SUPPLEMENT 6

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18 – 19 November 2022

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29th Annual Scientific Meeting of The Hong Kong Neurosurgical Society

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The Organising Committee would like to thank the following guest faculties for their invaluable contributions to the 29th Annual Scientific Meeting

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Leanne CHAN, PhD
Associate Professor, Department of Electrical Engineering, The City University of Hong Kong, Hong Kong SAR, China

SCIENTIFIC PROGRAMME

Venue: Kowloon Shangri-La, Tsim Sha Tsui, Kowloon

18 November 2022, Friday

08:00 – 08:25	Registration	**POSTER PRESENTATION / EXHIBITION**
08:25 – 08:30	**OPENING SPEECH** ***Dr Calvin Mak***	
08:30 – 09:30	**FREE PAPER I—General / Paediatrics** Chairpersons: *Dr KM Leung & Dr C Poon*	
09:30 – 10:30	**KEYNOTE LECTURE I** **Decoding Words From the Human Brain** ***Prof Edward F Chang*** Chairpersons: *Dr FC Cheung & Dr CF Fung*	
10:30 – 10:50	Tea Break	
10:50 – 11:20	**KEYNOTE LECTURE II** **Inspire: a New Treatment for Obstructive Sleep Apnoea through Hypoglossal Nerve Stimulation** ***Prof Gabriel Wong*** Chairpersons: *Dr HM Chiu & Dr YT Kan*	
11:20 – 11:50	**KEYNOTE LECTURE III** **Neuromodulation in Spinal Cord Injury - Diaphragmatic Pacing** ***Prof Raymond P Onders*** Chairpersons: *Prof Gilberto Leung & Dr WK Wong*	
11:50 – 12:30	**FREE PAPER II—Functional** Chairpersons: *Dr WM Lui & Dr HT Wong*	
12:30 – 13:30	Lunch	
13:30 – 14:10	**SPONSORED LECTURE** **How to Use the Innovative MRgFUS in the Recent Years to Treat Movement Disorders Issue and the Recent Application of MRgFUS in Japan** ***Prof Takaomi Taira*** Chairpersons: *Dr PH Chan & Dr Danny Chan*	
14:10 – 15:00	**FREE PAPER III—Tumour / Skull Base Tumour** Chairpersons: *Dr Derek Wong & Dr XL Zhu (online)*	
15:00 – 15:30	**KEYNOTE LECTURE IV** **Deep Brain Stimulation for Psychiatric Conditions** ***Prof Jin Woo Chang*** Chairpersons: *Dr Michael Lee & Dr TL Poon*	
15:30 – 15:50	Tea Break	
15:50 – 16:20	**FREE PAPER IV (Video)** Chairpersons: *Dr YC Po & Dr ST Wong*	
16:20 – 17:00	**FREE PAPER V—Vascular** Chairpersons: *Dr KY Pang & Dr Simon Lee*	
19:00 – 22:30	**ASM Dinner** **Venue: Grand Ballroom** Guest Speaker: *Dr Jason Chan Kai-Yue, MH, JP*	

19 November 2022, Saturday

08:30 – 08:45	Registration		**POSTER PRESENTATION / EXHIBITION**
08:45 – 09:45	**KEYNOTE LECTURE V** **1. Electrocorticography-Based Brain-Computer Interfaces** **2. Development of Motor Neuroprosthesis and Way Forward** ***Prof Kai J Miller*** Chairpersons: *Dr ST Chan & Prof WS Poon (online)*		
09:45 – 10:15	**SPINE CHAPTER LECTURE** **1. Awake Spinal Fusion** ***Prof Alok Sharan*** **2. Time is Spine: New Updates on Acute Spinal Cord Injury** ***Dr Nader Hejrati*** Chairpersons: *Dr David Sun, Dr YH Tse & Dr David Chan (online)*		
10:15 – 10:30	Tea Break		
10:30 – 11:10	**FREE PAPER VI—Spine / Trauma** Chairpersons: *Dr KY Chan & Dr WK Mak*	**NURSING SESSION** **Way Forward in Preparing Ourselves for Challenges** Chairpersons: *Ms MY Chang & Mr Nobel CK Hung*	
11:10 – 11:50	**FREE PAPER VII—Endovascular** Chairpersons: *Dr Dawson Fong & Dr ST Wong*		
11:50 – 12:20	**FREE PAPER VIII—Endovascular** Chairpersons: *Dr YW Fan & Dr CP Yu*		
12:20 – 12:30	Group photo & Announcement		
12:30 – 13:40	**SPONSORED LUNCH SYMPOSIUM** **Biomarkers in Traumatic Brain Injury – Exploring Their Utility in Clinical Practice** ***Dr John Thundyil*** **Potential Utility of Blood Based Biomarker for Mild Traumatic Brain Injury** ***Dr William Ho*** Chairpersons: *Dr Tony Chan & Dr SC So*		
13:40 – 15:20	**LOCAL ROUND TABLE DISCUSSION** **1. Non-invasive BCI in Motor Rehabilitation and Prosthesis** ***Prof Raymond Tong (CUHK)*** **2. Machine Learning Application in EEG and BCI: Identifying Limb Movement Intentions With Intelligent Algorithms** ***Prof Thomas Choi (PolyU)*** **3. Advances in Neurostimulation of Retina: Restoring Vision and Beyond** ***Prof Leanne Chan (CityU)*** **4. Round Table Discussion and Way Forward** ***All speakers, panellists and audience*** Chairpersons: *Dr Michael Lee, Dr ST Wong & Prof Ken Yung (HKBU)*		
15:20 – 15:40	Tea Break		
15:40 – 16:00	**SRS CHAPTER LECTURE: The Pearls of 2022 ISRS Congress** ***Dr Jason Ho*** Moderator: *Dr KY Yam*		
16:00 – 16:50	**FREE PAPER IX – Glioma** Chairpersons: *Dr TC Tan & Dr CK Wong*		
16:50 – 17:00	Closing Remarks *Dr Michael Lee*		

FP 1.1

Early Discharge Support Through Telecare for Reducing Caring Distress of Caregivers Amid the COVID-19 Pandemic

Rachel YH Lam[1], LF Li[2], SKR Chang[3], KW Lam[2], MS Boo[2], KM Chan[3], SK Yu[3], SLS Mo[1]
[1] Department of Medical Social Services, Queen Mary Hospital, Hong Kong SAR, China
[2] Department of Neurosurgery, Queen Mary Hospital, Hong Kong SAR, China
[3] Department of Medicine, Queen Mary Hospital, Hong Kong SAR, China

Objective: To reduce the caring distress through early caregiver empowerment and strengthening social support.
Methods: During the COVID-19 pandemic, patients' caring options and caring quality may be affected. Early discharge support (EDS) programme through telecare may address the service gap and improve understanding of patients' health condition, care pathway, and availability of community support amid the pandemic. Patients who were admitted to stroke or neurosurgical wards in an acute hospital and their core family members were recruited to join the EDS programme from August 2021 to July 2022. Upon first week of admission, caregivers were invited to attend an online orientation programme on disease management and supportive services in the community. Afterwards, they were connected to various community resources for early engagement and continuous support according to their care preference through phone follow-up. A quasi-experiment with pre-test and post-test design was adopted to measure the change of caregivers' distress upon patient admission and 1 week after patient discharge. Caregiver's distress was measured by the validated Cantonese version of the Zarit Burden Interview (C-ZBI).
Results: A total of 92 caregivers completed the pre-test and post-test questionnaires. There were statistically significant decreases on caring burden from 6.89 to 5.87 ($P<0.001$) by C-ZBI.
Conclusion: The programme provided timely education on disease management, psychological support, community resources networking via telecare to relieve caregiver's distress on caring neurosurgical and stroke patients when special visiting and social distancing policies were imposed.

FP 1.2

Transcranial Cerebral Oximetry for Prediction of Delayed Cerebral Ischaemia Following Subarachnoid Haemorrhage

MT Wong, KY Pang, LY Ho, CY Hung, SK Chan
Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong SAR, China

Objective: Delayed cerebral ischaemia (DCI) is a major cause of morbidity and mortality following subarachnoid haemorrhage (SAH). Prompt diagnosis and treatment may improve the outcome. Transcranial cerebral oximetry (TCCO) is a non-invasive technique for measurement of regional cerebral oxygen saturation (rSO2). Whether TCCO can enhance the reliability for detecting DCI remains controversial. This study aimed to evaluate the efficacy of TCCO for prediction and diagnosis of DCI in patient having aneurysmal SAH.
Methods: This was a retrospective study of 32 patients operated for aneurysmal SAH in Pamela Youde Nethersole Eastern Hospital between 1 June 2022 and 31 May 2022 and were applied with TCCO for continuous measurement of rSO2.
Results: Thirty-two patients with aneurysmal SAH were included (DCI, n=12; non-DCI, n=20). The rSO2 levels of patient with DCI were significantly lower than the baseline value, but the difference was not significant between patients with DCI and patients without DCI.
Conclusion: Transcranial cerebral oximetry is a safe, easy to use, non-invasive bedside measurement tool for continuous monitoring of rSO2. However, this study does not support its use in clinical decision-making and prediction of DCI. A larger cohort study with precise protocol is required to obtain a more conclusive result.

FP 1.3

Clinical Profiles and Early Outcomes in Medulloblastoma Patients: Three-Year Experience of Hong Kong Children's Hospital

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, Hong Kong SAR, China

Objective: To review the clinical profiles and treatment outcomes of medulloblastoma patients at the Hong Kong Children's Hospital.
Methods: Paediatric patients diagnosed with medulloblastoma between 2019 and 2021 were reviewed. Clinical profiles and treatment outcomes were analysed retrospectively.
Results: Fifteen consecutive patients were identified. The median age at surgery was 8.28 years, and two patients had disease onset before 3 years old. The male-to-female ratio was 1:1.5. The most common initial presenting symptoms were vomiting (60%) and headache (53.3%). On initial magnetic resonance images, 86.7% of patients had hydrocephalus. In all, 33.3% and 13.3% of patients had intracranial and spinal metastases, respectively. In all, 86.7% of the patients received near-to-gross total excision. Those unable to achieve gross total excision were limited by tumour adherence to PICA/floor of 4th ventricle/brainstem. Cerebrospinal fluid diversion was performed in 80% of the patients. 33.3% received endoscopic third ventriculostomy and 20.0% had ventriculoperitoneal shunt insertion. In patients who had molecular and histology testing performed, 35.7% were WNT-activated, 64.3% were non-WNT/non-SHH, and none were SHH-activated. In total, 93.3% had medulloblastomas with classic histology, while 6.7% had a mixed histology. Adjuvant therapy including chemotherapy and radiotherapy were given in 93.3% of patients. Various protocols were adopted for high-risk disease, including patients with early disease onset, significant residual tumour, high-risk molecular profiles and disease relapse. Rates of 6-month, 1-year, and 2-year progression-free survival were 84.6%, 76.2%, and 46.4%, respectively. Rates of 1-year and 2-year overall survival were 91.7% and 50.9%, respectively.
Conclusion: Medulloblastoma comes with high mortality and recurrence rates despite optimal neurosurgical intervention. Molecular subgrouping gives neurosurgeons and neuro-oncologists a very good idea on treatment direction and prognostication. In Hong Kong there are more brain/spine metastases upon presentation, leading to poorer treatment outcomes. The waiting time between diagnosis to radiotherapy affects outcome and should be addressed.

FP 1.4

A Local Review Into Infantile High-Grade Glioma Patient Outcome

Katrina CW Chau[1], Sarah SN Lau[2], Kevin KF Cheng[2], Wilson WS Ho[2], Anthony PY Liu[3], Dennis TL Ku[4], Godfrey CF Chan[3]
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[2] Department of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong SAR, China
[3] Department of Paediatrics and Adolescent Medicine, Queen Mary Hospital, Hong Kong SAR, China
[4] Department of Paediatrics and Adolescent Medicine, Hong Kong Children's Hospital, Hong Kong SAR, China

Objective: To review local infantile high-grade glioma (IHG) patients and their outcomes.
Methods: Local data from 37 patients aged <1 year who were diagnosed with brain tumour were analysed using statistics software.
Results: There were 16 male and 21 female patients. The most common diagnosis was astrocytoma (n=9), followed by medulloblastoma (n=6), germ cell tumours (n=6), primitive neuroectodermal tumour (n=5), atypical teratoid rhabdoid tumour (n=4), ependymoma (n=2), choroid plexus tumour (n=3), craniopharyngioma (n=1), and ganglioglioma (n=1). Of the nine patients with astrocytoma, four males and three females were diagnosed with infantile hemispheric glioma. The mean patient age at diagnosis was 3 (range, 0-12) months. Six patients had glioblastoma and one patient had anaplastic astrocytoma. One patient had her tumour in infratentorial region. Multilobar involvement occurred in three patients. NTRK fusion was found in four patients (NTRK fusion, ETV6-NTRK3 fusion, and TPR-NTRK1 fusion). ALK fusion was found in one patient (HMBOX1-ALK). All patients underwent chemotherapy, with three patients switched to NTRK inhibitor following standard therapy. One patient died 20 months after diagnosis.
Conclusion: A local review gives us more insight into updated management and outcomes of infantile patients diagnosed with brain tumours. Infantile high-grade glioma should be regarded as a unique tumour entity and a multidisciplinary approach is paramount in improving survival for this group of patients.

