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LUCAS→CCL→ECMO→PCI

Current Regions EMS Protocol (Inclusion Criteria)

If an arrest is felt to be of card etiol and the:

- Initial rhythm is V fib/V tach
- Pt is between ages of 18-75
- Pt is not DNR
- Pt fits into LUCAS
- Transport time under 30 min with time from 911 to CCL < 90 min

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Current Regions EMS Protocol (Exclusion Criteria)

Pt is not brought to the U of M if:

- Family/caregiver declines
- Contraindication to mechanical CPR
- Known to be pregnant
- NH resident
- Known terminal illness

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Current Regions EMS Protocol (under discussion)

Then:

- After 3 shocks
- And 300mg amiodorone
- Try and keep total scene time to under 10-12 minutes
- Transport to the U of M

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U of M ECMO in OHCA Policy (Exclusion Criteria)

Pt not candidate for ECM0 if:

- $ETCO_2$ < 10mm Hg
- PaO_2 < 50mm Hg or SaO_2 < 85%
- Lactate > 18

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Coronary Artery Disease in Patients With Out-of-Hospital Refractory Ventricular Fibrillation Cardiac Arrest

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ABSTRACT

BACKGROUND The prevalence of coronary artery disease (CAD) among patients with refractory out-of-hospital (OH) ventricular fibrillation (VF)/ventricular tachycardia (VT) cardiac arrest is unknown.

OBJECTIVES The goal of this study was to describe the prevalence and complexity of CAD and report survival to hospital discharge in patients experiencing refractory VF/VT cardiac arrest treated with a novel protocol of early transport to a cardiac catheterization laboratory (CCL) for extracorporeal life support (ECLS) and revascularization.

METHODS Between December 1, 2015, and December 1, 2016, consecutive adult patients with refractory OH VF/VT cardiac arrest requiring ongoing cardiopulmonary resuscitation were transported by emergency medical services to the CCL. ECLS, coronary angiography, and percutaneous coronary intervention were performed, as appropriate. Functionally favorable survival to hospital discharge (Cerebral Performance Category 1 or 2) was determined. Outcomes in a historical comparison group were also evaluated.

RESULTS Sixty-two (86%) of 72 transported patients met emergency medical services transport criteria. Fifty-five (89%) of the 62 patients met criteria for continuing resuscitation on CCL arrival; 5 had return of spontaneous circulation, 50 received ECLS, and all 55 received coronary angiography. Forty-six (84%) of 55 patients had significant CAD, 35 (64%) of 55 had acute thrombotic lesions, and 46 (84%) of 55 had percutaneous coronary intervention with 2.7 ± 2.0 stents deployed per patient. The mean SYNTAX score was 29.4 ± 13.9. Twenty-six (42%) of 62 patients were discharged alive with Cerebral Performance Category 1 or 2 versus 26 (15.3%) of 170 in the historical comparison group (odds ratio: 4.0; 95% confidence interval: 2.08 to 7.7; $p < 0.0001$).

CONCLUSIONS Complex but treatable CAD was prevalent in patients with refractory OH VF/VT cardiac arrest who also met criteria for continuing resuscitation in the CCL. A systems approach using ECLS and reperfusion seemed to improve functionally favorable survival. (J Am Coll Cardiol 2017;70:1109–17) © 2017 by the American College of Cardiology Foundation.

72 Patients that presented with VF were transported by EMS after 3 unsuccessful DC shocks and amiodarone administration.

62 Patients Transported Met Early Transport Protocol Criteria

10 Excluded Not Meeting Early Transport Inclusion Criteria (**Protocol Violations**)
- 3 – Manual CPR Only
  - 1 – Pectus Excavatum
  - 2 – Morbid Obesity
- 3 – Time from 911 to CCL > 90 minutes
- 1 – Age = 80 years; terminal cancer
- 1 - Stage IV renal cell Ca (59 yo man)
- 2 - DNR discovered on arrival

55 patients received full CCL treatment:
- 5 patients had ROSC before arrival
- 50 patients were placed on ECLS

7 were declared dead because of failure to meet the ECLS initiation criteria:
- 1 - ETCO2 on arrival < 10mm Hg
- 3 - PaO2 < 50 mmHg or O2 Sat < 85%
- 3 - Lactate > 18

47 patients were admitted to the CICU.

8 were declared dead after ECLS was initiated due to inability to reestablish organized rhythm after 90 minutes.

Hospital discharge and 3 Months Outcomes

Denominator:	**All transferred**	**Within Protocol**	**Admitted**
Survival to DC:	28/72 (38%)	28/62 (45 %)	28/47 (60%)
Survival to DC with CPC 1 or 2:	26/72 (36%)	26/62 (42%)	26/47 (55%)
3- month Survival with CPC 1:	26/72 (36%)	26/62 (42%)	26/47 (55%)

Yannopoulos, et al, JACC, 2017

Results

- Avg time from 911 to CCL was 58 minutes.
- Avg time from arrival to CCL to ECMO was 6.1 minutes.
- Avg time from ECMO to balloon inflation was 60 minutes.

