The Impact of Early Postoperative Acute Kidney Injury on One-year Risk of Acute Myocardial Infarction, Stroke and Death Among Patients Undergoing Elective Cardiothoracic Surgery: A Cohort Study

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Aim

- To examine the association between acute kidney injury (AKI) and one-year risk of Acute Myocardial Infarction (AMI), stroke and death after elective cardiothoracic surgery.

Background

- Acute kidney injury (AKI) is a common and serious complication after cardiothoracic surgery.[1]
- Up to 30% of patients who undergo cardiothoracic surgery experience an episode of AKI.[2]
- AKI is known to be associated with increased mortality.[3]
- Studies on the long-term prognostic impact of AKI after elective cardiothoracic surgery remain sparse.[4]
- No studies have examined the long-term prognostic impact of AKI on subsequent risk of AMI and stroke after elective cardiothoracic surgery.

Methods

- **Study Population:** 1,030 adult elective cardiothoracic surgical patients from the Department of Cardiothoracic and Vascular Surgery, Aarhus University Hospital, Denmark, between April 1, 2005 and October 8, 2007. Follow-up began on the fifth post-operative day.
- **Exclusion Criteria:** Severe kidney disease (s-creatinine >2.3mg/dL (200µmol/L)) and/or previous heart or renal transplant surgery.
- **Exposure:** AKI was defined by the AKIN criteria (Table 2). There were complete baseline s-creatinine measurements for the study population.
- **Outcomes:** AMI, stroke and death within a year after surgery. Data were obtained through linkage to the Danish National Registry of Patients and the Danish Civil Registration System.
- **Statistical Analyses:** We computed the cumulative risk of AMI, stroke and death using a cumulative incidence method, and hazard ratios (HRs) using a Cox proportional hazards regression model. In the adjusted analyses we corrected for propensity score.

Results

- A total of 287 (27.9%) of 1,030 patients experienced an episode of AKI.
- AKI patients were older, had higher level of comorbidity and higher baseline s-creatinine values.
- Table 1: One-year risk and HRs for AMI, stroke and death.
- Table 3: One-year risk of death according to AKI stage.

Table 1. One-year cumulative risks, unadjusted and adjusted hazard ratios for AMI, stroke and death by AKI status.

Outcome	Events n	Cumulative risk % (95% CI)	Unadjusted HR (95% CI)	Adjusted HR[a] (95% CI)
AMI				
non-AKI	18	2.4 (1.5–3.8)	1 (reference)	1 (reference)
AKI	7	2.4 (1.1–4.7)	1.0 (0.4–2.4)	1.2 (0.5–3.0)
Stroke				
non-AKI	17	2.3 (1.4–3.6)	1 (reference)	1 (reference)
AKI	10	3.5 (1.8–6.1)	1.6 (0.7–3.5)	1.5 (0.7–3.6)
Death				
non-AKI	17	2.3 (1.4–3.7)	1 (reference)	1 (reference)
AKI	27	9.4 (6.6–13.4)	4.3 (2.3–7.9)	3.2 (1.7-6.2)

[a] Adjusted for propensity score

Table 2: AKIN s-creatinine criteria for AKI[5]

Stage 1: Increase in sCr by 0.3mg/dl (26.5µmol/L) within 48h or increase from baseline sCr by 1.5-1.9 within the prior seven days.

Stage 2: Increase in baseline sCr by 2.0-2.9 within the prior seven days

Stage 3: Increase in baseline sCr by ≥3.0 within the prior seven days or increase in sCr to 4.0mg/dl (354µmol/L) with an acute rise of 0.5mg/dl (44µmol/L) or initiation of renal replacement therapy.

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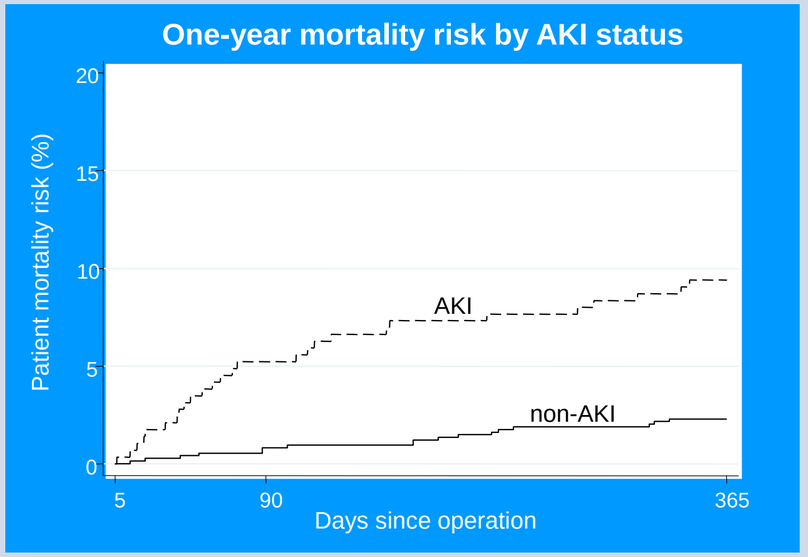

Table 3. One-year cumulative risks, unadjusted and adjusted hazard ratios for death by AKI stage.

Outcome	Events n	Cumulative risk % (95% CI)	Unadjusted HR (95% CI)	Adjusted HR[a] (95% CI)
Death				
non-AKI	17	2.3 (1.4–3.7)	1 (reference)	1 (reference)
Stage 1	21	8.8 (5.8–13.2)	4.0 (2.1–7.6)	3.0 (1.5–6.0)
Stage 2	3	9.7 (3.2–27.1)	4.3 (1.3–14.8)	3.7 (1.1–12.8)
Stage 3	3	16.7 (5.7–43.2)	8.2 (2.4–27.9)	5.4 (1.5–19.5)

[a] Adjusted for propensity score

Conclusions

- AKI is associated with increased one-year mortality after elective cardiothoracic surgery.
- This increase is consistent with advancing AKI stage.
- The risk of AMI and stroke was insignificantly increased.

References

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