FP 1.5

20-Year Follow-up Analysis of Ventriculoperitoneal Shunt Placement in Our Locoregional Centre

Shek Ching Lam, Shuk Wan Joyce Chow, Tak Lap Poon, Fung Ching Cheung
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR, China

Objective: Ventriculoperitoneal (VP) shunt is the most common method of permanent cerebrospinal fluid diversion. It is often associated with the need of further revisions due to complications. The aim of this long-term follow-up analysis is to review the risk factors associated with shunt revisions.
Methods: Data in our hospital from January 1998 to December 2002 (with 20-year follow-up) and from January 2012 to December 2016 (with medium term follow-up) were retrospectively reviewed and analysed by SPSS. The primary outcomes were the overall shunt revision rate and the revision rates in those with a programmable valve or a non-programmable valve. Risk factors (patient factors, disease factors, operative factors, shunt factors) associated with shunt revisions were analysed using univariate and multivariate analyses. Kaplan-Meier curves were used to determine the duration from shunt placement to first shunt revision.
Results: A total of 200 patients and 199 patients received primary VP shunt in the periods of 1998-2002 and 2012-2016, with mean follow-up durations of 76 months and 56 months, respectively. The overall revision rate was 15.8%; the revision rates of those with a programmable valve and non-programmable valve were 15.9% and 15.8%, respectively; 73% of revisions occurred within the first year of primary VP shunt. Infected shunt and blocked shunt were the two most common indications of VP shunt revision. In univariate and multivariate analyses, tumour-related hydrocephalus ($P<0.001$) and post-traumatic hydrocephalus ($P=0.05$) were associated with higher rate of VP shunt revision. Tumour-related hydrocephalus was associated with higher rate of VP shunt revision even when those with early mortality within 6 months of VP shunt placement were excluded ($P=0.015$).
Conclusion: The 15.8% overall revision rate in our centre was relatively low. The revision rate was similar in those with a programmable valve or a non-programmable valve. Higher primary VP shunt revision rate was associated with post-traumatic hydrocephalus and tumour-related hydrocephalus.

FP 1.6

Comparison of Pupil Size and Reactivity Rating Between Manual Observation and the Use of Automated Pupilometer in Neurosurgical Patients

SW Chau[1], CK Ng[2]
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Background: Discrepancy in pupil size and reactivity rating during neurosurgical observation among examiners is common, and it may directly affect treatment time, plan, and outcome.
Objective: To compare manual observation with automated pupilometer in measuring the pupil size and reactivity.
Methods: Neurosurgical patient's pupil size and reactivity were observed by both manual and automated pupilometer by an independent examiner. Individual eye was examined with contralateral eye opened and contralateral eye closed. Data were analysed with paired-sample t-test.
Results: From April 2022 to June 2022, 100 eyes in 50 neurosurgical patients (26 females and 24 male) aged 21 to 88 years were examined. There was significant difference in mean scores of pupil size by pupilometer and manual observation (contralateral eye opened: $t99=8.079$; $P<0.001$ vs eye closed: $t99=11.725$; $P<0.001$). On average, pupil size by pupilometer was bigger than manual observation (contralateral eye closed: 1.289 vs eye opened: 0.779). The sensitivity and specificity of pupil reactivity by manual observation were 96.6% and 58.3%, respectively. Five (5.56%) false positive and three (30%) false negative cases were identified.
Conclusion: Heedful observation of pupil size and reactivity is crucial during neurosurgical observation. Automated pupilometer is superior to manual observation in terms of sensitivity and reproducibility, especially for patients with equivocal pupil size and reactivity.

FP 2.1

Does Hybrid Positron Emission Tomography/Magnetic Resonance Imaging Alter Management Decisions in Patients with Drug Resistant Epilepsy?

Ben KL Luk, Y Chan, KY Chan
Department of Neurosurgery, Kwong Wah Hospital, Hong Kong SAR, China

Objective: To evaluate the effect of hybrid positron emission tomography (PET)/magnetic resonance imaging (MRI) on management decisions in patients with drug-resistant epilepsy.
Methods: This is a retrospective study of patients with drug-resistant epilepsy. Inclusion criteria were patients who underwent hybrid PET/MRI of the brain from mid-2019 to mid-2022. Exclusion criteria were patients who were diagnosed with intracranial space-occupying lesions.
Results: A total of 32 patients were recruited. After exclusions, 29 patients were analysed. The mean age was 31. Seizure duration ranged from 2 to 31 years. Most (80%) patients had focal seizure. Initial MRI revealed lesional pathology in 62% of patients; most of them had mesial temporal sclerosis. Most patients were treated conservatively after initial MRI. Subsequent hybrid PET/MRI showed positive findings in 71% of patients, among which PET showed hypometabolism in 75% of patients, whereas MRI showed morphological lesion in 89% of patients. Change in epilepsy management after hybrid PET/MRI was found to be 82%, in which most patients underwent surgical resection followed by vagus nerve stimulator implantation.
Conclusion: Hybrid PET/MRI plays a role in drug-resistant epilepsy management and should be used for epilepsy investigation.

FP 2.2

Early Experience on Directional Lead for Deep Brain Stimulation for Idiopathic Parkinson's Disease in a Tertiary Neurosurgical Centre

KW See[1], MH Yuen[1], HF Chan[2], YF Cheung[2], TL Poon[1]
[1] Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR, China
[2] Department of Medicine, Queen Elizabeth Hospital, Hong Kong SAR, China

Objective: Subthalamic nucleus (STN) is the commonest target for deep brain stimulation for idiopathic Parkinson's disease. Spastic muscle contraction and gaze deviation could be common stimulation side-effects to structures surrounding the STN. Directional lead is gaining popularity to reduce stimulation side effects. This study aimed to review the early experience on directional lead in Queen Elizabeth Hospital.
Methods: Patients with directional lead inserted from March 2018 to February 2022 (4 years) were included. Baseline demographics, unified Parkinson's disease rating scale (UPDRS), levodopa equivalent, stimulation side-effects, and usage of directional stimulation were charted. Size of STN was measured by volumetric study in BrainLab Element. Length of a good STN signal in microelectrode recording was also charted. Statistical analysis was done with SPSS (Windows version 21.0; IBM Corp, Armonk [NY], US).
Results: A total of 19 patients were included; one of them was subsequently excluded due to lack of long-term follow-up data. Mean age of patients was 64 years. Mean duration of Parkinson's disease was 15.7 years. Directional stimulation was used in eight patients (44%) to handle stimulation side-effects. In 80% of the scenarios, patients' symptoms improved after directional stimulation. The length of a good STN signal was inversely associated with directional stimulation (P=0.03). However, there was no significant correlation of directional stimulation with improvement in UPDRS part III (motor).
Conclusion: Directional stimulation is an effective technology to reduce stimulation side-effects in patients who receive deep brain stimulation to STN for idiopathic Parkinson's disease.

FP 2.3

The More the Better? 25-Year Retrospective Study on How the Extent of Hippocampal Resection Affects the Outcomes of Mesial Temporal Lobe Epilepsy

William Xue, KW See, Joyce SW Chow, TL Poon, FC Cheung
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR, China

Objective: To investigate retrospectively the extent of hippocampal resection on seizure control in mesial temporal lobe epilepsy (mTLE) patients from Queen Elizabeth Hospital.
Methods: A total of 23 patients with medically intractable unilateral mesial temporal lobe epilepsy who underwent hippocampal resection at Queen Elizabeth Hospital from 1998 to 2022 were reviewed. Pre- and post-operative sagittal cut images were compared to measure the extent of hippocampal resection. Residual hippocampal tail was defined as the distance from the posterior resection margin of hippocampus to the tectum. The degree of seizure control was measured by Engel classification and reduction in use of anti-epileptic drugs. Data was imported into SPSS for multiple regression, controlling for patient's demographics.
Results: The mean patient age at operation was 43.43 years (standard deviation [SD]=9.42 years). In all, 13 (56.53%) patients were male, and 12 (52.17%) patients had right-sided disease. Their mean pre- and post-operative hippocampal lengths were 40.80 mm (SD=4.54 mm) and 17.92 mm (SD=5.05 mm), respectively. The mean length and percentage of hippocampal resection were 22.89 mm (SD=5.39 mm) and 56.06% (SD=11.41%), respectively. 21 (91.30%) of the patients achieved Engel class I or II seizure outcome. In total, 19 (86.36%) of the 22 patients with follow-up of more than two years weaned off one or more anti-epileptic drug(s). There was no statistically significant correlation to Engel class or reduction in anti-epileptic drugs in terms of post-operative residual hippocampal length, length of hippocampal resection, or percentage of hippocampal resection.
Conclusion: There was no statistically significant correlation between the extent of hippocampal resection and seizure control past a reasonable length of 2-2.5 cm.

FP 2.4

Diffusion Tensor Imaging–Mapped Corticospinal Tract for Guiding Deep Brain Stimulator Lead Placement in Patients with Parkinson's Disease

Janice HC Law, KW See, TL Poon
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR, China

Objective: To analyse any correlation between stimulation side-effects and contact-to-corticospinal tract distance on diffusion tensor imaging (DTI) tractography in Parkinson's disease patients having subthalamic nuclei deep brain stimulation.
Methods: Parkinson's disease patients implanted with bilateral subthalamic nuclei deep brain stimulators in 2021 were studied. All patients had pre-operative magnetic resonance imaging (MRI) [including axial DWI, coronal T2W SPACE FLAIR, and DTI] and post-operative computed tomography (CT) of the brain. Images were imported into Brainlab Element iPlan FibreTracking software (version 2.0.0.188) for corticospinal tract (CST) tracking and CT-MRI fusion. For CST tractography, regions-of-interest and tractography parameters (fractional anisotropy, maximum angulation, and minimum fibre length) were set with reference to previous studies. Intra-operatively, STN on each side was stimulated through different contacts of the lead, at magnitudes of 1-4 mA. As side-effect rarely occurred during weak stimulation, only side-effects during 4mA stimulation were analysed. Side-effects not linked to CST, such as dizziness, were excluded. The shortest distance between CST and each tested contact was measured on fused CT-MRI. Contact-to-CST distance was correlated with incidence of side-effect at 4 mA stimulation at each contact. Unpaired t-test was performed for any correlation between contact-CST distance and side-effects. Significance level of $P<0.05$ was used.
Results: Preliminary analysis of data from 24 contacts in 5 patients found significant correlation between contact-CST distance and stimulation side-effects ($P=0.04$).
Conclusion: Diffusion tensor imaging tractography may be used to guide deep grain stimulation lead placement to reduce stimulation side-effects and to widen therapeutic stimulation window.

Importance of Multidisciplinary Management in Skull Base Pathologies

FP 3.1

William WY Chung[1], CF Ng[1], Calvin HK Mak[1], FC Cheung[1], WS Ng[2], KL Yuen[3]
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[3] Department of Ophthalmology and Visual Sciences, Hong Kong Eye Hospital, Hong Kong SAR, China

Objective: To review surgical outcome of skull base operations collaborated with otorhinolaryngologist and ophthalmologist.
Methods: This was a retrospective review of skull base operation collaborated with otorhinolaryngologist and ophthalmologist in Queen Elizabeth Hospital from January 2018 to August 2022.
Results: There were 48 multidisciplinary skull base operations performed from January 2018 to August 2022. Otorhinolaryngologists participated in 29.2% of total operations, whereas ophthalmologists participated in 81.3%. Most prevalent age-group was 60-69 years, accounting for 35.4% of total patients, followed by 50-59 years (22.9%) and 40-49 years (16.7%). Male and female were equally distributed. About two-third of cases were benign in pathology such as Schwannoma, meningioma, and cavernous haemangioma. One-fifth of cases were malignant, and the remaining included trauma, osteonecrosis. The most operated site was orbital apex (20.8%), followed by mastoid (10.4%), then sphenoid ridge, trigeminal nerve, and orbital extraconal space (each accounting for 8.3%). Almost 70% of operations used solely the endoscopic approach, whereas 16.7% were performed openly and 14.6% used the combined approach. Among endoscopic approach cases, over 60% were transorbital and 25% were endonasal. Notably, there were 4 cases of bi-portal operation and a case of tri-portal operation on parapharyngeal space tumour, which was first reported in the literature.
Conclusion: This study illustrates the importance of multidisciplinary approaches on tailor-made management of complex skull base pathologies.

Surgical Outcomes of Endoscopic Transorbital Approach to Skull Base

FP 3.2

CF Ng[1], Calvin HK Mak[2], TS Tse[3], FC Cheung[1], KL Yuen[2]
[1] Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR, China
[2] Department of Ophthalmology and Visual Sciences, Hong Kong Eye Hospital, Hong Kong SAR, China
[3] Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China

Objective: To review surgical outcomes of endoscopic transorbital surgeries.
Methods: This was a retrospective review of surgical outcomes of transorbital surgeries from January 2020 to August 2022.
Results: A total of 27 cases of endoscopic transorbital approach to skull base were performed from January 2020 to August 2022. There was roughly the same number of men as women. The mean age was 57.6 years. Tumours accounted for 70% of cases, with schwannomas being the most common indication. Lid crease incision was most commonly used (44%). Gross total excision was achieved in 68% of patients in which excisions of lesions were performed. The right-sided lesion was more common (56%), with orbital lesions being the most common location (22.2%). Removal of lateral orbital rim was performed on three patients. Twelve of them (44.4%) had proptosis on presentation, and 75% of them improved after the operations. In all, 88.9% of patients had equal or better visual acuity after the operation. Five patients needed bi-/tri-portal surgeries. There were no cerebrospinal fluid leaks. Transient diplopia and supraorbital numbness were the most common transient complaints after the surgery. There was one case of orbital apex syndrome, one case of cavernous sinus syndrome, and one case of wound infection.
Conclusion: Endoscopic transorbital approach is a minimally invasive, highly versatile, and safe procedure for orbital and skull base pathologies.

FP 3.3

Primary Central Nervous System Lymphoma: 20 Years of Experience at New Territories West Cluster

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Objective: To review all histologically confirmed intracranial primary central nervous system (CNS) lymphoma cases diagnosed between 2002 and 2022.
Methods: This was a retrospective analysis of 37 patients with histologically confirmed primary CNS lymphoma (PCNSL) diagnosed between 2002 and 2022 in Tuen Mun Hospital.
Results: There has been an increasing trend of histologically confirmed PCNSL diagnoses at New Territories West Cluster. Median age of patients at diagnosis was 61 years (range, 34-85 years); 62% were women. Most common presenting symptom was focal sensory motor deficit. In all, 35% of magnetic resonance imaging reports mentioned PCNSL as a differential diagnosis; of those, 24% listed PCNSL as the main differential diagnosis. In all, 78% of patients were started on pre-operative dexamethasone but later were withheld in most patients. After diagnosis, 35% of patients were started on chemotherapy, 24% on radiotherapy, and the rest on both or none. Median delay to diagnosis was 33 days (interquartile range=23-56 days) with no significant predictors for longer time to diagnosis identified. Median overall survival was 28 weeks. Infratentorial tumours and need for re-biopsy predicted a worse outcome. Time to diagnosis and overall survival were overall comparable to those in previous contemporary studies.
Conclusion: Primary CNS lymphoma poses a diagnostic challenge; however, early recognition of the disease, histological diagnosis, and oncological therapy could improve overall survival.

