

How chronic kidney disease and haemodialysis influence stroke outcome.

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Background:

- * Stroke patients with underlying chronic kidney disease (CKD) and those on dialysis have complex rehabilitation needs.

comorbidities

- * HTN
- * DM
- * PVD
- * Amputations

Common issues

- * Unstable BP: extremes of HTN or post dialysis hypotension.
- * Sugars: labile: as renal function deteriorates: insulin requirement varies.

Sepsis and other issues

- * Prone for infections
- * Fistula related problems.

Rehab goals

- * Patients on HD: post discharge need to for HD in satellite centres.
- * Minimum requirement : sitting tolerance for 4 hours.
- * Based on progress: further rehab goals are set.

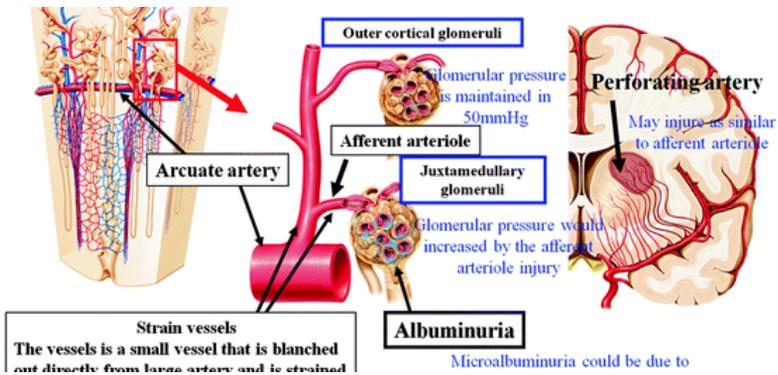
background

- * The number of individuals undergoing dialysis is steadily increasing.
- * Patients undergoing dialysis are susceptible to vascular complications including stroke [1].

Kidney and brain similarities

- * The kidney and brain both “require continuous and stable high blood flow in a low vascular resistance system”
- * These two organs are supplied by “strain arterioles”. Owing the branching nature of these arterioles, they are susceptible to blood pressure changes [2, 3].

Strain arteriole



arteriole in ckd

- * The arterial endothelium and tunica media are adversely affected in patients with CKD.
- * These patients are prone to cerebrovascular insults [3, 4].
- * Further, in patients on haemodialysis (HD), the baroreceptor reflex is altered owing to deranged autonomic function [5]
- * This results in poor tolerance to fluid and BP changes during dialysis [6].
- * HD can also result in myocardial stunning, leading to inadequate cerebral perfusion, which may lead to ischaemic brain injury [7].

aim

- * This study aimed to review the post-stroke survival and
- * Functional outcomes following rehabilitation in patients with CKD (stages G3b, G4, G5) and dialysis.

Methods

- * retrospective analysis 37 stroke patients
- * with underlying CKD (stages G3b, G4, G5; n = 30), and those on dialysis at the time of stroke (n = 7)
- * The follow-up period ranged from 20 to 93 months
- * Singhealth IRB approval

inclusion criteria: stroke in patients with

- * Patients with CKD stages G3b, G4, G5 (based on the Kidney Disease: Improving Global Outcomes (KDIGO) staging)
- * Those on haemodialysis, or peritoneal dialysis at the time of stroke diagnosis

exclusion criteria

- * previous known strokes
- * incomplete follow-up records
- * those with normal renal function, acute kidney injury, and CKD stage G1, G2, G3a.

results

- * 37 patients met the selection criteria.
- * Of which 30 had CKD (stages G3b, G4, G5)
- * 7 were on dialysis at the time of stroke
- * follow up duration of 56 months (20- 93).

results

- * 23 had Partial anterior circulation stroke
- * 8 had posterior circulation stroke
- * 6 had total anterior circulation stroke of which 3 had haemorrhagic transformation .
- * The mean values of eGFR on admission was, 21.3 (5-44), and haemoglobin 11.9 (9-18).
- * urea 12.1 (3.8-26)
- * albumin 29.9 (15-39).

results

- * The mean age of patients was 64.7 (36-87) years
- * 16 (44%) men
- * 73% (27) had DM.
- * The mean duration of hospitalisation: 28 days (4-77) .

