations: ACC=American College of Cardiology; PPCM=peripartum cardiomyopathy.

Pronostic

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N (%)	All	Europe	Africa	Asia-Pacific	Middle East	P-value
In-hospital devices						
Assist device	17 (3)	12 (7)	0 (0)	5 (6)	0 (0)	<0.001
Implantable cardioverter-defibrillator	5 (0.4)	4 (2)	0 (0)	0 (0)	1 (0.7)	0.101
Cardiac resynchronization therapy	1 (0.4)	1 (0.6)	0 (0)	0 (0)	1 (0.7)	0.833
Death						
In-hospital						
All-cause	16 (2)	7 (3)	1 (0.5)	1 (0.9)	7 (4)	0.046
Heart failure	9 (56)	4 (57)	0 (0)	1 (100)	4 (57)	1.000
Sudden	4 (25)	1 (14)	1 (100)	0 (0)	2 (29)	0.484
Stroke	3 (19)	2 (29)	0 (0)	0 (0)	1 (14)	1.000
6 months						
All-cause	35 (6)	8 (4)	8 (5)	8 (8)	11 (10)	0.082
Heart failure	14 (42)	5 (63)	0 (0)	2 (33)	7 (64)	0.018
Sudden	10 (30)	1 (13)	2 (25)	4 (67)	3 (27)	0.204
Stroke	5 (15)	2 (25)	2 (25)	0 (0)	1 (9)	0.520
Presumed cardiovascular	4 (12)	0 (0)	4 (50)	0 (0)	0 (0)	0.004
Re-hospitalization at 6 months						
All-cause	58 (10)	24 (12)	18 (10)	7 (7)	9 (9)	0.667
Heart failure	30 (53)	9 (39)	11 (61)	3 (43)	7 (78)	0.220
Other cardiac	13 (23)	10 (43)	1 (6)	1 (14)	1 (11)	0.025
Vascular	5 (9)	1 (4)	4 (22)	0 (0)	0 (0)	0.191
Non-cardiovascular	11 (19)	4 (17)	3 (17)	3 (43)	1 (11)	0.441

739 women with PPCM
from 49 countries around the world

Baseline

Do *not* rely on physical examination to detect PPCM

42% had *no* peripheral oedema

41% had *no* pulmonary rales



Severe LV systolic dysfunction



In most patients:
2/3 LVEF < 35%
2/3 NYHA III-IV

HF symptoms developed



Outcome at 6 months...

