# PCI Strategy in Heart Failure

MacKay Memorial Hospital
Taiwan
Chun-Wei Lee

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Multiple conditions

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**CAD: ACS/CCS; MVD/LM/Bifurcation/CTO**

**Other: Devices(IVUS, OCT, FFR…), Drugs,**

**Hemodynamic (arrhythmia, IABP, PCPS…)**

# Due to the complex situation

This is a BIG question...

Most condition lack of RCT

Multiple conditions

Indirect evidence & observational data

HF: Acute HF/Chronic HF; HFpEF/HFrEF

Principle: Similar with general condition

CAD: ACS/CCS; MVD/LVG/Revascularization/CTO

Due to the complex situation

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JACC STATE-OF-THE-ART REVIEW

# Impact of Percutaneous Coronary Intervention on Outcomes in Patients With Heart Failure

## JACC State-of-the-Art Review

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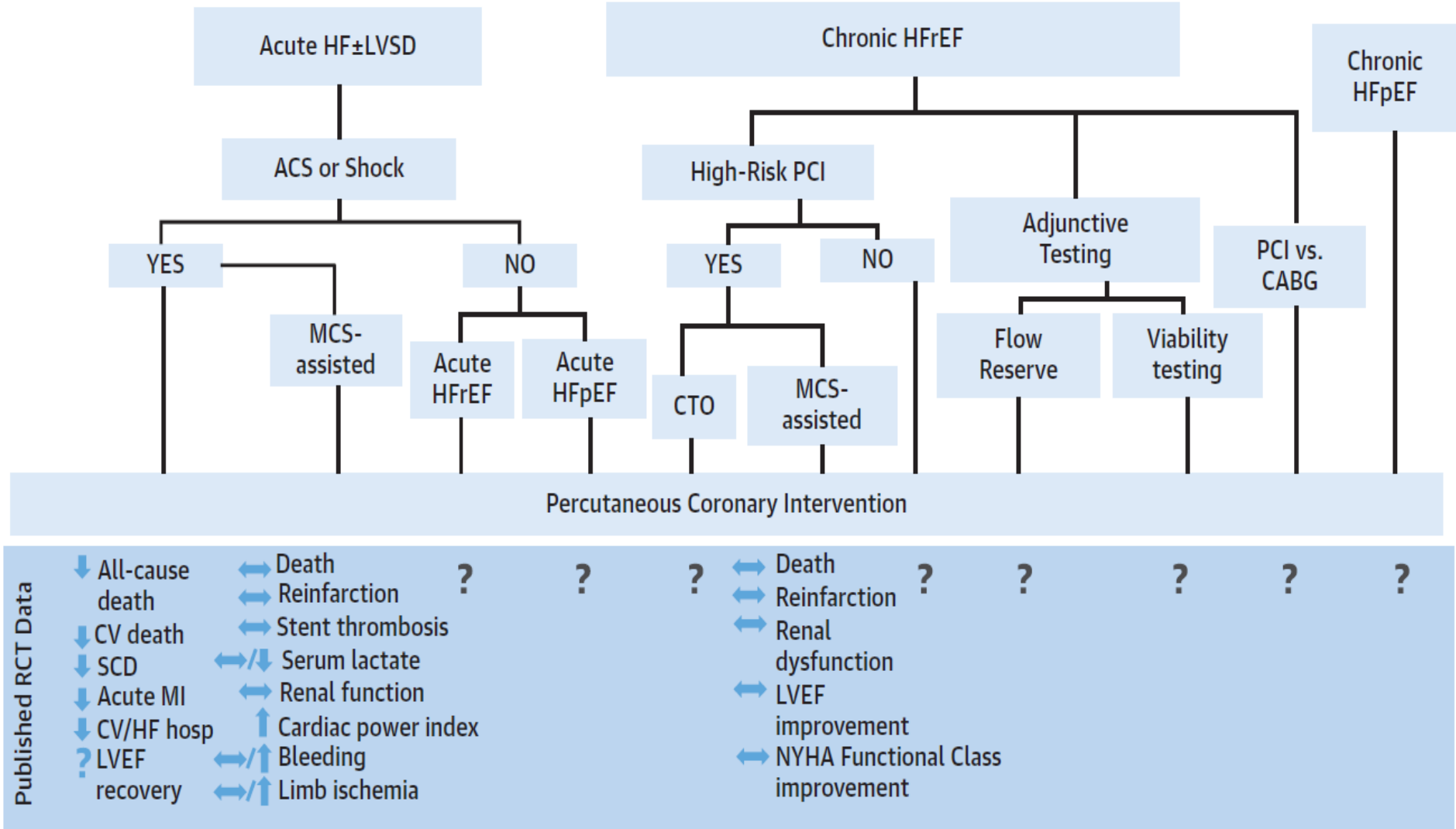
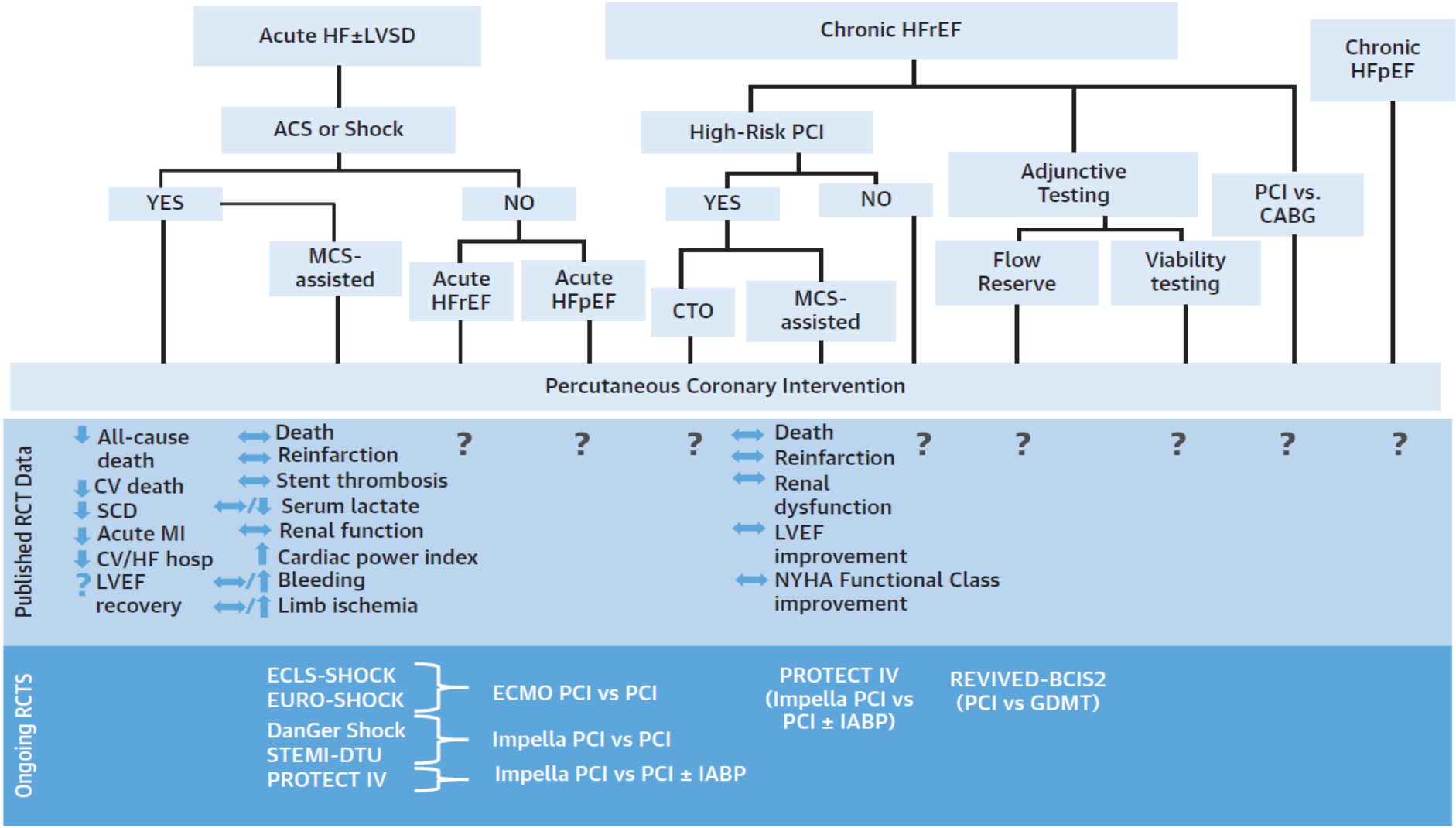
# CAD