FP 3.4

Characteristics and Clinical Course of Patients with Brain Metastases—a Local Centre Two-Year Review

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Objective: To review the outcome of patients with brain metastases treated at a local hospital.
Methods: A retrospective review was performed on patients diagnosed with brain metastases of solid cancers at Queen Mary Hospital from January 2020 to December 2021. Patient demographics, treatment modalities and outcomes were analysed using statistics software.
Results: A total of 100 patients with brain metastases were identified (59% male; median age at diagnosis, 65 years). Thirty-three percent of patients had Karnofsky performance scale score of <70 on presentation. The most common primary tumour was lung cancer (57%), followed by breast cancer (8%), colon cancer (7%), gastro-oesophageal cancers (6%), and renal cell carcinoma (4%). Forty-one percent of patients had known extracranial metastases at diagnosis. Seven percent of patients had asymptomatic brain metastasis detected incidentally through radiological staging exam. Eighteen percent of patients presented with headache, 15% with dizziness, and 12% with vomiting. Other common symptoms include focal neurological deficits (8%), unsteady gait (4%), and seizures (3%). Forty-six percent of patients had upfront surgical resection of brain tumour. Of these 52% received adjuvant stereotactic radiosurgery and 35% received whole brain radiotherapy. Eight percent of patients had stereotactic radiosurgery and 31% of patients had whole brain radiotherapy as primary treatments. Median overall survival was 7 months.
Conclusion: Recent advancements of oncological management greatly increased the number of patients presenting to neurosurgery with brain metastases requiring treatment. Further insight into the outcome of this group of patients will facilitate better patient selection for neurosurgical treatment.

FP 3.5

Craniofacial Resection in Treating Locally Advanced Nasopharyngeal Cancer Recurrence—a Case Series

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Objective: To discuss characteristics, survivals, and outcomes after extracranial-intracranial (EC-IC) bypass followed by craniofacial resection for recurrence of nasopharyngeal cancer (NPC).
Methods: A retrospective review of patients with locally advanced recurrent NPC underwent craniofacial resection from 2010 to 2022 in a local institute.
Results: All patients underwent first-stage EC-IC bypass with neck dissection; followed by second-stage operation for radical excision of recurrent nasopharyngeal carcinoma by craniofacial resection—craniotomy and maxillary swing to remove the tumour with surrounding skull base structure involved, such as cavernous sinus. In all, 14 patients were operated over the past 12 years. All of them underwent chemo-irradiation or radiotherapy for the primary treatment of NPC, with majority of pathology being undifferentiated carcinoma. Nasopharyngeal cancer recurrence was detected at 7 months to 13.9 years after first diagnosis. Two patients were treated with chemotherapy before resection of recurrent tumour and 14 patients underwent operation as primary treatment for recurrence. Adjuvant chemotherapy or chemo-irradiation was given for 3 patients. Majority of patient had recurrence of the initial pathology, and one patient found to have post irradiation sarcoma. Complications included stroke, hydrocephalus, graft bleeding, stenosis or thrombosis, reperfusion haemorrhage. The median overall post-operative survival was 1 year (0 days to >7 years). Seven patients were found to have recurrences. Two patients were alive without recurrence. Survivors had variable tumour staging and cervical lymph node status, but all remained undifferentiated carcinoma with negative resection margin, involvement limited to parapharyngeal space and internal carotid artery without intracranial extension.
Conclusion: Craniofacial resection after EC-IC bypass is one of the treatment options for locally advanced NPC recurrence with a potential cure. However, it is associated with morbidity and a limited survival which should be well acknowledged in treatment decisions.

FP 5.1

Redefining the Operability Boundary in Intermediate Supplemented Spetzler-Martin Grade Patients by Additional Risk Stratification and Outcome Analysis

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Objective: To compare the prognostic accuracy of Supplemented Spetzler-Martin (Supp-SM) versus Lawton-Young and stand-alone SM grading in an Asian population, and to determine the boundary of operability by investigating the relevant predictors in the intermediate Supp-SM grade 5-7 subtypes.
Methods: This retrospective study was conducted on a consecutive series of patients who underwent microsurgical arteriovenous malformation (AVM) resection at Queen Mary Hospital between 1999 and 2021. Functional outcomes were dichotomised according to modified Rankin scores (mRS). A subgroup analysis was performed on Supp-SM grades 5-7 patients. Univariate and multivariate analyses studied factors associated with worsened mRS scores in these patients.
Results: The Supp-SM system (area under the receiver operating characteristic [AUROC]=0.87, 95% confidence interval [CI]=0.97-0.96) had superior predictive power than SM (AUROC=0.77, 95% CI=0.67-0.87) and LY grades (AUROC=0.79, 95% CI=0.70-0.88). Among Supp-SM grade 5 subjects, 6.7% had worsened mRS, compared to 17.9% for Supp-SM grade 6, and 66.7% for Supp-SM grade 7 patients. Logistic regression analyses identified nidus diffuseness (N0: compact nidus; N1: diffuse nidus) and deep perforator supply (P0: absence of deep perforator supply; P1 presence of deep perforator supply) as independent worse outcome predictors. Next, Supp-SM grades 5-7 patients were stratified into combinations of N0P0, N1P0, N0P1, and N1P1. Patients with Supp-SM grade 6 and N0P0 and N1P0 subtypes ('good 6') had comparable outcomes as Supp-SM grade 5 patients (P=0.51). Outcomes in Supp-SM grade 6 with N0P1 or N1P1 subtypes ('bad 6') had similar outcomes to Supp-SM grade 7 patients (P=0.59). Meanwhile, outcomes in the 'bad 6' category had significantly worse mRS outcomes than in Supp-SM grade 5. This suggests that Supp-SM grade 6 N0P0/N1P0 may serve as a valid operability boundary.
Conclusion: The Supp-SM grading system was superior to SM system and LY system in operative outcome prediction. Supp-SM grade 6 with N0P1 or N1P1 modifiers predicted elevated surgical morbidity and could serve as an operability boundary in the selection of patients for microsurgical AVM resection.

FP 5.2

Frameless- and Frame-Based Stereotactic Radiosurgery for Cerebral Arteriovenous Malformation: a Focus on Obliteration

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Objective: We aimed to compare the efficacy of frameless stereotactic radiosurgery on cerebral arteriovenous malformation (AVM), compared with frame-based stereotactic radiosurgery.
Methods: This retrospective review consisted of 65 patients from 1998 to 2020 who underwent frameless or frame-based stereotactic radiosurgery for the treatment of cerebral arteriovenous malformation. The primary outcome was the obliteration rate. The secondary outcomes included radiation-induced change, adverse radiation effect, and post-radiosurgery haemorrhage. Propensity score matching was performed for the two-study cohort for baseline characteristics with consideration of the sample size. Survival analysis with Kaplan-Meier curve was used for comparing the obliteration between the two-treatment cohort. Patient's functional status changes were reviewed at baseline and at the last follow-up.
Results: There were 40 patients in the frame-based group and 25 patients in the frameless group. Baseline characteristics of were comparable between the frame-based and frameless groups, as were the overall obliteration rate (82.5% vs 80.0%, P=0.310) and the median time to obliteration (32.9 vs 34.8 months, P=0.700). Bleeding in the latency period occurred in one case (1.5%) while symptomatic adverse radiation effect occurred in 17 cases (26.2%). There were 56 patients (86.2%) remained unchanged in the modified Rankin Scale score.
Conclusion: Frameless stereotactic radiosurgery for cerebral AVM is an effective treatment modality, compared with frame-based techniques. Further study for long-term follow-up was necessary to compare the development of late adverse radiation effect.

FP 5.3

A Long-Term Outcome Analysis in Large to Giant Aneurysms: a Single Centre Retrospective Study

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Objective: Large (>1 cm) and giant aneurysms are associated with higher risk of rupture, peri-operative morbidity and morbidity. Treatment options include clipping, coiling, and flow diverters. This study aimed at reviewing long-term outcomes of these three modalities.
Methods: This is a retrospective review of patients with large to giant aneurysms who underwent clipping, coiling, flow diverters or combination of them from 2010 to 2019. Patients' demographics, radiological features like location of aneurysm, clinical presentation, clinical outcomes were collected. Clinical outcomes in terms of modified Rankin Scale (mRS), aneurysm obliteration rate, re-operative rate, recanalisation rate, re-rupture rate, and 3-year survival rate were collected.
Results: There were 81 patients with large to giant aneurysms from 2010 to 2019. In all, 31% of patients underwent clipping while 69% of patients underwent endovascular treatments. In patients undergoing clipping, both recanalisation and reoperation rate were 12%. In all, 32% patients achieved good long-term functional outcomes (3-year post-operative mRS=0-3). Three-year survival rate post-treatment was 64%. In patients receiving endovascular treatment, recanalisation rate was 39% and reoperative rate was 25%. In all, 71% patients achieved good long-term functional outcomes (3-year post-operative mRS=0-3). Three-year survival rate post-treatment was 86%. Further subgroup analysis of endovascular treatment would be presented in the final presentation.
Conclusion: Endovascular intervention and surgical clipping have different benefits and drawbacks in managing large to giant aneurysms.

FP 5.4

Haematoma Drain With Thrombolysis Versus Craniotomy in Hypertensive Intracerebral Haemorrhage

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Objective: To compare the outcome of haematoma drain followed by thrombolysis versus craniotomy in surgical treatment of supratentorial hypertensive intracerebral haemorrhage.
Methods: This was a five-year retrospective single-centre review of patients with supratentorial hypertensive intracerebral haemorrhage treated by haematoma drain followed by thrombolysis, compared to patients with similar propensity score value who were treated by craniotomy.
Results: Patients treated by haematoma drain with thrombolysis (n=10) versus those treated by craniotomy (n=10) showed no significant difference in functional outcome in terms of modified Rankin score, but Montreal Cognitive Assessment score was found to be slightly better in the haematoma drain group. There was no significant difference in the number of serious adverse events and post-operative reduction of haematoma size. Patients treated by haematoma drain had less intra-operative blood loss and shorter operation time but required longer stay in high-dependency unit due to the need for thrombolysis.
Conclusion: Haematoma drain followed by thrombolysis is non-inferior to craniotomy in treating supratentorial hypertensive intracerebral haemorrhage and has potential to provide a better cognitive outcome. Further studies on a larger sample size are warranted.

FP 6.1

Middle Meningeal Artery Embolisation for Chronic Subdural Haematoma: a Case Series for Evaluation of Its Safety and Effectiveness

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Objective: Chronic subdural haematoma (CSDH) is common in older people after fall, with or without a definite history of head injury. It was believed that the ongoing inflammation process and neovascularisation of the subdural membrane played an important role in the formation of CSDH. Middle meningeal artery (MMA) embolisation was proposed to preclude the blood supply of subdural membrane, hence the resolution of CSDH. It can be used as a monotherapy or an adjunct to burr hole drainage. This study aimed to evaluate the safety and effectiveness of MMA embolisation.
Methods: This was a retrospective study of 10 patients who underwent burr hole drainage and adjuvant MMA embolisation with PVA particles and/or coils in Pamela Youde Nethersole Eastern Hospital between 1 January 2022 and 31 August 2022.
Results: There were no procedure related complications noticed. All patients achieved resolution of CSDH in 3 months. Of note, eight of them were either on anti-platelet or anti-coagulant. The average duration of withholding anti-coagulant or anti-platelet was 16 days. Prior to the implementation of MMA embolisation, recurrence of CSDH was observed up to 8%. The time of withholding antiplatelet or anticoagulant was significant longer up to few months. The incidence of thromboembolic event was relatively higher.
Conclusion: Middle meningeal artery embolisation is safe and feasible treatment option to prevent recurrence of CSDH and allows early resumption of antiplatelet or anti-coagulant, thus reduces incidence of thromboembolic event.

FP 6.2

Exploration of Diagnostic Value of Quantitative Electroencephalography in Post-Concussion Syndrome and Outcome Review of Transcranial Direct Current Stimulation

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Objective: To explore if quantitative electroencephalography (qEEG) parameters can facilitate post-concussion syndrome (PCS) diagnosis. To review the treatment response of PCS patients to transcranial direct current stimulation (TDCS).
Methods: This study compared qEEG results of PCS patients and healthy controls. For the PCS patients started on TDCS, their subjective and object outcomes were analysed.
Results: In all, 17 PCS patients and 17 healthy controls were recruited. Each group contained seven females and seven males. Age and years of education were balanced between the two groups. After running T-test statistics and qEEG analysis, a significantly higher beta total power in patients with PCS was found when compared with healthy controls. Significant lower relative power in theta in patients with PCS was also found when compared with healthy controls across the eyes closed condition. Fourteen PCS patients were started on TDCS treatment. Effectiveness of TDCS was evidenced in objective outcomes but equivocal in subjective outcomes.
Conclusion: There is significant difference in the qEEG parameters between PCS patients and healthy controls, which may facilitate PCS diagnosis. TCDS is a recommended treatment method for PCS.

FP 6.3

Spinal Canal and Paraspinal Arteriovenous Fistulas: Case Reports and Single-Centre Experience

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Objective: To report cases of spinal arteriovenous fistulas and to share centre's experience in management.
Methods: We reviewed medical records of four patients diagnosed with spinal arteriovenous fistulas, as well as their presentations, clinical course, diagnostic workup, and therapeutic outcomes.
Results: All four patients were men, with ages ranging from 64-72 years. There were one thoracic paraspinal arteriovenous fistulas (AVF), one thoracolumbar epidural AVF, and two dural AVFs (one thoracic and the other cervical). Seventy-five percent of patients presented as Foix-Alajouanine Syndrome and 25% as spinal epidural haematoma. Seventy-five percent of patients underwent surgical intervention and 25% managed with endovascular embolisation. Seventy-five percent of patients had good neurological outcome and 25% had no improvement in neurological deficit.
Conclusion: A high index of suspicion is required for a timely diagnosis and appropriate management of these rarest of conditions. Early diagnosis and management are essential to preserve neurologic functioning.

