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# MEDICAL JOURNAL

香港醫學雜誌



## 28th Annual Scientific Meeting of The Hong Kong Neurosurgical Society

### Updates on Traumatic Brain Injury and Neurocritical Care

26 – 27 November 2021

**第二十八屆  
香港神經外科學會 週年學術會議  
創傷性腦損傷和神經重症醫學的最新發展**

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# SCIENTIFIC PROGRAMME

VENUE: BALLROOM I & II, 7/F, CORDIS HONG KONG AT LANGHAM PLACE, MONGKOK, HONG KONG SAR

26 NOVEMBER 2021, FRIDAY

08:00 – 08:30	Registration	Poster Room <b>EXHIBITION AND POSTERS</b>
08:30 – 08:40	<b>WELCOME SPEECH</b> <i>Dr Michael Lee</i>	
08:40 – 09:50	<b>FREE PAPER I</b> Chairpersons: <i>Dr KY Pang, Dr Christopher Poon</i>	
09:50 – 10:10	Tea Break	
10:10 – 10:30	<b>INTERIM REPORT ON HKNS RESEARCH: Impact of Cranioplasty on Cerebral Perfusion and Cognitive Outcome</b> <i>Dr Calvin Mak, Dr David Chan, Dr Anderson Tsang on behalf of Research Subcommittee</i> Chairpersons: <i>Dr Derek Wong, Dr HT Wong</i>	
10:30 – 11:30	<b>FREE PAPER II</b> Chairpersons: <i>Dr YT Kan, Dr CP Tsang</i>	
11:30 – 12:30	<b>KEYNOTE LECTURE I</b> <b>1. Anatomy and Physiology of Intracranial Cisterns</b> <b>2. Surgical Techniques for Cisternostomy in Traumatic Brain Injury</b> <i>Prof Iype Cherian</i> Chairpersons: <i>Dr HM Chiu, Dr Dawson Fong</i>	
12:30 – 13:40	Lunch	
13:40 – 14:10	<b>Extraordinary General Meeting of the Hong Kong Neurosurgical Society</b>	
14:10 – 14:50	<b>FREE PAPER III</b> Chairpersons: <i>Dr Joseph Lam, Dr YH Tse</i>	
14:50 – 15:10	Tea Break	
15:10 – 15:30	<b>SPINE CHAPTER LECTURE—Hong Kong Neurospine Service and Development</b> <i>Dr WK Mak, Dr Calvin Mak, Dr David Chan (Chapter Convenor)</i> Moderators: <i>Dr CF Fung, Dr Daniel Ng</i>	
15:30 – 16:30	<b>KEYNOTE LECTURE II</b> <b>1. Monro-Kellie 2.0: A New Understanding of Pathophysiology in Intracranial Pressure</b> <b>2. Pre-hospital and Early Management in Traumatic Brain Injury</b> <b>3. Sports- and Work-Related Mild Traumatic Brain Injury—A UK Perspective</b> <i>Prof Mark Wilson</i> Chairpersons: <i>Dr FC Cheung, Dr CK Wong</i>	

**27 NOVEMBER 2021, SATURDAY**

08:00 – 08:30	Registration	Poster Room <b>EXHIBITION AND POSTERS</b>		
08:30 – 10:00	<b>KEYNOTE LECTURE III</b> <b>1. Implementation of Guidelines in the Management of Severe Traumatic Brain Injury—Which One Is Better?</b> <b>2. Thinking of the Pathophysiological Change—Before Writing Your Orders</b> <b>3. Targeted Temperature Management (TTM) for Neurocritical Care—What You Need to Know?</b> <i>Prof SS Kung</i> Chairpersons: <i>Dr Danny Chan, Dr KM Leung</i>			
10:00 – 10:20	Tea Break			
10:20 – 10:40	<b>FREE PAPER IV</b> Chairpersons: <i>Dr Clarence Leung, Dr TC Tan</i>			
10:40 – 12:00	<table border="1"> <tr> <td> <b>FREE PAPER V</b>            Chairpersons: <i>Dr ST Chan, Dr WK Wong</i> </td> <td> <b>10:40 – 11:40</b>  <b>VENUE:</b>  <b>BALLROOM III, 7/F</b>  <b>NURSING SESSION</b>  <b>Excellence in Neurocritical Patient Care Journey</b>            Chairpersons: <i>Mr MK Chu, Ms MY Lok</i> </td> </tr> </table>		<b>FREE PAPER V</b> Chairpersons: <i>Dr ST Chan, Dr WK Wong</i>	<b>10:40 – 11:40</b> <b>VENUE:</b> <b>BALLROOM III, 7/F</b> <b>NURSING SESSION</b> <b>Excellence in Neurocritical Patient Care Journey</b> Chairpersons: <i>Mr MK Chu, Ms MY Lok</i>
<b>FREE PAPER V</b> Chairpersons: <i>Dr ST Chan, Dr WK Wong</i>	<b>10:40 – 11:40</b> <b>VENUE:</b> <b>BALLROOM III, 7/F</b> <b>NURSING SESSION</b> <b>Excellence in Neurocritical Patient Care Journey</b> Chairpersons: <i>Mr MK Chu, Ms MY Lok</i>			
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12:10 – 13:40	Lunch			
13:40 – 14:10	<b>FREE PAPER VI</b> Chairpersons: <i>Dr Michael Lee, Dr YC Po</i>			
14:10 – 14:50	<b>FREE PAPER VII</b> Chairpersons: <i>Dr WM Lui, Dr YC Po</i>			
14:50 – 15:10	Tea Break			
15:10 – 15:30	<b>SRS CHAPTER LECTURE—Stereotactic Radiosurgery Practice In HA Hospitals</b> <b>Surgical Treatment of Trigeminal Scheannomas</b> <i>Dr KY Yam (Chapter Convenor)</i> Moderators: <i>Dr TL Poon, Dr CP Yu</i>			
15:30 – 16:50	<b>KEYNOTE LECTURE IV</b> <b>1. Current Evidence in Management of Moderate and Severe Traumatic Brain Injury</b> <b>2. Surgical Treatment in Severe Traumatic Brain Injury—Evidence Based Practice</b> <b>3. A Global Perspective and Research in Traumatic Brain Injury</b> <i>Prof Peter Hutchinson</i> Chairpersons: <i>Prof W Poon, Dr ST Wong</i>			
16:50 – 17:00	Concluding Remarks <i>Dr Michael Lee</i>			

## Does Scheduled Progress Computed Tomography of the Brain Alter Management in Patients with Intracranial Haemorrhage from Traumatic Brain Injury?

Ben KL Luk, WN Ho, MK Ho, KY Yam  
Department of Neurosurgery, Tuen Mun Hospital, Hong Kong

**Objective:** To evaluate the efficacy of scheduled progress computed tomography brain in the management of traumatic brain injury with intracranial haemorrhage. Secondary aim was to identify patients with risk factors who would benefit from a scheduled progress computed tomography brain.

**Methods:** This is a retrospective cohort study. Inclusion criteria were patients who sustained a traumatic brain injury with the presence of intracranial haemorrhage in the year of 2020. Patients who underwent neurosurgical operation on arrival and those who received progress computed tomography brain beyond 12 hours from the first scan were excluded from the study. Demographics analysed included age, gender, Glasgow Coma Scale, systolic blood pressure, mechanism of injury, pathology, time between first and scheduled progress computed tomography brain, presence of neurological decline and drug history. Statistical analyses were carried out by SPSS with P value of <0.05 as significant cut-off.

**Results:** A total of 304 cases were recruited. After exclusions, 206 cases were analysed. Majority of injury mechanism was fall on same level (76.7%). Mean age was 68. Interval enlargement of intracranial haemorrhage in progress computed tomography brain was observed in 11.7% of cases. In all, 8.3% of cases underwent neurosurgical intervention subsequently, all of whom presented with a neurological decline. Warfarin use and the presence of intracerebral contusion were risk factors for neurological decline.

**Conclusion:** Scheduled progress computed tomography brain does not alter neurosurgical intervention in patients without clinical deterioration. Patients with warfarin use or intracerebral contusion have a higher risk of neurological decline who might benefit from a progress computed tomography brain.

## The Role of Tranexamic Acid in Treating Chronic Subdural Haematoma

CH Ho, LF Li, WM Lui  
Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong

**Background:** Chronic subdural haematoma (CSDH) is a common neurosurgical condition, especially in the elderly. With an ageing population, the incidence of CSDH is expected to rise. Burr-hole is the mainstay of evacuating CSDH causing mass effect. The postoperative recurrence rate is commonly reported at 10% to 30%. In the last decade, tranexamic acid (TXA) is increasingly being recognised as being a safe and effective adjunct in managing intracranial haemorrhage, especially in the setting of neuro-trauma. This study aimed to evaluate the effectiveness and safety of TXA in the setting of CSDH as it is a common condition in elderly patients who are predisposed to thromboembolic complications due to their comorbidities. The roles of anti-platelet and anti-coagulation therapy in contributing towards recurrence or thromboembolic events were also evaluated.

**Methods:** This is a single-centre, retrospective study. Patient list was retrieved from the departmental database using International Classification of Diseases codes. All patients who underwent burr-hole during 2015 to 2019 for evacuation of chronic subdural haematoma were included in the study. Patients under the age of 18 were excluded.

**Results:** In total, 295 patients were included in the study. 67.8% (200/295) of patients received TXA perioperatively. No significant difference in thromboembolic complications or recurrence rate was identified between the groups. In all, 36.6% (108/295) of patients were on anti-platelet or anti-coagulant at the time of their presentation. Patients on warfarin were associated with significantly higher risks of having thromboembolic events in the perioperative period. (9.5% vs 0.75%; P=0.001)

**Conclusion:** The use of TXA is safe. Perioperative interruption or reversal of warfarin needs to be balanced against the risks of thromboembolism. Further study is required to evaluate the effectiveness of TXA in treating chronic subdural haematoma.

## A Multicentre Study of Patients with Sports- and Recreational Cycling-related Traumatic Brain Injury in Hong Kong

Eric YH Cheung<sup>1</sup>, Peter YM Woo<sup>1</sup>, Fion WY Lau<sup>1</sup>, Nancy WS Law<sup>1</sup>, Carly KY Mak<sup>1</sup>, Peony Tan<sup>1</sup>, Bertrand Siu<sup>1</sup>, Anson Wong<sup>1</sup>, Calvin HK Mak<sup>2</sup>, KY Chan<sup>1</sup>, KY Yam<sup>3</sup>, KY Pang<sup>4</sup>, YC Po<sup>5</sup>, WM Lui<sup>6</sup>, Danny TM Chan<sup>7</sup>, WS Poon<sup>7</sup>

<sup>1</sup> Department of Neurosurgery, Kwong Wah Hospital, Hong Kong

<sup>2</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>3</sup> Department of Neurosurgery, Tuen Mun Hospital, Hong Kong

<sup>4</sup> Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

<sup>5</sup> Department of Neurosurgery, Princess Margaret Hospital, Hong Kong

<sup>6</sup> Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong

<sup>7</sup> Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** To determine the epidemiology of sports-related traumatic brain injury (TBI) in Hong Kong and predictors for recreational cycling-induced intracranial haemorrhage, including the effect of helmet wearing.

**Methods:** This was a five-year retrospective multicentre study of public hospital patients diagnosed with sports-related TBI. Computed tomography scans were reviewed by an independent assessor. The primary endpoint was traumatic intracranial haemorrhage. The secondary endpoint was unfavourable Glasgow Outcome Scale (GOS) outcome at discharge from hospital.

**Results:** In total, 720 patients were hospitalised for sports-related TBI (crude incidence: 1.9 per 100 000). The most popular sport was cycling (59.2%, 426). For cycling-related TBI the incidence was 1.1 per 100 000. Cyclists were prone to having intracranial haemorrhage (odds ratio [OR]=2.3; 95% confidence interval [CI]=1.7-3.2) and unfavourable GOS (OR=2.8; 95% CI=1.3-6.2), compared to patients with TBI due to other sports. In all, 47% of cyclists had intracranial haemorrhage, but only 15% wore a helmet. Significant factors were: age >60 years, antiplatelet medication, moderate or severe TBI, skull fractures and helmet wearing (OR=0.6; 95% CI=0.3-0.9). Among mild TBI cyclists (88.0%, 375/426), helmet wearing was protective against intracranial haemorrhage (OR=0.5, 95% CI=0.3-0.9), in particular epidural (OR=0.8, 95% CI=0.7-0.9) and acute subdural haematomas (OR=0.3, 95% CI=0.1-0.8) as well as skull fractures (OR=0.4, 95% CI=0.2-0.9) regardless of age, antiplatelet medication intake and mechanism of injury. Only 7.3% (31/426) of cyclists had unfavourable outcomes upon discharge from hospital.

**Conclusions:** The incidence of sports-related TBI is low in Hong Kong. Head-injured cyclists have a higher risk of intracranial haemorrhage and unfavourable outcomes. Helmet wearing has a protective effect against intracranial haemorrhage and skull fractures among mildly injured cyclists.

## Comparison of Quantitative Electroencephalography of Patients of Post Concussion Syndrome with Healthy Subjects: A Preliminary Study

MH Yuen<sup>1</sup>, Calvin HK Mak<sup>1</sup>, FC Cheung<sup>1</sup>, YC Chan<sup>2</sup>, KL Chan<sup>2</sup>, KP Yu<sup>2</sup>, KM Tsoi<sup>2</sup>, NF Lui<sup>3</sup>

<sup>1</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>2</sup> Community Rehabilitation Service Support Centre, Queen Elizabeth Hospital, Hong Kong

<sup>3</sup> Occupational Therapy Department, Queen Elizabeth Hospital, Hong Kong

**Objective:** To compare the quantitative electroencephalography (qEEG) parameters of patients of post concussion syndrome (PCS) with those from healthy volunteers to see if there is objective evidence of PCS.

**Methods:** 19-channel EEG by using standard 10-20 international electrode placement system was applied. Ten patients with PCS and 10 healthy control subjects were recruited with EEG data acquired at two conditions (3-minute eyes-close and 3-minute eyes-open). All EEG data was recorded under 250 Hz sampling rate, 2250 mV resolution with 0.1 to 100 Hz bandpass filter and 48-52 Hz notch filter. The EEG data was then analysed using EEGLAB software. Visual inspection, Independent Component (IC) Analysis and IC label application was done for artefacts removal. The qEEG metrics including absolute power and relative power in delta (0.5-4Hz), theta (4-8Hz), alpha (8-12Hz), beta (12-32Hz), pairwise derived Brain Symmetry Index (pdBSI) and coherence were computed.

**Results:** Twenty subjects were recruited with 10 being patients with PCS and 10 being healthy volunteers. There was no significant difference in age distribution for the two groups. After running T-test statistics and qEEG analysis, a significantly higher beta total power in patient with PCS (mean=7.49uV<sup>2</sup>) was found when compared with healthy controls (mean=4.50uV<sup>2</sup>) across the eyes-closed condition ( $t[18]=14.60$ ,  $P=0.048$ ). Significant lower relative power in theta in patients with PCS (mean=0.07) was also found when compared with healthy controls (mean=0.10) across the eyes-closed condition ( $t[18]=12.28$ ,  $P=0.033$ ).

**Conclusion:** There were significant differences in qEEG parameters between the two groups in this small scale preliminary trial. Further study is recommended to see if qEEG can be used as an objective diagnostic tool for PCS.

