A MAYO CLINIC ROCHESTER THIRTEEN-YEAR RETROSPECTIVE INVESTIGATION OF THE SYNDROME OF RAPID ONSET END STAGE RENAL DISEASE (SORO-ESRD) IN AN INCIDENT ADULT HEMODIALYSIS COHORT, 2001-2013.

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OBJECTIVES

In 2010, we described the new syndrome of rapid onset end stage renal disease (SORO-ESRD) in a Northwestern Wisconsin Mayo Clinic Hemodialysis population. This is acute precipitate yet irreversible ESRD following AKI, in patients with a priori stable CKD. This is in contradistinction to the so-called “classic” ESRD where CKD to ESRD progression is represented by a predictable, linear, progressive and time-dependent decline in renal function, with predictably increasing serum creatinine values, simultaneously falling eGFR levels, associated increasing proteinuria where applicable, ultimately leading inexorably to terminal symptomatic ESRD and the subsequent need for renal replacement therapy.

Furthermore, in a recent June 2011 retrospective investigation in four Northwestern Wisconsin Mayo Clinic Dialysis Services (MCDS) Outpatient Hemodialysis Units, SORO-ESRD accounted for 31 (34%) of 91 incident US adult ESRD patients. Nonetheless, the plausible differential impact of this newly described syndrome on ESRD mortality outcomes is unknown and remains speculative. Moreover, the underlying pathogenetic renal pathology in these patients who come down with SORO-ESRD remains mostly unknown.

In 2014, we completed a 13-year Mayo Clinic, Rochester retrospective investigation of SORO-ESRD in a larger incident adult ESRD population.

OBJECTIVES AND METHODS

The Mayo Clinic Health System provides a comprehensive integrated health care network in an area with 395,000 residents in Southeast Minnesota, Northern Iowa, and Southwest Wisconsin. MCDS provides all hemodialysis in the Mayo Clinic Health System through 8 community-based outpatient hemodialysis facilities and is staffed solely by Mayo Clinic nephrologists who also provide the inpatient hemodialysis care.

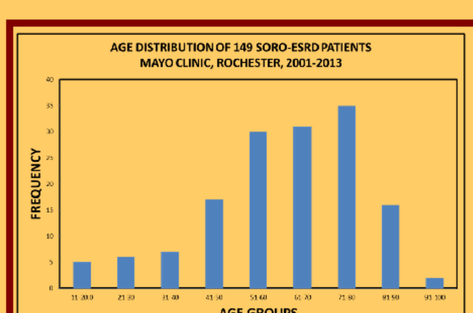
All adults (age ≥ 18 years; n=1461) in the Mayo Clinic Health System initiating hemodialysis therapy between January 1, 2001, and December 31, 2013, with Minnesota Research Authorization were identified.

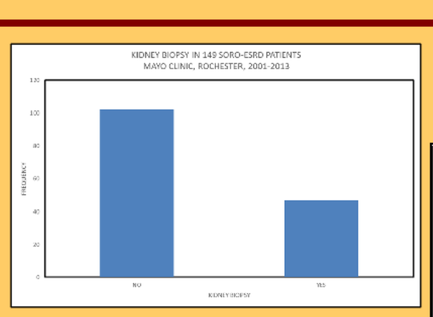
The primary outcome was to establish the incidence of the syndrome of rapid onset end stage renal disease (SORO-ESRD) in this incident hemodialysis cohort and to further characterize the features of presentation and patient outcomes in this specific group of patients.

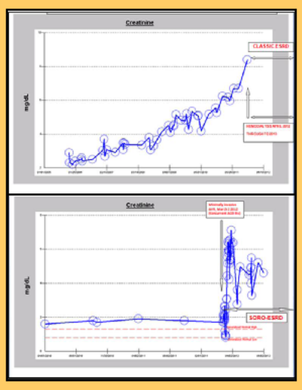
The Mayo Clinic Institutional Review Board approved this study.

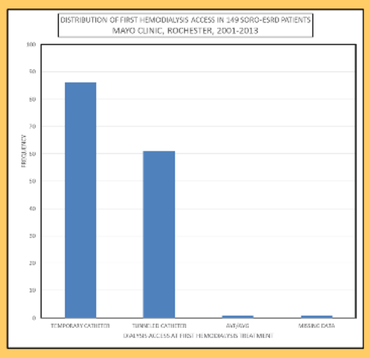
DIAGNOSIS OF THE SYNDROME OF RAPID ONSET END STAGE RENAL DISEASE (SORO-ESRD)