FP 6.4

Use of Split Spinous Laminectomy in Resection of Benign Intradural Extramedullary Masses: a Retrospective Case Series

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Objective: To review medical records of patients who underwent benign intradural extramedullary mass resection through the split spinous laminectomy approach.
Methods: We retrospectively identified all patients who underwent benign intradural extramedullary mass resection through the split spinous laminectomy approach. Patients aged <18 years were excluded. All patients must have both pre-operative and post-operative magnetic resonance imaging (MRI) data. A total of 4 cases met the above inclusion criteria. The Goutallier classification was used to assess the degree of muscle atrophy and fatty infiltration. Other clinical factors including degree of resection and post-operative outcomes were also assessed.
Results: Our findings show that split spinous laminectomy approach demonstrated preservation of paraspinous muscle with reduction in degree of muscle atrophy. All patients were able to achieve gross total resection through this method of resection.
Conclusion: Split spinous laminectomy is an effective safe surgical approach in the resection of benign intradural extramedullary masses. This novel surgical approach allows surgeons to achieve gross total resection whilst minimising extent of incision and paraspinal muscle damage.

FP 7.1

Application of Rapid Processing of Perfusion and Diffusion Automated Computed Tomography Perfusion Software in Acute Ischaemic Stroke Secondary to Large Vessel Occlusion

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Objective: Intra-arterial thrombectomy is the standard of care for acute ischaemic stroke with large-vessel occlusion (LVO). Perfusion scan can help identify patients with salvageable brain tissue, but manual analysis of imaging is time-consuming and skill-intensive. The application of rapid processing of perfusion and diffusion (RAPID) software since August 2021 in our centre has served as an important adjunct for patient selection of endovascular treatment.
Methods: This is a single-centre retrospective study conducted in our hospital from August 2020 to July 2022. Pre-RAPID group and post-RAPID group were compared. Data were analysed by SPSS. Primary outcome was the time from imaging to groin puncture. Secondary outcomes were functional status (modified Rankin scale [mRS] at 3 months) and recanalisation rate (thrombolysis in cerebral infarction [TICI] grade).
Results: A total of 58 patients received intra-arterial thrombectomy for LVO in the captioned period; 27 patients and 31 patients with a median age of 75.3 and 70.9 years were in the pre-RAPID group and the post-RAPID group, respectively. The mean time from imaging to groin puncture was reduced from 39 minutes to 32 minutes (P=0.039) with the use of RAPID. 61.5% of patients in the post-RAPID group had better mRS 0-2 at 3 months, compared with 29.6% of patients in the pre-RAPID group. Recanalisation rate (TICI 2b or 3) for both groups were similar.
Conclusion: The use of the RAPID software can reduce treatment time in stroke care and improves patient's outcome. It can help select better candidates of intra-arterial thrombectomy for difficult cases.

FP 7.2

Long-Term Outcomes in Stent-Assisted Embolisation for Ruptured Cerebral Aneurysms in the Acute Period: a Retrospective Review

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Objective: The purposes of this study were to retrospectively review the complications of stent-assisted embolisation for ruptured cerebral aneurysms in the acute period and to evaluate the haemorrhagic and ischaemic complications and risk factors.
Methods: Between April 2013 and October 2018, thirty-four patients had stent-assisted embolisation for treatment of acutely ruptured cerebral aneurysms that were not amendable by coiling alone. Hospital notes were retrospectively reviewed. All patients had a dose of intravenous abciximab 10 mg and heparin 2000 units before stenting and dual antiplatelet loading and daily treatment started after procedure.
Results: Of the thirty-four patients, twenty-six (76%) were treated with braided stents and eight (24%) were treated with laser-cut stents. There was no rebleeding in thirty-two patients who achieved total aneurysmal occlusion or residual neck only at the end of embolisation. Rebleeding happened in two patients who only achieved partial embolisation, resulting in mortality. There were three (9%) procedure-related cerebral infarctions, in which two were independent upon discharge, and one with World Federation of Neurological Surgeons (WFNS) Grade V on admission succumbed. Twenty (59%) patients achieved clinical favourable outcomes. The 30-day mortality was closely related to admission WFNS grade (P=0.05), EVD insertion (P<0.01), size (P=0.03) and neck of aneurysm (P=0.04). The mRS was closely related to admission WFNS grade (P=0.03), EVD insertion (P<0.01) and size of aneurysm (P=0.05).
Conclusion: Stent-assisted embolisation for acutely ruptured cerebral aneurysms should be considered with the discussion of risk profile and the embolisation goal of total aneurysmal occlusion or residual neck only.

FP 7.3

Side Branch Occlusion Following Flow Diverter for Internal Carotid Artery Aneurysms—a Five-Year Retrospective Review

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Objective: To assess the side branch patency rate following coverage by a flow diverter.
Background: Flow diverter is increasingly utilised as a treatment for intra-cranial aneurysms. Side branch occlusion rates of 10% to 20% have been reported in the literature; the majority of patients were asymptomatic. We evaluated the side branch occlusion rate and outcome from a single centre.
Methods: We retrospectively reviewed all patients who underwent flow diverter for treatment of intra-cerebral aneurysm in a single neurosurgery centre from year 2016 to 2020. The demographics, clinical data, and angiograms were reviewed. The primary outcome was side branch patency rate following coverage by a flow diverter. Secondary outcomes were clinical events or new vascular pathology following flow diverter insertion.
Results: A total of 55 patients received flow diverter as treatment for internal carotid artery aneurysm from 2016 to 2020 in our centre. At 1 year, the side branch patency rates were 90.9% (10/11) for first segment anterior cerebral artery, 75% (15/20) for posterior communicating artery, 97.5% (39/40) for ophthalmic artery, and 90.5% (19/21) for anterior choroidal artery. None of the patients in our series developed clinical symptoms following side branch occlusion. One patient was found to have a new contralateral carotid artery aneurysm following wrapping and flow diverter on follow-up.
Conclusion: Side branch occlusion following flow diverter treatment is well tolerated. New vascular pathology is rare or may only appear after longer follow-up.

FP 7.4

Safety and Efficacy of Woven Endobridge Device in Treatment of Wide Neck, Bifurcation Intracranial Aneurysm: a Single-Centre Experience

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Objective: Endovascular treatment of wide neck, bifurcation aneurysm has been technically challenging and difficult. With the introduction of the Woven Endobridge (WEB) device, a novel self-expanding intrasaccular flow disruption device, since 2010 in Europe, there is rising concerns on its safety and efficacy in endovascular treatment of wide neck, bifurcation aneurysm. This study was to analyse the safety and efficacy of WEB device in treatment of wide neck, bifurcation aneurysm.
Methods: A single-centre retrospective analysis was conducted to assess patients treated with the WEB device between June 2018 and August 2022. Clinical and immediate, short-term, midterm, and latest follow-up angiographic outcomes were assessed. Aneurysm occlusion was classified based on the WEB occlusion scale (WOS).
Results: Fourteen patients, including 8 males and 6 females, with a mean age of 63.8 ± 7.1 years and 16 aneurysms were studied. In all, 14 aneurysms were treated with WEB device. No complication related to the device or the procedure occurred. Procedure-related mortality and procedure-related mortality were 0% and 0%, respectively. Complete aneurysm occlusion (WOS A or B) was observed in 5 of 13 aneurysms (38.5%), 5 of 11 aneurysms (45.5%), 7 of 11 aneurysms (63.6%), and 7 of 11 aneurysms (63.6%) at immediate follow-up (mean=3.3 days), short-term follow-up (mean=3.3 months), midterm follow-up (mean=6.5 months), and latest follow-up (mean=34.3 months), respectively. Adequate aneurysm occlusion (WOS A-C) was observed in 6 of 13 aneurysms (46.2%), 6 of 11 aneurysms (54.4%), 7 of 11 aneurysms (63.6%), and 8 of 11 aneurysms (72.7%) at immediate follow-up (mean=3.3 days), short-term follow-up (mean=3.3 months), midterm follow-up (mean=6.5 months), and latest follow-up (mean=34.3 months), respectively.
Conclusion: Treatment of wide neck, bifurcation aneurysm with the WEB device demonstrated satisfactory complete occlusion/adequate occlusion rate on follow-up and similar safety profile to other conventional endovascular techniques. It is a safe and effective alternative for treatment of wide neck, bifurcation intracranial aneurysm up to 10 mm in diameter.

FP 8.1

Persistence of Posterior Communicating Artery Aneurysms after Flow Diverters and Change in Strategies

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Objective: To investigate the complete occlusion rate of Posterior Communicating Artery (PComA) after flow diverter treatment and propose of new treatment strategies.
Methods: This is a retrospective study of cohort from January 2012 to March 2022. Data from patients treated with flow diverter for PComA aneurysms at Kwong Wah Hospital were analysed. Aneurysms were grouped into fetal and non-fetal PComA. Primary endpoint was complete aneurysm occlusion at last follow-up. Secondary endpoints were clinical outcomes and treatment safety.
Results: Twenty-four consecutive patients with twenty-four PComA aneurysms were treatment. The overall occlusion rate was 29%. And the occlusion rate in fetal PComA group was 56%, compared with 80% in non-fetal PComA group.
Conclusion: The occlusion rate of fetal PComA aneurysms after flow diverter is lower than non-fetal PComA ones. Other treatment strategies should be considered for fetal PComA aneurysms.

FP 8.2

Cerebral Arteriovenous Malformation Embolisation With Pressure Cooker Technique—a Three-Year Single-Centre Retrospective Review

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Objective: To investigate the outcome of cerebral arteriovenous malformation treated with embolisation with the pressure cooker technique (PCT).
Methods: This is a 3-year single centre retrospective review of cerebral arteriovenous malformation (AVM) with endovascular embolisation. The primary outcomes of interest were obliteration rates (derived from pre- and post-operative imaging by semi-automatic volumetric assessment). The secondary outcomes were treatment-related morbidity rates (including non-target embolisation, reflux and haemorrhage). Descriptive statistics were used to calculate rates and means.
Results: Totally 26 cases of endovascular embolisation for cerebral AVM were performed from 2019 to 2022, in which 9 of them were performed with pressure cooker technique. The cases were further separated into two groups according to timing of embolisation. Volumetric analysis of the endovascular embolisation cases in elective settings showed a higher volume reduction in those with the pressure cooker technique used. However, complete obliteration was not achieved with the pressure cooker technique, compared with 6.7% cases achieved in the conventional group. Failure rate was 0% in PCT group and 6.7% in the conventional group. Treatment-related morbidity rate was 11% in PCT group and 13% in the conventional group.
Conclusion: Endovascular embolisation with the pressure cooker technique is a safe and effective method in treatment of cerebral AVMs.

FP 8.3

A Seven-Year Single-Centre Retrospective Review of Patient Outcome With Endovascular Treatment of Ruptured Wide-Necked Cerebral Artery Aneurysms in the Emergency Setting

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Objective: To investigate and compare the outcomes of patients presenting with ruptured intracranial wide-neck aneurysms within our centre, and to evaluate the method of endovascular intervention, in particular primary coiling versus stent assisted coiling.
Methods: A single-centre retrospective review was conducted within the period of 1 January 2016 to 31 January 2022. Wide neck aneurysms were defined as neck diameters ≥4 mm or dome-to-neck ratio <2. The baseline demographics, Glasgow Coma Score, aneurysm features, grading and location were evaluated. Patients were followed up for at least 6 months with their clinical outcomes defined by the Modified Rankin Scale (<3 as satisfactory) and the presence of any residual neck or residual aneurysm which required second stage treatment. Risk profiles related to bleeding complication from antiplatelet usage, in-stent stenosis or thrombosis, bleeding risk in secondary procedure if required eg, shunting, intracranial pressure monitoring was evaluated.
Results: A total of 234 patients aged 34 to 87 years within the study period were admitted for ruptured intracranial aneurysms, with 202 of cases classified as wide-neck aneurysms. In all, 178 patients underwent primary coiling, with 1 balloon-assisted coiling. In particular, 26 patients received stenting, flow diverters or mesh placed in the primary procedure. In total, 120 aneurysms belonged to the anterior circulation and 82 belonged to the posterior circulation. Clinical outcomes including patients who require subsequent second stage treatment for residual aneurysm or residual neck, their predicting factors, as well as complication profiles are pending further analysis.

FP 9.1

Awake Craniotomy: Introducing an Intraoperative Brain Mapping Programme and a Review of Initial Results for Glioma Resection

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Objective: To illustrate our centre's intraoperative brain mapping programme for awake craniotomy and to review the outcomes in glioma resection regarding disease control and functional preservation.
Methods: This was a retrospective review of awake craniotomies performed in Kwong Wah Hospital over a period of 82 months from August 2015 to June 2022. All patients received preoperative assessment by neurosurgeons, neuro-anaesthetists, intraoperative monitoring nurses, and clinical psychologists. Intraoperative language, motor and neuro-psychological functional mapping were performed using the Penfield technique. Postoperative day 1 magnetic resonance imaging with volumetric analysis for all glioma patients and 3-to-6-month scans were arranged for all high-grade glioma (HGG) patients.
Results: A total of 62 awake craniotomies were performed (one every six weeks); 44 (71%) were left-side lesions. In all, 44 (71%) were HGG, 5 (8%) were vascular lesions including arteriovenous malformation and cavernoma, and 2 (3%) were epilepsy surgeries. Mean operative time was 5 hours 51 minutes. In total, 41% of HGG resections were 5-ALA fluorescent-guided. Positive mapping was detected in 89% of patients. Intraoperative adverse events occurred in 23% of HGG patients, including seizures (70% focal, 30% generalised), superior mesenteric artery syndrome, and venous air embolism. All these events were reversible. Postoperative 30-day morbidity was 5% including intracerebral haemorrhage, epidural haemorrhage and surgical site infection, transient speech and motor deficits and focal seizures. The mean extent of resection was 90 ± 15.6% for contrast enhancing lesion and 64 ± 28.8% for FLAIR hyperintense signal lesions. For glioblastoma patients, the median progression free survival and median overall survival were 12 months and 28.5 months, respectively. The median length of stay was 10 days. In all, 83% of patients had a ECOG of 0 to 1 at 3-month follow-up.
Conclusion: Awake craniotomy demonstrated promising outcomes in both extent of resection and functional preservation.