## Oxygen Therapy for Chronic Subdural Haematoma after Burr-hole Drainage? Faster Pneumocephalus Resorption with Postoperative Supplemental Low-flow Normobaric Oxygen

David YC Chan, WS Poon, Stephanie CP Ng, KT Yeung, Gabriel YY Lu, Emily KY Chan, Rebecca YT Ng, WK Mak, Danny TM Chan, George KC Wong

Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

**Objective:** Significant postoperative pneumocephalus was independently associated with chronic subdural haematoma (cSDH) recurrence. Pneumocephalus resorption (PR) rate might be a modifiable factor. This study aimed to evaluate the differences in PR rates in postoperative cSDH in room air versus with supplemental oxygen.

**Methods:** Consecutive adult cSDH patients with burr-hole drainage from 1 April to 31 December 2020 at Prince of Wales Hospital were reviewed. The primary outcome was the pneumocephalus resorption rate per hour between the first and second postoperative CT scan in cSDH patients with room air, versus patients with supplemental low-flow oxygen (2-6 L/min O<sub>2</sub>) during the early postoperative period. Secondary outcomes included recurrence rate, 30-day mortality, and functional outcome in terms of modified Rankin Scale (mRS) at 3 months and 6 months.

**Results:** In total 55 patients were recruited in this study. The average pneumocephalus volume was 22.4 mL (range, 1 mL-128.5 mL) in the first postoperative computed tomography (CT). The average interval between the first and second CT was 30.9 hours (range, 5.3 hours-93.8 hours). The average pneumocephalus volume in the second CT was 12.8 mL (range, 0 mL-125.9 mL). The average hourly resorption rate of pneumocephalus was 1.11% (standard deviation [SD]=0.6%) for room air versus 2.39% (SD=1.6%) with supplemental oxygen therapy ( $P<0.001$ ). There were no significant differences in the secondary outcomes.

**Conclusion:** Pneumocephalus resorption rate was significantly higher in cSDH patients with low-flow supplemental oxygen during the early postoperative period. Further studies are required to determine the optimal timing, dosage, and duration of the oxygen therapy for any potential improvement in the clinical outcomes.

## Concomitant Placement of Intracranial Pressure Monitor during Isolated Acute Subdural Haematoma Evacuation Does Not Improve Neurological Outcomes

FP 1.6

SL Lee, Jason Ho  
Division of Neurosurgery, Tuen Mun Hospital, Hong Kong

**Objective:** To investigate and compare the outcomes in patients who underwent isolated acute subdural haematoma evacuation with or without concomitant placement of intracranial pressure (ICP) monitor.

**Methods:** A 20-year single-institution retrospective comparison between change in neurological status of patients who underwent isolated acute subdural haematoma evacuation with or without concomitant placement of intracranial pressure monitor. The primary outcome of change in neurological status was defined as the difference between the best postoperative Glasgow Coma Scale (GCS) and the most immediate preoperative GCS. Secondary outcomes including change in management, including medical and surgical management of elevated ICP, and 30 days mortality were also studied.

**Results:** There was no significant difference in neurological outcomes between patients who underwent concomitant placement of intracranial pressure monitor. There was no significant change in medical management, operative management, or 30 days mortality.

**Conclusion:** There is no utility in the concomitant placement of intracranial pressure monitor in isolated acute subdural haematoma evacuation. The use of unnecessary invasive monitoring should be minimised to optimise operative time, nursing care, and reduce direct and indirect complications.

## Traumatic Cerebrovascular Injury: A Retrospective Review in a Major Trauma Centre in Hong Kong

FP 1.7

WZ Ye, JK Sham, FC Cheung  
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

**Objective:** Blunt traumatic cerebrovascular injury (TCVI) is one of the commonly associated injuries in major trauma patients. It is however easily missed and devastating consequence of stroke can be potentially preventable with early diagnosis and treatment. This study is performed to review the outcome of this group of patients in a major trauma centre.

**Methods:** This is a retrospective review of patients admitted to Queen Elizabeth Hospital from January 2015 to June 2021 with TCVI. The demographics, mechanism of injury, pathology, treatment, and outcome of these patients are investigated.

**Results:** A total of 12 patients are included, age ranging from 20 to 60, two-third are male. Mechanisms of injury include 41% fall from height, 21% road traffic accident, and 16% slip and fall. The pathologies include carotid or vertebral artery dissection, pseudoaneurysm, and carotid-cavernous fistula. In all, 66% of patients have associated skull base fracture. Concerning treatment, 50% of these patients require surgical intervention which include stenting, embolization of pseudoaneurysm and carotid-cavernous fistula. The other half of patients require aspirin alone. The overall stroke rate is 25%. The risk factors associated with TCVI would be investigated and presented.

**Conclusion:** TCVI is often underdiagnosed and patients with TCVI has high risk of stroke. High clinical suspicion with early diagnosis and treatment is required.

## “Blood-Brain Matters”—A Study on the Clinical Impact of Anaemia in Neurocritical Care of Ruptured Intracranial Aneurysms

Carmen Yim, Ronald Li, Alain KS Wong, KY Chan  
Department of Neurosurgery, Kwong Wah Hospital, Hong Kong

**Objective:** To study the prevalence of anaemia in neurocritical care patients with ruptured intracranial aneurysms managed by endovascular coiling, the trend of haemoglobin and haematocrit in the acute phase of subarachnoid haemorrhage (Day 0 to Day 14), and the risk factors and clinical impact of anaemia.

**Methods:** This is a 9-year retrospective review of patients admitted to the Department of Neurosurgery, Kwong Wah Hospital, from 2012 to 2020, with subarachnoid haemorrhage secondary to ruptured intracranial aneurysms and received endovascular management. A total of 187 cases are recruited. Primary outcomes are the prevalence of anaemia and the clinical outcomes of anaemic and non-anaemic patients. This study will look into the percentage of anaemic patients, the mean and nadir haemoglobin and haematocrit levels at Day 0 to Day 14 of subarachnoid haemorrhage, and the percentage of red cell transfusion. Regarding the clinical impact of anaemia, we will compare the percentage of vasospasm, cerebral infarct, myocardial infarct, modified Rankin Scale upon discharge, length of hospital stay and mortality rate between patients with and without anaemia. For the secondary outcomes, we would like to identify risks factors associated with anaemia by performing regression analysis of the baseline haemoglobin level, iron deficiency, the use of aspirin and anticoagulant and their associations with anaemia. Statistical analysis will be performed by SPSS (Windows version 26; IBM Corp, Armonk [NY], United States).

**Results:** A downward trending of haemoglobin and haematocrit level is observed at Day 0 to Day 14 post-subarachnoid haemorrhage. Up to 80% of patients developed anaemia, with most of them being mildly anaemic. Patients with moderate and severe anaemia in general have longer hospital stay and a poorer modified Rankin Scale score upon discharge. In patients with vasospasm and cerebral infarct, the majority of them are from the moderately anaemic group. The relationships between anaemia and its risk factors are to be investigated.

**Conclusion:** Anaemia is a commonly observed condition in neurocritical patients and is associated with poorer clinical outcomes. More judicious use of intravenous fluid and lower threshold for blood transfusion can be considered in future neurocritical care.

## Resource Optimisation to Improve Outcome in the Timely Treatment of Large Vessel Stroke in Hong Kong

Vincent KY Pang, MWY Lee, FLY Ho, RSK Chan, TSR Chow  
Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

**Objective:** Identify opportunities to enhance the care of acute large vessel stroke patients by examining early aspects of hospital care in Hong Kong with considerations on resource distribution.

**Methods:** This is a retrospective case series study of consecutive patients admitted to Pamela Youde Nethersole Eastern Hospital between April 2020 to June 2021. Suitable cases outside Pamela Youde Nethersole Eastern Hospital service hours will be transferred to Queen Mary Hospital for further management after discussion with Queen Mary Hospital neurovascular team. We have reviewed records to compare the elapsed time from “onset of stroke” and “door-to-groin puncture time” (primary outcomes) and modified Rankin Scale (mRS) at 90 days and thrombolysis in cerebral infarction score (secondary outcomes). Other relevant parameters were examined.

**Results:** There were 25 mechanical thrombectomy cases performed in Pamela Youde Nethersole Eastern Hospital, while there were 16 cases transferred to Queen Mary Hospital. The baseline demographics and clinical characteristics of the two group were similar. The mean “computed tomography angiography [CTA] to groin puncture time” in Pamela Youde Nethersole Eastern Hospital group was  $31.6 \pm 18.9$  minutes, while that of Queen Mary Hospital group was  $154 \pm 31.3$  minutes. Concerning patients with anterior circulation stroke, functional independence rate (mRS 0-2 at 90 days) was 30% in Pamela Youde Nethersole Eastern Hospital group and 15.4% in Queen Mary Hospital group. The revascularisation outcome and mortality at 90 days were similar in both groups.

**Conclusion:** Within our study period, we have found that “CTA to groin puncture time” will be increased inevitably in those cases requiring interhospital transfer. This may be one of the contributing factors for functional outcome of our patients. Fine tuning of interhospital logistics and adding interventionists could elevate the level of timely care for acute stroke service in Hong Kong.

## How Old Is Too Old? Outcomes and Poor Prognostic Factors in Geriatric Patients Receiving Intra-arterial Thrombectomy for Large Vessel Occlusion

Stephanie WY Yu, TF Zhuang, Anderson CO Tsang, Olivia MY Choi, WM Lui  
Department of Neurosurgery, Queen Mary Hospital, Hong Kong

**Objective:** To review the clinical outcomes of patients aged 80 or above with large vessel occlusions in these geriatric patients and identify factors associated with poor prognosis.

**Methods:** This is a retrospective case series including all patients aged 80 or above from 2018 to 2021, who underwent mechanical thrombectomy for large vessel occlusion in our centre. Demographics, procedural variables, mode of anaesthesia, clinical outcome measures were extracted. The rate of thrombolysis in cerebral infarction (TICI) 2B grade or above recanalisation, symptomatic haemorrhage and favourable clinical outcome were identified.

**Results:** A total of 85 patients were identified. Mean age was 85.5 years old. In all, 47% of patients were 85 or older. Median National Institutes of Health Stroke Scale score was 22, the median Alberta stroke programme early computed tomography score was 9. Only 75 patients underwent thrombectomy after diagnostic angiography was performed. Successful recanalisation (TICI 2B/3) was achieved in patients (89.7%). Favourable outcome (modified Rankin Score 0-2 at 3 months) was observed in 26 patients out of 75 (35.1%). The mortality at 3 months was 29.7%. Intraoperative complications occurred in 15% of patients, including embolisation to new territory, vessel dissection, perforation with contrast extravasation and others. Significant haemorrhage occurred in 3.7 % of patients.

**Conclusion:** Mechanical thrombectomy in geriatric patients old than 80 years of age is feasible and safe. Acceptable clinical outcome occurred in 35.1% of patients. Therefore, mechanical thrombectomy should not be withheld from very elderly patients.

## Neurological Complications in Patients on Extracorporeal Membrane Oxygenation: Predictors, Outcomes, and Implications for Surgical Management

Christopher HF Sum, LF Li, Kevin KF Cheng, Wilson WS Ho, WM Lui  
Division of Neurosurgery, Department of Surgery, The University of Hong Kong, Hong Kong

**Objective:** There is paucity of data in existing literature to guide management of neurological complications in extracorporeal membrane oxygenation (ECMO) patients. We studied the incidence of neurological complications, predictors of intracranial bleeding and 30-day mortality, and reviewed outcomes of management in this unique group of patients.

**Methods:** From August 2015 to July 2021, 349 consecutive patients had ECMO insertion at Queen Mary Hospital. Patients with ischemic or haemorrhagic intracranial events were included. Nested case-control with 1:2 nearest neighbour matching was performed (without replacement) to identify a group without neurological complications. Univariate and multivariate logistic regressions studied the predictors for intracranial bleeding (ICH) and 30-day mortality. Finally, a case series of ECMO patients who underwent neurosurgical interventions were reviewed.

**Results:** The incidence of neurological complications was 11.2% (39/349). Extracranial bleeding (adjusted odds ratio [OR]=8.25 [2.78-25.11],  $P<0.001$ ), prior cardiopulmonary resuscitation (CPR) [adjusted OR=2.63 (1.16-6.25),  $P=0.021$ ], lower platelet (adjusted OR=0.99 [0.99-1.00],  $P=0.049$ ) and higher activated partial thromboplastin time (APTT) levels (adjusted OR=1.15 [1.01-1.32],  $P=0.032$ ) were independent predictors of intracranial haemorrhage. Presenting Glasgow Coma Scale (GCS) [adjusted OR=0.80 (0.68-0.95),  $P=0.012$ ] and ICH volume (adjusted OR=1.05 [1.00-1.10],  $P=0.038$ ) predicted 30-day mortality. The 30-day mortality was 42.9% for the seven ECMO patients who underwent neurosurgical interventions, which had no significant difference compared with the non-operated group (13.6% vs 23.5%,  $P=0.350$ ).

**Conclusion:** Three were significantly more intracranial haemorrhage in our ECMO cohort compared to Caucasian data. Extracranial bleeding, prior CPR, lower platelet and higher APTT levels independently predicted incidence of intracranial bleeding in ECMO patients. Presenting GCS and ICH volume significantly predicted 30-day mortality. Neurosurgical interventions did not alter the rate of 30-day mortality.



## Comparison of Transradial versus Transfemoral Access for Interventional Neuro-endovascular Procedures: A Clinical and Technical Outcome Study

Janet HM Wong<sup>1</sup>, Christopher HF Sum<sup>2</sup>, Anderson CO Tsang<sup>2</sup>, WM Lui<sup>2</sup>, WP Cheng<sup>1</sup>, Edward YL Chu<sup>1</sup>, Raymond Lee<sup>1</sup>

<sup>1</sup> Department of Radiology, Queen Mary Hospital, Hong Kong

<sup>2</sup> Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong

**Objective:** There is a rising trend for a “radial-first” paradigm to be adopted in interventional neuro-endovascular procedures. We aimed to study the major outcomes measures of transradial access (TRA) in a tertiary neuro-endovascular centre.

**Methods:** From September 2020 to July 2021, 96 consecutive neurovascular interventional procedures were performed at Queen Mary Hospital. They were dichotomised into the transradial and transfemoral access (TFA) groups. Independent variables, such as baseline demographics, the use of antiplatelet or anticoagulation, sheath size, indication and setting (emergency or elective) of procedure, were collected. To achieve balance in the co-variables, propensity score matching in 1:1 ratio without replacement was performed with caliper value set at 0.2. We compared the access-site and overall complications, procedural time, technical success rate, and duration of hospital stay between the matched TFA and TRA cohorts.

**Results:** Before matching, TRA patients were significantly younger ( $P < 0.001$ ) and were associated with substantially less emergency procedures (46.7% vs 87.9%,  $P < 0.001$ ). The rate of overall complications was higher in the TFA group (16.7% vs 0%,  $P = 0.016$ ), as was for access-site complication rate (9.1% vs 0%,  $P = 0.098$ ). Mean procedural time was longer in the TRA group (149 min vs 105 min,  $P = 0.012$ ). The technical success rate (successful cannulation of target vessel without crossover) was similar (83% vs 94%,  $P = 0.13$ ). After matching, 22 patients in each group were yielded. TRA group had lower rates of overall complications (0% vs 18.2%,  $P = 0.05$ ), and access-site complications (0% vs 13.6%,  $P = 0.17$ ). The mean procedural time ( $P = 0.71$ ) and length of hospitalisation ( $P = 0.614$ ) was similar. The technical success rate was slightly lower than the TFA group (77.3% vs 100%,  $P = 0.048$ ).