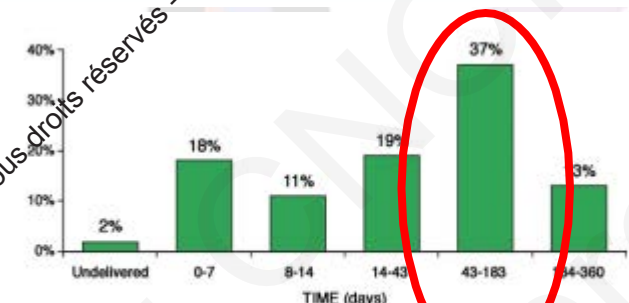
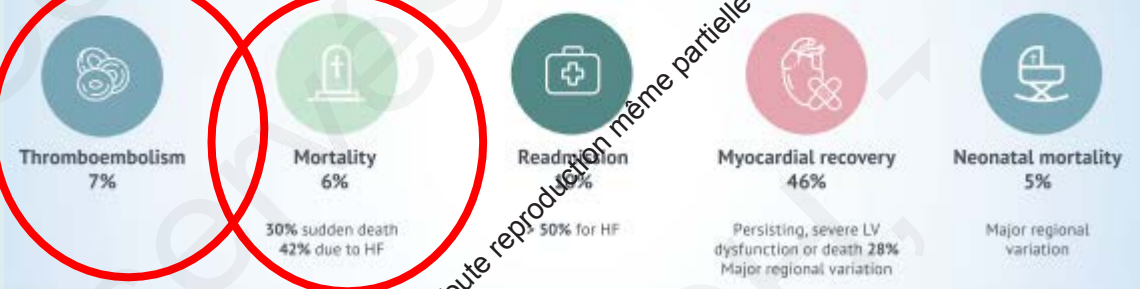
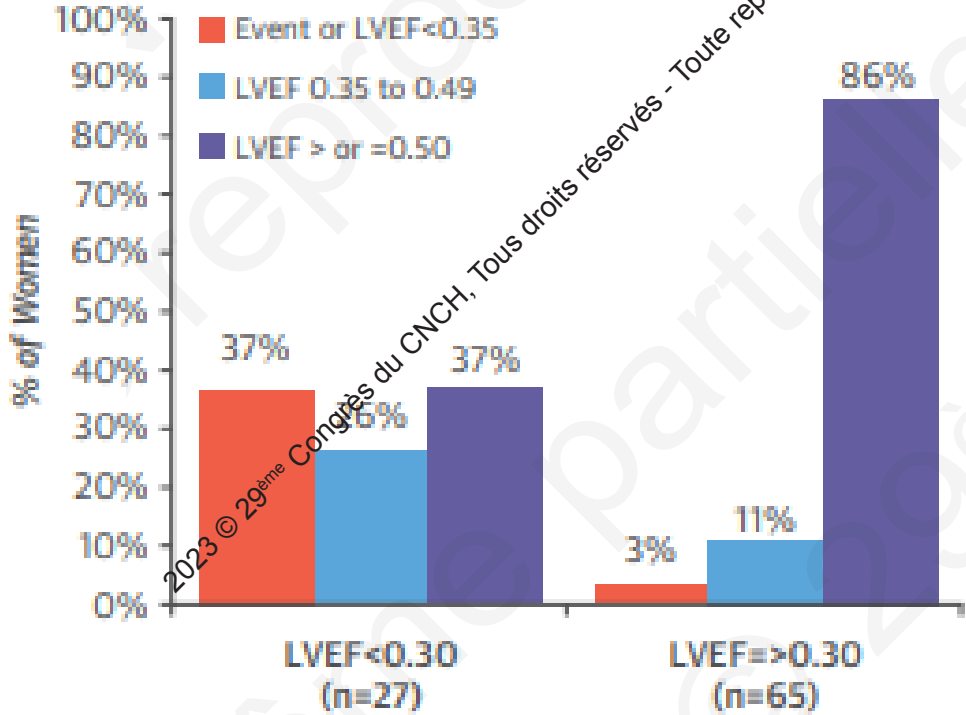


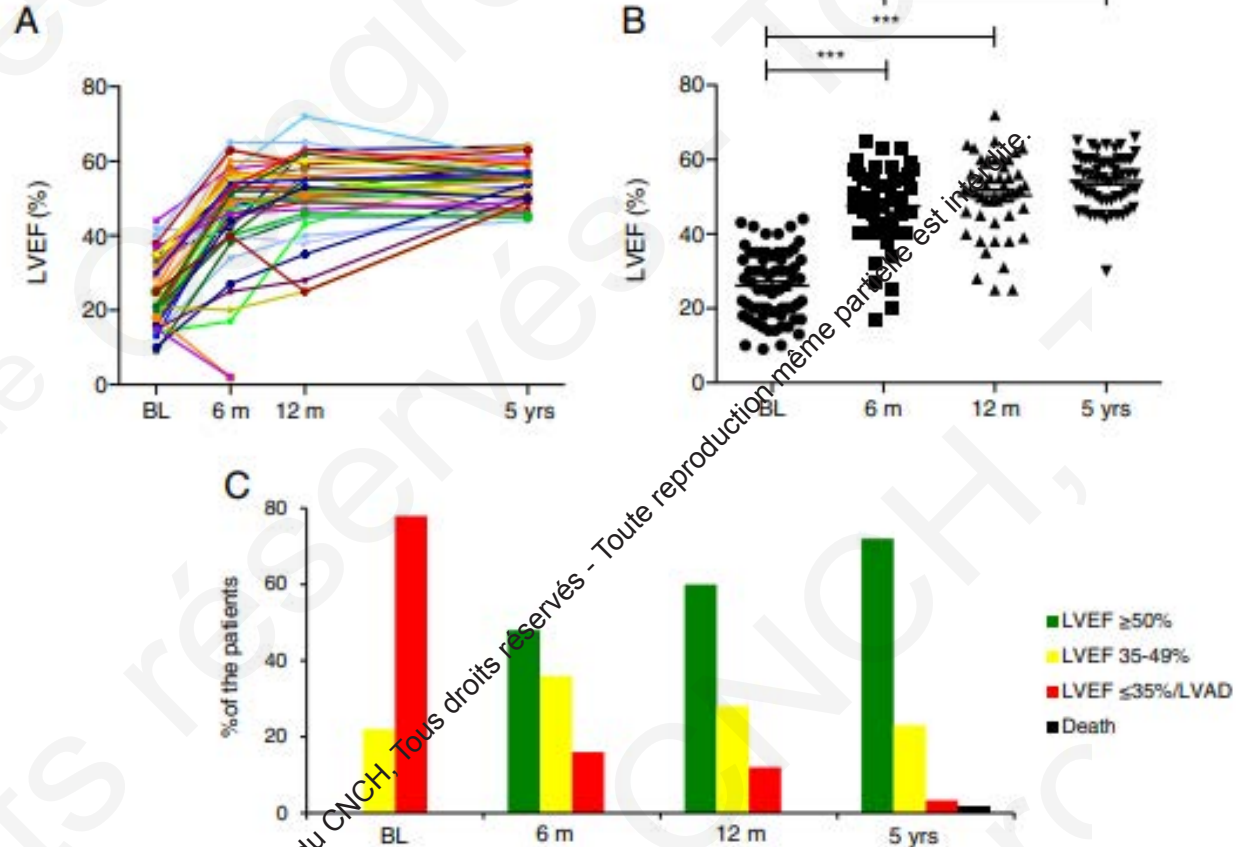
Figure 5 Timing of Mortality After Diagnosis in Patients With PPCM