FP 9.2

A Case Series: Prognostic Factor of Grade 4 Glioma

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Objective: To investigate the various prognostic factors influencing the course of grade 4 glioma.
Methods: This ten-year case series analysed the prognostic factors of patients with World Health Organization grade 4 glioma treated in the Department of Neurosurgery of Princess Margaret Hospital during 2010-2020. Prognostic factors were explored by comparing the patients with an overall survival of less than 2 years to those with an overall survival of over 2 years.
Conclusion: Multiple prognostic factors were explored.

Temporalis Muscle: a Predictor of Survival Time in Glioblastoma?

FP 9.3

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Background: Sarcopenia has been suggested as a prognostic biomarker for outcomes in head and neck malignancies. We evaluated the prognostic relevance of temporalis and masseter muscles measured on magnetic resonance imaging (MRI) brains in patients affected by glioblastoma.
Methods: Using electronic medical records, glioblastoma patients in Hong Kong between 2006 and 2019 were reviewed. Temporalis and masseter muscle thickness were measured on pre-operative axial MRI and overall survival measured.
Results: A total of 436 glioblastoma patients with resection and completed Stupp regimen with pre-operative MRI were analysed. The mean temporalis muscle thickness was 7.51 mm (95% confidence interval [CI]=7.28-7.78 mm) for male patients and 6.88 mm (95% CI=6.68-7.13 mm) for female patients; whilst the mean masseter thickness was 13.70 (95% CI=13.37-14.03 mm) for male patients and 12.30 (95% CI=12.02-12.58 mm) for female patients. Thicker temporalis or masseter muscle thickness did not correlate to longer glioblastoma survival.
Conclusion: Temporalis and masseter muscle thickness do not correlate with increased duration of glioblastoma survival.

Towards a Personalised Approach in Predicting Prognosis of Low-Grade Glioma

FP 9.4

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Objective: To investigate how the molecular mutation of tumour cells affect the survival of patients with low-grade glioma (LGG).
Methods: This is a single-centre retrospective review of the survival outcome among post-operative LGG patients. Patient and disease characteristics, intra-operative details, and post-operative outcomes were reviewed. Molecular results of the resected glioma were retrieved. Magnetic resonance imaging was reviewed with OsiriX DICOM Viewer to assess the resection extent. Kaplan Meier analysis was performed to examine association between molecular mutation and survival. Multivariate regression analysis was performed to adjust potential confounders.
Results: From 2010 to 2020, a total of 72 patients had excision of glioma performed in Prince of Wales Hospital. Mean patient age was 37.37 ± 16.26 years. Mean tumour size was 71.46 ± 61.74 mm. Isocitrate dehydrogenase (IDH) mutation was tested in 51 patients (66.2%) with 32 mutations found. Twenty-three patients (31.9%) had 1p19q codeletion tested and 13 (18.1%) had MGMT methylation tested. Extent of tumour resection varied from 1.18% to 99.2%. Patients were stratified into two groups by recurrence and morality. Patients with good outcome (n=51) had a more complete resection (78.4% vs 52.4%, P=0.027), a shorter hospitalisation (6.77 ± 4.57 vs 10.37 ± 6.31 days, P=0.013) and more IDH-1 mutation (51% vs 28.6%, P=0.071). Upon multivariate analysis, more complete tumour resection was associated with a better overall survival (Hazard ratio=0.47, 95% confidence interval=0.23-0.96, P=0.039), while there was no association noted in the overall survival after adding IDH-1 mutation to the model.
Conclusion: Review of molecular mutation will assist a better prognostication of LGG on an individual basis.

Ommaya Reservoir Insertion for Intraventricular Chemotherapy: Two-Decade Experience in Queen Mary Hospital

FP 9.5

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Objective: To review the safety profile in patients with Ommaya reservoir insertion for intrathecal chemotherapy.
Methods: Patients with Ommaya reservoir inserted in Queen Mary Hospital from January 2002 to August 2022 were reviewed retrospectively. Haemorrhagic and non-haemorrhagic complications were identified. Peri-operative blood results were analysed. Post-operative and post-chemotherapy brain imaging were reviewed for interval periventricular changes.
Results: A total of 75 patients were identified, in which 94.7% (n=71) had haematological malignancies. Haemorrhagic complications were identified in 8.0% (n=6) of patients, and none required intervention. Only one of these patients was symptomatic, and only one patient had haemorrhagic changes on immediate post-operative computed tomography scan. Delayed device infection was found in 1.3% (n=1) of patients, requiring device removal. Device-related complications were found in 2.7% (n=2) of patients, including delayed catheter malfunction and suboptimal positioning. Overall revision rate was 1.3% (n=1) due to suboptimal positioning. One patient developed intracranial hypotension. Among patients with peri-operative blood results available, 29.0% (n=20) of patients had significant peri-operative thrombocytopenia (platelet count, $<100 \times 10^9$/L). No patients had deranged clotting profile peri-operatively. There was no significant correlation between significant peri-operative thrombocytopenia and haemorrhagic complications (P=0.806). Significant peri-operative neutropenia (absolute neutrophil count, $<1.0 \times 10^9$/L) was found in 18.8% (n=13) of patients, with no significant association with infectious complications (P=0.627). New or further increase in periventricular white matter changes were found in 26.2% (n=16) of patients with post-chemotherapy brain imaging performed.
Conclusion: Ommaya reservoir insertion is a safe procedure with low complication rates even in patients with significant cytopenia. However, post-chemotherapy periventricular changes are common and should be correlated clinically for any symptomatic methotrexate-related leukoencephalopathy.

Solitary Spinal Extradural Plasmacytoma Causing Spinal Compression: a Case Report

P 1

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Introduction: It is exceedingly rare for plasma cell neoplasm to present as solitary extradural plasmacytoma, with only ten case reports in the literature. Here we report a rare case of solitary extradural plasmacytoma presented with bilateral lower limbs weakness.
Case Report: An 83-year-old man initially complained of subjective bilateral lower limbs weakness with unremarkable physical examination. He developed acute retention of urine and reduced lower limb power 3 days afterwards. Magnetic resonance imaging (MRI) whole spine revealed a T7-T9 extradural spinal tumour. Emergency operation of T7 to T9 laminectomy and spinal tumour excision was performed. Pathology of the tumour was plasma cell neoplasm. He is now receiving palliative radiotherapy and thalidomide with multidisciplinary input from the medical and oncology colleagues.
Discussion: Solitary extradural plasmacytomas usually present as well-defined lesions located in the extradural dorsal spinal canal without bone erosion and bone marrow involvement. They have variable MRI features which can make pre-operative diagnosis difficult. Solitary extramedullary plasmacytoma is usually treated with surgery and radiotherapy, while the use of adjuvant chemotherapy remains controversial.

P 2

Intraoperative Cortical–Middle Cerebral Artery Pressure Monitoring in Extracranial-Intracranial Bypass

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Objective: To demonstrate the set-up of intraoperative cortical–middle cerebral artery (MCA) pressure monitoring in extracranial-intracranial (EC-IC) bypass and its value in proving autoregulation loss in intracranial atherosclerotic disease.
Methods: A 58-year-old man with severe left M1 stenosis presented with aphasia susceptible to blood pressure below 130 mmHg. Computed tomography perfusion showed a large penumbra area in left MCA territory. Double-barrel left STA-M4 bypass was performed. After the parietal branch of superficial temporal artery (STA) was anastomosed with M4, a 22-gauge blunt needle was inserted to the un-anastomosed frontal branch with the STA main trunk remained clamped. The pressure recorded over the frontal branch reflected the cortical MCA pressure. The needle was connected to an A-line transducer. Mean arterial pressure (MAP) was elevated from 80 mmHg to 110 mmHg for haemostasis challenge. Afterwards, vasopressor was stopped to allow a gradual return of MAP into baseline. In every one-minute interval change of the MAP, the corresponding cortical MCA pressure was recorded. A graph showing the fluctuation of cortical MCA pressure in relation to MAP for ten minutes was plotted.
Results: Intraoperative cortical MCA pressure showed fluctuations in concordance with MAP changes, reflecting a state of autoregulation loss in MCA territory. One possible explanation to this was the long-standing M1 stenosis had reduced the MCA territory perfusion to below 60 mmHg—out of the range of the cerebral autoregulation limit. Besides, the susceptibility of cortical MCA pressure to blood pressure change had emphasised the importance of postoperative stringent blood pressure control to prevent re-perfusion injury.
Conclusion: Intraoperative cortical MCA pressure monitoring demonstrated the loss of autoregulation and emphasised the need of postoperative meticulous blood pressure control in EC-IC bypass.

P 3

Calcitriol Promotes Macrophage Phagocytosis Through LRP1 Upregulation in Glioblastoma Multiforme

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Objective: To investigate the mechanism of calcitriol in promoting macrophage phagocytosis of glioblastoma multiforme (GBM).
Methods: First, Live cell imaging system was used to assess the phagocytosis of GBM by macrophage post calcitriol treatment. Phagocytosis in macrophage and GBM co-culture was then quantified via flow cytometry post treatment. Following RT-qPCR and western blot analysis to assess the expression levels of LRP1 in macrophages, Chromatin immunoprecipitation (ChIP) assay was then used to identify the promoter responsible for LRP1 expression levels post treatment. Si-RNA was then used to knockdown LRP1 expression in macrophage in-vitro, and the number of phagocytosed GMB in co-culture was analysed via flow cytometry. Lastly, calcitriol treatment was given in-vivo to mice with intracranially xenografted GBM. Phagocytosis was then quantified via two-photon excitation microscopy and flow cytometry.
Results: Treatment with calcitriol was observed to significantly increase the number of phagocytosed GL261 in mice bone marrow-derived macrophages (BMDM) from 11.67 to 18.33 (P=0.0315). Further analysis via flow cytometry revealed calcitriol to significantly increase the percentage of phagocytosed GL261 in BMDM from 25.16% to 27.11% (P=0.0308). Calcitriol was identified to significantly increase LRP1 expression levels via western blot and RT-qPCR analysis. ChIP assay confirmed vitamin D receptor (VDR) as the promoter of LRP1 expression via binding calcitriol. LRP1 knockdown was expected to reverse effects of calcitriol treatment, while increased phagocytosis of GBM was expected to be found in-vivo post treatment.
Conclusion: Calcitriol was found to increase the phagocytosis of GMB via binding to VDR thus upregulating LRP1 expression.

P 4

Splenectomy Improves Functional Outcome of Experimental Intracerebral Haemorrhage in Mouse Models Through Increased Haematoma Resorption

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Objective: Intracerebral haemorrhage (ICH) is a type of stroke that involves bleeding within the brain parenchyma. The peripheral immune system, particularly the spleen, plays a role in damage caused by ICH. Splenectomy has been shown to reduce inflammation and improve functional outcome in ischaemic stroke. However, the effect of splenectomy on ICH has not been studied. This study investigated the effect of splenectomy on functional outcomes of ICH.
Methods: The effect of splenectomy on the functional outcome of ICH was demonstrated in mouse models. Splenectomy was performed 2 weeks before inducing ICH. The spleen was removed by cauterising the vessels. ICH was induced in 12-week-old C57/6J mice fed with normal diet, by intrastriatal injection of type IV collagenase. The mice were separated into two groups: ICH mice that had undergone splenectomy and ICH mice that had undergone laparotomy only.
Results: Mice that had undergone splenectomy 2 weeks before ICH showed better functional outcome. We demonstrated that splenectomy improved Rotarod (P=0.0420) and cylinder test (P=0.0218) results on day 3. The modified Neurological Severity Scores also improved on day 1 (P=0.0228) and on day 7 (P=0.0002). Both experimental groups showed similar initial haematoma sizes. We revealed that the haematoma sizes in brains of mice with splenectomy were significantly smaller than those with laparotomy on day 3 (P=0.0002). Hence, the improvement is due to increased haematoma resorption.
Conclusion: Splenectomy 2 weeks before ICH improves functional outcome of experimental ICH through increased haematoma resorption.

P 5

The Role of Intra-Tumoural CXCR3 in Glioblastoma

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Objective: To investigate the functions of intra-tumoural CXCR3 in GBM, its mechanism and interaction with temozolomide (TMZ).
Methods: In vitro, U87 and U251 glioblastoma (GBM) cells with or without CXCR3-siRNA were investigated phenotypically (proliferation, colony formation, etc) and mechanistically (DNA damage, ER stress, etc). In vivo, U87 and GL261 cells with or without CXCR3-shRNA were injected intracranially into nude and C56 WT and CXCR3-knockdown mice, respectively. Results were compared phenotypically (growth, invasion, etc) and mechanistically (same as in vitro). For TMZ, in vitro U87 and U251 cells were given TMZ at a concentration of 125 uM for 72 hrs. In vivo, post-injection tumour-bearing mice were given TMZ at 55 mg/kg oral gavage for 3 days (consecutive)/week for 2 cycles.
Results: CXCR3 expression was elevated in vitro and vivo in GBM, as compared to control. There was also a corresponding increase in LRP1, supporting the idea of CXCR3/LRP1 cross-talk invasion in GBM. In vitro, CXCR3 siRNA cells demonstrated significantly reduced proliferation and colony formation. Thus, phenotypically results in vivo would be similar, and further mechanistic studies would be conducted post confirmation. Moreover, in TMZ treated tumours in vitro and vivo, CXCR3 levels were shown to significantly increase compared to control. There was also no significant difference in proliferation from TMZ treatment alone compared to CXCR3-siRNA and TMZ combined treatment.
Conclusion: Intra-tumoural CXCR3 plays a functional role in GBM progression, including proliferation, invasion, and angiogenesis. Further investigation is required for its downstream mechanism and exact relationship with TMZ.

