Poster Number 5

Nephrotoxic Medication Associated Acute Kidney Injury leads to Chronic Kidney Disease Development at 6 Months

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Abstract

Background Nephrotoxic-medication exposure is a common cause of Acute Kidney Injury (NTMx-AKI) in hospitalized children. No longitudinal data exist regarding post-hospitalization kidney outcomes after NTMX-AKI.
Design We did a retrospective outcome assessment for non-critically ill children (pt) exposed to an IV aminoglycoside for ≥3 days or ≥ 3 NTMx simultaneously, from June 2011 to May 2012. Data was collected on those who developed AKI by the pRIFLE criteria, and those who had exposure but did not develop AKI. All had daily serum creatinine (SCr) monitored during hospitalization as part of institutional practice. Follow-up data > 6 months after exposure to NTMx were retrieved from medical records.
Results-100 pt (mean age 9.30±6.9 yrs) with NTMx-AKI were identified. Mean pre-AKI eGFR (mL/min/1.73m^2) was 118.8 ± 14.9, and was between 90-150 for all. Mean AKI duration was 11.4 ± 9.8 days. 92 pt survived to discharge. Mean eGFR at discharge was 105.1 ± 27.2; 28 (30%) had eGFR <90.
At 6 months post-NTMx-AKI, data were available for 77 pt (6 had no follow up, 6 deceased, 3 had no SCr). Mean eGFR was 113.3 ± 30.6. 18 (23.3%) pt had eGFR <90, 2 <60 and 9(11%) had eGFR >150. Mean Cystatin C GFR was 80.2 ± 23.4 (n=52). 27/34 assessed pt had Up:c >0.2. 29 pt had hypertension. Only 15 (17.2%) were seen in a pediatric nephrology clinic. Overall, 58 pt (72.5%) had at least 1 sign of Chronic Kidney Disease (CKD) (proteinuria, hypertension or impaired eGFR); 18 had 2 signs, 4 pt had 3. Only 34(42.5%) had a complete evaluation of blood pressure, serum creatinine and proteinuria.
We compared this cohort with 57 age and primary service matched pt who were exposed to NTMx but did not develop AKI. At 6 months, the mean eGFR for the controls was 123.5± 14.5; 2 had eGFR> 150, and none less than 90.
Conclusions After exposure to NTMx, those who develop AKI are more likely to have residual kidney damage at 6 months, in the form of reduced GFR, hyperfiltration, proteinuria or hypertension, than those who do not. However less than 50% undergo a complete evaluation for CKD and only 20% are seen by a nephrologist. With studies showing an association between AKI and CKD, we suggest systematic comprehensive follow up is essential to assess for CKD in children after an episode of NTMx-AKI.

Background

- Nephrotoxic medications (NTMx) are a common cause of AKI in hospitalized children[1]
- This is associated with longer hospital stay and higher costs[2]
- 33% of children receiving IV Aminoglycoside ≥ 5 days have AKI by pRIFLE criteria[2]
- Patients with AKI have higher NTMx exposures, doses, and days of NTMx therapy than patients without AKI[3]

Objectives

- To assess 6 month kidney outcomes after Nephrotoxic medication associated AKI (NTMx-AKI)
- To compare renal outcomes between those who develop AKI after NTMx-exposure

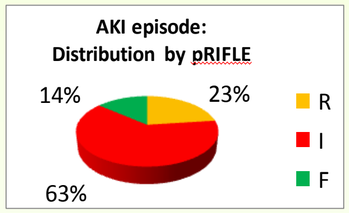
Methods

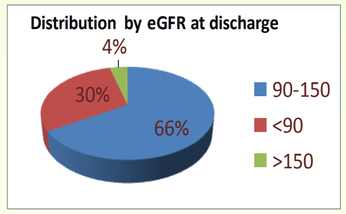
- Retrospective outcome assessment
- Subjects: All non-critically ill pts exposed to IV aminoglycoside for ≥3 days or ≥3 NTMx simultaneously who developed AKI by pRIFLE criteria
- Controls: age and primary service matched pts with NTMx-exposure but no AKI
- Follow-up data > 6 months after NTMx-exposure retrieved from medical records

Results

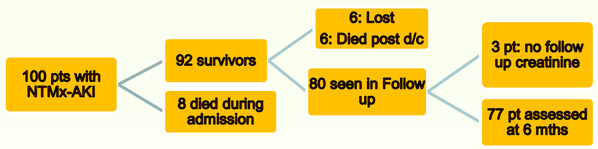
Baseline: 100 patients with NTMx-AKI

- Mean Age: 9.3± 6.9 yrs
- Pre-AKI eGFR: 118.8 ± 14.9 mL/min/1.73m^2
  All were between 90-150 ml/min/1.73m^2
- Duration of AKI : 11.4 ± 9.8 days





Follow up after AKI



eGFR at follow up: 113.3 ±30.6 mL/min/1.73m^2

- **eGFR < 90 : 18 (22.5 %)**; eGFR < 60: 2
- **eGFR >150: 9 (11.2%)**

	Pre-AKI	6 month Follow up
eGFR (mL/min/1.73m^2)	118.4 ± 15.4	112.3 ± 31.9
eGFR between 90-150	100%	64.9%
Cystatin C GFR (mL/min/1.73m^2)	NA	80.2 + 23.4 (n=52).
Urine p:c > 0.2	0/15	27/34

Table 1: Pre and post AKI Comparison

- Only 15 (18%) seen by pediatric nephrologist

Results

Evaluation for CKD

- Overall, 42 pt (54.5%) had impaired eGFR or proteinuria; 29 had hypertension
  - 4 pt had all three
- Only 34 patients (42.5%) had a complete evaluation
  - Measurement of blood pressure, serum creatinine, proteinuria

	Subjects with AKI (n=77)	Controls (NTMx-exposure without AKI) (n=57)	p value
Age (yrs)	8.87 (7.09)	7.13 (6.11)	0.14
Males (%)	66.2	50.9	0.07
Baseline eGFR	118 (15.14)	119.98 (15.41)	0.48
≥ 1 NTMx at follow up (%)	54.5	40.4	0.1
eGFR at 6 months	114.07 (30.96)	123.46 (14.54)	0.04
GFR by Cys C	80.21 (23.47)	111.64 (24.37)	<0.001
Up:c >0.2 (%)	35.1	10.5	<0.001
Up/c at 6 months	0.9 (1.14)	0.27 (0.21)	0.04
Subjects with hypertension	29 (37.7)	11 (19.3)	0.01
Subjects with at least 1 sign of CKD or hypertension	59 (76.6)	17 (29.8)	0.001

Table 2: Comparison with controls

Conclusions

- After NTMx-exposure, pts who develop AKI are more likely to have residual kidney damage at 6 months
- Less than 50% of them undergo a complete evaluation for CKD
  - Only 20% are seen by a nephrologist
- Systematic comprehensive follow up is essential to assess for CKD in children after an episode of NTMx-AKI

References

1. Pediatric ARF epidemiology at a tertiary care center from 1999 to 2001, Am J Kidney Dis. 2005 Jan;45(1):96-101
2. Acute kidney injury in non-critically ill children treated with aminoglycoside antibiotics in a tertiary healthcare centre: a retrospective cohort study, Nephrol Dial Transplant (2011) 26: 144–150
3. Acute kidney injury and increasing nephrotoxic-medication exposure in noncritically-ill children, CJASN April 2011 vol. 6 no. 4 856-863

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