Postoperative NSAID use and Incidence of Renal Failure in Cardiac Surgery (NIRF)

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Background

- Open heart surgery poses risk for acute kidney injury (AKI)
- Incidence of AKI after cardiopulmonary bypass up to 20-30%
- No widely accepted standard of care for pain management post-cardiac surgery
- Acetaminophen and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) used in Royal Columbian Hospital (RCH) to reduce opioids
- Post-open heart surgery NSAID use may be associated with increased renal injury

Objective

- To evaluate the possible association between post-operative NSAID use and composite renal risk, injury, and failure in cardiac surgery patients at RCH within 14 days post-operation, or at earlier discharge

Methods

Design
- Retrospective unmatched case-control

Population
- Patients receiving open-heart surgery at RCH from Feb 4, 2011 – Sep 13, 2012

Inclusion
- >18 years of age
- Coronary Artery Bypass Graft (CABG), valve replacement or repair, or combination surgery

Exclusion
- Pre-existing renal disease
- Stage III, IV, V renal disease (KDOQI* criteria), dialysis
- Shock prior to surgery requiring inotropes or vasopressors
- Peri-operative Intra-Aortic Balloon Pump (IABP) use
- Cardiac catheterization within 48 hours of surgery

Outcome
- Composite of renal risk, injury, failure, dialysis

Statistical Analysis
- Estimated sample size (N=782) to show odds ratio (OR) of 1.5 assuming 55% exposure rate in control group
- Characteristic differences calculated with Chi-square analysis
- Association between NSAIDs and renal impairment evaluated using logistic regression

Definitions

Based on Risk-Injury-Failure-Loss-End stage kidney disease (RIFLE) from Acute Dialysis Quality Initiative (ADQI)

No renal impairment
- Serum creatinine (SCr) increase <1.5x or
- Estimated glomerular filtration rate (eGFR) decrease <25%

Renal risk
- Increased SCr x 1.5 or eGFR decrease >25%

Renal injury
- Increased SCr x 2 or eGFR decrease >50%

Renal failure
- Increased SCr x 3 or eGFR decrease >75%

Figure 1: Renal Impairment in Patients

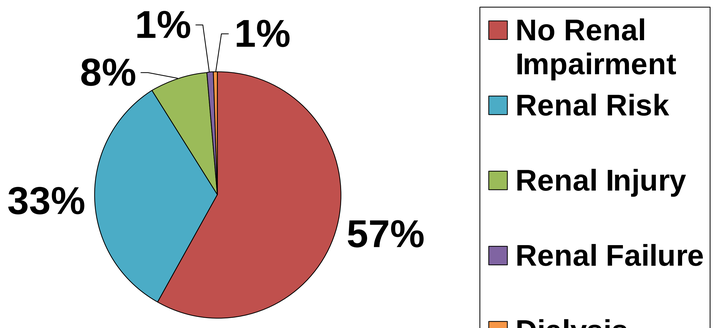

Table 1: Patient Characteristics

	No Renal Impairment (N=224)	Renal Impairment (N=162)
Age (median)	67 years	69 years
Male	77.2%	73.5%
Surgery type		
Valve	17.9%	11.7%
CABG	73.7%	74.1%
Combination	8.5%	13.6%
Diabetes	27.7%	34.6%
Ejection fraction <40%	15.6%	13.6%
Cardiopulmonary bypass time (median)	97.5 min	105 min
Fluid balance in operating room (median)	1457.5 mL	1480.0 mL

Preliminary Results

- 1320 patients screened
- 386 patients included to date

Outcomes

	No Renal Impairment (N=224)	Renal Impairment (N=162)	Odds Ratio (95% CI)
NSAIDs			
Indomethacin	71.0%	50.6%	0.42 (0.28-0.64)
Ibuprofen	69.2%	52.5%	0.49 (0.32-0.75)
Naproxen	0.9%	0	NS
Any NSAIDs	80.8%	67.3%	0.57 (0.45 – 0.74)
Number of doses of any NSAIDs	10 (median)	3 (median)	0.94 (0.91 – 0.97)
ACEI	30.4%	32.1%	NS
ARB	4.0%	1.9%	NS
Aminoglycosides	0.4%	0	NS
Vancomycin	5.8%	11.7%	NS
Furosemide	75.0%	85.2%	1.92 (1.13-3.25)

After adjusting for age, gender and diabetes:

	OR (95% CI)
Any NSAIDs received	0.68 (0.44 – 1.03)
Any NSAIDs total doses	1.06 (0.92 – 1.22)

- No significant associations between renal impairment and gender, age, surgery type, diabetes, fluid balance in OR, ACEI use, or ARB use

Limitations

- Retrospective chart review
  - Inability to adjust for unknown confounders
- Preliminary analysis, underpowered

Conclusion

- Preliminary data show no association between renal impairment and NSAID use post-cardiac surgery when adjusted for age, gender and diabetes

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*KDOQI: Kidney Disease Outcomes Quality Initiative

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