The Effect of Temozolomide on Chaperon-Mediated Autophagy in Glioblastoma cells

P 6

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Objective: To investigate the effect of temozolomide (TMZ) treatment on CMA in glioblastoma (GBM) cells.
Methods: The expression levels of LAMP2A in TMZ sensitive and resistant cells (induced by >1-year TMZ treatment) were measured using western blotting and RT-qPCR. In vitro, the expression levels of LAMP2A under different time points of TMZ treatment were detected by western blotting. In vivo, the expression levels of LAMP2A with or without TMZ treatment were examined by immunohistochemical analysis.
Results: Both protein and RNA expressions of LAMP2A were elevated in TMZ resistant U87 and U251 GBM cell lines. Further, 2-week TMZ treatment could upregulate LAMP2A expression significantly both in vitro and in vivo, while 3-day TMZ treatment was not able to change the expression of LMAP2A, even with higher TMZ concentration.
Conclusion: Upregulated LAMP2A might be a result of long-term TMZ treatment, which was not dose dependent. Its consequence needs further exploration.

Systematic Review of Acute Traumatic Central Cord Syndrome (SyRAT review)—the Role, Timing and Obstacles of Surgery and Prognostic Factors

P 7

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Objective: There are controversies over the role, time, and obstacles of surgery for acute traumatic central cord syndrome (ATCCS). Prognostic factors associated with ATCCS are also inconclusive.
Methods: A systematic review was performed in August 2022 according to the PRISMA 2020 guidelines. The initial search on PubMed, EMBASE, Scopus, and Cochrane retrieved 243 articles, of which 76 relevant papers were included. The results of quantitative and qualitative analysis were presented.
Results: Studies favouring surgery were limited. There was pre-existing bias in patients managed conservatively, as a stable spine less likely warrants surgery and therefore have better outcome. Patients below 50 and those with clinically moderate and severe ATCCS seemed to have better outcomes like quicker improvement in neurological status and motor scores (n=12), fewer future complications (n=6), and shorter hospital or intensive care unit (ICU) stay (n=2). Prognostic factors of ATCCS can be categorised into patient, radiological, and management factors. Younger age (n=19), better cervical canal size (n=7), and earlier surgery (n=4) were the most mentioned factors in each category. Most studies (n=21) define early surgery as below 24 hours. Earlier surgery was associated with better neurological outcomes (n=13) but serious adverse events (n=1). Surgeries were usually delayed due to transport, availability of staff, a delay in radiological diagnosis, and a better neurological status initially.
Conclusion: Earlier surgery may bring quicker improvement in neurological status, reduce secondary injury, and shorten hospital or ICU stay. Focused trial on younger patients with expected poorer prognosis may be considered.

Neuroprotective Potential of the MasR Agonist in the Experimental Intracerebral Haemorrhage

P 8

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Objective: Systolic blood pressure is recommended to be acutely decreased and maintained to lower than 140 mmHg after intracerebral haemorrhage (ICH). The renin-angiotensin system (RAS) typically regulates blood pressure and fluid-electrolyte balance. ACE2/Angiotensin 1-7/MasR is a regulatory RAS axis reducing blood pressure. Its roles in ICH in a non-blood pressure-related aspect have not been studied. This study investigates the neuroprotective effects of the MasR agonist in the experimental ICH.
Methods: Hemin was added to SHSY5Y cells to induce ICH-like neuronal injury in in-vitro models. MasR agonist (AVE0991) and vehicle solvent were added to the in-vitro models. Viability was assessed by MTT assay. For in vivo study, MasR agonist (AVE0991) and vehicle solvent were intraperitoneally injected into collagenase-induced ICH mice after ICH induction. Post-ICH neurologic functional alterations were evaluated by different behavioural tests, including modified Neurological Severity Score (mNSS), accelerated rotarod test, cylinder test, grid walking test, and gait analysis.
Results: For the in vitro study, hemin showed toxicity to SHSY5Y cells, which was inhibited by AVE0991. AVE0991 increased the cell viability of SHSY5Y cells exposed to hemin in a dose-dependent manner. In the animal study, mice intraperitoneally administrated AVE0991 after ICH showed significant lower mNSS, less left forelimb foot fault in the grid walking test and more extended gait swing of the left forelimb in the gait analysis.
Conclusion: AVE0991 tends to exert a neuroprotective effect and improve neuro-functions after ICH, but its therapeutic roles in ICH need further investigation.

Vacuum Extraction as a Treatment Modality for Neonatal Skull Depression

P 9

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This case report aims to share a local experience of treating neonatal skull depression using bedside vacuum suction. Controversies still exist regarding the management of neonatal depressed skull fractures. We share our experience of treating a newborn with depressed skull fracture not associated with any trauma during pregnancy or at delivery. Bedside suction through a neonatal face mask was utilised, and we successfully elevated the "ping-pong" skull depression. Post-procedure ultrasound showed no intra-cranial bleed, and the patient tolerated the procedure well. Thus, bedside vacuum suction is a safe and convenient method for treating neonatal skull depression.

P 10

Mind-Reading—Early Experience of Applying Local Field Potentials From Subthalamic Nuclei in Deep Brain Stimulation

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Objective: To describe our early local experience in implementing brain sensing in deep brain stimulation (DBS) to subthalamic nuclei (STN) in clinical practice at Queen Elizabeth Hospital.
Methods: This is a case series of three patients with the Medtronic Percept implantable pulse generator (IPG) installed. Patients and their carers were educated on recording sentinel Parkinsonism events––fall, tremor, rigidity, dyskinesia, and medication. Their STN gamma and beta wave oscillations were reviewed and correlated to their recorded events at our joint neuromodulation clinic with neurologists. Anti-Parkinsonism medications and IPG settings were titrated according to local field potentials.
Results: Local field potentials from our patients have demonstrated an association of gamma oscillation with dyskinesia, as well as an association of beta oscillation with the synchrony of voluntary muscle recruitment and potentially events of fall. Clinical improvement was observed amongst patients.
Conclusion: Capturing local field potentials could provide a promising gateway to further our understanding in how DBS works. It also potentially helps the titration of medical and stimulation treatment. Further research is needed to correlate local field potentials to clinical events, and ultimately guiding the development of close-loop DBS.

P 11

The Role of Adjuvant Radiation to Patients With Atypical Meningioma

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Objective: To investigate if adjuvant radiotherapy alters progression-free survival for patients with atypical meningioma.
Methods: We looked in Queen Elizabeth Hospital brain tumour registry. Data of patients who had the diagnosis of atypical meningioma were retrieved.
Results: The median progression-free survival (PFS) for patients who received irradiation was 162.6 (47.9-263) months. The median PFS for patients with atypical meningioma treated with isolated surgical resection was 162 (33.1-280) months. The patient who underwent stereotactic radiosurgery had no recurrence after 181 months. Whereas the median PFS was 147.7 months for patients who had intensity modulated radiotherapy. Simpson grading one resection was the only statistically significant factor preventing future recurrence.
Conclusion: For patients with gross total resection of atypical meningioma, the role of irradiation remains less clear.

P 12

The Baby and The Brain—A Case Report on A Ruptured Arteriovenous Malformation during Pregnancy

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Volume expansion in late pregnancy has been correlated with an increased risk of arteriovenous malformation (AVM) rupture. Hyperdynamic circulation also occurs up to 2 weeks postpartum due to autotransfusion from a contracting uterus and the release of inferior vena cava compression. This case report was to illustrate postpartum haemodynamic changes and their significance for deciding the timing of AVM surgery during puerperium. A 32-week pregnant woman presented with acute right-side weakness and an episode of a generalised tonic-clonic seizure. Computed tomography of the brain showed a large left fronto-parietal lobar haemorrhage with bilateral intraventricular haemorrhage and hydrocephalus. Emergency lower segment caesarean section was performed, immediately followed by bilateral external ventricular drain insertion. The patient could obey commands with cerebrospinal fluid drainage alone. Magnetic resonance imaging and angiogram of the brain later confirmed a ruptured Spetzler-Martin grade 2 left frontal AVM. A staged operation for AVM excision was performed on day 9 postpartum. The operation was uneventful with no added deficits. Neurological recovery was fair with residual mild expressive dysphasia and right hemiplegia. Postpartum hyperdynamic circulation imposes a challenge to the management of ruptured AVM. The best timing of surgery requires case-by-case discussion in a multidisciplinary team. Early, instead of urgent, AVM surgery might be a reasonable approach to balance the risk and benefit if the mass effect is not of immediate concern.

P 13

One Man With "Two" Diseases—Co-Existence of Craniopharyngioma and Functioning Pituitary Adenoma Presenting With Acromegaly: a Case Report and Literature Review on Pituitary Collision Tumour

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Objective: To report a rare case of collision tumour presenting with acromegaly and conduct a literature review of pituitary collision tumours.
Methods: This is to report a rare case of collision craniopharyngioma and pituitary adenoma presenting as acromegaly. A literature review was conducted for collision tumours (n=33) and the association of craniopharyngioma (n=8). Integrated quantitative and descriptive analyses were carried out.
Results: A 49-year-old patient with acromegaly was diagnosed to have a 3.4 × 3.7 × 4.3 cm heterogeneous sellar mass with chiasmatic compression on magnetic resonance imaging. Immunohistochemistry confirmed a growth hormone and prolactin-secreting pituitary adenoma after an urgent transsphenoidal partial tumour excision. An interval growth of the residual mixed solid/cystic tumour with unresolved optic nerve compression compelled an extended transsphenoidal total excision 3 months later. Intraoperative and pathological findings were consistent with a craniopharyngioma, with no characteristic nuclear staining of beta-catenin and a negative stain for growth hormone. Among the 22 case reports with diagnoses of both craniopharyngioma and pituitary adenoma, 15 (68.2%) of them were pathologically proven concurrent tumours. And only four cases (18.2%) reported acromegaly both clinically and biochemically. There remains an unclear linkage between growth hormone excess and IGF-1R expression on the effect of craniopharyngioma development.
Conclusion: The paucity of studies exploring the association of growth hormone and IGF-1R expression in craniopharyngioma warrants further research on the topic. Acromegaly, as an uncommon presentation of collision craniopharyngioma and pituitary adenoma, would be a sign for relevant histopathological analyses.

Application of Hyperbaric Oxygen Therapy for Brain Abscesses: Two Cases in Hong Kong

P 14

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Objective: To test the hypothesis that hyperbaric oxygen therapy (HBOT) can improve the clinical outcome of brain abscess management.
Methods: Two patients with brain abscesses were treated in a multiposition hyperbaric oxygen chamber. We compared their clinical outcome with those treated with conventional therapy.
Results: The two cases found encouraging results to support more extensive studies to evaluate the efficacy of HBOT as an adjunct to brain abscess management.
Conclusion: Emerging studies in the management of brain injury suggest beneficial effect of HBOT. Applications of HBOT for traumatic and ischaemic brain injury in animal models and clinical studies have shown beneficial effects in cognitive and functional outcome. Although so far the degree of improvement has generally been modest, the results of HBOT for intracerebral abscess in the two cases support a more comprehensive study.

Intra-Ventricular Diffuse Midline Glioma, H3K27M-Altered: a Case Report

P 15

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Objective: H3K27M altered diffuse midline glioma is classified as a grade 4 paediatric-type high-grade glioma in the 5th edition World Health Organization classification of central nervous system tumours. Diffuse midline gliomas primarily affect children. The clinical behaviour remains poorly characterised in adult patients due to rarity. Most of these tumours are found in midline structures including brainstem, spinal cord, and thalamus. Intra-ventricular diffuse midline gliomas were rarely reported.
Methods: A 42-year-old man presented with headache, drowsiness, and left hemiparesis. Subsequent imaging revealed a well-defined 2 × 2.3 × 2.7 cm lesion at the frontal horn of right lateral ventricle with obstructive hydrocephalus. The patient underwent urgent external ventricular drainage, followed by septostomy and endoscopic biopsy.
Results: Histologically, the sections showed a glial tumour of moderate cellularity and areas of microvascular proliferation without necrosis. The Ki67 proliferative index was up to 30%. Immunohistochemically, the tumour cells were positive for H3K27M and negative for IDH1 or IDH2 mutations. It demonstrated neither ATRX mutation nor p53 mutation. The diagnosis of diffuse midline glioma, H3K27M altered was established. The MGMT gene promoter methylation was not detected. The patient eventually underwent craniotomy for tumour excision. Postoperatively, the patient recovered well without focal neurological deficit. The patient was referred to oncology unit for adjuvant chemoradiotherapy.
Conclusion: Diffuse midline glioma is a rare and highly aggressive tumour, with median survival ranging from 9 to 16 months. The imaging features lack specificity and mimic other intra-ventricular tumours such as ependymoma or subependymoma. Prompt histological diagnosis is warranted to correctly identify these tumours due to its prognostic significance.

Hybrid Surgery in Cervical Myelopathy: Case Report and Literature Review

P 16

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Cervical myelopathy is a common condition in spinal spondylosis disease resulting in significant limitations and compromise to patients. Many patients may require a surgical management to alleviate the symptoms. There are various surgical methods to decompress the spinal cord, namely anterior approach, posterior approach, and a combination of both. Among the anterior approaches, both anterior cervical discectomy and fusion and cervical disc arthroplasty can deliver promising results to patients. Cervical disc arthroplasty has numerous benefits including preserving segmental range of motion, lower incidence in adjacent segment degeneration, etc. However, it has shortcomings including osteolysis and implant migration. It may be hard for the surgeons to tackle anterior pathology disease with multiple levels involved. We report on a case of cervical myelopathy that was treated with a combination of anterior cervical discectomy and fusion with cervical disc arthroplasty. This case demonstrates the pros and cons of each of the treatment and the benefits of hybrid surgery. Also, it can illustrate our train of thoughts in deciding the surgical approach.

