Post stroke seizure

Shrikant D Pande
Kaung M, Lwin M, Thant A A, Khine A A, Wyn M,
Department of Rehabilitation medicine
Changi General Hospital
Singapore
Julie Morris: Reader, Department of statistics University of Manchester

background

* Stroke remains the major contributor to inpatient rehabilitation as it leads to significant disabilities and long-term complications.
* The majority of stroke patients require long term follow up for co-morbidities and complications.

background

* Although seizure is a known complication of stroke, the incidence, treatment modalities and long-term mortality associated with seizures vary in different studies to date.

background

* Incidence of epilepsy but not post stroke seizure has been studied from local population of Singapore.
* This warranted a study exploring the prevalence of post stroke seizure and its associations.

background

* Post-stroke patients also receive cholesterol lowering, anti-spasticity medications.
* Antidepressants (fluoxitine) and neuro-stimulants such as levodopa are also prescribed for neurological recovery in stroke patients.

aims

* In this study we aimed to identify the prevalence of post stroke seizure and its association with stroke type, location.

* We also explored the relationship of seizure with concomitant use of drugs in stroke patients such as antidepressants
* anti-spasticity drugs
* cholesterol-lowering agents and
* neuro-modulating drugs.

IRB

* Study has approval of SingHealth IRB for retrospective data collection.

patients

* All the patients who were analysed in the current study were discharged from rehabilitation facility with the diagnosis of stroke and were followed up regularly as outpatient.
* This is retrospective analytic study of patients who met the selection criteria. (June 2008 to May 2017).

Inclusion criteria

* Consecutive patients with stroke (both infarction or spontaneous intracerebral haemorrhage) admitted to inpatient rehabilitation facility.
* Age above 21 years.

Exclusion criteria

* Patients with known epilepsy pre-admission.
* Previous or known central nervous system infection or tumor, previous neurosurgical procedure.
* Traumatic brain injury or and traumatic intracranial bleed.
* Toxic or metabolic disturbances.

Diagnostic criteria for seizure

* Clinical examination with or without EEG after ruling out stroke mimics and secondary causes.
* ILAE: classification as a reference guide
* Acute symptomatic seizures: those occurring within 1 week of stroke onset.
* Late seizure(epilepsy): seizures occurring post 1 week after stroke onset.

Statistical analysis

* **Statistical analysis:** Categorical data are presented as frequency (percentage) and continuous data are presented as mean (±standard deviation) for parametric distributions and median (±interquartile range) for non-parametric distributions. The differences in characteristics were examined using chi square tests for categorical variables and two sample t test or Mann Whitney U tests for continuous variable where appropriate.

Statistical analysis

* Logistic regression analysis was performed in order to determine the association potential predictors and the outcomes of seizure. Odd ratio (OR) were presented along with 95% confident interval (CI). Two tailed, p value of <0.05 was considered statistically significant. The analysis was performed with Statistical Package for the Social Sciences (SPSS) version 19.0 (IBM Corp. Armonk, New York

Results

* Total of 722 (Female: 38%) patients met the selection criteria of which ischemic strokes were 531(74%)
* 191 (26%) were haemorrhagic strokes
* Average follow up 50.4 months (±27.6 S.D), (range 6-108 months).

Stroke territory

* Based on Oxfordshire Classification, the territories for stroke were:
* total anterior circulation syndrome (TACS) :12.5%
* partial anterior circulation syndrome (PACS) :46%
* posterior circulation syndrome (POCS) :26.5%
* lacunar syndrome (LACS) :15%

Stroke aetiology

* Aetiology of the stroke using Trial of Org 10172 in Acute Stroke Treatment (TOAST) classification:
* large artery atherosclerosis :356 (67%) .
* Small artery: 175(33%) .
* Cardioembolic strokes were: moderate 118(20%) and high probabilities for cardioembolic were 104(18%).

Seizure

* The average age of patients was 64 years (21-97) of which 48 patients (6.64%) had seizures.
* 12 patients experienced early onset seizure (occurring up-to one week post-stroke)
* 36 had late onset seizures (one week onwards).

seizure

* Late onset seizure: occurred between 1-72 months post stroke (average 15.65 months).
* 9 out of 36 (25%) in this group of late onset seizure was recorded to have recurrence.

levodopa

* Thirty one patients were initiated on levodopa with starting dose of 62.5mg twice a day.
* This dose was further titrated to 125 mg BD.

results

* The primary analysis looked at the predictive power
* of haemorrhagic stroke
* neurosurgical procedures (burr hole, external ventricular drain (EVD,)
* intracerebral pressure (ICP) monitoring
* craniotomy, or craniectomy
* IHD, cardioembolism
* statin and levodopa use.

results

* Neurosurgical procedures (OR=5.0, 95%CI: 2.4-10.7)
* IHD (OR=2.0, 95%CI: 1.03-3.80) and
* levodopa use (OR=22.9, 95%CI: 1.2-6.9) were found to be independent predictors of seizure.

Seizure association

* Significant associations for seizure after the stroke were :
* cerebral haemorrhage (p=0.021),
* PACS (p=0.025)
* Neurosurgical procedure (p<0.001)
* Levodopa (p<0.001)
* Lower APTT value on admission (mean 25.6 vs 26.8, p= 0.015)
* Patients with ischemic heart disease (IHD) (p=0.07).

Seizure association

* Large artery atherosclerosis was more likely to get post stroke seizure than small artery disease with borderline significance (14% vs 86%, p=0.05).

Seizure association

* Patients receiving statins tends to have less seizure with borderline significance (p=0.056).
* No association with : antidepressant, anti-spasticity medication with seizure.
* No association with: alterned kidney function and other comorbidities.

Haemorrhagic conversion

* One hundred (14%) patients displayed haemorrhagic conversion on their repeat brain scans after stroke, of which 9% had seizure.

results

* Secondary analysis was done to review the predictive power of haemorrhagic stroke, neurosurgical procedure, IHD, statin, levodopa uses and APTT (on the sub cohort of n=617 with data on APTT).

independent predictors of seizure

* In this subset, neurosurgical procedures (OR6.2, 95%CI: 2.9-13.1, p<0.001)
* IHD (OR=2.2, 95%CI: 1.08-4.60, p=0.029)
* APTT per unit increase (OR=0.86, 95%CI: 0.76-0.98) (protective effect)

results

* Neurosurgical interventions were found to be associated with increased incidence of post stroke seizure in our study.
* This could be as a result of neurosurgical intervention leading to additional insult to already damaged brain.
* The other possibility is : patients needing neurosurgical interventions had significantly larger strokes hence increasing risk of seizures.

discussion

* The incidence of seizure in patients after the stroke is found to be around 11% in population studies
* 11.5% in five years in Oxfordshire Community Stroke Project
* 11% in Rochester study, by Hauser and colleagues and 10.5% in Norway by Naess et. al.
* The relatively lower incidence of 6.64% post stroke seizure of the 722 patients from our study may be reflective of variation within the local diverse ethnic population.

strengths

* Although post stroke seizure has been investigated in the past, the protective effect of statins has been published in only few studies.
* The role of levodopa, antidepressants (including fluoxetine) in relation to seizures has not been studied before.
* APTT levels on admission of stroke with seizure has not been studied before.

Monitoring for seizures

* Stroke patients with underlying IHD
* Intracerebral bleeds
* Large artery infarcts
* Neurosurgical procedures
* Low admission APTT
* Patients receiving levodopa for neurostimulation should be reviewed and should be weaned off as soon possible. This need further investigation.

limitation

* Retrospective nature of study

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Thank you