**Conclusion:** Transradial access for interventional neuro-endovascular procedures was shown to have lower overall complications and a trend towards lower access-site complications, with similar procedural time and acceptable technical success rate.

## Inhibition of C-X-C Motif Chemokine Receptor 3 Improved the Outcomes of Intracerebral Haemorrhage

Anson CK Ng, Cathy JX Liu, Karrie MY Kiang, John ZY Zhu, Katrina CW Chau, TL Lam, Gilberto KK Leung

Division of Neurosurgery, Department of Surgery, The University of Hong Kong, Hong Kong

**Objective:** To examine the effects of inhibition of C-X-C Motif Chemokine Receptor 3 (CXCR3), a chemokine receptor, on the outcomes of experimental intracerebral haemorrhage (ICH) and to explore the potential underlying mechanism.

**Methods:** Wild-type C57BL/6N and CXCR3 Knock-Out mice were used in this study. Experimental ICH was induced via intra-striatal injection of 0.04U Type IV collagenase in 0.5ul of 0.9% normal saline. The cylinder test, rotarod test and grid walking test were used to assess motor outcomes. Demyelination was examined by transmission electron microscopy and immunofluorescence staining. Real-time quantitative polymerase chain reaction was used to quantify the relative mRNA expression levels of CXCR3 and pro-inflammatory markers. The cell types that expressed CXCR3 and the changes in the percentages of various cell populations in brain and blood were detected by flow cytometry.

**Results:** CXCR3 Knock-Out mice had better motor functions especially in the first week after ICH. The degree of demyelination of the CXCR3 Knock-out mice was less severe compared to that of the Wild-Type mice. The relative expression levels of several pro-inflammatory markers are under investigation. CXCR3 mRNA expression was upregulated in the perihaematoma area but not in the contralateral hemisphere. A subpopulation of T cells was the main cell type that carried CXCR3. Preliminary result showed that CXCR3 expression was also upregulated in a T cell subpopulation in the peripheral blood in addition to its upregulation in the brain post-ICH.

**Conclusion:** The inhibition of CXCR3 improved outcomes of ICH in mice potentially via the reduction in neuroinflammation.

## Is Arthroplasty a Better Alternative to Anterior Cervical Discectomy and Fusion in Patients With Cervical Spinal Degenerative Disease?

FP 3.1

LK Cheung<sup>1</sup>, Allan NL Chan<sup>2</sup>, HY Law<sup>1</sup>, YC Po<sup>2</sup>, KY Yam<sup>1</sup>

<sup>1</sup> Department of Neurosurgery, Tuen Mun Hospital, Hong Kong

<sup>2</sup> Department of Neurosurgery, Princess Margaret Hospital, Hong Kong

**Objective:** To investigate the operative outcome between arthroplasty and anterior cervical discectomy and fusion (ACDF) in patients with cervical spinal degenerative disease.

**Methods:** This was a 10-year retrospective review of all the patients with cervical spinal degenerative disease who received either arthroplasty or ACDF in two tertiary hospitals. Operative outcome including duration of surgery, blood loss, hospital length of stay, postoperative pain control and neurological improvement in terms of Japanese Orthopaedic Association score, neck disability score and 36-item short form survey (SF-36) will be reviewed.

**Results:** A total of 48 patients were recruited in this study, 30 cases with ACDF done, 11 cases with arthroplasty done, and the remaining cases with both procedures done. Patients received arthroplasty had lower incidence of adjacent segment disease compared with those received ACDF. They had similar rate of operative complication, neurological improvement and pain control after the surgery. There was no statistical significance between two groups in terms of the operative time and blood loss as well.

**Conclusion:** Arthroplasty is non-inferior to ACDF and should be considered in younger patients with cervical degenerative disease in order to preserve range of movement and prevent adjacent segment disease.

## Illustrative Case Series of the Degenerative Cervical Myelopathy: Dilemmas in Surgical Management

FP 3.2

Brandon CK Ma, JCY Hung, MWY Lee, TSF Chow

Division of Neurosurgery, Department of Surgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

**Objective:** There is no clear consensus among neurosurgeons on when to offer surgical decompression for asymptomatic or mildly symptomatic patients with degenerative cervical myelopathy. We reviewed the case history of three patients to illustrate the complications attributable to such ambiguity.

**Methods:** A retrospective case review of three patients evaluated and managed at the Specialist Outpatient Department of Pamela Youde Nethersole East Hospital for degenerative cervical myelopathy/stenosis. Medical record was analysed.

**Results:** Case 1: A 58-year-old man with symptomatic central cord syndrome deferred surgery for over 20 years progressed from gainfully employment to wheelchair bound. Case 2: A 68-year-old woman, with undiagnosed cervical stenosis became quadriparetic after a fall, underwent surgical decompression with spinal reconstruction. Case 3: Minimally symptomatic active 64-year-old man with severe C3/4 stenosis.

**Conclusion:** The incidence of fall amongst the elderly population is high in Hong Kong with devastating personal suffering and society cost. Silent cervical myelopathy is prevalent in the elderly. The symptoms of slowly progressive degenerative spinal canal stenosis are typically subtle and often dismissed by those afflicted until a precipitous injury causing quadri-paresis or -plegia. These narratives support the proposal that vigilant monitoring for signs, symptoms, and structural defects of cervical cord dysfunction is important to diagnose silent or subclinical myelopathy among the aged. Better disseminated information about this condition's natural history and treatment options should enhance patient health and wellbeing.

## A Case of Bilateral Cervical Spondylolysis at the Sixth Cervical Vertebra and Review of Literature and Its Surgical Approach

Bill KB Wong, Tom SF Chow

Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

**Objective:** To describe a case of bilateral spondylolysis at the sixth cervical vertebra (C6) of a Chinese female and to review the literature for the aetiology and the surgical treatment of cervical spondylolysis.

**Methods:** A 63-year-old Chinese female presented with neck pain and finger numbness for 2 years. Plain radiographs showed a radiolucent defect of the articular pillar and cleft of spinous process of C6. Computer tomography showed a well corticated discontinuity of bilateral C6 laminae and confirmed the diagnosis of cervical spondylolysis. A literature review of the cases with bilateral cervical spondylolysis at C6 treated surgically is undertaken.

**Results:** The patient's radiological images were reviewed and was advised for an anterior cervical discectomy with interbody and anterior plate instrumentation at the sixth/seventh cervical vertebra. C6 vertebra was noted to be unique in its anatomy which may post a vulnerable site for trauma and stress fracture, leading to cervical spondylolysis.

**Conclusion:** This case suggests that a systematic evaluation of symptoms, associated abnormalities, and the presence of instability in patients with bilateral cervical spondylolysis is important in formulating an optimal treatment plan for the patient. We also advocate early surgical approach in an unstable and symptomatic patient suffering from bilateral cervical spondylolysis.

## Tarlov Cyst: Image-guided Intervention

Derek WL Ng<sup>1</sup>, Norren NL Chan<sup>1</sup>, Justin Christopher Ng<sup>2</sup>, FC Cheung<sup>1</sup>

<sup>1</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>2</sup> Department of Radiology, Queen Elizabeth Hospital, Hong Kong

**Objective:** To review the effectiveness and complications of computed tomography-guided aspiration and tissue glue injection for symptomatic Tarlov Cyst at Queen Elizabeth Hospital.

**Methods:** A retrospective observational study of the nine procedures performed since the commencement of service in October 2020 at Queen Elizabeth Hospital.

**Results:** In all, 56% of the procedures had led to symptoms improvement. All patients were discharged on the same day of admission. There was no significant adverse effect or complication.

**Conclusion:** Computed tomography-guided aspiration and tissue glue injection is a relatively non-invasive, effective, and safe treatment modality that can be considered in the management of symptomatic Tarlov cyst.

## Glioblastoma Patient Survival Predictors Treated by the Hong Kong Hospital Authority: A Multicentre Retrospective 15-Year Review

FP 5.1

Sarah SN Lau, Peter YM Woo, Louisa Lui, Herbert HF Loong, TC Lam, Aya El Helali, Ken KM Cheung, Amanda Kan, Tony KT Chan, Joyce SW Chow, Calvin HK Mak, Michael WY Lee, LF Li, ST Wong, Danny TM Chan, Stephen Yau, Jenny KS Pu, WS Poon  
The Hong Kong Neuro-Oncology Society

**Objective:** To review predictors for overall survival (OS) among glioblastoma (GBM) patients treated by the Hong Kong Hospital Authority.

**Methods:** This was a multicentre retrospective study of adult patients with a histological diagnosis of glioblastoma from the 2006 to 2020. Only patients treated by the Hospital Authority's seven Neurosurgical units were included. Clinical, tumour molecular and radiological data were collected. Predictors for OS were identified by log-rank testing followed by multivariate analysis using Cox regression.

**Results:** A total of 1033 patients were identified during this 15-year period. The mean age was  $57 \pm 14$  years (range, 18-91) and the female-to-male ratio was 1:1.6. In all, 8% (84/1033) of patients were lost to follow-up. In total, 93% (956/1033) had primary GBM with 58% (602/1033) having a Karnofsky performance scale score (KPS) of  $\leq 70$  on presentation. The most common tumour location was the frontal lobe (34%, 351/1033) followed by temporal (27%, 279/1033) and parietal lobes (26%, 269/1033). Of the 693 (67%/1033) tumours that were subject to pMGMT methylation testing, 45% (313/693) were methylated. Of the 425 tumours (41.1%) that had IDH-1 testing, 13% (54/425) were mutated. In all, 31% (320/1033) of patients underwent gross total resection and 15% (155) only had a biopsy. In total, 51% (524/1033) of patients underwent adjuvant concomitant temozolomide chemo-radiotherapy (CCRT). Median OS (mOS) was 11.1 months (interquartile range [IQR]=15.4 months). The 6-, 12- and 24-month survival rates were 71%, 46% and 20%, respectively. Although there was an increase in mOS over the three time-periods: 2006-2010 (11.1 months), 2011-2015 (11.4 months) and 2016-2020 (13.0 months), this was not significant (P value=0.23, log-rank test). Independent predictors for OS were: preoperative KPS  $\geq 80$  (adjusted odds ratio [aOR]=0.73; 95% confidence interval [CI]=0.56-0.93), gross total or subtotal resection (aOR=0.70; 95% CI=0.51-0.94), CCRT (aOR=0.43; 95% CI=0.34-0.55), pMGMT methylated (aOR=0.64; 95% CI=0.50-0.85) and IDH-1 mutated tumours (aOR=0.65; 95% CI=0.44-0.95).

**Conclusion:** This is one of the largest cohorts of Chinese glioblastoma patients in the literature. Patients with pMGMT unmethylated GBM may benefit from temozolomide CCRT. In the last 15 years, there has been no significant increase in overall survival.

## Early Outcome after Transsphenoidal Surgery for Management of Hormone Secreting Pituitary Adenoma: A Single-centre Experience in Hong Kong

Jennie SY Yeung, KH Chow, YC Po  
Department of Neurosurgery, Princess Margaret Hospital, Hong Kong

**Background:** Transsphenoidal surgery has been used to treat hormone secreting pituitary adenoma (including GH secreting, ACTH secreting, TSH secreting, FSH secreting adenoma and prolactinoma that presented with apoplexy). In this retrospective study, we aimed to evaluate the clinical, hormonal, and radiological outcomes of hormonal secreting pituitary adenoma treated with transsphenoidal surgery in our centre from July 2016 to June 2021. We would also review perioperative complications including craniospinal fluid leakage and diabetes insipidus in these patients.

**Methods:** We reviewed medical records of patients who underwent transsphenoidal surgery for pituitary adenoma in Princess Margaret Hospital of Hong Kong from July 2016 to June 2021. Pituitary adenoma with abnormal hormonal secretion and with postoperative hormonal blood test are included in this study. The hormonal control rate for acromegaly and Cushing disease with and without medication are calculated. The perioperative complications including craniospinal fluid leakage and diabetes insipidus are calculated. The timing from surgery to hormonal control, need of second operation and need of adjuvant therapy are also reviewed. The postoperative magnetic resonance imaging is reviewed for any residual tumour.

**Results:** There were 100 transsphenoidal surgeries for pituitary adenoma, 19 for hormonal secreting pituitary adenoma. These included 11 for acromegaly, 4 for Cushing disease, 2 for prolactinoma with apoplexy, 1 for TSH secreting adenoma, and 1 for FSH secreting adenoma. For acromegaly patients, 82% achieved hormonal control without medication, the remaining achieved hormonal control with bromocriptine. For Cushing disease patients, all of them achieved hormonal control without medication. For prolactinoma patients, they have persistent high prolactin level that need medication. The TSH secreting adenoma patient has normal TSH level but increased free T4 level, offered re-operation but patient refused. The FSH secreting adenoma patient has normal FSH level postoperatively.

**Conclusion:** Hormonal control can be achieved after surgery in most patients with acromegaly and Cushing disease.

## Effect of Orbitotomy on Surgical Freedom in Endoscopic Transorbital Approach to the Skull Base: An Anatomical Study

CF Ng<sup>1</sup>, Stacey Carolyn Lam<sup>2</sup>, SC Lam<sup>1</sup>, TS Tse<sup>1</sup>, Hunter KL Yuen<sup>2</sup>, Calvin HK Mak<sup>1</sup>

<sup>1</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>2</sup> Department of Ophthalmology and Visual Sciences, Hong Kong Eye Hospital, Hong Kong

**Objective:** This is the first anatomical study to investigate the angle of attacks and surgical freedom in different extents of orbitotomy for Endoscopic Transorbital Approach (ETOA) to the skull base.

**Methods:** This is an anatomical and radiological study in which Digital Imaging and Communications in Medicine (DICOM) of plain cut computed tomography of brain is retrieved and analysed using a commercial medical imaging viewer. Four types of orbitotomy (Group 1: supraorbital rim with lateral orbital rim resection; Group 2: limited supraorbital rim with lateral orbital rim resection; Group 3: lateral orbital rim resection; Group 4: No orbitotomy) were calculated on both sides of 19 patients. Angle of attacks and surgical freedom were calculated with reference to three dimensional coordinates of 4 target points (1. Foramen ovale; 2. Foramen rotundum; 3. End of lacerum segment of internal carotid artery; 4. Internal acoustic meatus) and compared among four groups using paired-sample t-test.

**Results:** There is a statistically significant increase in surgical freedom, horizontal and vertical angle ( $P < 0.001$ ) in Group 1 to 3 compared to Group 4. The horizontal and vertical angles for the four reference points were the same across Group 1 to 3 and was increased compared to Group 4. Whereas, with greater extent of orbitotomy, there is a larger increase in surgical freedom.

**Conclusion:** Removal of lateral orbital rim is useful to increase the angle of attack to skull base lesions whereas the area of orbitotomy is the main determinant of surgical freedom in ETOA. Lateral orbital rim removal should be considered when ETOA is used for deep seated skull base pathologies to improve visualisation and minimise retraction related morbidities.