Varicella Zoster Virus Vasculopathy and Spinal Subarachnoid Haemorrhage

P 17

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Objective: To report case of varicella zoster virus (VZV) vasculopathy and its rare complication of spinal subarachnoid haemorrhage.
Methods: We reviewed medical record of patient diagnosed with VZV vasculopathy and reported its rare complication, clinical course, diagnostic workup, and therapeutic outcome.
Results: An older woman presented with a short history of sciatica who soon developed acute confusion and was diagnosed with VZV infection. She was started on a 1-week course of low molecular weight heparin for pulmonary embolism. During treatment for infection, she developed symptoms relating to cord compression. An urgent laminectomy for evacuation of spinal subarachnoid haemorrhage was performed, which resulted in good neurological recovery.
Conclusion: Spinal subarachnoid haemorrhage is a rare complication of VZV vasculopathy. A high index of suspicion and a timely diagnosis with appropriate management are essential to preserve neurologic functioning.

P 18

A Case Report of a Spontaneous Cervicomedullary Junction Haemangioblastoma and Its Literature Review

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Objective: To report on a case of cervicomedullary junction haemangioblastoma and to review the literature to evaluate the safety of surgical treatment.
Methods: We describe a case of cervicomedullary junction haemangioblastoma managed surgically, with good neurological recovery and functional outcome. A literature review of English publications in the Pubmed, Google Scholar, and Embase databases was performed. Publications from 2000 to 2021 with key words "mortality", "morbidity", "cervicomedullary junction" and "hemangioblastoma" were included.
Results: A 61-year-old man with a 2.1 × 2.0 × 4.2 cm cystic haemangioblastoma at the cervicomedullary junction presented with grade IV right-side hemiparesis, paraesthesia, and bilateral cranial nerve IX, X, XII palsy. The patient underwent a posterior fossa craniectomy with intraoperative somatosensory evoke potential monitoring. Postoperatively, cranial nerve palsies were resolved without major complications. Surgery remains the mainstream of treatment with an overall mortality of 4% and neurological morbidity of 13%. Several techniques were used to minimise the surgical risk without compromising on the surgical outcomes and the tumour clearance. Adjunctive preoperative management such as administration of proton pump inhibitor and intraoperative somatosensory evoke potential monitoring can further lower the risk of common surgical complications.
Conclusion: Surgical resection of haemangioblastoma at the cervicomedullary junction is an effective treatment. Appropriate preoperative management, attention to techniques, and meticulous dissection can lead to a safe and promising cure.

P 19

Management of Hyponatraemia in Neurosurgical Patients: a Pilot Study Involving the Use of Dietary Meal-Based Modifications

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Objective: To investigate the use of dietary meal-based modifications as a management method of hyponatraemia in neurosurgery patients.
Methods: We implemented a new pilot protocol for the management of hyponatraemia in neurosurgical patients at the Division of Neurosurgery, Prince of Wales Hospital. All patients admitted to the neurosurgical ward in September 2022 with hyponatraemia were included in this prospective study. A 3-hour urine test was completed to look for potential underlying causes of hyponatraemia. Patients with notable cerebral salt wasting or syndrome of inappropriate antidiuretic hormone failing fluid restriction were prescribed with salt-heavy diets. Quantity of administered salt was dependent on the degree of sodium deficit as calculated on a case-by-case basis. We then examined the efficacy of salt-heavy diets in the management of hyponatraemia within our patient population.

P 20

Intraoperative Anaphylaxis Due to Gelofusine in Patient Undergoing Glioma Excision: a Case Report

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Gelatin-based synthetic colloids are commonly used in the perioperative management for patients undergoing neurosurgery. Despite its superiority over crystalloid in haemodynamic stabilisation, the risk of anaphylaxis is well described in the literature. We describe a case of confirmed Gelofusine-induced anaphylaxis during glioma excision. A 64-year-old Chinese woman was admitted to our hospital for left parietal tumour excision. Magnetic resonance imaging demonstrated a large solitary heterogeneously enhancing necrotic tumour with mild oedema, suspicious of high-grade glioma. Excision was done for decompression of brain parenchyma and histological diagnosis. Intraoperatively, there was spontaneous rupture of her glioma with torrential bleeding upon dural opening. Gelofusine infusion was given, whereby she subsequently developed cardiovascular collapse, high airway pressure, and rash. A presumptive diagnosis of Gelofusine anaphylaxis was made, with 500 mcg of adrenaline boluses and dexamethasone given. Her airway oedema persisted requiring a prolonged course of tracheostomy. During her prolonged in-hospital stay, she developed hospital acquired pneumonia requiring multiple broad-spectrum antibiotics. The culprit drug is often difficult to identify during perioperative anaphylaxis, with limitations to both provocation and skin testing. The present case highlights the need of perioperative gelatin allergy screening and assessment of fluid therapy in elective neurosurgical patients with anticipated high bleeding risk.

P 21

Neurocysticercosis in Hong Kong—a Case Report and Literature Review

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Objective: Despite being the most common cause of treatable epilepsy worldwide, neurocysticercosis is uncommonly seen in Hong Kong. Here we illustrate a case of neurocysticercosis in a Chinese woman and perform a review of current literature.
Case summary: A 55-year-old woman presented with dizziness and vomiting, without any focal neurological deficits or seizure. Initial computed tomography of the brain showed numerous disseminated small lesions suggestive of brain metastases. However, positron emission tomography-computed tomography and tumour markers were all negative and did not reveal any primary tumour. Subsequent magnetic resonance imaging (MRI) of the brain showed scolex appearances of the lesions typically found in neurocysticercosis. The patient was then started on antiparasitic treatment. The patient's symptoms improved clinically, and follow-up MRI of the brain also showed radiological improvement.
Discussion: A literature review regarding neurocysticercosis was performed. The gold standard for diagnosing neurocysticercosis remains to be lesion biopsy. Non-invasive diagnosis of neurocysticercosis relies on criteria combining clinical, serological, and radiological features. Current management strategies include antiparasitic regimen with steroid cover as the mainstay of treatment, with surgical management focusing on treating complications such as hydrocephalus, focal deficits due to mass effect and refractory seizure.
Conclusion: This case illustrates the importance of the multi-modality approach in diagnosing neurocysticercosis, as well as the multi-disciplinary collaboration in managing such patients.

P 22

Classification-Based Surgical Management of Neurogenic Tumours of the Spine: a Five-Year Retrospective Review of 16 Cases at Prince of Wales Hospital

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Objective: We reviewed a case series of spinal neurogenic tumours and analysed the clinical outcome based on Toyama Classification to develop an algorithm for the optimal surgical approach to achieve gross total resection with less procedure-related risk for complications.
Methods: We retrospectively analysed medical records of 14 patients who underwent resection of cervical dumbell tumours between August 2017 and August 2022. Cases were reviewed through clinical history and physical examination from consultation notes and radiological images. Demographics were matched in terms of age, sex, Toyama classification (I-VI), spinal level, pre-operative and post-operative status, and procedure performed (posterior, with or without instrumented reconstruction eg, lateral mass, pedicle, or others). Clinical outcomes of the two groups were compared in terms of the extent of resection (gross total resection or subtotal resection), intra-operative complications, duration of post-operative hospital stay and neurological complications. The primary endpoint was re-operation, whereas the secondary end point was an alternative treatment (eg, radiotherapy, chemotherapy) or development of neurological deficit.
Results: Toyama Class IIa and IIb cases were more completely resected with extended bony removal supported by instrumented reconstruction. The other cases can be sufficiently addressed by a posterior approach with good results.
Conclusion: Extended bony removal can achieve a better resection of cervical tumour for Toyama Class IIa and IIb. A larger population size is needed to study tumours of other Toyama Classes.

P 23

Revealing the Neural Basis of Muscle Synergies in Humans through Direct Electrical Stimulation on the Cortex

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Objective: During voluntary movement, the human motor system may generate complex motor commands by recruiting muscle synergies that co-activate muscle groups as discrete activation units. But direct neurophysiological evidence for the existence of muscle synergies in humans is still lacking. We ask whether it is possible to retrieve muscle synergies observed in daily motor tasks by direct electrical stimulation (DES) of focal motor cortical loci during awake craniotomy for glioma resection.
Methods: Patients diagnosed with gliomas while still having normal motor functions (n=8) were enrolled in two upper-limb experimental sessions—the pre-operation behavioural session and the operation session that applied DES. Multi-muscle surface electromyographic signals (EMGs) were recorded in both sessions, then behavioural muscle synergies and DES-derived muscle synergies were decomposed from the recorded EMGs by the non-negative matrix factorisation (NMF) algorithm, respectively. The characteristics of the DES-derived and behavioural muscle synergies were compared.
Results: The DES-derived muscle synergies showed higher dimensionality and sparseness compared with their corresponding behavioural muscle synergies, and these DES-derived muscle synergies could be matched to the behavioural synergies with different levels of similarities. Flexible recruitment of the DES-derived muscle synergies, through synergy merging or fractionation, provided better explanations for the behavioural tasks.
Conclusion: Our results supported muscle synergies extracted from the EMGs of natural motor tasks using NMF encoded in the motor system of humans. We demonstrated that it is possible to access and map out muscle synergies in the primary motor cortex of humans by applying DES to the M1.

P 24

Management Outcomes of Spontaneous Intracerebral Haemorrhage admitted to a Neurosurgical Unit in Hong Kong

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Objective: We aimed to review the surgical and conservative management outcomes of patients with spontaneous intracerebral haemorrhage (ICH) admitted to a neurosurgical unit.
Methods: We retrospectively reviewed all patients admitted to the neurosurgery department of Prince of Wales Hospital for spontaneous ICH from January 2021 to December 2021. Spontaneous ICH was defined as those not caused by head trauma and did not have a visualised structural cause and coagulopathy. We separated patients into a surgical group and a conservative group. Modified Rankin Scale (mRS) score was the primary outcome, in which a score of 0-2 was defined as favourable.
Results: In total, 58 patients were included, of whom 32 (55.24%) were treated surgically and 26 (44.8%) conservatively. The mean patient age was 53.5 years. The mean ICH volume was 40.1 mL. Of the ICH cases, 47 (81.0%) were supratentorial, 10 (17.2%) were cerebellar, and one (1.7%) was brainstem. Intracerebral haemorrhage volumes were stratified into small (<30 mL) [n=27, 46.6%], and large (>30 mL) [n=31, 53.4%]. For patients with small ICH, 9 (33.3%) were treated surgically, in whom one (11.1%) had a favourable outcome, while 16 out of 18 (88.9%) in the conservative group had a favourable outcome. For patients with large ICH, 23 (74.2%) were treated surgically, in whom two (8.7%) had a favourable outcome, while two out of eight (25%) in the conservative group had a favourable outcome.
Conclusion: Patients who underwent surgical treatment for spontaneous ICH had a poorer outcome. Further studies are required to streamline the management.

P 25

Use of Tolvaptan for Hyponatraemia in Conservatively Managed Head Injury Patients: Two Case Reports

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Objective: To evaluate the effectiveness and potential risks of tolvaptan for hyponatraemia in conservatively managed head injury patients.
Methods: Two middle-aged men were admitted for head injuries. Both patients had hyponatraemia with symptoms suggestive of the syndrome of inappropriate antidiuretic hormone secretion (SIADH) and were given tolvaptan for treating the hyponatraemia. A literature review of conservatively managed head injury cases with the use of tolvaptan for hyponatraemia was undertaken.
Results: In both cases, serum sodium levels effectively increased within a short period. Urine output significantly increased around 5 hours after the drug was administered. An aggressive fluid replacement regimen was given to balance the urinary loss. However, the rise of serum sodium level still exceeded 10 mmol/L in 24 hours for both cases. Its effect lasted for a day and then the serum sodium level gradually dropped again without any further treatment for hyponatraemia given.
Conclusion: Tolvaptan is an effective treatment for hyponatraemia associated with SIADH. However, its use in head injury patients treated conservatively requires judicious use. To prevent overly rapid correction of hyponatraemia that may result in central pontine myelinolysis, the use of smaller doses with fluid replacement and close monitoring of blood parameters and urine output is of utmost importance.

Effect of Half-Half Solution on Serum Sodium Level in Neurosurgical Patients

P 26

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Objective: This retrospective cohort study examines the correlation of the use of half-half solution and reduction in serum sodium level in neurosurgical patients.
Methods: A total of 43 patients admitted to our neurosurgical unit (20 males, 23 females; average age=62 years) were included in this study. The in-vitro fertilisation (IVF) use, initial serum Na level, and first serum Na level after initial period of IVF were reviewed.
Results: A total of 27 patients (63%) were given half-half solution, seven patients (16%) were given NS and eight (19%) were not given any IVF. Six of them had hyponatraemia (serum Na ≤135 mmol/L) before any IVF. In all, 17 patients (40%) did not have their Na level rechecked. Of 27 patients given half-half solution, 18 had sodium level rechecked; the average Na level change was -1.37 mmol/L; Of seven patients given NS, six had sodium level rechecked; the average Na level change was +3.17.
Conclusion: Half-half solution may lower serum sodium level and may contribute to hyponatraemia in neurosurgical patients. Further prospective studies are required to investigate the effect and outcome following use of different IVF.

A Single Centre Prospective Study of Intracranial Aneurysm Flow Diverting Stent Treatment

P 28

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Objective: Intracranial aneurysms are vascular abnormalities occurring in 0.4% to 6% of the population. Their ruptures may result in subarachnoid haemorrhage, with a mortality rate of 45%, highlighting the necessity of timely treatment. Traditional surgical clipping of aneurysms is associated with satisfactory occlusion but higher mortality and morbidity rates. Thus, physicians turn to a safer alternative: endovascular treatment. This study aimed to evaluate the safety and effectiveness of endovascular stents for intracranial aneurysm treatment.
Methods: Patients were followed up at 6 months, 1, 2, and 3 years after operation with endovascular stents. Follow-up imaging, modified Rankin Scale, and EuroQol-5Dimension were assessed every visit to monitor changes in condition.
Results: In all, 78 patients (64.1% female) with a mean age of 57.78 ± 12.695 who had one or more intracranial aneurysms were followed up up to 36 months. The location, size, and rupture status of aneurysms were determined by DSA and 3D DSA imaging. 48.7% were found in the internal carotid artery, particularly the ophthalmic and communicating segments; 92.3% were small to medium-sized aneurysms (smaller than 12 mm), and 53.8% were unruptured. More than half of the patients had histories of hypertension and smoking. Nine reported adverse events, with four unrelated to procedure. Among the rest, there was only one case of transient ischaemic attack (1.3%), while others were all small haematoma at access site with mild severity.
Conclusion: The data suggested that stent treatment of intracranial aneurysms using the new generation of pipeline shield and vantage flow diverters was safe.