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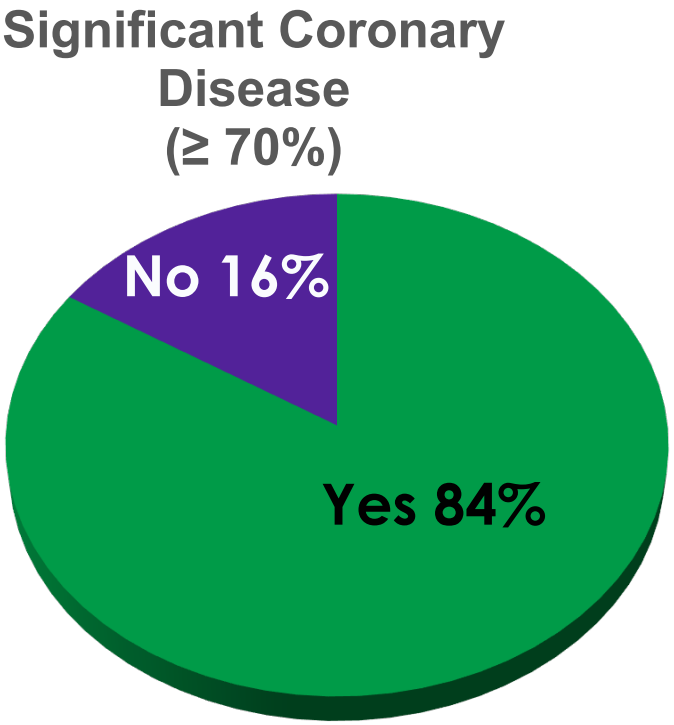

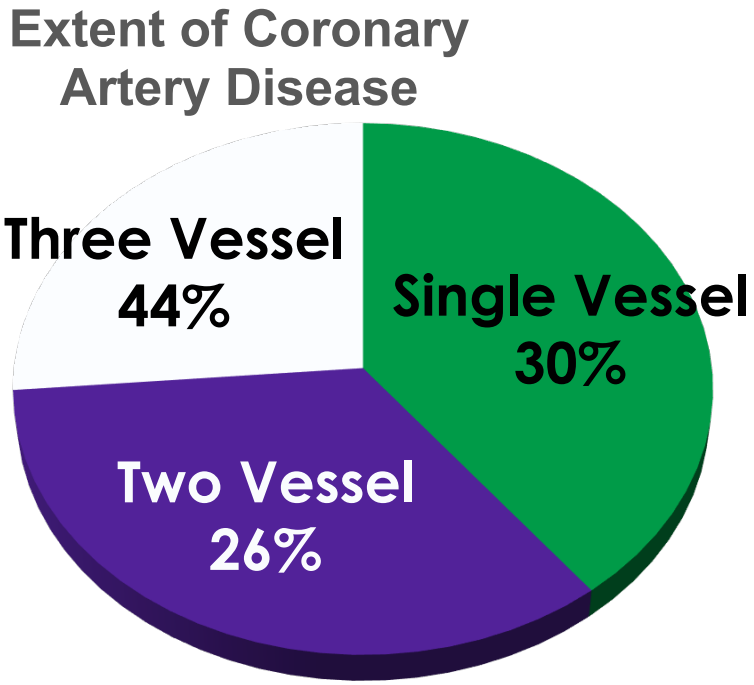

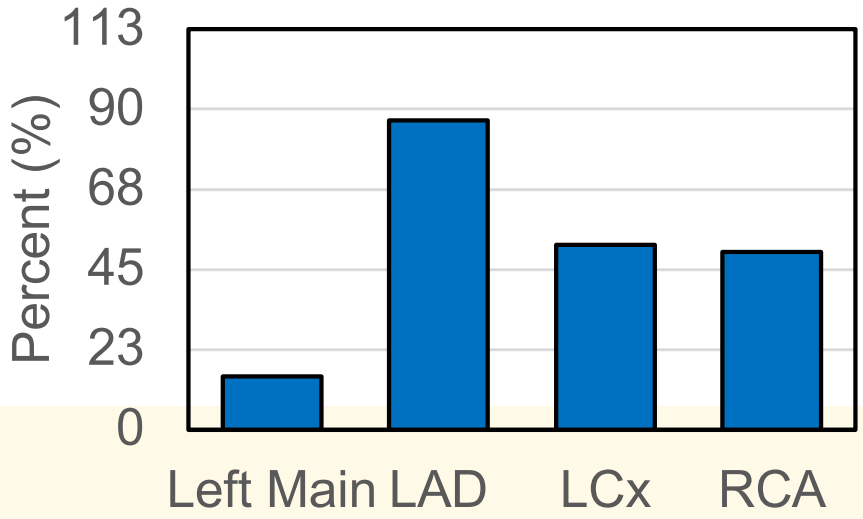

Lesion Complexity	Value
Prior Coronary Artery Bypass Grafts	5 (9%)
Chronic Total Occlusion Present	18 (33%)
Patients with Acute Thrombotic Lesions	35 (64%)

Yannopoulos, et al, JACC, 2017

Results

- 91% CA was 1st evidence of CAD.
- No pts had ischemic sx's PTA.
- Avg age of survivors was 59.

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Results

- All pts had severe left ventricular compromise in the first 48 hours which recovered over 3-5 days.
- De-canualation occurred at day 3 on avg.

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Results

- Best predictors of survival:
  - –ETCO2
  - –Lactate
  - –Gasping
  - –Time
  - –Episode(s) of ROSC prior to ECLS

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Summary

We have currently treated 110 pts inside of the protocol and 148 total inside and outside of protocol. The results are holding in the 40-45% range.

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CONCLUSION

If these preliminary findings hold up, there should be a paradigm shift in the tx of OHCA.

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FACT

You can’t make chicken salad out of chicken poop,

But you can make chicken poop out of chicken salad.

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THE FUTURE

We are planning expanding the protocol to include:

- A new ambulance design.
- A new staffing model.
- A new billing model.
- Field ECMO.
- ? Field PCI.

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Thank You.

Any Questions?

(Remember: a good question is one that I know the answer to.)

(A great question is one that I have a slide for.)

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