Récupération FEVG

FIGURE 4 Final Status Based on the Initial LVEF



- 72% récupèrent une FEVG ≥ 50% à 1 an
- Récupération dépend de la FEVG initiale



Traitement après récupération FEVG

Long-term Outcomes

- After recovery, optimal duration of medication treatment is unknown
- In the case of stopping medications, wean gradually and observe closely
- Continue surveillance after recovery

Davis, M.B. et al. J Am Coll Cardiol. 2020;75(2):207-21.

Guérison ou rémission ?



Grossesse ultérieure ?

2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy

The Task Force for the Management of Cardiovascular Diseases during Pregnancy of the European Society of Cardiology (ESC)

Consultation pré-conceptionnelle multidisciplinaire

Table 3 Modified World Health Organization classification of maternal cardiovascular risk

	mWHO I	mWHO II	mWHO II–III	mWHO III	mWHO IV
Diagnosis (if otherwise well and uncomplicated)	Small or mild – pulmonary stenosis – patent ductus arteriosus – mitral valve prolapse Successfully repaired simple lesions (atrial or ventricular septal defect, patent ductus arteriosus, anomalous pulmonary venous drainage)	Unoperated atrial or ventricular septal defect Repaired tetralogy of Fallot Most arrhythmias (supraventricular arrhythmias) Turner syndrome without aortic ...	Mild left ventricular impairment (EF >45%) Hypertrophic cardiomyopathy Native or tissue valve disease not considered WHO I or IV (mild mitral stenosis, moderate aortic stenosis) Marfan or other HTAD syndrome without aortic ...	Moderate left ventricular impairment (EF 30–45%) Previous peripartum cardiomyopathy without any residual left ventricular impairment Mechanical valve Systemic right ventricle with good or mildly decreased ventricular function Fontan circulation.	Pulmonary arterial hypertension Severe systemic ventricular dysfunction (EF <30% or NYHA class III–IV) Previous peripartum cardiomyopathy with any residual left ventricular impairment Severe mitral stenosis
Risk	No detectable increased risk of maternal mortality and no/mild increased risk in morbidity	Small increased risk of maternal mortality or moderate increase in morbidity	Intermediate increased risk of maternal mortality or moderate to severe increase in morbidity	Significantly increased risk of maternal mortality or severe morbidity	Extremely high risk of maternal mortality or severe morbidity
Maternal cardiac event rate	2.5–5%	5.7–10.5%	10–19%	19–27%	40–100%
Counselling	Yes	Yes	Yes	Yes: expert counselling required	Yes: pregnancy contraindicated: if pregnancy occurs, termination should be discussed
Care during pregnancy	Local hospital	Local hospital	Referral hospital	Expert centre for pregnancy and cardiac disease	Expert centre for pregnancy and cardiac disease
Minimal follow-up visits during pregnancy	Once or twice	Once per trimester	Bimonthly	Monthly or bimonthly	Monthly
Location of delivery	Local hospital	Local hospital	Referral hospital	Expert centre for pregnancy and cardiac disease	Expert centre for pregnancy and cardiac disease