## Timing of Stereotactic Radiosurgery after Resection of Brain Metastases— Does It Affect the Outcome?

FP 5.4

WL Cheung, Jason MK Ho, KY Yam  
Department of Neurosurgery, Tuen Mun Hospital, Hong Kong

**Objective:** To investigate whether the timing of postoperative stereotactic radiosurgery/radiotherapy would affect the local control and survival in patients with brain metastases.

**Methods:** Patients who had brain metastases resected and treated with adjuvant single-fraction stereotactic radiosurgery (SRS) or multiple-fraction stereotactic radiotherapy (SRT) from 2016 to 2020 in Tuen Mun Hospital were identified. Cases of recurrent brain metastases with previous radiation and surgery were excluded. The time from surgery to magnetic resonance imaging (MRI) and SRS/SRT were recorded. The presence of local recurrence, distant brain metastases, leptomeningeal disease and radionecrosis and the survival were recorded. Potential predictive factors including age, the histology of primary, extracranial disease control, the extent of excision, number, size, and site of tumour were analysed.

**Results:** Total 34 patients were included. The median time from surgery to SRS/SRT was 45 days (19 to 115 days). The local recurrence rate changed most significantly at a cut-off of 6 weeks. For the patients who had SRS/SRT within 6 weeks, the local recurrence rate was 6.67%. It was significantly increased to 36.8% ( $P=0.039$ ) in the patients who received SRS/SRT after 6 weeks. There was no significant difference between two groups in term of median survival (23 months in group with SRS/SRT <6 weeks and 22 months in group with SRS/SRT >6 weeks). The rate of radionecrosis did not differ significantly between two groups (20% with SRS/SRT <6 weeks vs 31% with SRS/SRT >6 weeks,  $P=0.447$ ). There was no significant difference observed in other factors including the extent of excision, extracranial disease control, the site, and the size of tumour.

**Conclusion:** Postoperative SRS/SRT should be commenced early after surgery. Delayed SRS/SRT beyond 6 weeks was associated with a lower local control rate.

## Sodium Fluorescein Guided Surgery for High Grade Glioma—A 3-Year Review

FP 5.5

KC Chan, KW See, TL Poon, FC Cheung  
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

**Objective:** To investigate cases of high-grade glioma with sodium fluorescein guided resection and analyse the difference in outcome between sodium fluorescein-guided surgery and image-guided surgery in high grade glioma.

**Methods:** This is a 3-year retrospective review of the use of sodium fluorescein guidance in high grade glioma resection in Queen Elizabeth Hospital from 2019 to 2021. Patients' demographics and tumour characteristics were collected. Primary outcome was defined by extent of resection derived from pre- and postoperative magnetic resonance imaging by semi-automatic volumetric assessment. The overall survival and presence of neurological deficit after operation were also assessed as part of patients' outcome.

**Results:** About 30 patients with high grade glioma resection done were included. The extent of resection was 80% with fluorescein guidance and 70% with image guidance only. No patients reported any local or systemic side-effects after fluorescein injection. There is no significant difference in rate of postoperative neurological deficit.

**Conclusion:** Intraoperative usage of sodium fluorescein guidance in high grade glioma resection is effective and safe in increasing the extent of resection.

## Outcome Analysis of Neuromodulative Surgery for Drug Refractory Epilepsy: A Review of 6-Year Experience in Queen Elizabeth Hospital

KW See<sup>1</sup>, WZ Ye<sup>1</sup>, Germaine HF Chan<sup>2</sup>, KW Fong<sup>2</sup>, Michelle Tse<sup>3</sup>, Iris Chan<sup>3</sup>, YF Cheung<sup>2</sup>, TL Poon<sup>1</sup>, FC Cheung<sup>1</sup>

<sup>1</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>2</sup> Department of Medicine, Queen Elizabeth Hospital, Hong Kong

<sup>3</sup> Department of Clinical Psychology, Queen Elizabeth Hospital, Hong Kong

**Objective:** Neuromodulative surgery improves seizure control in patients with drug resistant epilepsy yet unsuitable for resection surgery. Vagal nerve stimulation (VNS) and deep brain stimulation (DBS) are the two modalities of intervention available in Hong Kong. We would like to review our cases of neuromodulation, in order to formulate patient selection criteria.

**Methods:** This was a 6-year retrospective study of neuromodulative surgery for drug resistant epilepsy patients, in terms of patient selection, effectiveness of seizure control and comparison between vagal nerve stimulation and deep brain stimulation.

**Results:** In total 14 patients reviewed, 11 of them had VNS and 3 of them had DBS. After surgery, there were lower frequency and shorter duration of seizure attacks, less severe symptoms, and less secondary generalisations in those with partial onset. One year time after operation, >50% of the patient have seizure reduction by more than 50%. Two of these patients also had improvement on psychiatric aspects with reduction in irritability. For outcome of DBS, all the three cases showed significant decrease in duration and severity of attacks. Out data also showed that in patients with temporal epilepsy, DBS had the tendency to improve seizure control more than those with VNS done.

**Conclusion:** Both vagal nerve stimulation and deep brain stimulation are effective neuromodulative surgery for drug resistant epilepsy. Good case selection is one of the keys to achieve satisfactory outcome.

## Overview of the Aetiologies & Outcomes of Traumatic Brain Injury in Different Paediatric Age-groups before and during the COVID-19 Pandemics

JF Liu, Joyce SW Chow, FC Cheung

Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

**Objective:** (1) To identify the common aetiologies of traumatic brain injury (TBI) in different paediatric age-groups; (2) to compare causes of paediatric TBI before and during the COVID-19 period; (3) to identify the surgical outcomes of those who underwent an emergency operation because of their head injury.

**Methods:** This is a retrospective review by selecting paediatric patients admitted with a TBI to Queen Elizabeth Hospital from 2016 to 2020. We divide them into different age-groups, including neonates (0-1 month), infants (1 month-1 year), toddler (1-3 years), pre-school (3-6 years), school-age (6-12 years), and adolescent (12-18 years), and review their admission notes, discharge summary, and outpatient follow-up documents. Their data were entered into an excel spreadsheet. Frequency and percentages are used to present the categories variable. For the outcome analysis, we use Glasgow Outcome Score (GOS) as the primary outcome, while the secondary outcome to be the length of the hospital stay.

**Results:** A total of 156 patients' data were retrieved from the Cancer Data Access System. The most common cause of TBI in infants (n=31) and toddler (n=38) groups was 'fall from bed' and occupied 58% and 43%, respectively. Compared to pre-school kids (n=33), TBI was often found in recreational activities (55%). There are no specific causes identified among school-age children (n=30). However, for the adolescent group (n=24), assault (42%) is the most significant cause and followed by TBI during sports injuries (25%). Overall, the outcome of Paediatrics TBI is promising, with majorities (84%) stayed in the hospital for less than or equal to three days. Even though minorities (0.04%) of cases may require emergency surgeries, all patients can achieve good recovery afterward.

**Conclusion:** Overall, majorities of the Paediatrics TBI are found in those aged less than 3, with the most common reason being 'fall from bed' followed by TBI during the recreational activities. They demonstrate good recovery potential in the long run.

**Remarks:** The above result and conclusion are based on the statistics in 2020. After reviewing the data, we would like to extend our inclusion criteria to include those admitted with TBI in recent 5 years. Firstly, to compare their causes before and during the COVID-19 period. Secondly, to involve more patients who underwent surgery to compare their surgical outcomes.

## Open Cranial Vault Remodelling versus Endoscopic Suturectomy with Postoperative Helmet Therapy for Non-syndromic Craniosynostosis

HY Lau, Kevin KF Cheng, Wilson WS Ho, WM Lui

Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong

Department of Surgery, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong

Department of Neurosurgery, Hong Kong Children's Hospital, Hong Kong

**Objective:** To review the perioperative outcomes of paediatric patients with non-syndromic craniosynostosis treated with open cranial vault remodelling or endoscopic suturectomy with postoperative helmet therapy.

**Methods:** Endoscopic suturectomy is an emerging approach to treat craniosynostosis, with postoperative helmeting to aid early correction of head shapes. This was an 11-year retrospective review of paediatric patients with non-syndromic craniosynostosis who received either open cranial vault remodelling or endoscopic suturectomy in Queen Mary Hospital and Hong Kong Children's Hospital from 2010 to 2021. Patients' demographics, operative indications, and age at operation were analysed. Outcomes measured included length of operation, blood loss, need for blood transfusion, duration of hospital stay, and perioperative morbidity. Helmet therapy was designed for eligible patients. Through phone survey and out-patient follow-up, cosmetic outcomes, parents' satisfaction, complications, and compliance to helmet therapy were analysed.

**Results:** A total of 16 patients were identified, with 3 (19%) and 13 (81%) patients undergoing surgery by endoscopic and open approaches, respectively. Syndromal patients with craniosynostosis were excluded. Compared to open cranial vault remodelling, patients receiving endoscopic suturectomy had a younger mean age at operation, shorter operative time, smaller wound size, lower transfusion rate, and faster recovery. There were no significant differences in terms of perioperative morbidities.

**Conclusion:** Both open and endoscopic surgeries with helmeting are feasible approaches to treat craniosynostosis. Early endoscopic suturectomy with postoperative helmet therapy represents a safe and effective approach with outcomes as promising as open cranial vault remodelling to treat craniosynostosis.

## Anterior Nucleus of Thalamus Deep Brain Stimulation for Refractory Epilepsy: Long-term Results of a Prospective Cohort Study

Eric YH Cheung<sup>1</sup>, KY Lau<sup>1</sup>, XL Zhu<sup>1</sup>, Howan Leung<sup>2</sup>, Eva LW Fung<sup>3</sup>, Venus YH Tang<sup>4</sup>, Danny TM Chan<sup>1</sup>, WS Poon<sup>1</sup>

<sup>1</sup> Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

<sup>2</sup> Division of Neurology, Department of Medicine and Therapeutics, Prince of Wales Hospital, Hong Kong

<sup>3</sup> Department of Paediatrics, Prince of Wales Hospital, Hong Kong

<sup>4</sup> Department of Clinical Psychology, Prince of Wales Hospital, Hong Kong

**Objective:** The anterior nucleus of thalamus (ANT) has been one of the deep brain stimulation (DBS) targets for refractory epilepsy. The study aimed to investigate the seizure outcome among patients with ANT DBS for epilepsy. We report the long-term outcome of a prospective cohort study.

**Methods:** Prospective cohort study of DBS for adult patient with medically refractory epilepsy, who are not suitable for resective epilepsy surgery.

**Results:** Six cases (3 females and 3 males, mean age 31.3) received bilateral ANT DBS in our institute from 2015 to 2018 (one in 2015, two in 2017 and three in 2018, respectively). Frame-based stereotactic surgery was performed with both frontal trans-ventricular approach or parietal approach. The active contacts were selected based on the closest Euclidean distant to the mammillothalamic tract (MTT) and ANT junction. Five out of six cases (83.3%) achieved greater than 50% seizure reduction compared with preoperation. Mean percentage of seizure reduction was 59.2% at 3 years after DBS (range from 32.7%-80%). Overall, there was a trend of increased seizure reduction rate from year 1 to year 6 postoperatively.

**Conclusion:** This is the first report of ANT DBS for epilepsy in Hong Kong. Although the case number is small, the results are encouraging. It suggests that ANT DBS for refractory epilepsy is effective. Details of the cases and seizure outcome will be presented. The imaging modality to visualise the ANT, the scenario of choosing different surgical approaches and the programming adjustment will be discussed.



Laura LW Leung, Matthew MC Chan, KY Lau, XL Zhu, Stephanie CP Ng, Danny TM Chan  
Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

**Objective:** Traditionally, Deep Brain Stimulation (DBS) for treatment of Parkinson's Disease (PD) is done under awake surgery to aid accuracy of lead implantation and side-effect testing. However, DBS done under awake surgery requires a highly cooperative patient, and the preoperative halt of L-Dopa medication may cause significant stress to the patient. With the recent advancement in technology, there has been a push towards the completion of DBS surgery under general anaesthesia (GA). In our centre, we are advocating for the transition of awake to GA-based DBS surgery, involving the use of Electromyogram (EMG) to test for motor side-effects. We hypothesise that EMG can be used in a GA setting for the detection of muscle contractions, and subsequently predict the corresponding clinical stimulation side-effect threshold.

**Methods:** We retrospectively examined the clinical data of 57 PD patients (114 leads) who underwent DBS Surgery of the subthalamic nucleus. The intraoperative threshold needed to induce contralateral limb muscle contraction was correlated with the first programming postoperative threshold needed to elicit clinical side-effects. Descriptive statistics and t-test were completed.

**Results:** In this cohort, the mean voltage needed to induce limb muscle contraction intraoperatively was  $4.623 \pm 1.209$  mV. Postoperatively, the threshold needed to induce clinical side effects was  $3.912 \pm 0.951$  mV. The postoperative side-effect threshold was consistent above 2.5 mV, with a P value of 0.00.

**Conclusion:** Our results indicated that EMG is indeed a valuable tool in predicting postoperative clinical stimulation side-effect threshold and can be used as an adjunct for the targeting accuracy in GA-based DBS surgeries.

## Does Repeat Resection for Recurrent Glioblastoma Improve Overall Survival? A Multicentre Review

FP 6.3

Tiffany HP Law<sup>1</sup>, Peter YM Woo<sup>1</sup>, Kelsey KY Lee<sup>1</sup>, Joyce SW Chow<sup>2</sup>, LF Li<sup>3</sup>, Tony KT Chan<sup>4</sup>, ST Wong<sup>5</sup>, Michael WY Lee<sup>6</sup>, Jenny KS Pu<sup>3</sup>, Danny TM Chan<sup>7</sup>, KY Chan<sup>1</sup>, WS Poon<sup>7</sup>

<sup>1</sup> Department of Neurosurgery, Kwong Wah Hospital, Hong Kong

<sup>2</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>3</sup> Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong

<sup>4</sup> Department of Neurosurgery, Princess Margaret Hospital, Hong Kong

<sup>5</sup> Department of Neurosurgery, Tuen Mun Hospital, Hong Kong

<sup>6</sup> Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

<sup>7</sup> Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** To investigate whether repeat surgery for recurrent glioblastoma improve overall survival.

**Methods:** This is a multicentre, retrospective study of patients admitted to all of the Hong Kong Hospital Authority's neurosurgical units for the treatment of glioblastoma (GBM) from 2006 to 2020. Data were broadly classified into patient-related: age, preoperative Karnofsky Performance Scale (KPS); treatment-related: temozolomide concomitant chemoradiotherapy (CCRT) treatment, extent of resection and tumour-related: isocitrate dehydrogenase-1 (IDH-1) mutation and O(6)-methylguanine-DNA methyltransferase (MGMT) promoter methylation status. For patients with repeat resective surgery, overall survival (OS) was compared according to tumour size, location, extent of resection and the type of adjuvant oncologic treatment provided after the second resection. Patients that had cerebrospinal fluid surgery or other cranial procedures other than tumour resection were excluded. The National Institutes of Health-Recurrent GBM Scale was referenced to predict median survival for patients that underwent further resection.

