Spectrum and severity of peripheral neuropathy in chronic kidney disease and electrophysiological pathological correlation – A prospective Study

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OBJECTIVES

- To study spectrum and severity of peripheral neuropathy in Chronic Kidney Disease(CKD) patients and correlate electrophysiological findings with estimated Glomerular filtration rate.
- To establish electrophysiological and pathological correlation in assessment of the progression of peripheral neuropathy with progression of Chronic Kidney Disease.

METHODS

- A prospective cross-sectional observation study where 60 consecutive patients with CKD (eGFR <60 mi/min) were enrolled excluding patients having malignancy, liver cirrhosis, alcoholism, hypothyroidism, autoimmune disorder, HIV or Hepatitis B infection, history of drug exposure causing significant neuropathic symptoms and hereditary or acquired neuropathy due to any other causes except diabetes.
- Detailed history and clinical examination including neurology symptom score (NSS) score and electrophysiological examinations were done. Sural nerve biopsy was done and correlated with severity and progression of CKD using SPSS Version 16.0 (for Windows).

RESULTS

- Out of 60 CKD patients, M: F was 1.6:1. Age was 49.38±13.12years. Twenty nine patients were diabetic CKD.
- About 81.66% of subject were having distal symmetric polyneuropathy and NS Score was 1.75±1.36. In 25% Mononeuropathy, 3.33% (CTS) Cranial Neuropathy and 11.6% Autonomic involvement were found. Among 49 neuropathy positive (Np+) patients, 48.97% were having sensory motor polyneuropathy while 51.02% were having pure sensory polyneuropathy.
- Neuropathic group were more symptomatic and having higher (NSS)(p-0.0002) and also having higher s. creatinine level(p- 0.012) compared to non- neuropathy group. Hyperkalemia was seen more in neuropathic group with mean serum K+ level of 5.39 compared to non-neuropathy group (mean serum K+ 4.93) (p- 0.17).
- Diabetes patients were having higher risk of neuropathy with odds ratio of 6.89 compared to non-diabetic in CKD subjects.
- Paresthaesia and/or dysesthaesia were the most common symptoms present in 40(66.66%), while most common abnormality in examination was abnormal vibration sensitivity in 37(61.66%) subjects.
- Nerve conduction study revealed sural sensory action potential (81.66% abnormal) was the most common abnormal parameter, while tibial motor action potential and peroneal distal latency were second most common findings. Sural nerve biopsy revealed mostly axonopathy in advanced CKD and in few cases demyelination which closely correlated with EP study.

GRAPHS AND TABLES

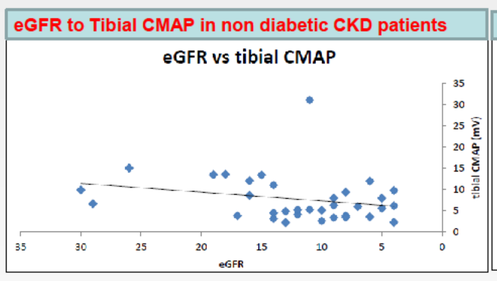
Comparison of demographic features, clinical and laboratory analysis between neuropathy and non neuropathy group

PARAMETER	Np+ve (total-49)	Np-ve (total-11)	*P* value
Age	51.53±12.49yr	39.81±11.94yr	0.006
Sex(M/F)	30M/19F	7M/4F	-
NSS Score	2.04±1.32	0.45±0.52	0.0002
S. Creatinine	5.96±2.93 mg/dl	3.54±0.98 mg/dl	0.012
eGFR	19.36±6.42	13.20±9.22	0.04
S. K+	5.39±0.99 mEq/L	4.93±0.92 mEq/L	0.17
Hb	7.72±1.54 g/dl	8.08±1.13 g/dl	0.46
S. Ca+	2.3±0.09	2.4±0.13	0.27
Diabetes mellitus(P/A)	20/29	1/10	OR- 6.89

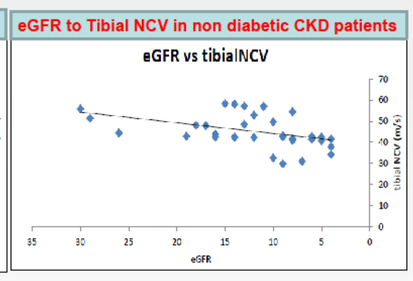
Correlation of eGFR abnormal Electrophysiology

Patient group	Parameter	Coefficient (r)	P value	95% C.I.
TOTAL (n=60)	Tibial CMAP	0.02	0.85	-0.52 to 0.43
	Tibial NCV	-0.05	0.67	-0.33 to 0.22
	Tibial 'f' latency	0.11	0.40	-0.20 to 0.49
NON-DM (n=39)	Tibial CMAP	0.20	0.20	-0.14 to 0.67
	Tibial NCV	0.45	0.003	0.13 to 0.64
	Tibial 'f'latency	-0.41	0.014	-0.79 to -0.09
DM (n=21)	Tibial CMAP	-0.18	0.42	-3.089 to 1.32
	Tibial NCV	-0.45	0.03	-1.5 to -0.04
	Tibial 'f' latency	0.62	0.009	0.22 to 1.31

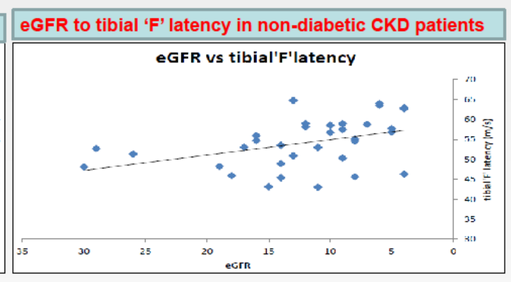
eGFR to Tibial CMAP in non diabetic CKD patients



eGFR to Tibial NCV in non diabetic CKD patients



eGFR to tibial 'F' latency in non-diabetic CKD patients



CONCLUSIONS

1.Peripheral neuropathy is common and linearly correlated with severity of CKD.
2. Axonopathy is common in advanced CKD and there is a clear relationship between electrophysiological – pathological study.

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