1. Highly prevalent in pts with HF (nearly 2/3)
2. Remains the most common cause of HF in the US (60-70% of cases)


Acute HF±LVSD
ACS or Shock
YES
MCS-assisted
NO
Acute HFrEF
Acute HFpEF
Chronic HFrEF
High-Risk PCI
YES
CTO
MCS-assisted
NO
Adjunctive Testing
Flow Reserve
Viability testing
PCI vs. CABG
Chronic HFpEF
Percutaneous Coronary Intervention
Published RCT Data
All-cause death
CV death
SCD
Acute MI
CV/HF hosp
? LVEF recovery
Death
Reinfarction
Stent thrombosis
Serum lactate
Renal function
Cardiac power index
Bleeding
Limb ischemia
? ? ?
Death
Reinfarction
Renal dysfunction
LVEF improvement
NYHA Functional Class improvement
? ? ? ? ?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Limb ischemia
Death
Reinfarction
Renal dysfunction
LVEF improvement
NYHA Functional Class improvement
Ongoing RCTS
ECLS-SHOCK
EURO-SHOCK
ECMO PCI vs PCI
DanGer Shock
STEMI-DTU
Impella PCI vs PCI
PROTECT IV
Impella PCI vs PCI ± IABP
PROTECT IV (Impella PCI vs PCI ± IABP)
REVIVED-BCIS2 (PCI vs GDMT)

# ACS

# ACS + HF

1. **Primary PCI is strongly recommended in STEMI** regardless of BP or HF subtype