**Results:** A total of 1033 patients with a histological diagnosis of glioblastoma were analysed. Predictors for OS benefit were age  $\leq 50$  years ( $P < 0.001$ ), a preoperative KPS of 80 to 100 ( $P < 0.001$ ), temozolomide CCRT treatment ( $P < 0.001$ ), gross or subtotal tumour resection ( $P = 0.023$ ), IDH-1 mutation ( $P < 0.001$ ) and methylated pMGMT ( $P < 0.001$ ). Other than age and IDH-1 mutation status, all the other factors were independent predictors for OS. A total of 302 patients (29%) underwent repeat resective surgery and their median OS was 15.0 months (interquartile range [IQR]=8.4-26.4) compared to 9.4 months (IQR=4.3-17.0) for those that underwent only a single procedure. Repeat resective surgery was noted to be an independent predictor with an adjusted OR of 0.70 (95% confidence interval=0.55-0.90).

**Conclusion:** Repeat resective surgery is a predictor for OS among GBM patients. Factors that contribute to better survival in this patient group will be discussed.

Eric YH Cheung, YT Ng, George KC Wong

Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** Endovascular embolisation has been one of the treatment modalities of cerebral arteriovenous malformation. Newer liquid embolic agents including precipitating hydrophobic injectable liquid (PHIL; dimethyl sulfoxide [DMSO]-based agent; Microvention, USA) and SQUID (Ethylene vinyl alcohol copolymer [EVOH]-based agent; Emboflu, Switzerland) has more homogenous radiopacity and slower precipitation during injection which may optimise visibility during procedure when compared with conventional agents. This study aimed to investigate and compare the effectiveness and safety profile of the two newer liquid embolic agents in embolisation of cerebral arteriovenous malformation.

**Methods:** This is a retrospective study on all patients diagnosed with cerebral arteriovenous malformation undergoing endovascular embolisation with liquid embolic agents PHIL and SQUID admitted to the Division of Neurosurgery, Department of Surgery in Prince of Wales Hospital from January 2014 to June 2021. Functional outcomes, morbidity and mortality were assessed after embolisation. Patient demographics, imaging and embolisation records will be reviewed. Statistical analysis will be performed with SPSS (Windows version 25.0; IBM Corp, Armonk [NY], US).

**Results:** A total of 23 patients with cerebral arteriovenous malformation were treated with 34 sessions of endovascular embolisation with liquid embolic agents of either PHIL or SQUID (17 sessions each) with male to female ratio of 2.3:1 (male 16; female 7) and mean age of 44.6 years (range, 12 to 67). Nine patients (39.1%) received two or more sessions of embolisation. Mean total nidus obliteration rate per session was 57% (range from 5% to 100%). Twenty-one patients (91.3%) received further embolisation, stereotactic radiosurgery or surgical excision after initial endovascular embolisation. All patients had static or improvement in modified Rankin Scale at 3 to 6 months upon discharge.

**Conclusion:** PHIL and SQUID are effective and safe liquid embolic agents for endovascular embolisation of cerebral arteriovenous malformation. Detailed results will be discussed in the meeting.

## Ten Years of Experience in Intraoperative Angiogram for Intracranial Vascular Malformations

CH Ho, Karin KY Ho, Anderson CO Tsang, WM Lui

Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong

**Objective:** To review the utility of performing intraoperative angiogram in treating intracranial vascular malformations.

**Methods:** Retrospective review of all patients who underwent open resection of intracranial vascular malformations in Queen Mary Hospital from 2011 to 2020 which mainly included arteriovenous malformation and arteriovenous fistulas. Patient list was retrieved from the departmental database. The primary outcomes were recurrence, complication rate and functional outcome at 6 months. Patients who underwent surgery with and without intraoperative angiogram were compared and their outcomes were analysed for statistical significance.

**Results:** Preliminary analysis suggested that intraoperative angiogram is associated with lower recurrence rate (0% vs 17%,  $P=0.01$ ). The incidence of complication attributed to intraoperative angiogram is also low (0%).

**Conclusion:** Preliminary analysis suggested that intraoperative angiogram is safe and effective. Detailed results will be available at the time of presentation.

HM Leung, PT Yuen, KF Fok  
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

**Objective:** Middle cerebral artery (MCA) stenosis is an important cause of stroke, which often leads to poor neurological outcome and mortality. Treatment options for medically refractory cases include surgical bypass and endovascular stenting. This study aimed at reviewing the treatment outcome of these two modalities.

**Methods:** This is a retrospective review of 15 patients with MCA stenosis in Queen Elizabeth Hospital and Tuen Mun Hospital receiving surgical bypass or stenting from 2011 to 2021. Information regarding patients' demographics, radiological features like location of stenosis and perfusion study, clinical outcomes are collected. Clinical outcomes in terms of modified Rankin Scale, cognitive function, stroke rate, haemorrhage rate and death are collected. Stent and bypass graft patency rate are also analysed.

**Results:** There were four cases of MCA stenting and 11 cases of bypass. Preliminary results revealed low perioperative complication rate. There were 0 case of stroke or haemorrhage within 30 days of intervention in both groups. Perioperative mortality was 0 in both groups. No recurrent stroke was noted in both stenting and bypass patients. Both stent and bypass graft patency rates reached 100%. Perfusion study showed significant improvement of cerebral vascular reserve in bypass group.

**Conclusion:** Both bypass and stenting can achieve good clinical outcome and prevent recurrent stroke in carefully selected patients.

## Mechanical Thrombectomy for In-hospital versus Community-onset Ischemic Stroke: Comparison of Time Metrics, Technical and Clinical Outcomes

Christopher HF Sum, Anderson CO Tsang, Wilson WS Ho, WM Lui  
Division of Neurosurgery, Department of Surgery, The University of Hong Kong, Hong Kong

**Objective:** Intra-arterial thrombectomy (IAT) for in-hospital onset ischemic stroke with large vessel occlusion (LVO) is not uncommon. In-patient delay to timely neuroimaging and intervention is a reported phenomenon, but no local study on this specific issue is available. We aimed to analyse the technical and clinical outcomes of in-hospital stroke (IHS) patients with IAT performed, compared to the community-onset group (COS).

**Methods:** A retrospective 5-year data analysis was performed for 240 consecutive IATs done at Queen Mary Hospital from January 2016 to June 2021. They were dichotomised into the in-hospital and community-onset subgroups. Independent variables, such as baseline demographics, presenting NIHSS, ASPECTS, location of occlusion and thrombectomy device used, were collected. Primary outcome was functional independence (modified Rankin Scale [mRS] 0-2) at 3 months. Secondary outcomes included onset-to-puncture time, CT-to-CTA (angiogram) time, onset-to-perfusion time, rates of successful reperfusion (TICI 2b/3), significant intracerebral haemorrhage (sICH) and 6-month mortality. These outcomes were compared with the COS cohort.

**Results:** Among the IATs performed, 21% (50/240) were for in-hospital stroke. In all, 38% (19/50) occurred peri-procedurally (within 14 days post-intervention). The rate of intravenous tissue plasminogen activator (IV-tPA) administration was lower (22% vs 48%,  $P < 0.001$ ) in the IHS group. The mean onset-to-puncture (297 vs 247 min,  $P = 0.041$ ) and onset-reperfusion time (379 vs 314 min,  $P = 0.009$ ) were significantly longer in the IHS group. The 3-month mRS 0-2 rate (40% vs 41%,  $P = 0.91$ ), successful reperfusion rate (84% vs 86%,  $P = 0.85$ ), 6-month mortality (31% vs 27%,  $P = 0.71$ ) and sICH (2% vs 5%,  $P = 0.69$ ) were similar.

**Conclusion:** There were significant time latencies in the management of in-hospital onset LVOs. This may represent missed opportunities in the management of hyperacute stroke. Pre-specified pathways and revolutions in workflow sequence are needed to close the gap with community-onset LVOs.

## External Ventricular Drains in the Treatment of Subarachnoid Haemorrhage with Concurrent Intraventricular Haemorrhage

P 1

Adrian SJ Yu, George KC Wong

Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** To report on the observed outcomes and complications of patients following conservative or surgical management by insertion of an external ventricular drain (EVD) in patients who have radiological evidence of subarachnoid haemorrhage (SAH) with concurrent intraventricular haemorrhage (IVH).

**Methods:** We conducted a retrospective review of the electronic patient records of IMASH, HDSSAH and CDSAH studies. Only patients diagnosed with concurrent SAH and IVH using computed tomography were included. Outcomes of conservative management, insertion of unilateral and bilateral EVDs were compared against the severity of IVH (Modified Graeb Score). The primary aim was to define the functional outcomes (modified Rankin's Scale and the Barthel Index) and survival rates. The secondary aim was to compare the rate of conversion to ventriculoperitoneal shunt, time interval before extra-ventricular drain removal and notable complications between unilateral and bilateral EVDs.

**Results:** The increased severity of IVH correlated with poorer survival in cases treated conservatively. Overall, insertion of EVDs resulted in improved survival rates, but showed no significant benefit in functional outcomes. There were no significant differences in measurable outcomes between unilateral and bilateral EVDs.

**Conclusion:** Unilateral EVD insertion was the de facto initial treatment of choice; however, the choice of unilateral or bilateral EVDs would need to be based on additional clinical parameters beyond the scope of this review.

## Could Unilateral Moyamoya Vasculopathy Be a Response to Repetitive Head Trauma? An Unusual Case of Subacute Subdural Haematoma with Chronic Middle Cerebral Artery Dissection, and Infarction in a Young Football Player

P 2

WC Poon, LY Ho, WY Lee, KY Pang, Tom SF Chow

Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

**Objective:** To investigate the cause of infarct and moyamoya phenomenon in an unusual case.

**Methods:** We present an unusual case of a 21-year-old man, a young football player, with otherwise good past health, who presented to us with headache and left-sided weakness. His initial computed tomography (CT) showed an intermediate size right frontotemporoparietal isodense subdural haematoma and a patch of right parietal parenchymal hypodensity (3 × 4 × 5 cm) of unclear aetiology, which was later found to be an infarct on magnetic resonance imaging. CT angiogram showed stenosis of the mid segment of the right M1 and lenticulostriate microvasculature compatible with early development of moyamoya vessels. We searched for the current literature regarding such cases and performed detailed clinical, biochemical, and radiological workup for the cause of middle cerebral artery (MCA) stenosis and moyamoya phenomenon in this patient.

**Results:** Detailed workup for the cause of MCA dissection and stenosis have excluded common causes reported in the literature such as autoimmune vasculitis, connective tissue disorders, atherosclerosis, and congenital disorders. We propose a plausible explanation that unifies data in this case and postulate one mechanism for traumatic induction of the moyamoya phenomenon. This case also illustrates one potential consequence of repetitive head trauma upon young athletes of contact sports.

**Conclusion:** Repetitive head injury is one of the causes of MCA dissection, stenosis and moyamoya phenomenon in young athletes of contact sports. We advise for wearing protective helmets in such athletes.

## Perceptions and Attitudes toward Neurosurgery as a Career Choice among Medical Students and Interns in Hong Kong

P 3

Karin KY Ho, Anderson CO Tsang

Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, The University of Hong Kong, Hong Kong

**Objective:** To evaluate perceptions toward Neurosurgery among clinical-year medical students and interns in Hong Kong.

**Methods:** A cross-sectional anonymous electronic survey was administered to investigate the perceptions of students from Year 4 to Year 6 and Interns toward Neurosurgery using Likert rankings (agree strongly, agree moderately, agree somewhat, and disagree). Survey elements pertained to perceptions regarding the specialty itself, and factors that either influence their interest or that might encourage them to choose to pursue a career in Neurosurgery.

**Results:** The study involved 75 participants, comprising Year 4 (25%), Year 5 (28.9%), Year 6 (28.9%) students, and Interns (17.1%). Most agreed that Neurosurgery is intellectually interesting and innovative, with potential for technological advancement. While most were either interested (34.7%) in Neurosurgery or still uncertain (42.7%), all participants perceive that it is difficult to obtain a training post. The majority (69.1%) also disagree that Neurosurgery has fixed work hours that would enable work-life balance. Among those uncertain or not interested in Neurosurgery, 89.8% agree that more exposure during medical school would promote interest, and 98% agree mentoring or programmes to provide guidance into Neurosurgery would be encouraging.

**Conclusion:** The findings show a potential area for encouraging students and Interns toward further exploring Neurosurgery. Neurosurgery is admired as an interesting specialty that is surgically challenging with potential for technological advancement. However, many are discouraged by perceived difficulty of obtaining a residency post and would find more exposure in medical school and mentoring programmes beneficial.

## Surviving Gliosarcoma: A Retrospective Single-centre Review of Patient Survival

P 4

Lucia Lam, KW See, MH Yuen, TL Poon, FC Cheung

Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

**Objective:** Gliosarcoma is a rare malignancy of the central nervous system with poor prognosis. Our objective was to investigate the mean survival of patients diagnosed with gliosarcoma in our centre and the survival benefit of adjuvant chemoradiotherapy in our patient population.

**Methods:** A database search was performed on our operative system using the diagnosis “brain tumour” between 1 September 2011 and 1 September 2021. Anatomical pathology results were screened for diagnosis of gliosarcoma. Patient disease-free survival and overall survival was calculated from time of presentation with comparison performed between surgery-only group and patients who received adjuvant chemoradiotherapy.

**Results:** A total of ten patients were identified with pathological diagnosis of gliosarcoma or glioblastoma multiforme with gliosarcoma features in the 10-year period. Mean disease-free survival was 7 months and overall survival was 13 months. Although patients who underwent adjuvant chemoradiotherapy had longer disease-free survival, tumour recurrence was detected in all patients on surveillance imaging.

**Conclusion:** The prognosis of gliosarcoma in our patient population remains poor despite adjuvant chemoradiotherapy. This is in keeping with internationally-reported data. Further long-term studies are required to establish the beneficial effect of adjuvant chemoradiotherapy on patient survival and comparisons should be made between the gliosarcoma and glioblastoma multiforme with gliosarcoma features groups to establish whether they should be managed as separate disease entities.

## Deep Brain Stimulation for Tourette Syndrome: A Mini-case Series

P 5

William Xue<sup>1</sup>, Cannon XL Zhu<sup>1</sup>, Claire KY Lau<sup>1,2</sup>, Anne YY Chan<sup>2</sup>, Venus YH Tang<sup>3</sup>, Danny TM Chan<sup>1</sup>

<sup>1</sup> Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

<sup>2</sup> Division of Neurology, Department of Medicine and Therapeutics, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

<sup>3</sup> Department of Clinical Psychology, Prince of Wales Hospital, Hospital Authority, Hong Kong

**Introduction:** Deep brain stimulation (DBS) is an effective therapy for refractory Tourette syndrome. Many targets are proposed, yet there is no consensus on how the selection of targets could be personalised to the patients' presentation, especially when such patients often have Psychiatric comorbidities. Here we describe the local experience of three cases with Tourette syndrome treated with DBS, targeting bilateral anteromedial nuclei of globus pallidus internus (amGPi). Target-brain connectivity is analysed.

**Methods:** Three patients with Tourette syndrome refractory to medical treatment underwent DBS during 2018 to 2020. Clinical data were collected prospectively. Clinical outcomes were measured by Yale Global Tic Severity Scale (YGTSS) and Yale-Brown Obsessive-Compulsive Scale (Y-BOCS). Follow-up period was  $\geq 1$  year postoperatively. Target-brain connectivity was studied by fibre tracking using the volume of tissue activated as the seed.