RESEARCH ARTICLE

Open Access



Maternal and fetal prognosis of subsequent pregnancy in black African women with peripartum cardiomyopathy

48,3% mortalité !

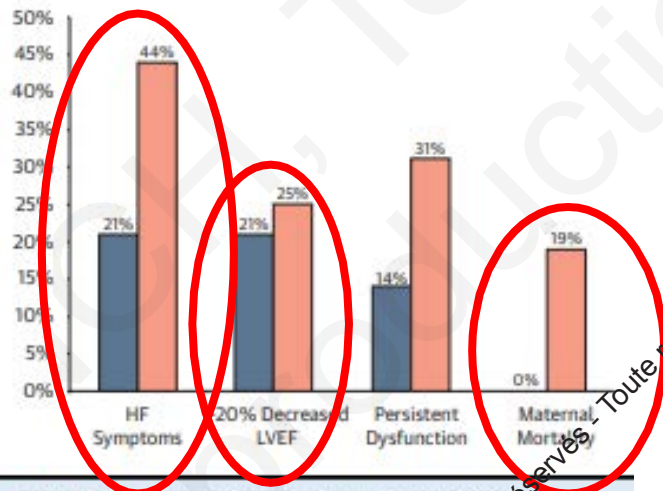


FIGURE 2 Maternal Complications Associated With Subsequent Pregnancy in 44 Patients With a History of Peripartum Cardiomyopathy

Blue bars are group 1, women with left ventricular ejection fraction (LVEF) ≥ 50% before subsequent pregnancy. Salmon bars are group 2, women with LVEF < 50% before subsequent pregnancy. HF = heart failure. Reprinted with permission from Elkayam et al. (10).