2. Consider **total revasculization** especially for those **HF etiology is CAD related**

3. PCI timing depend on patients condition (take hemodynamic condition into concern)

→ Index procedure or index admission (esp Non- culprit lesion)

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# CCS

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2. Those with ischemic cardiomyopathy may **benefit more from total revasculization.**

3. **Function guide** and **imagine guide** may help to achieve a better outcome

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# FFR

- No RCT has studied

FFR-guided PCI vs angiographically guided PCI

FFR-guided PCI vs medical therapy

in patients with HFrEF or HFpEF

# FFR

- Traditionally defined as: (Pd-Pv)/(Pa-Pv), during maximal hyperemia; however, this has been **simplified to Pd/Pa in clinical practice**
- Reduced LVEF theoretically may influence the FFR value across a stenosis: HFrEF have a increased Pv compared with patients with preserved LVEF.
- However, the influence on FFR will be **limited unless the Pv is very high**, in which case an **overestimation** of FFR might occur.

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- LVEF ≤40% was present in <10% of the study population
- Substudy:

50-90% stenosis: Similar FFR values

91-99% stenosis: Pts with reduced LVEF had higher mean FFR across lesions compared with those with preserved LVEF (p=0.02).

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# CTO

- Currently NO RCT investigating revascularization of CTOs compared with OMT specifically in HF pts.
- Successful CTO recanalization in observational study:

1. The more ischemic zone, the more benefit
2. Improve outcomes in pts with LVSD
3. Reduced all cause mortality
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# Take Home Message

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2. Lack of RCT evidence, due to the complexity of the situation(acute/chronic, hemodynamic, HF type).
3. Current evidence mostly based on observational studies and expert opinions.
4. PCI principle is similar with general condition.
5. Revasculization is suggested for ACS + HF despite HF subtype, especially with HF etiology is CAD.

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| Angiographic Presentation | No Symptoms | Symptoms (0 AA Drugs) | Symptoms (1 AA Drug) | Symptoms (≥2 AA Drugs) |
|---|---|---|---|---|
| 1-vessel disease | M | M | M | A |
| 2-vessel disease (no proximal LAD) | M | M | A | A |
| 2-vessel disease with proximal LAD (regardless of diabetes) | M | A | A | A |
| 3-vessel disease of low complexity (i.e., SYNTAX ≤22) and no diabetes | M | A | A | A |
| 3-vessel disease of low complexity (i.e., SYNTAX ≤22) and diabetes | M | M | A | A |
| 3-vessel disease of high complexity (i.e., SYNTAX >22) (regardless of diabetes) | M | M | M | M |

| Heart Failure Type | Existing RCTs Examining This Specific HF Population | Upcoming RCTs Examining This Specific HF Population |
|---|---|---|
| Acute HF (ACS + cardiogenic shock) (MCS-assisted PCI vs. PCI) | Thele et al (Tandem Heart PCI vs. IABP PCI) (33)<br>IABP SHOCK II (IABP-PCI vs. PCI) (29)<br>ISAR-SHOCK (Impella 2.5 PCI vs. IABP PCI) (24)<br>IMPRESS in Severe Shock (Impella CP PCI vs. IABP PCI) (32) | DanGer Shock (Impella CP PCI vs. PCI) (39)<br>ECLS-SHOCK (ECMO PCI vs. PCI) (40)<br>EURO-SHOCK (PCI ECMO vs. PCI) (41) |
| Acute HF (ACS without cardiogenic shock) (MCS-assisted PCI vs. PCI) | CRISP-AMI (IABP PCI vs. PCI) (30) | STEMI-DTU (Impella CP PCI vs. PCI) (NCT03947619)<br>PROTECT IV (PCI Impella CP vs. PCI ± IABP) (NCT04763200) |
| Acute HFrEF (non-ACS) (PCI vs. medical therapy) | – | – |
| Acute HFpEF (non-ACS) (PCI vs. medical therapy) | – | – |

| Heart Failure Type | Existing RCTs Examining This Specific HF Population | Upcoming RCTs Examining This Specific HF Population |
|---|---|---|
| Chronic HFrEF<br>(PCI vs. medical therapy)<br>(PCI vs. CABG) | –<br>– | REVIVED-BCIS2 (PCI vs. medical therapy) (66)<br>– |
| Chronic HFrEF<br>(CTO PCI vs. medical therapy) | – | – |
| Chronic HFrEF<br>(MCS-assisted PCI vs. PCI) | BCIS-1 (IABP-PCI vs. PCI) (69)<br>PROTECT II (Impella 2.5 PCI vs. IABP PCI) (23) | PROTECT IV (PCI Impella CP vs. PCI ± IABP) (NCT04763200) |
| Chronic HFrEF<br>(FFR PCI vs. angio-guided PCI)<br>(FFR PCI vs. medical therapy) | – | – |
| Chronic HFrEF<br>(Viability-guided PCI vs. medical therapy)<br>(Viability-guided PCI vs. angio-guided PCI) | – | – |
| Chronic HFpEF (PCI vs. medical therapy) | – | – |