NIHSS score

- * A significant decrease was observed from the time of admission [6 (2-19)] to the time post discharge [4 (1-17)] ($p < 0.001$; Wilcoxon signed rank test)

FIM motor score

- * increased significantly from the time of admission [31 (13-87)] to the time of discharge [50.5 (13-91)] (p<0.001; Wilcoxon signed rank test)

FIM cognition score

- * Increased significantly from the time of admission [24.6 (5-35)] to the time of discharge [26.6 (5-35)] (p=0.046; Paired t-test).

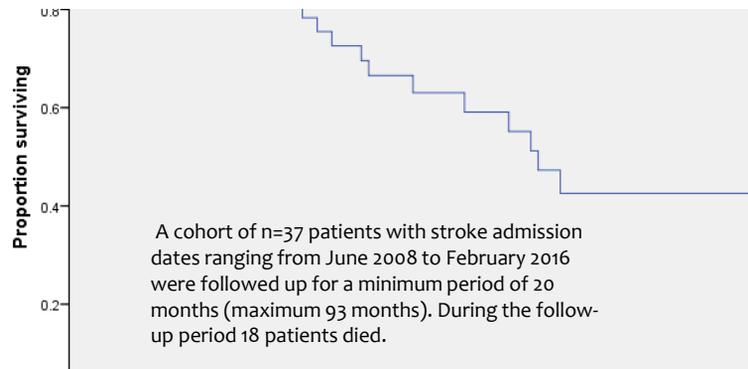
results

- * Median number of recurrent admissions were 6 (1-50)
- * Median hospital-stay duration was 48 days (2-291).
- * Older age, longer hospital-stay duration and lower eGFR were all significantly related to mortality ($p < 0.05$).
- * Lower haemoglobin levels showed borderline significance ($p = 0.051$).

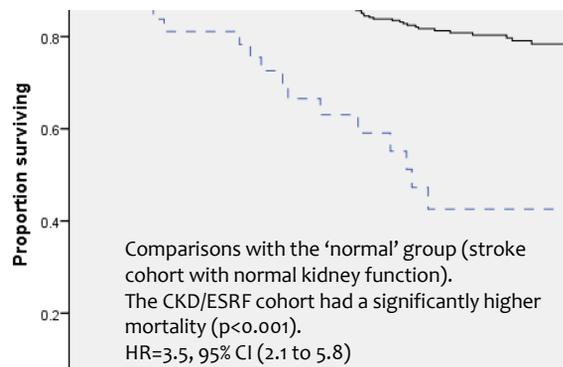
independent predictors of mortality

- * Age
- * Length of hospital-stay and
- * Low haemoglobin: were found to have significant independent relationships with mortality. (multivariable Cox regression).

Ckd stroke survival graph



Comparative survival with non ckd stroke group



discussion

- * Murray et. al. concluded that the number of stroke events within the first month of initiation of HD increased by a factor of 7 [20]
- * This could be attributed to the decreased cerebral perfusion and the altered rate of blood flow [20, 21, 22]
- * Other factors contribute to an increased risk of stroke at dialysis initiation were advancing age, DM, HTN [18],
- * Patients receiving Erythropoietin [20].

discussion

- * Compared to the general population, patients on dialysis have about 10 times [19] increased risk of stroke
- * 20 to 30% being haemorrhagic strokes [23, 24])
- * increased risk of haemorrhagic transformations and
- * with more hematoma volume in haemorrhagic stroke [25].

Cerebral protection during HD

- * Eldehni et. al. concluded that dialysis performed at 0.5°C below a patient's core temperature was associated with better hemodynamic stability and led to protection against white matter ischaemic changes [8].
- * Continuous, instead of intermittent dialysis, has also been suggested to reduce the incidence of brain injury [1].

conclusion

- * Despite significant improvements in functional scores, survival remains poor in stroke patients with CKD and in those on HD.
- * The average hospital-stay duration and recurrent hospitalisations rate is higher compared to stroke patients without CKD.

conclusion

- * Morbidity and mortality in stroke patients with CKD and HD may be a result of the complications associated with the comorbidities rather than stroke itself.

conclusion

- * Community services which focus on preventing or addressing these issues may help reduce the recurrence of hospital admissions and hospital acquired infections.

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