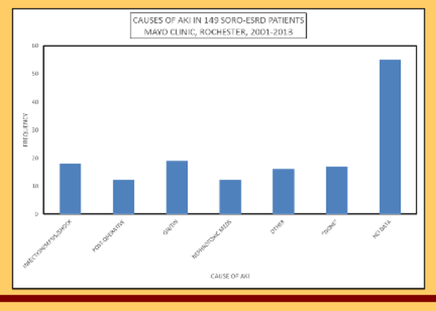
The diagnosis of the syndrome of rapid onset end stage renal disease (SORO-ESRD), based on our previous reported experiences, for this incident hemodialysis study, was based on three diagnostic criteria:
1.eGFR of ≥ 30 ml/min/1.73 sq. m BSA OR a serum creatinine equivalent of ≤ 1.75 mg/dL in the last year before first hemodialysis treatment.
2. Remaining on maintenance hemodialysis or other forms of RRT for ≥ 90 days from first hemodialysis treatment without evidence of renal recovery.
3. Adult patient, age 18 years and older, at first hemodialysis treatment.

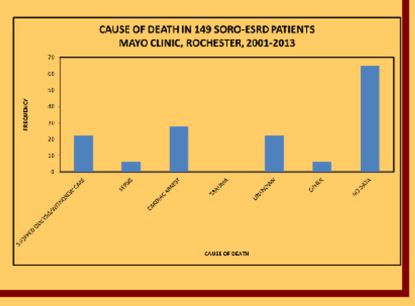












RESULTS

- 149 (10%) of 1461 patients in the cohort had the syndrome of rapid onset end stage renal disease (SORO-ESRD).
- There were 76 males and 73 females, age range 19-95 years, mean age 62 years, with the 70-80 age group being the modal group.
- Ten of 149 (7%) SORO-ESRD patients were renal transplant recipients (RTRs).
- Fifteen of 149 (10%) recovered renal function.
- Duration on hemodialysis ranged from 90-4166 days, mean 682 days.
- Vascular access at first hemodialysis was 86 (58%) temporary catheters, 61 (41%) tunneled catheters, 1 (1%) had an AVF, and data was missing in 1 (1%)
- Initial first hemodialysis was in-hospital in 126 (85%) versus outpatient center in 23 (15%) patients.
- Causes of precipitating AKI include glomerulonephritis or tububo-interstitial nephritis in 19 of 94 (20%), infection/sepsis in 18 (19%), nephrotoxic medications in 12 (13%), and post-operative in 12 (13%).
- Twenty-three (15%) patients were transplanted during this study period.
- Ninety-two (62%) had no prior nephrologist evaluation in the last year before first hemodialysis treatment whereas 57 (38%) had been evaluated by a nephrologist in the prior one year before hemodialysis initiation.
- Kidney biopsy was carried out in 12 RTRs and in 34 native kidneys.
- Among the RTRs, acute tubular necrosis (ATN) in 3 (25%) was the commonest pathology described.
- For native kidneys, the commonest pathologic diagnosis was ATN in 7 (21%).
- Of the 84 who died, cardiac arrest was the cause in 28 (33%), 22 (26%) died after stopping hemodialysis, and sepsis was the cause of death in 6 (7%).

CONCLUSIONS

- SORO-ESRD is not unlike “classic ESRD” and requires permanent RRT. Nevertheless, it is acute, precipitate and unanticipated – **A tale of two different cities (Figures above)**.
- SORO-ESRD accounted for about 10% of the incident hemodialysis cohort at Mayo Clinic Rochester, 2001-2013, and therefore is not uncommon among incident adult ESRD patients on maintenance hemodialysis in the United States.
- SORO-ESRD contributes significantly to renal allograft loss.
- Older patients are more susceptible to SORO-ESRD.
- Exposure to nephrotoxic agents including angiotensin inhibition, may be significant predisposing factors to SORO-ESRD.
- Cardiac causes including cardiac arrest remain the principal cause of death among SORO-ESRD patients, similar to patients with “classic” ESRD.
- Initial Hemodialysis vascular access is overwhelmingly (99%) temporary HD catheters (58%) and tunneled HD catheters (41%) in SORO-ESRD patients, when contrasted with patients with ‘classic” ESRD.
- Causes of AKI precipitating SORO-ESRD include infection/sepsis, nephrotoxic exposure, post-op states, and acute nephritis.
- Acute tubular necrosis (ATN) is the commonest pathology in SORO-ESRD patients, both native kidneys and renal allografts.
- This is yet another clarion call for the practice of more preventative nephrology or **renoprevention,** as we have dubbed this paradigm of nephrology care**,** to limit the scourge of AKI including the precipitation of irreversible ESRD.

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