**Results:** In one patient, YGTSS improvement is modest (phonic 17%, motor 24%, impairment 50%) while no improvement for Y-BOCS—this patient did not exhibit obsessive compulsive disorder (OCD) symptoms. The other two patients who had significant OCD symptoms showed significant improvement in all aspects ( $>50\%$ ). Target-brain connectivity showed prominent connectivity to the pre-frontal region via the anterior limb of internal capsule and to the limbic system via the fornix. The results are consistent with literature that amGPi DBS is effective for Tourette syndrome with comorbid OCD.

**Conclusion:** In the target selection of DBS for Tourette syndrome with significant comorbid OCD, amGPi might be the choice. More cases and quantitative analyses of target-brain connectivity are needed.

**Acknowledgement:** I would like to thank Dr XL Zhu, Ms KY Lau, and Dr TM Chan from the Prince of Wales Hospital Neurosurgical Department for the opportunity and guidance.

## Lumbar Epidural Blood Patch: A Safe Treatment for Intracranial Hypotension

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Laura LW Leung, Danny TM Chan

Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

**Objective:** Previous literature has demonstrated the efficacy of lumbar epidural blood patch (LEBP) in the management of spontaneous intracranial hypotension (SIH). However, the underlying pathophysiology of such management remains unclear. In this study, we aimed to evaluate the utility of LEBP injections in the management of SIH and develop a potential management algorithm used in the triage and management of SIH patients.

**Methods:** We retrospectively examined the clinical case notes of 14 patients with SIH (age: 25-69 years) who were managed with LEBP injections. We evaluated the presenting symptoms of each selected patient, radiological findings as well as treatment outcomes.

**Results:** In all, 93% of patients describe the presence of headache at presentation, whilst 43% describe it as being of an orthostatic nature. All patients demonstrated typical findings on magnetic resonance imaging brain. In total, 85% of patients demonstrated resolution of symptoms, whilst 15% of patients complained of further worsening in symptoms.

**Conclusion:** LEBP injection is an effective method of management in patients with a diagnosis of SIH. It should be given to all SIH patients irrespective of whether a so-called "dural leak" can be localised through radiological investigations.

## The Spatial and Temporal Dynamics of Microglia Cells after Focal Cerebral Ischemia

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Cyrus WC Cheng<sup>1</sup>, George KC Wong<sup>2</sup>

<sup>1</sup> Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong

<sup>2</sup> Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** Microglia cells are the inflammatory cells of the central nervous system. Following a stroke, cerebral ischemia activates the microglia cells into a diverse range of phenotypes, each with different physical characteristics, surface markers and secretory products, to mediate, augment or suppress the inflammatory process in the brain. We hope to characterise the behaviour of these cells to elucidate their role in the inflammatory process.

**Methods:** We developed a middle cerebral artery occlusion (MCAO) model on male Sprague-Dawley rats (250-280 g) to simulate transient cerebral ischemia by inserting a 4-0 silicone-coated suture through the external carotid artery and the internal carotid artery to occlude the middle carotid artery. After 60 minutes, the filament was removed to allow for reperfusion. Functional assessments were performed on D1, D2, D3, D5 and D7. The animals were subsequently sacrificed. The brains were double-stained with immunofluorescent Tmem119 and Iba1 antibodies for analysis. The results were compared to a sham group which received the same surgery bar the insertion of suture.

**Results:** The MCAO model produced consistent neurological deficits in the rats. Immunofluorescence staining showed that the number and the size of microglia cells, and the length of their processes increased in various brain regions after transient cerebral ischemia, peaked on either D3 or D5, and decreased afterwards. The changes were non-linear in nature.

**Conclusion:** The changes in the physical characteristics of the microglia cells suggest that there is a change of microglia cell phenotypes with time following transient cerebral ischemia. Prospectively, RNA profiling may be used to define these phenotypes to aid the identification of novel stroke therapeutics.

## Role of Vitamin D Deficiency in Intracerebral Haemorrhage in Mice Model

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TL Lam

Division of Neurosurgery, Department of Surgery, The University of Hong Kong, Hong Kong

**Introduction:** Intracerebral haemorrhage (ICH) represents 15% of the strokes, and it has a high mortality (50%) and poor recovery. Clinical data suggest that vitamin D deficient (VDD) is associated with worse outcomes in ICH. However, whether the association is causal is not well understood. In this study, we aimed to test the causal relationship between VDD a worse ICH outcome.

**Methods:** To induce VDD in mice, mice are fed with VDD diet. ICH is induced in mice by intracerebral collagenase injection. Behaviour and mortality are recorded afterward. Haematoma size and evaluate haematoma clearance are measured by immunohistochemistry.

To investigate the performance of haematoma clearance by macrophage, bone marrow derived macrophage is cultured in vitro, which is later exposed to red blood cells (RBC). The ability of macrophages to phagocytose hence remove those red blood cells is evaluated by immunohistochemistry and flow cytometry.

**Results:** Compared to normal mice, VDD mice have higher mortality after ICH induction. VDD mice have poorer performance in behaviour test as well. VDD mice are associated with larger haematoma and slow haematoma clearance. Bone marrow derived macrophage from VDD mice is less capable of phagocytosing red blood cells. Macrophages of VDD mice have downregulated CD36, an important protein for phagocytosis.

**Discussion:** Vitamin D is a hormone with pleiotropic effects. It has been demonstrated to have an important role in cellular differentiation and immune functions. From our study, we believe that vitamin D is essential for haematoma clearance after ICH. Vitamin D level should be used as a marker for prognosis. Our study also points to the possibility of vitamin D administration to VDD patients.



CH Ho, LF Li, WM Lui

Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong

**Background:** Chronic subdural haematoma (CSDH) is a common neurosurgical condition, especially in the elderly. With an ageing population, the incidence of CSDH is expected to rise. Burr-hole is the mainstay of evacuating CSDH causing mass effect. The postoperative recurrence rate is commonly reported at 10% to 30%. In the last decade, tranexamic acid (TXA) is increasingly being recognised as being a safe and effective adjunct in managing intracranial haemorrhage, especially in the setting of neuro-trauma. This study aimed to evaluate the effectiveness and safety of TXA in the setting of CSDH as it is a common condition in elderly patients who are predisposed to thromboembolic complications due to their comorbidities. The roles of anti-platelet and anti-coagulation therapy in contributing towards recurrence or thromboembolic events were also evaluated.

**Methods:** This is a single-centre, retrospective study. Patient list was retrieved from the departmental database using ICD codes. All patients who underwent burr-hole during 2015 to 2019 for evacuation of chronic subdural haematoma were included in the study. Patients under the age of 18 were excluded.

**Results:** A total of 295 patients were included in the study. 67.8% (200/295) of patients received TXA perioperatively. No significant difference in thromboembolic complications or recurrence rate was identified between the groups. In all, 36.6% (108/295) of patients were on anti-platelet or anti-coagulant at the time of their presentation. Patients on warfarin were associated with significantly higher risks of having thromboembolic events in the perioperative period (9.5% vs 0.75%;  $P=0.001$ ).

**Conclusion:** The use of TXA is safe. Perioperative interruption or reversal of warfarin needs to be balanced against the risks of thromboembolism. Further study is required to evaluate the effectiveness of TXA in treating chronic subdural haematoma.

## Emergency versus Elective Brain Tumour Excisions: A 3-Year Propensity Score Matched Outcome Analysis

Christopher HF Sum, LF Li, Gilberto KK Leung, WM Lui

Division of Neurosurgery, Department of Surgery, The University of Hong Kong, Hong Kong

**Objective:** Emergency brain tumour operations entail less time in radiological investigations and planning, less available intraoperative monitoring (IOM) and subspecialised neurosurgeons and neuro-anaesthetists. However, the disparity in outcomes between emergency versus elective surgeries is under-evaluated. This investigation aimed to delineate differences in: (1) intraoperative; (2) clinical; and (3) oncological outcomes between the two surgical settings.

**Methods:** A consecutive series of 262 craniotomy/craniectomies for brain tumours were performed between January 2018 and December 2020 at Queen Mary Hospital. They were stratified into emergency ( $n=86$ ) and elective ( $n=176$ ) cases. Independent variables including preoperative Karnofsky Performance Score (pre-KPS), American Society of Anesthesiologists (ASA) score, tumour location and volume were collected. To correct for the heterogeneous baseline co-variables, propensity score with 1:1 nearest neighbour matching without replacement was performed, yielding 60 patients in each group. Their outcomes were compared for any significant disparities.

**Results:** Before matching, there were more brain metastasis (48% vs 14%,  $P<0.001$ ), lower pre-KPS (75% vs 80%,  $P<0.001$ ), less IOM (87% vs 4.7%,  $P<0.001$ ) and more infratentorial tumours (24% vs 13%,  $P=0.029$ ) in the emergency group. After matching, the intraoperative outcomes were comparable in terms of blood loss (426 mL vs 514 mL,  $P=0.26$ ) and operative time (174 min vs 200 min,  $P=0.08$ ). For clinical outcomes, the rate of having  $\geq 1$  30-day complication was similar (33% vs 28%,  $P=0.69$ ). They had comparable rates of local (eg, new neurological deficit) or systemic (eg, deep vein thrombosis) complications. The emergency subset had higher re-operation rate (9.1% vs 0%,  $P=0.03$ ). For oncological outcomes, Simpson grading was similar (2 vs 2,  $P=0.83$ ), but for non-meningioma pathologies, emergency surgeries more often achieved gross total resections (78% vs 54%,  $P=0.02$ ).

**Conclusion:** After matching for co-variables, except for re-operation rate, emergency brain tumour operations attained comparable intraoperative, clinical, and oncological outcomes compared to elective surgeries.

## Early Experience of Stereotactic Electroencephalograph in Non-lesional Refractory Epilepsy: A Case Illustration

SC Lam<sup>1</sup>, KW See<sup>1</sup>, SW Chow<sup>1</sup>, KW Fong<sup>2</sup>, TL Poon<sup>1</sup>

<sup>1</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>2</sup> Department of Medicine, Queen Elizabeth Hospital, Hong Kong

**Objective:** It is challenging to delineate the epileptogenic zone (EZ) in cases of non-lesional refractory epilepsy, especially with discordant video-EEG findings. With the advent of invasive stereotactic electroencephalograph (SEEG), lateralisation and localisation of seizure foci become more accurate. Here we present our early experience of SEEG in a patient with non-lesional refractory epilepsy.

**Methods:** Case study.

**Results:** We present a case of a 42-year-old male with non-lesional refractory epilepsy. The monthly average seizure frequency was 2. Regarding seizure semiology, it began with cephalic aura, bilateral hearing loss, later became dialeptic, left facial twitching, drooling of saliva, mild jerking of left upper limb, aphasia, eventually post-ictal amnesia. In view of negative or discordant non-invasive workup, invasive SEEG was considered. Our preimplantation hypotheses were (1) right frontal lobe was the most symptomatogenic one; (2) right temporal discharge preceded the right frontal discharge, and (3) left temporal discharge transmitted via insula and posterior commissure to the right side. Bilateral SEEG implantation under frameless navigation guidance was performed. Fifteen electrode leads were implanted according to the SEEG implantation map. More than ten seizure attacks were recorded. Discussed in multidisciplinary team, the likely EZ was right insula and posterior temporal lobe, with transmission of epileptic discharge to right frontal lobe causing the symptoms. Post-implantation hypothesis was made with EZ excised accordingly. No more seizure noted until the last visit.

**Conclusion:** SEEG is useful in EZ delineation when workup for non-lesional refractory epilepsy is inconclusive. Good outcome might be achieved with resection surgery guided by SEEG findings.

## Less Invasive Approach for Total Resection of Paraspinous Dumbbell Shaped Neurogenic Neoplasm of the Spine

Victor Chan, Tom SF Chow

Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

**Objective:** To develop a less invasive approach for resecting paraspinous masses with intraspinal canal component by minimising the trauma of incision and soft tissue dissection for early recovery and mobilisation.

**Methods:** Retrospective case report of an uncommon application of the recently available tubular retractor system which had been designed and used in degenerative spinal conditions.

**Results:** We report a case of a 32-year-old woman with pain and radiculopathy due to an expansile dumbbell shaped mass at L2 with characteristics of a neurogenic tumour. She underwent hemilaminectomy and facetectomy for the total excision of a ganglioneuroma with pedicle screw and rod reconstruction using a tubular retractor system. Incision was 3 cm and the patient ambulated the evening of surgery. At 3-year follow-up, the patient is asymptomatic and has no residual or recurrent tumour.

**Conclusion:** Tubular retractor system can be used for the resection of paraspinous neurogenic dumbbell shaped neoplasms with good result. Further development of this technique may improve the outcome of the surgical management of these lesions by minimising the postoperative pain to encourage early mobilisation and thereby shorten hospital stay and recovery.

## Magnetic Resonance Imaging in Patients with High Grade Glioma— Pseudoprogression and Recurrence

Natalie Iris TY Ho

Department of Neurosurgery, Prince of Wales Hospital, Hong Kong  
Department of Radiology, Prince of Wales Hospital, Hong Kong

From 2015 to 2020, a total of 25 patients underwent total excision of high grade gliomas in our institution followed by concurrent chemoradiotherapy (CCRT). Patients were subjected to a protocol scanning schedule of magnetic resonance imaging (MRI) scans on day 1 after operation, 2 weeks after completing CCRT and every 3 months thereafter.

**Objective:** Retrospective study to demonstrate the incidence of radiological progression, pseudoprogression and recurrence of high-grade gliomas after treatment.

**Results:** Among the 21 patients included in the review, most (>80%) had true progression of the disease. Two patients (around 10%) had pseudoprogression.

**Conclusion:** Preoperative and post-treatment MRI scans, together with careful interpretation, are pivotal in the assessment of disease progress of patients with high grade glioma.

## Is the Scientific Basis of Wakefulness Sufficient to Guide Neurosurgical Management in the Care of Patients in a Persistent Vegetative State in Hong Kong? A Medico-legal Analysis

Karen KW Lam

Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

**Objective:** After we have analysed the medico-legal conflicts that arose in the care of a 50-year-old woman in a persistent vegetative state from a severe brain insult, we proposed a mitigation strategy.

**Methods:** A retrospective case analysis of a patient admitted to Pamela Youde Nethersole Eastern Hospital for ischemic stroke. Medical record was analysed.

**Results:** Our case illustrated the difficulties in the management of neurosurgical patients in a persistent vegetative state. Conflicts arose between the patient's family members who invoked their rights as surrogate decision makers and the clinical care providers who justified their actions based on established Hospital Authority protocols and the prevailing legal opinions. While the resolution is consistent with Hong Kong laws, UK NHS Trust and MCHK guidance, the patient's family remained dissatisfied. That dissatisfaction may negatively affect their future interactions with the healthcare system.

**Conclusion:** While there is general agreement on the clinical definition of persistent vegetative state among neurosurgeons in Hong Kong, more scientific evidence is emerging which may affect the management in a medico-legal context. The patient's family advocates for the patient's best self-interest; but clinicians must act in compliance with objective standards. The gap lies between the cultural and traditional expectations, and the clinical and scientific understanding of the injured brain. Hong Kong society as a stakeholder must weigh the cost of futile care for a few against the benefit of financing care for the many to bring about improvement in the quality of life for all.

