Journal Club Eastern Virginia Medical School
Therapy Article

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CITATION: Lee YH **Refractory ventricular fibrillation treated with esmolol.** Resuscitation. 2016 Oct;107:150-5.

I. **WHAT IS BEING STUDIED?**	BB IN CASES OF REFRACTORY VFIB
1. Study Objective	To compare the clinical outcomes in the RVF patients including ROSC, and survival with good neurological outcome between the esmolol and the conventional group.
2. Study Design	Retrospective pre-post study at a single center in South Korea.
3. Inclusion Criteria	1 – age > 18 2 – OHCA w initial Vfib or vtach 3 – RVF (defined as VF resistant to 3 or more defib, 3 epi, 300mg amio, and no rosc after 10 min
4. Exclusion Criteria	1 – severe head trauma or active bleeding 2 – sepsis 3 – VF after initial asystole or pea 4 – Terminal malignancy 5 – hx of severe neuro deficits 6 – BB prior to arrest
5. Interventions Compared	Compared patients with RVF from OHCA who did (post-phase) and who did not (pre-phase) receive esmolol -500ug/kg f/b 0-100 ug/kg/min -retrospectively reviewed initial rhythm, number of defib attemtps, kinds and dosage of drugs, duration of resuscitation, and clinical outcomes
6. Outcomes Evaluated	1 – sustained rosc (>20min of spont circulation without recurrence of arrest) 2- survival to ICU admit, survival to hospital dc, and survivial with favourable neuroogic outcomes at 30d, 3mos, and 6mos

II. **Are the results of the study valid**	
1. Was the assignment of patients randomized?	NO. This was a before and after study.
2. Was randomization concealed (blinded)?	NO
3. Were patients analyzed in the groups to which they were randomized?	Again, no. they were analyzed by time period (pre phase vs post phase) and intervention (esmolol vs standard acls) but there was no randomization
4. Were patients in the treatment and control groups similar with respect to known prognostic factors?	This is a little hairy. Yes if you look at the esmolol vs non-esmolol groups you see that a lot of the characteristics were pretty similar overall However, looking at the characteristics between those with sustained and non-sustained ROSC you see that those with non-sustained are older, more unwitnesed, longer CPR time, and still about the same number got esmolol (7 vs 9)
III. **Did experimental and control groups retain a similar prognosis after the study started (answer the questions posed below)?**	
1. Were patients aware of group allocation?	No – retrospective analysis and they were in cardiac arrest.
2. Were clinicians aware of group allocation?	Yes. Can lead to bias by perceiving a benefit that may not be there
3. Were outcome assessors aware of group allocation?	Yes. No mention of blinding outcome assessors. This could have been done. Two independent assessors would have been able to reduce observation bias.
4. Was follow-up complete?	Uncertain. Authors state that all patients were follower until discharge or death but do not report actual follow-up. Reported certain number of deaths and 6/9 of the esmolol group died within 5 days but did not mention the other 3 and what their outcomes were
IV. What were the results? Answer the questions posed below	

1. How large was the treatment effect? (Difference between treatment and control group).	On primary outcome temporary ROSC – 81% vs 24% (p=0.001), ; On sustained ROSC 56% vs 16% (p=0.0007) no CI's reported. 56 vs 16% survival to ICU(p=0.007) no stat sig differences in other secondary outcomes
2. What was the estimated treatment effect at a 95% confidence interval? (Precision)	No reporting of CI's. Small numbers likely to represent wide CI's
V. **Will the results help me in caring for my patients? (Applicable?)**	
1. Were the study patients similar to my patient?	Probably Although this study was done in Korea at a single center some of the characteristics of this center do apply to our patient population 80K pt/yr ED tertiary referral center all pts managed by resuscitation team including EP, resident, technicians ACLS based on 2015 AHA guidelines
2. Were all clinically important outcomes considered?	I think so. Really the key I think is survival with good neurologic outcome. In all respects this is the outcome that we want to see improve.
3. Are the likely treatment benefits worth the potential harm and costs?	Hard to say. On the one hand it does look like there is a clear benefit in providing temporary or even permanent ROSC. However, the secondary outcomes, which I personally think are what are more clinically relevant, seem not to show much benefit if any. I've asked Rali if she can get back to me on the cost of esmolol at our institutions but from looking online it seems like it is pretty expensive. I think that you have to weight the costs and benefits and I don't really see much of a use of it honestly

Study Limitations

1. Very small study so insufficiently powered.

2. Retrospective data vulnerable to omission of data and significant bias.
3. Follow-up was ambiguous.
4. Data assessors could have been blinded but were not predisposing to observation bias
5. Id like to know a little more about the characteristics of the people who had good neurologic outcomes. Again youd have to have better follow up but what were these people treated with, and what were they typical characteristics of their arrest

Given that it is a retrospective pre-post study it looks at whether the participants in an intervention group improve or become worse off with the intervention. One of the limitations is that the study attributes the improvement to said intervention. Also, there is selection bias associated with most retrospective studies

Clinical Bottom Line:

I think this study does a good job at attempting to tackle this difficult disease process. Overall, I think the study does a good job of collecting the data and even analyzing it to an extent. It will take more studies to show a greater benefit particularly with good neurologic outcomes before it becomes adopted in mainstream practice