Cost Analysis of Intra-Aortic Balloon Pump Support Device In Patients With ST Elevation Myocardial Infarction Complicated By Cardiogenic Shock

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Introduction

- Intra-aortic balloon pumps (IABP) are the most commonly used mechanical support devices in patients with cardiogenic shock after a ST segment elevation myocardial infarction (STEMI) worldwide (1).
- Their use has been scrutinized after the IABP-SHOCK II trial in 2012 failed to demonstrate improvement in all-cause-mortality in patients treated with IABP versus medical therapy.
- The European Society of Cardiology’s STEMI guidelines update in 2017 recommended against routine use of IABP in patients with STEMI and cardiogenic shock (3). Recent ACCF/AHA guidelines have downgraded their level of recommendation from a Level I to IIb.

Methods

- Retrospective analysis through chart review from January 2016 to September 2019.
- Encounters with ICD 10 codes for cardiogenic shock, acute myocardial infarction and STEMI were included in the analysis.
- Cardiogenic shock (systolic blood pressure <90 and diastolic <60) was confirmed in addition to STEMI and presence or absence of a mechanical support device.

Results

- 802 cases from initial ICD10 search; 661 excluded:
  - CS criteria not met
  - IABP placed for coronary perfusion
  - NSTEMI, not STEMI
  - Shock from alternate etiology (sepsis)
  - Transferred to other facility
- N=141
- 50 Medical therapy, no IABP
- 91 IABP

The observed/expected (O/E) cost was also higher in the IABP group than the medical therapy group; $52,271.44 versus $37,907 (p-value=.023). The observed/expected (O/E) cost was also higher in the IABP group with an O/E ratio of 1.54 vs 1.31.

Discussion

- The average total cost of hospital stay per patient was $14,364 higher in the IABP group than the medical therapy group; $52,271.44 versus $37,907 (p-value=.023). The observed/expected (O/E) cost was also higher in the IABP group with an O/E ratio of 1.54 vs 1.31.
- In our study, the average observed mortality was higher in the medical therapy group 44% vs 35% in IABP. However when adjusted for the expected mortality, the O/E mortality was comparable in the subgroups; 2.38 medical therapy vs 2.31 IABP. These findings are consistent with prior studies that found no mortality benefit in the use of IABP in CS and STEMI.
- Other observations included the use of IABP for many other indications other than cardiogenic shock at our institution.

Conclusion

Our data showed that an additional $14,364.44 in total hospital cost was observed in patients treated with IABP versus medical therapy. The observed/expected mortalities were comparable in the two groups, consistent with prior studies suggesting no mortality benefit when IABPs were used. Our study suggests that IABP may not be cost effective in comparison to medical therapy in patients with STEMI complicated by cardiogenic shock.

References


Graph 1. Observed and Expected Costs

As cardiogenic shock contributes to greater than a $2.7 billion dollars in annual hospitalization cost, we aim to perform a cost analysis of IABPs versus medical therapy (vasopressors and inotropes) in this subpopulation.