L Lyu, XL Zhu, KY Chan, TM Chan, David YC Chan, KY Lau, Patricia KY Kan  
Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** To present a paediatric patient having diastematomyelia with thickened filum and lipoma and discuss whether operation is necessary and how timing of operation affects the outcome.

**Methods:** This was a case report on a paediatric patient with diastematomyelia, supplemented by radiological films and operative photos. Review of literature reporting the same disease and its outcome from 1992 to 2021 was done.

**Results:** Operative repair for patients having symptoms due to diastematomyelia usually had excellent outcomes and can prevent further neurological deterioration. Our patient had early signs of neurological deficit further supported by somatosensory evoked potential findings, which had improvement after operation.

**Conclusion:** A standard management plan of diastematomyelia is difficult to formulate due to its rarity. Operation of our patient was necessary and timely.

## Newborn with Large Open Myelomeningocele Associated with Kyphoscoliosis: A Case Report

Ray YM O, Kevin KF Cheng, Wilson WS Ho, Gilberto KK Leung, WM Lui  
Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong

**Background:** The incidence of spinal dysraphism has declined drastically due to the routine use of prenatal folate. With antenatal screening and termination of pregnancy, it is rare to see newborn with huge open myelomeningocele (MMC).

**Case Report:** A pregnant woman with substance abuse and drug-induced psychosis presented at 36 weeks of gestation without any previous antenatal check-up. Ultrasound on presentation found a fetus with open neural tube defect, hydrocephalus, and deformed lower limbs with clubfoot and paraplegia. Upon delivery by Caesarean section, a huge open MMC was revealed with active cerebrospinal fluid leakage. The MMC was associated with severe kyphoscoliosis and full anterior fontanelle suggestive of hydrocephalus secondary to Chiari II malformation. Urgent MMC repair was performed. Intraoperative challenges included positioning, ethical judgement on sacrificing neural tissue for kyphectomy and closure of large skin defect. In view of the large skin defect, severe kyphosis, and absence of neurological function in the lower limbs, L3 cordectomy followed by L3 to L5 partial discectomy and corpectomy were performed. The large skin defect was subsequently closed by V-Y advancement flap by the Plastic team. Ventriculoperitoneal shunt was inserted after 13 days for hydrocephalus. At postoperative 9 months, the patient was able to lie supine with good wound healing and static neurological functions.

**Conclusion:** In neonates with MMC and kyphosis with complete loss of neurological function, kyphectomy in conjunction with MMC repair can be considered for early correction of the deformity.

## Malignant Melanoma Presenting with Brain Metastases: Three Case Reports in an Asian Population

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Robin Wong, George KC Wong, David YC Chan  
Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** Malignant melanoma with brain metastases is rare in our locality. The pathognomonic intraoperative finding of dark pigmented melanotic deposits is particularly striking. We reviewed patients with melanoma brain metastases to highlight the clinical presentation, treatment approach and disease course of this unique condition.

**Methods:** Three cases of malignant melanoma presenting with symptomatic brain metastases treated at the Prince of Wales Hospital Division of Neurosurgery were retrospectively reviewed.

**Results:** One case of uterine cervical melanoma, one case of anal melanoma, and one case of unknown primary melanoma were identified. None of the cases were of the cutaneous type of melanoma which is the third most common cause of brain metastases in Western countries. All three patients presented with symptomatic brain metastases, ranging from focal neurological deficits and signs of raised intracranial pressure to coma with blown pupil. Features of tumour haemorrhage were unanimously identified on neuroimaging. All three patients were treated initially with surgical resection of brain tumour followed by whole brain radiation therapy. Survival from the time of symptomatic brain metastases varied from 4 to 30 months.

**Conclusion:** Melanoma with brain metastases is rare, and generally presents with advanced disease and poor prognosis.

## Non-traumatic Paediatric Intracranial Haemorrhage in Children—Case Series in Hong Kong

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Jacqueline CL Fung, George KC Wong  
Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Background:** Non-traumatic paediatric intracranial haemorrhages (pICH) are rare. Most management of such cases are derived from adult guidelines, though the spectrum of underlying pathology may differ. Previous studies have tried to bridge the knowledge gap between paediatrics and adults ICH to improve the care for ICH in children.

**Objectives:** We aimed to describe the underlying pathologies, management, and outcomes of pICH.

**Methods:** A retrospective review of consecutive patients admitted into a tertiary neurosurgical centre in Hong Kong with non-traumatic pICH.

**Results:** Sixteen patients were identified. Clinical presentation was headache in 11 patients and others included seizures and focal neurological deficits. Site of ICH included nine within cerebrum, three in cerebellum, two in thalami and one each in brainstem and ventricles. The most common underlying pathology was arteriovenous malformation (AVM); others included cavernous malformation and acute myeloid leukaemia. Immediate management included emergency operation for clot evacuation, followed by subsequent definitive operations. There were no mortality. Most patients were successfully treated with minimal residual symptoms.

**Conclusion:** Unlike in adults, ruptured cerebral AVM is more common than ruptured cerebral aneurysms. Sudden onset of headache without trauma is the key presenting symptom. pICH tend to have low permanent morbidity and most children were able to continue with schooling.

## Complications of Post-craniectomy Cranioplasty: A Retrospective Study and Risk Factor Analysis

P 19

MT Wong

Department of Surgery, Kwong Wah Hospital, Hong Kong

**Objective:** To investigate the predisposing factors of procedure-related complications after cranioplasty.

**Methods:** This was a 10-year retrospective study of all cranioplasties done in Pamela Youde Nethersole Eastern Hospital between 1 January 2011 and 31 December 2020.

**Results:** Regarding the 119 operations in this study, the overall surgical complication rate was 38.9%. Infection existed in 12 patients (10%). Suboptimal flap position found in nine patients (8%). There was no significant relationship with complications regarding indications for the craniectomy, choice of graft materials and the time interval between craniectomy and cranioplasty. The choices of antibiotics used in cranioplasty had no significant impact on the postoperative infection rate. The defect size of craniectomy had no significant association with the ultimate flap malposition rate. The preoperative functional status was comparable to postoperative functional status.

**Conclusion:** Graft materials, choice of antibiotics and defect size had no significant impact on the outcome of post-craniectomy cranioplasty.

## Use of Split Spinous Process Sublaminar Decompression Technique for Resecting Intradural Spinal Lesion

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HC Wong, Sneha Sharma, Thomas Chow

Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

**Objective:** To introduce the use of split spinous process sublaminar decompression technique for resecting Intradural Spinal Lesion.

**Methods:** This was a case report of intradural spinal tumour resection using split spinous process sublaminar decompression technique.

**Results:** A 35-year-old male presented with a 3.6 cm spinal myxopapillary ependymoma spanning over L2, L3, L4 vertebral levels, causing spinal stenosis with cauda equina compression. Microscopic gross total resection of the tumour was achieved using a split spinous process sublaminar decompression exposure, with good postoperative recovery.

**Conclusion:** Split spinous process sublaminar decompression technique is a feasible approach for resecting intradural lesions.

## Infant with Cutis Aplasia Congenita, Encephalocele, and Syntelencephaly: A Case Report

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HY Lau, Kevin KF Cheng, Wilson WS Ho, WM Lui  
Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong  
Department of Surgery, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong

Encephalocele is a neural tube defect with brain herniation through a skull defect. Syntelencephaly is a rare variant of holoprosencephaly. The objective of this case report is to explain the embryopathogenic mechanism of syntelencephaly, its radiological characteristics, and the prognosis. A 1-month-old girl was first incidentally noted to have a skull defect in antenatal structural ultrasound. Subsequent fetal magnetic resonance imaging (MRI) revealed a vertex encephalocele. She was the only child born to a nonconsanguineous Chinese-Polish couple. After a thorough discussion with multidisciplinary team involvement, the couple decided to continue the pregnancy due to religious beliefs, understanding that neurosurgical intervention would be offered if the baby could maintain spontaneous breathing. Born by emergency Caesarean section due to premature rupture of membranes at 37 weeks, the baby had a fetal weight of 2287 g, head circumference of 29 cm, and APGAR score of 9. Despite a 4.5-cm diameter cutis aplasia congenita with encephalocele and active cerebrospinal fluid leak, the baby could maintain spontaneous breathing with active limbs movements. Emergency repair of the encephalocele and dura was performed. Post-natal MRI showed failure of separation of posterior frontal and parietal lobes and deficient supratentorial midline structures, confirming the diagnosis of syntelencephaly. The pathogenic mechanism is a defect in the embryonic roof plate induction. There was also a single ventricle with Dandy Walker phenomenon. The baby was referred to paediatric geneticist for further investigations. She managed to return home with her parents with sustainable breathing effort and spontaneous limbs movement.

## A Single-centre, Retrospective Study of Intraventricular Thrombolysis Outcome on Intraventricular Haemorrhage

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JW Li, WK Mak, David YC Chan, George KC Wong  
Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** Intraventricular haemorrhage poses significant morbidity and mortality. External ventricular drain controls intracranial pressure but is often occluded by coagulated blood. Intraventricular thrombolysis has been only demonstrated to reduce mortality. This study aimed to evaluate the usage of tissue plasminogen activator (tPA) on neurologic outcome.

**Methods:** A retrospective study was conducted in a university neurosurgical unit in Hong Kong. Twenty-six patients presented from April 2013 to August 2021 with intraventricular haemorrhage were enrolled. Patient demographics, Glasgow Coma Scale score, Graeb score, tPA regimen, catheter blockage rate, bleeding tendency, functional outcome and mortality rates were evaluated.

**Results:** Administration of tPA is associated with interventional re-patency of external ventricular drain and reduction of intraventricular haemorrhage. The tPA regimen is often tailored to patient's clinical condition and improved functional outcome in a subset of patients.

**Conclusion:** Intraventricular thrombolytic therapy using tPA is a safe and effective method of managing intraventricular haemorrhage and may confers functional benefit. Institutional intraventricular thrombolysis protocol shall be adopted.

## Novel Surgical Technique for Parapharyngeal Liposarcoma: Case Report of a Rare Disease and Literature Review

WL Ng<sup>1</sup>#, TW Lee<sup>2</sup>#, FC Cheung<sup>1</sup>, Calvin Mak<sup>1</sup>, TC Chu<sup>2</sup>, WS Ng<sup>2</sup>, CF Ng<sup>1</sup>, Hunter KL Yuen<sup>3</sup>

<sup>1</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>2</sup> Department of Ear-Nose-and-Throat (ENT), Queen Elizabeth Hospital, Hong Kong

<sup>3</sup> Department of Ophthalmology, Hong Kong Eye Hospital, Hong Kong

# Co-author

**Aim:** To present the first reported case of a parapharyngeal liposarcoma resection performed via a multidisciplinary triportal minimally invasive surgical technique comprising Trans-Oral Robotic Surgery (TORS), Trans-Nasal Endoscopic Surgery and Trans-Orbital Neuroendoscopic Surgery (TONES), and to review the literature.

**Background:** A 57-year-old gentleman presented with right recurrent otorrhea. Nasoendoscopy revealed a whitish firm mass obliterating the right eustachian tube. Nasoendoscopy-guided biopsy confirmed the lesion as a well-differentiated liposarcoma. Computed tomography and magnetic resonance imaging showed a 4 cm encapsulated lipomatous mass in the right upper parapharyngeal space, which abutted the internal carotid artery (ICA) posteriorly and displaced the second and third divisions of trigeminal nerve (V2 and V3) laterally, without evidence of regional and distant metastasis.

**Methods:** A multidisciplinary operating team was formed; comprising of otorhinolaryngologists, neurosurgeons and ophthalmologists. The inferomedial part of the tumour was dissected by otorhinolaryngologists using TORS and trans-nasal endoscopic approach, whilst the supra-lateral aspect of the tumour was dissected by neurosurgeons and ophthalmologists through trans-orbital endoscopic approach. ICA, V2 and V3 were protected throughout the surgery under direct visualisation by neurosurgeons.

**Results:** En-bloc resection of tumour achieved without neuro-vascular injury with satisfactory cosmetic result.

**Conclusion:** The possibility of liposarcoma should be considered when encountering a lipomatous mass in the parapharyngeal space, even though it is a rare entity. In selected cases where the tumour is in close anatomical relationship with neurovascular structures, multi-portal minimally invasive surgery provides multiple angles of attack, allowing safe en-bloc resection of the tumour with good cosmetic outcome.



## A Retrospective Multicentre Study Identifying Predictive Factors for Glioblastoma Gross Total Resection

Saori Takemura<sup>1</sup>, Peter YM Woo<sup>1</sup>, Joyce SW Chow<sup>2</sup>, Jason MK Ho<sup>3</sup>, Sarah SN Lau<sup>4</sup>, LF Li<sup>4</sup>, Tony KT Chan<sup>5</sup>, Michael WY Lee<sup>6</sup>, Danny TM Chan<sup>7</sup>, KY Chan<sup>1</sup>

<sup>1</sup> Department of Neurosurgery, Kwong Wah Hospital, Hong Kong

<sup>2</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>3</sup> Department of Neurosurgery, Tuen Mun Hospital, Hong Kong

<sup>4</sup> Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong

<sup>5</sup> Department of Neurosurgery, Princess Margaret Hospital, Hong Kong

<sup>6</sup> Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong

<sup>7</sup> Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** Extent of surgical resection (EOR) is an established independent significant predictor for overall survival (OS) in patients with glioblastoma (GBM). However, EOR is influenced by multiple factors, including tumour size, location especially with regard to their relationship with eloquent areas and preoperative functional performance. Maximal safe resection depends on these factors as well as intraoperative surgical adjuncts such as image-guidance, electrical stimulation mapping, and 5-aminolevulinic acid (5-ALA) fluorescence-guided surgery. The study showed a promising result for the correlation between topographical staging of tumour, EOR and survival of patients. The aim of this study was to identify patient, tumour and surgical factors that predict gross total resection (GTR) of GBM.

**Methods:** Clinical, radiological and operation records of consecutive adult patients with histologically-proven GBM treated with surgical resection all seven of the Hospital Authority's Neurosurgical Centres from 1 January 2017 to 30 November 2020 were evaluated. The presenting symptom of each patient and their preoperative Karnofsky performance score (KPS) was determined. Apart from tumour anatomical location and size, other features include its relationship with the subventricular zone (SVZ), its functional topographical stage according to the Shinoda and the Motor-Speech-MCA grading systems were determined. Operation records were reviewed to determine the surgical adjuncts utilised such as image-guidance (neuronavigation, ultrasonography), electrical stimulation brain mapping and 5-ALA. The primary endpoint was GTR as determined by the operating neurosurgeon. Data was then analysed using multivariate logistic regression to determine independent predictors for GTR.

**Results:** A total of 135 patients were reviewed during this three-year period. The mean age was  $58 \pm 13$  years with a male:female ratio of 1.8:1. The median preoperative KPS was 80 (interquartile range: 80-90). In all, 38% (51/135) of tumours were located in the frontal lobe followed by the temporal lobe (30%, 40/135). In total, 51% (69/135) of tumours were located on the left-side with 79% (106/135) located at predefined eloquent regions. Also, 30% (41/135) of patients underwent GTR with intraoperative ultrasound, neuronavigation and 5-ALA used in 95% (39/41), 85% (35/41) and 32% (13/41) of GTR patients, respectively. Among 84 patients with tumour involving subventricular zone, 82% (69/84) of them had non-GTR of tumour.

