Peri-operative Stroke – Incident and Risk Factors

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Peri-operative stroke – incident and risk factors

Although modern anaesthesia is relatively safe, severe complications still occur
Peri-operative stroke – incident and risk factors

Last year, our Anaesthesia Related Mortality Audit revealed a mortality rate of 0.614 per 10,000 operations
Peri-operative stroke – incident and risk factors

Regarding morbidities:

• **AMI, Stroke, Renal Failure, Chest Infection** are considered significant if they occur in the peri-operative period

• **Stroke** is the most severe peri-operative morbidities
Peri-operative stroke – incident and risk factors

COC (Anaesthesiology) decided to conduct an audit on peri-operative stroke in year 2003 to 2005 looking at the true incident and the associated risk factors
## Peri-operative stroke – incident and risk factors

### Hospitals (n = 20) participated in the audit

<table>
<thead>
<tr>
<th>Hong Kong East Cluster</th>
<th>Kowloon West Cluster</th>
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<tbody>
<tr>
<td>Pamela Youde Nethersole Eastern Hospital*</td>
<td>Caritas Medical Centre</td>
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<tr>
<td>Ruttonjee Hospital</td>
<td>Kwong Wah Hospital</td>
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<td>Tung Wah East Hospital</td>
<td>Our Lady of Maryknoll Hospital</td>
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<th>Hong Kong West Cluster</th>
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<tr>
<td>Grantham Hospital</td>
<td>Yan Chai Hospital</td>
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<td>Queen Mary Hospital*</td>
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<tr>
<th>The Duchess of Kent Children’s Hospital</th>
<th>New Territories East Cluster</th>
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<tbody>
<tr>
<td>Tung Wah Hospital</td>
<td>Alice Ho Mui Ling Nethersole Hospital</td>
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<tr>
<th>Kowloon Central Cluster</th>
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<td>Hong Kong Eye Hospital</td>
<td>Prince of Wales Hospital*</td>
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<td>Queen Elizabeth Hospital</td>
<td>North District Hospital</td>
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<tr>
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<td>United Christian Hospital*</td>
<td>Tuen Mun Hospital*</td>
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<td>Tseung Kwan O Hospital</td>
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Peri-operative stroke – incident and risk factors

• Searched through the data base of the Clinical Data Analysis and Reporting System (CDARS) using operation, stroke, cerebrovascular accident, cerebral infarction, cerebral haemorrhage, anaesthesia codes of 1 to 7 as key words

• Retrieved various types of stroke after operation before hospital discharge - 500 cases in total
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• The audit co-ordinators then went through patients’ notes carefully and screened the accuracy of the diagnosis of peri-operative stroke against a set of pre-determined criteria

• All likely risk factors were also recorded
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• 155 cases of peri-operative stroke during the 3 years were confirmed

• 4 peri-operative stroke per 10,000 operations
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• The risk factors were then analysed to rate the significance

• Demographics
• Preoperative
• Intra-operative
• Post-operative
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2003-2005 Anaesthesia Related Morbidity - Perioperative CVA of 155 Index Patients

Age Group Distribution

% of patients

<table>
<thead>
<tr>
<th>Age Group</th>
<th>% of Patients</th>
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<tbody>
<tr>
<td>30-39</td>
<td>1</td>
</tr>
<tr>
<td>40-49</td>
<td>2</td>
</tr>
<tr>
<td>50-59</td>
<td>2</td>
</tr>
<tr>
<td>60-69</td>
<td>3</td>
</tr>
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<td>70-79</td>
<td>44</td>
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<td>80-89</td>
<td>23</td>
</tr>
<tr>
<td>90-99</td>
<td>1</td>
</tr>
<tr>
<td>100-101</td>
<td>0.5</td>
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Age group distribution graph showing the percentage of patients in each age group.
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- Data suggested that increasing age was associated with higher risk in developing peri-operative stroke.

- Patients over the age of 70 years accounted for 78% of all patients who had stroke after operations in the year 2003 to 2005.
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- Data suggested the male gender was associated with slightly higher risk to develop peri-operative stroke

- Male vs female = 53 vs 47%
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2003-2005 Anaesthesia Related Morbidity - Perioperative CVA of 155 Index Patients
Baseline Risk Factors

Perioperative baseline risk factors

- CAD
- renal
- arrhythmia
- valvular disease
- AF
- smoking
- PVD
- DM
- hepatic disease
- COPD
- TED
- TIA recent stroke
- carotid stenosis
- revision surgery
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2003-2005 Anaesthesia Related Morbidity - Perioperative CVA of 155 Index Patients
Baseline Risk Factors
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Data suggested the factors that were associated with peri-operative stroke in order of risk level are:

1. Pre-operative hypertension
2. Smoking history
3. Diabetic history
4. Previous stroke
5. Renal impairment
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2003-2005 Anaesthesia Related Morbidity - Perioperative CVA of 155 Index Patients
Preoperative Assessment - Drug History

16 kinds of drugs
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- Developing risk predictors for peri-operative stroke

- \[ \text{Stroke} = A \times \text{age} + B \times \text{gender} + C \times \text{hypertension} + D \times \text{others} \ldots \]
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To obtain the predictive factors:

1. Match group without peri-operative stroke (1:4)

2. Use multivariate analysis technique to obtain a formula

3. Fit the new data to assess the predictive value of the formula
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We can make use of the information in:

1. Obtaining consent for operation - accept the risk
2. Before operation - eliminate or reduce the risk factors
3. Intra-operative - develop strategies to reduce the risk
4. Post-operative period – better support
5. Ongoing research / audit - test the formula with improved monitoring or technique
Conclusions:

1. Multivariate analysis of all the risk factors helps to identify the more important factors that increase the incidence of peri-operative stroke.

2. Meticulous pre-operative optimisation, intra-operative care, and post-operative support of patient’s condition may reduce this serious incident.
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- All Audit Co-ordinators
- Panel Members of the QA Subcommittee of the COC (Anaesthesiology) HA
- Thank you