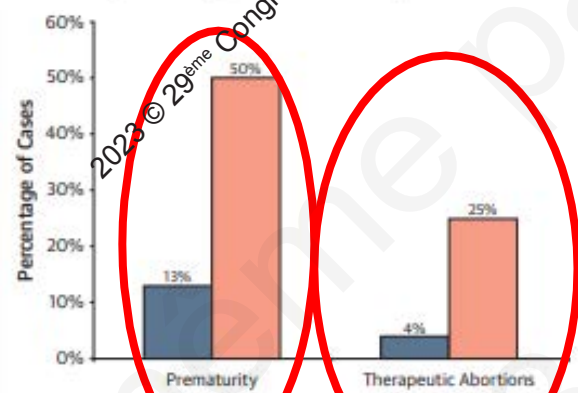


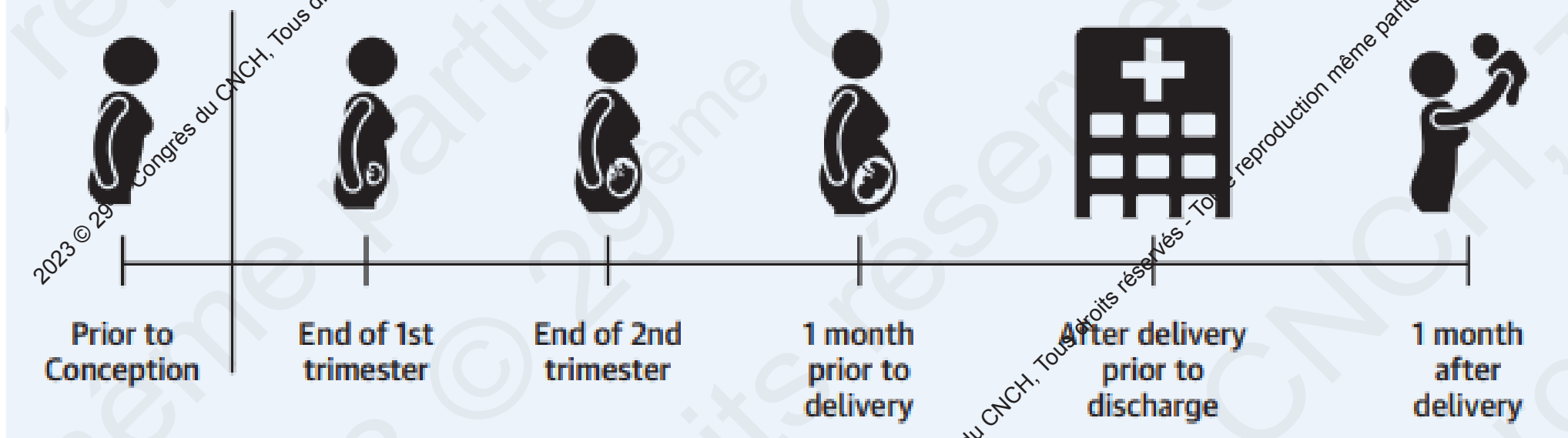
FIGURE 4 Fetal Complications Associated With Subsequent Pregnancy in Patients With Peripartum Cardiomyopathy

Table 1 Clinical presentation and outcome of subsequent pregnancies (SSPs) in patients entering SSP with persistently reduced (LVEF < 50%) or fully recovered left ventricular function (LVEF ≥ 50%)

	LVEF < 50% (n = 16)	LVEF ≥ 50% (n = 18)	P-value
Age at index PPCM, years (mean ± SD)	27 ± 7 (16/16)	29 ± 5 (18/18)	0.50
Age at SSP, years (mean ± SD)	30 ± 7 (16/16)	31 ± 5 (17/18)	0.59
Gravida SSP, median (range)	3 (2–5) (16/16)	3 (2–5) (17/18)	0.60
Parity SSP, median (range)	3 (2–6) (16/16)	2.5 (1–4) (18/18)	0.04
Twin pregnancy	0% (0/16)	11% (2/18)	0.49
Caesarean section	40% (6/15)	24% (4/17)	0.45
Abortion, miscarriage, still birth	7% (1/15)	17% (3/18)	0.60
Pregnancy-induced hypertensive disorders	6% (1/16)	5.5% (1/18)	1.00
African origin	75% (12/16)	44% (8/18)	0.09
LVEF (%) at diagnosis of index PPCM (mean ± SD)	31 ± 7 (16/16)	32 ± 8 (18/18)	0.68
LVEF (%) before SSP (mean ± SD)	42 ± 6 (16/16)	58 ± 5 (18/18)	<0.0001
LVEF (%) after delivery of SSP (mean ± SD)	43 ± 11 (15/16)	51 ± 13 (17/18)	0.022
LVEF (%) SSP follow-up (mean ± SD)	43 ± 15 (12/16)	50 ± 13 (17/18)	0.24
Full recovery from PPCM after SSP	31% (5/16)	56% (10/17)	0.28
Death	25% (4/16)	0% (0/18)	0.04

Surveillance en cas de nouvelle grossesse

Clinical assessment, echocardiogram, and BNP should be performed at regular intervals and with any concerning symptoms:





Conclusion 1

- Rare mais y penser devant une dyspnée inhabituelle en péri-partum !
- CMPP définie par FEVG < 45%, diagnostic d'exclusion; NT-proBNP utile
- Traitement médicamenteux :
 - IEC/ARA2/ARM contre-indiqués durant grossesse mais utilisables après accouchement
 - Considérer anticoagulation si FEVG \leq 35%
 - Bromocriptine est une option thérapeutique prometteuse
- Allaitement souvent possible



Conclusion 2

- Penser à la contraception, santé mentale
- Pronostic s'est amélioré durant dernières décennies
 - 60-80% récupération FEVG
 - FEVG lors du diagnostic est fort élément pronostique de la récupération
- Information / surveillance cruciale en cas de nouvelle grossesse
 - Risque récurrence élevé lors des grossesses ultérieures, surtout si pas de récupération FEVG.



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