**Conclusions:** In all, 30% of glioblastoma patients underwent gross total resection of tumour. Among the studied variables, use of neuronavigation and absence of subventricular zone involvement were independent predictors of gross total resection of tumour.

Clayton HF Cheng, Jason MK Ho  
Department of Neurosurgery, Tuen Mun Hospital, Hong Kong

**Objective:** Fluorescein sodium has been used as a tool to increase the resection rate in brain tumour resection surgeries.

To introduce the chemical properties and the mechanism of fluorescein dye. How these characteristics of fluorescein can be applied in neurosurgeries, especially in brain tumour resection. To share the experience of use of fluorescein dye in our centre.

**Methods:** A review of the intraoperative use of fluorescein dye in brain tumour excision surgeries in our centre. To share the first-hand intraoperative use of fluorescein dye in a neurosurgeons' perspective and how fluorescein dye can improve visualisation of tumour tissue to achieve better resection. To compare fluorescein sodium dye and other fluorescence such as 5-ALA.

**Results and Conclusion:** Fluorescein sodium is a reliable tool for neurosurgeons to have better intraoperative visualisation of brain tumour tissue. It is a safe and feasible method that can be readily used to improve the extent of brain tumour resection.

## Role of Wada Test and Neuropsychological Assessment in the Management of Patients with Medically Intractable Epilepsy

YH Lau<sup>1</sup>, YH Tang<sup>2</sup>, HW Leung<sup>2</sup>, George KC Wong<sup>2</sup>

<sup>1</sup> Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong

<sup>2</sup> Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Objective:** The Wada test, alongside neuropsychological assessment, provides information on the lateralisation of memory and language functions in patients with medically intractable epilepsy. Such information allows a neurosurgeon to predict the postoperative outcomes by assessing the hemispheric memory and language functional reserve contralateral to the epilepsy foci of patients. This gives both neurosurgeons and patients a clearer picture on risks and benefits of epilepsy surgeries. This is a retrospective case series analysis of patients undergoing epilepsy surgeries to illustrate the use of the Wada test and neuropsychological assessments in guiding the management in medically intractable epilepsy patients.

**Methods:** The data of four patients who underwent epilepsy surgeries from 2010 to 2015 were collected and retrospectively analysed. Collected data include results from the Wada test and neuropsychological assessments performed before and after surgeries. The data were compared to the surgeries performed in each patient.

**Results:** Three out of the four patients were shown to be left-dominant in terms of language functions, while the remaining one has incomplete dominance of either hemispheres. Two of the left-dominant patients underwent right anterior temporal lobectomy and amygdalohippocampectomy. The remaining left-dominant patient underwent excision of the left posterior temporal lesion. The patient with incomplete dominance underwent left anterior temporal lobectomy and amygdalohippocampectomy. No significant decline in memory function was detected.

**Conclusion:** The Wada test and neuropsychological assessment provide crucial information on the lateralisation of patients' memory and language functions, and hence is essential in the preoperative planning for epilepsy surgery candidates.

## A High Fidelity and Modality Simulation in Delivering Knowledge and Hands-on Skills to Manage Tracheostomy Emergencies

P 27

CM Tsang, KM Fok, YK Tam, YF Chan, CK Chan, TK Tang, Angel Ki Hui  
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

**Objective:** To improve existing training model in delivering management and hands-on skills in handling emergencies in clinical areas.

To improve the competence and confidence of clinical staff and facilitate team approach in managing tracheostomy emergencies and resuscitation.

**Content:** Development of clinical competence involves active and passive learning in cognitive, psychomotor, and affective domains. Health profession education should combine the deliberation of learning activities with clinical immersion and learners' involvement. Simulation training, therefore, provides health professionals a valuable learning experience with high modality and fidelity as well as optimal behavioural, emotional, and cognitive engagement.

The average number of tracheostomies patients in neurosurgical units ranged from 8 to 12 per month, which outnumbered most specialties in Queen Elizabeth Hospital. However, tracheostomy care is associated with risks and complications. Tracheostomy incident is classified as a life-threatening condition, which could lead to significant morbidity and mortality.

Therefore, tracheostomised patients always require intensive nursing care. However, lack of training has hindered nursing staff from delivering high quality of caring; resulting in affecting patient safety and decreasing job satisfaction. In view of this, a tracheostomy emergencies simulation drill was conducted, resembling previous real-life tracheostomy emergencies happened in neurosurgical units.

**Results:** The simulation training scored 94% in the satisfactory survey. The participants demonstrated significant increase in knowledge, competence and confidence on a 5-point Likert Scale after the simulation. All junior staff verbalised that they became more confident and competent in managing tracheostomy emergencies. The tracheostomy incident rate was reduced by 100% after the simulation training.

**Conclusion:** High modality and fidelity of tracheostomy emergencies simulation provided better learning engagement, which strengthened staff's clinical competence and confidence in emergencies management, hence facilitated better team cooperation in resuscitation.

## A Clinical Investigation Evaluating the Efficacy of Olfactory Training by Two Olfactory Tests in Healthy Subjects

P 28

Queenie HW Wong<sup>1</sup>, Leo KT Yeung<sup>1</sup>, Samuel MW Chow<sup>2</sup>, Cecelia MS Leung<sup>1</sup>, Danny TM Chan<sup>1</sup>

<sup>1</sup> Division of Neurosurgery, Department of Surgery, The Chinese University of Hong Kong/Prince of Wales Hospital, Hong Kong

<sup>2</sup> Department of Otorhinolaryngology, Head and Neck Surgery, Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong

**Objective:** To evaluate the efficacy of olfactory training (OT) among healthy individuals by comparing their pre- and post-training olfactory performance, and to compare the results of two olfactory function assessment kits namely Sniffin' Sticks test and UPSIT when assessing the olfactory function in the healthy subjects.

**Methods:** This was a prospective study involving 20 healthy subjects recruited from the neurosurgeons in Hong Kong. Participants completed two pre-training olfactory tests, namely Sniffin' Sticks test and UPSIT, followed by an 8-week olfactory training, and afterwards completed the above two tests again. Sniffin' Sticks test and UPSIT were used to evaluate the efficacy of OT. For the former, outcome measures included the threshold (T) score, discrimination (D) score, identification (I) score, and TDI global olfactory score measured before and after OT. For the latter, the outcome measure was the UPSIT score at a maximum of 40, and it was also measured before and after OT.

**Results and Conclusion:** To be mentioned in the presentation.

## To Promote the Implementation of National Institutes of Health Stroke Scale in Department of Neurosurgery

N 1

SF Fung, CL Chang, LL Charm, NS Cheng, TK Tang, KY Wong  
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

**Objective:** To enhance clinical staff's expertise in using National Institutes of Health Stroke Scale (NIHSS) for the stroke patient.

**Introduction:** Intra-arterial thrombectomy is a neurovascular intervention for acute ischemic stroke. According to Hospital Authority annual plan 2021 to 2022, there is imminent need to provide 24-hour-life saving procedures for stroke. This results the increased importance of stroke care. The NIHSS is the useful tool for predicting the long-term functional outcome of stroke patients. To strengthen the nursing role in stroke care, it is important to promote NIHSS training to nursing staff. The initial phase of the training programme is aimed to promote NIHSS certification for all nursing staff and seek feedback to plan the next stage.

**Methods:** The initial phase of NIHSS training programme recruited 86 nursing staff working in Department of Neurosurgery, Queen Elizabeth Hospital. All participants were given the cue card and training material about NIHSS. After completing the initial phase, they were also asked to complete the questionnaire to evaluate their expertise in using NIHSS.

**Results:** All participants completed the initial phase of training. In all, 95% participants were satisfied with the NIHSS training. The average score of competency evaluation was 3.14 on all items. Some weaker areas, eg, the visual field were ranked low among all NIHSS items in the competency rating by nurses.

**Discussion:** In this online training, participants expressed the need for supplementary training. Repeated practice is the efficient technique for the staff to achieve their skills. Bedside clinical practice with clinical experts is required for participants to consolidate assessment skills.

**Conclusion:** The initial phase of NIHSS training provided the objective assessment tool for nursing staff to perform the assessment on stroke patients and collaborate patient's condition with other healthcare professionals. The next phase of training will be developed based on competency evaluation and feedback.

## Launching a "Nursing Management for Patients with Ventriculoperitoneal Shunts" Education Workshop for the Nursing Staff in Prince of Wales Hospital, and Tuen Mun Hospital under Hospital Authority

N 2

HW Yeung<sup>1</sup>, KF Chan<sup>1</sup>, KY Chu<sup>1</sup>, WC Kwan<sup>2</sup>, OK Wong<sup>2</sup>

<sup>1</sup> Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hospital Authority, Hong Kong

<sup>2</sup> Department of Neurosurgery, Tuen Mun Hospital, Hospital Authority, Hong Kong

**Objective:** This project aimed to launch a structural education workshop for improving the knowledge and competence of nursing staff on caring the patients with Ventriculoperitoneal (VP) shunts.

**Methods:** A 1-hour education workshop of "Nursing Management for Patient with VP Shunt", which included a pre-, post-test for assessing the effectiveness and a satisfactory survey for process evaluation, was established for all 76 nursing staff including Registered Nurses, Enrolled Nurses, Advanced Practiced Nurses, and Nurse Learners who working in the Neurosurgery units of the two hospitals.

**Results:** A total of 49 nursing staff completed the pre-test and got average score 5 out of 10. Fifty nursing staff participated in the workshop, and around 70% of them finished the post-test. The average of post-test was 8 out of 10. Furthermore, the satisfactory survey revealed the participants satisfied the arrangement of workshop, such as the venue, the time, the length, the content, the speakers, and the delivery methods.

**Conclusion:** Launching an education workshop for improving the knowledge and competence of nursing staff on caring the patients with VP shunts was effective, appropriate, and feasible.

## Enhanced Infection Control Measures in Department of Neurosurgery

N 3

MW Lam

Department of Neurosurgery, Princess Margaret Hospital, Hong Kong

**Objective:** To reduce hospital-acquired infection (HAI) through changing staff behaviour.

**Methods:** A 3-year retrospective review of the monthly number of hospital-acquired methicillin-resistant *Staphylococcus aureus* (MRSA) and multi-drug resistant organism (MDRO) cases in Department of Neurosurgery were analysed to evaluate the effectiveness of the enhanced infection control measures.

**Results:** There were over 80% reduction in the number of newly acquired MRSA and MDRO cases in Department of Neurosurgery in 2021, compared with 2019. The total number of hospital-acquired MRSA and MDRO in 2021 (from January to August) was 10 while there were 57 cases in 2019.

**Conclusion:** As neurosurgical patients are prone to acquire MRSA and MDRO and staff behaviours are key contributors to HAI, a series of interventions were implemented to reduce HAI by changing staff behaviour in Department of Neurosurgery, Prince Margaret Hospital since September 2020. Interventions were mainly focused on staff hand hygiene behaviour and infection control behaviour through empowering staff to monitor, teach and correct infection control practices in the unit. Enhanced measures included adoption of antimicrobial curtain, use of dedicated equipment, promotion of hand hygiene, enhance cleansing schedule and strategies on improving patient hygiene. To ensure staff compliance to improvement measures, infection control leaders were assigned in each shift of duty. Malpractice and wrong concepts can be stopped and rectified by immediate prompts. Staff awareness on infection control had been raised through reminders and encouragement. As nursing role in infection control is emphasised, nurses were motivated to perform better as role models for newcomers and supporting staff. To conclude, infection control behaviours among staff were improved through regular monitoring and feedback. The enhanced infection control measures by changing staff behaviour were effective and HAI were significantly reduced.

## Mechanical Prophylaxis of Deep Vein Thrombosis in Neurosurgery: Introduction of an Evidenced-based Guideline

N 4

WK Li, KF Mok, KW Lam

Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong

**Objective:** Deep Vein Thrombosis (DVT) is a common complication among surgical patients, and neurosurgical patients had the highest incidence of postoperative DVT among other surgery groups because of long operating times, paralysis, prolonged bed rest and posttraumatic status.<sup>1</sup> Meanwhile, controversy concerning the use of heparin as it may raise the rate of postoperative intracranial haemorrhage and potentially development of fatal complication, pulmonary embolism indicated the significance of mechanical DVT prophylaxis.<sup>1</sup> An evidence-based guideline was then developed to facilitate frontline nurses to assess the patient need and apply mechanical DVT prophylaxis for neurosurgical patients. This study aimed to investigate the effect of DVT reduction, as well as the effect of promotion in nurse compliance after the implementation of a DVT prophylaxis guideline.

**Methods:** This was a prospective study conducted in Queen Mary Hospital from January 2021 to September 2021. DVT incidence rate was compared between baseline and after implementation of the guideline. Nurse compliance was compared at different periods including baseline, after implementation and 9 months after implementation.

**Results:** The reported DVT incident rate dropped from 0.28% to 0.08% ( $P=0.199$ ). The nurse compliance regarding the use of new guideline and application of DVT prophylaxis noted 19% increase after implementation ( $P=0.002$ ) & 17% increase after 9 months ( $P=0.003$ ).

**Conclusion:** The implementation of the DVT prophylaxis guideline increased nurses' awareness towards DVT prophylaxis in clinical setting as evidenced by the increase in nurse compliance. However, a larger sample size is required to examine the effect of DVT incident rate reduction by the proposed guideline.

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KM Kwok<sup>1</sup>, KL Man<sup>1</sup>, MY Chang<sup>1</sup>, Calvin HK Mak<sup>1</sup>, Janice NF Lui<sup>2</sup>, Cass SY Chu<sup>2</sup>, Helen KY Luk<sup>3</sup>, Vera YL Chan<sup>3</sup>, SY Wan<sup>4</sup>

<sup>1</sup> Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong

<sup>2</sup> Department of Occupational Therapy, Queen Elizabeth Hospital, Hong Kong

<sup>3</sup> Physiotherapy Department, Queen Elizabeth Hospital, Hong Kong

<sup>4</sup> Social Welfare Department, HKSAR Government, Hong Kong

**Objective:** To provide continuity of care for patients transition from acute inpatient setting to the community through multidisciplinary approach in optimisation of patients' general condition after discharge, and maximisation on the use of community services.

**Methods:** A trial run of the Neurosurgery Extended Care Programme was carried out in the Department of Neurosurgery of Queen Elizabeth Hospital since August 2021. Patients admitted for traumatic brain injury were recruited if they have a history of fall, age over 64 with modified Barthel Index 75 or above. Outreach specialty-based services and community support service would be arranged according to individual needs. The services included nurse led telecare, physiotherapist and occupational therapist home visits and integrated community care service from non-governmental organisations.

**Results:** From August to October 2021, a total of 65 cases were screened for the programme. Twenty-three of them were recruited and seventeen joined. Fifteen females and two males. A total of 17 nursing telecare sessions and 40 home visits were carried out. Services mainly focus on areas like review of wound condition, drug management, health education, cognitive and mobility assessments and trainings, and home safety support. Positive feedback was obtained from the patients. Limited availability of outreach resources and technical issues including networking quality were some of the concerns.

**Conclusion:** Extension of care supported by specialty-based outpatient services could promote a continuity of patient care from acute setting. It benefits both the individuals and the corporate. By incorporating with technology advancement, extension of nursing services through telecare could certainly lead us to our mission for a comprehensive patient care throughout the patient journey.

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