The comparative outcome of off-pump versus on-pump coronary artery bypass surgery in general Medicare patients with chronic kidney disease

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Introduction
- Acute kidney injury (AKI) requiring emergency dialysis is a catastrophic complication of CAB surgery.
- Pre-op renal function is strongly correlated with the risk of dialysis.
- Studies suggest reduced AKI risk with off-pump vs on-pump CAB in CKD pts (Saiga et al, J Thorac Cardiovas Surg 2007).
- There are few comparative data on long-term ESRD and death risk in pts undergoing off-pump vs. on-pump CAB.

Study design
- Retrospective cohort study
- Data sources: Medicare 5% sample data (n=3,679,761)
- Study population: Medicare CKD pts, identified based on ICD-9-CM diagnosis codes, who had their first CAB surgery in 2001-2006, were continuously enrolled in Medicare both Parts A and B for at least 1 yr before CAB surgery, were aged 66 yrs or older on CAB surgery date, and resided in the US 50 states, Washington DC, or the Territories.
- Pts were excluded if they had concomitant valve surgery during CAB or were diagnosed with ESRD before CAB surgery.

Results
- CAB surgery was identified in Part A inpatient claims with ICD-9-CM procedure codes 36.1x.
- Exposure: CAB surgery performed without cardiopulmonary bypass (off-pump; CPT code 00566).
- Outcomes: All-cause death, ESRD, combined event of death/ESRD.
- Sample size: n=5,883.

Methods
- Patients were followed from the date of CAB surgery to the earliest of death, second CAB surgery, 3 years after the first CAB surgery, or 1/2/1/2006.
- For the events of ESRD or death/ESRD, follow-up also ended at the date of ESRD diagnosis.
- Patient baseline characteristics with on-pump and off-pump CAB surgery were compared using Chi-square test.
- Long-term event-free probability was estimated by Kaplan-Meier method and differences between subgroups were compared by log-rank test.
- The impact of off-pump CAB surgery on outcomes was estimated by Cox proportional hazards model, with adjustment for patient characteristics.

Summary
- 21% reduction in unadjusted risk of acute dialysis for off-pump CAB vs on-pump CAB.
- No significant difference in adjusted risk of acute dialysis for off-pump CAB vs on-pump CAB.
- No difference in long-term probability of all-cause death, ESRD, or composite endpoint of ESRD/death for off-pump vs on-pump CAB.
- Acute dialysis after CAB was associated with a 3.5 fold increase in long-term mortality risk and a twelve fold increase in ESRD risk.

Conclusions
- In this large observational study of Medicare patients with CKD, off-pump does not result in improved survival nor reduced risk of developing ESRD.
- Limitations:
  - Retrospective
  - Administrative data
  - Selection bias