Tele-Psychological Counselling Services for Patients with High-Grade Glioma

P 29

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Objective: Adults diagnosed with high-grade glioma (HGG) may experience functional, neurological, and psycho-behavioural complications. Both patients and caregivers may experience distress, and there are unmet gaps for psychological care needs. Counselling services that are timely accessible are essential. In May 2022, the CUHK Otto Wong Brain Tumour Centre collaborated with the Hong Kong Health Care Alliance to provide free counselling for patients with HGG. This report examined the uptake of the services and preliminary results on quality of life (QOL).
Methods: All patients with newly diagnosed HGG were recruited. Counselling was provided by an experienced counsellor via video conference or telephone. A course of five sessions were provided including psychoeducation, mood management, and supportive counselling. The EORTC QLQ-C30 was administered before and after counselling. The global QOL score was the primary outcome.
Results: Twenty-four patients (14 males) aged 21 to 77 (mean, 55±16.21) years were screened by clinical psychologists from May to August 2022 in the Prince of Wales Hospital and referred to the counselling service. Eighteen patients received the service (12 completed 5 sessions; 1 was ongoing; 5 expressed no needs after 2-4 sessions). Six patients did not receive the service due to no subjective psychological needs (n=5) and inability to use electronic device (n=1). Seven patients completed pre- and post- assessment. There was observable improvement on overall QOL from 54.77 to 85.70.
Conclusion: Integration of psychosocial support into routine care of HGG is likely to be beneficial.

Application of Mapping Intraoperative Neuromonitoring Device for Awake Craniotomy

P 30

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Objective: Awake craniotomy is a surgical option for selected cases of brain tumour resection as it can improve survival by maximising the extent of resection of the tumour and preserve quality of life and function by limiting damage to the eloquent areas. However, the success of the surgery depends on accurate cortical mapping, which can be time-consuming and often limited by intra-operative seizures due to cortical stimulation. We aimed to examine the mapping intraoperative neuromonitoring device (MIND) as an effective apparatus for streamlining the process.
Methods: We examined the role of the MIND during awake craniotomy performed in Kwong Wah Hospital.
Results: The MIND provides a four-in-one central display, converging the output from different sources within the operating theatre for instantaneous comparison. This facilitates timely response to and recording of neurological changes throughout the mapping process by the surgical team, especially with regards to intraoperative seizures which can be induced by cortical stimulation.
Conclusion: The MIND is effective in integrating multiple sources of data critical to intraoperative mapping in awake craniotomy into a single high-resolution display with diminished delay in feedback.

P 31

Timing of Concurrent Temozolomide Chemoradiotherapy in Glioblastoma Patients and Its Impact on Overall Survival: a 14-Year Multicentre Retrospective Analysis

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Objective: Maximal safe resection followed by concurrent chemoradiation (CCRT) and adjuvant temozolomide is standard-of-care first-line treatment for patients with glioblastoma. However, the optimal time interval between surgery and CCRT remains undetermined. This study aimed to examine whether the timing of CCRT after surgery improves overall survival (OS).

Methods: Records of all histologically confirmed glioblastoma patients across all seven Hong Kong neurosurgical units from 2006 to 2020 who received CCRT within 90 days after surgery were retrospectively reviewed. Multivariable Cox models with restricted cubic splines were used to analyse the association between resection-to-CCRT interval and OS. Conventional prognostic factors were analysed a priori, including age, sex, preoperative Karnofsky performance status (KPS), extent of resection, and MGMT-methylation status. Multiple imputation was used to handle missing data.

Results: In 472 patients, the median resection-to-CCRT interval was 42 (interquartile range [IQR]=33-48) days. The median OS was 17.2 (IQR=11.4-31.9) months. The median age at diagnosis was 57 (range, 18-81) years. The male-to-female ratio was 1.6:1. In all, 233 (49.4%) patients had a KPS >80. In all, 167 (35.4%) patients underwent GTR, 240 (50.8%) underwent STR, and 63 (13.3%) had a biopsy. Half of the patient cohort (49.9%, 188/377) had MGMT-methylated tumours. Radar cross-section analysis revealed an interval with lowest mortality risk between 36 days and 63 days post-resection. Early initiation of CCRT before this interval (≤35 days; n=161; adjusted hazard ratio [aHR]=1.18; 95% confidence interval [CI]=0.96-1.46; median OS=16.3 months) and late initiation of CCRT after (>63 days; n=21; aHR=1.32; 95% CI=0.84-2.08; median OS=17.9 months) were not prognostic of OS. Subgroup analysis of conventional prognostic factors also did not reveal an association between OS and the resection-to-CCRT interval. The only independent predictors for better OS were a KPS >80 (aHR=0.74; 95% CI=0.60-0.90) and MGMT methylated tumours (aHR=0.50; 95% CI=0.40-0.61).

Conclusion: Neither early nor late initiation of CCRT within 90 days after glioblastoma resection improves OS significantly. Preoperative functional performance and MGMT methylation status continued to be significant predictors for OS.

A Single-Centre Retrospective Review on Post-Operative Quality of Life for Drug Refractory Epilepsy

P 32

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Objective: To investigate whether epilepsy surgeries improve quality of life for patients presenting with drug refractory epilepsy.
Methods: This is a single centre, retrospective study of patients with drug refractory epilepsy admitted to Kwong Wah Hospital for surgical management from 2015 to 2022. Operative procedures were mainly classified into resection, disconnection, and neuromodulation. Surgical outcomes including seizure control, post-operative complications, and effects on various domains affecting quality of life such as cognitive function, memory, and language were analysed. Quality of Life in Epilepsy Inventory-10 (QOLIE-10) questionnaire was also referenced to provide an objective assessment on how epilepsy surgeries affect quality of life.
Results: A total of 31 patients (20 females and 11 males) with a median age of 33 years were recruited. Five patients received vagal nerve stimulation. Twenty-five patients received excisional surgeries, including frontal or temporal lobectomy with or without amygdalohippocampectomy, and focal lesion excision. One patient underwent subpial dissection. In all, 28 patients (90.3%) achieved better seizure control after epilepsy surgery, of whom 11 patients (39.3%) were seizure-free. Mesial temporal lobe epilepsy (MTLE) group had better seizure control overall. The majority of patients also had post-operative improvement in terms of memory, language, and intelligence quotient (IQ) assessments.
Conclusion: Patients with MTLE had better seizure control post-operatively. Our study group showed post-operative improvement in memory, language, and IQ. QOLIE-10 allowed for quick patient assessments and monitors outcomes apart from seizure freedom.

Assessment of the Impact of Ultra-Early Aneurysm Treatment on Outcomes in Patients With Poor Neurological Status After Intracranial Aneurysm Rupture

P 33

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Objective: To evaluate outcomes of local subarachnoid haemorrhage (SAH) patients admitted with poor neurological status after intracranial aneurysm rupture, and whether ultra-early aneurysm treatment improves their outcomes.
Methods: This prospective observational seven-centre study evaluates patient outcomes from admission over 2 years, with additional 6 months to complete last recruit's follow-up. Adults aged ≥18 years with spontaneous SAH admitted to Hospital Authority neurosurgical services, with initial Glasgow Coma Scale (GCS) ≤12 (World Federation of Neurological Surgeons [WFNS] grade 4-5) were recruited. Patients likely to leave Hong Kong shortly, or refusing participation were excluded. Follow-up end point was at 6 months post-SAH, with assessments at baseline, 30-day, 3-month and 6-month. Primary outcome was 6-month modified Rankin Scale. Secondary outcomes included Montreal Cognitive Assessment, Stroke Specific Quality of Life, Short Form-36, return-to-work, and hospital resource utilisation. This study compares outcomes of patients undergoing ultra-early definitive cerebral aneurysm treatment (coiling or clipping within initial 24 hours) with those undergoing non-ultra-early treatment (definitive treatment after initial 24 hours).
Results: Till 16 August 2022, 501 patients were recruited. In all, 430 (85.8%) completed primary outcome assessments. The mean patient age was 61 years; the male-to-female ratio was 1:2; the mean initial GCS and WFNS grade were 6 and 4. The mean ictus-to-definitive-treatment delay was 72 hours.
Conclusion: Recruitment and assessments are ongoing with final results expected in January 2023.

"Spooky Action at a Distance": a Report of Two Cases of Distant Wounded Glioma Syndrome

P 34

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Objective: To report two cases of distant wounded glioma syndrome and integrate current clinical knowledge with our experience.
Methods: We present two cases of distant wounded glioma syndrome. Two men in their 60s with multiple brain lesions underwent craniotomy and tumour excision on the left frontal lesions. In the computed tomography of the brain on post-operative day 1, both patients showed haemorrhage at a lesion of a distant site not manipulated during the operation: one over the right frontal region and the other at the left temporal region. Pathological examination of both lesions revealed glioblastoma multiforme. Both patients had no pre-existing bleeding tendency. There are two previously reported cases of such a syndrome in the English literature. All cases were compared and existing knowledge about wounded glioma syndrome was investigated.
Results: All reported cases of distant wounded glioma syndrome involved middle-aged men with multifocal glioblastoma multiforme. All had no pre-existing coagulopathy. In previously reported cases, this syndrome caused new neurological deficit and severe morbidity. In our centre, however, both patients were managed conservatively with no immediate deficits.
Conclusion: Distant wounded glioma is a separate complication of glioma excision surgery. Surgeons should be aware of this complication when determining surgical plan for glioblastoma multiforme. Haemorrhage over the distant tumour after excision of the major tumour may suggest an alternative non-locally acting mechanism for the more common wounded glioma syndrome. While multiple postulates for such a mechanism have been hypothesised, evidence is lacking. Further research may be done to elucidate this mechanism.

Efficacy Test for Intermittent Theta Burst Stimulation in Motor Rehabilitation in Post-Stroke Patients in a Tertiary Centre in Hong Kong

P 35

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Objective: To compare the efficacy profile of intermittent theta burst stimulation (iTBS) on motor rehabilitation in patients with subacute or chronic stroke with patients who received conventional individualised physiotherapy.
Methods: Twenty stroke patients underwent iTBS using MagVenture MagPro X100 with MagVenture MCF B70 butterfly coil, followed by individualised physiotherapy for motor training. Twenty matched controls were recruited. Primary outcomes included difference at 6 months between iTBS and control group in terms of motor power grading, upper extremity-Fugl-Meyer Assessment (UE-FMA), and Box and Block Test. Secondary outcomes included difference at 6 months in terms of Modified Ashworth grading, Timed up and Go Test, Handgrip strength, Modified Rankin scale, and Barthel Index, as well as potential adverse effects within 6 months. Data were analysed using paired *t*-test, with a P value of <0.05 taken as statistically significant.
Results: Patient baseline characteristics were well matched. For primary outcomes, there were statistically significant improvement between the iTBS group and control group in terms of motor power ($P<0.0001$), UE-FMA ($P<0.0001$), and Box and Block Test ($P<0.007$). For secondary outcomes, there were statistically significant improvement between the iTBS group and control group in terms of Modified Ashworth grading, Timed up and Go Test, handgrip strength, modified Rankin scale and Barthel Index. No adverse effects were identified.
Conclusion: Intermittent theta burst stimulation produced a statistical significant improvement in motor rehabilitation compared with conventional physiotherapy at 6 months. It is a safe method for motor rehabilitation.

Cell-Type-Based Pathway Analysis in Experimental Subarachnoid Haemorrhage

P 36

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Objective: Increasing evidence points to a pivotal role of neuroinflammation in the pathogenesis of subarachnoid haemorrhage (SAH). Microglia, astrocyte, central nervous system (CNS)–associated macrophage and other kinds of brain cells are important for brain homeostasis and response to external stimuli. We aimed to investigate the pattern of cell interaction and mode of ligand-receptor action after SAH.
Methods: Endovascular perforation murine SAH model was established to reproduce experimental SAH. Post-SAH CD11b+ single-cell suspension was harvested at day 3 and sequenced using 10X single-cell RNA-sequencing platform. Then, the detailed single-cell information of post-SAH cells was analysed with bioinformatics. The same pathways and related ligand-receptors in microglia and other cells were compared.
Results: More than 51 pathways were found in the crosstalk of brain cells after SAH. These cells included microglia (microglia worked in 25 pathways), CNS-associated macrophage, astrocyte, neuron, monocyte and macrophage, and oligodendrocyte. In the microglia subsets' interaction, 15 pathways upregulated, of which four pathways were specific to microglia subsets. Gene ontology results showed that compared with non-microglia cells, post-SAH microglia had upregulated function like leukocyte, glia cell activation, and migration, while having downregulated functions of protein-lipid complex remodelling.
Conclusion: These results revealed the cellular mechanisms for neuroinflammation after SAH; the ligand-receptor results provided a theoretical basis and opportunities for accurate monitoring and modulation of SAH in the future.

Integrating Simulation Training Into the Clinical Nursing Practice of Perioperative Care in a Neurosurgical Setting

N 1

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Background: Simulation training has been widely adopted as an effective and safe training method. Health care professionals and services can be benefited by simulation training in terms of reducing human errors and promoting patient safety. In newly graduated nurses who are not experienced in perioperative care for neurosurgical patients, a scenario-based simulation training was held to enhance their competence, so as to maintain the safety and quality of care provided to patients.
Objective: The objectives of the simulation training on perioperative care carried out in a designated neurosurgical setting were to reinforce the knowledge and skill on the perioperative care, identify the strength and weakness of the current practice, formulate the improvement measures of the nursing care, and enhance the speak up culture among the clinical team.
Methods: A scenario-based simulation training was conducted in a neurosurgical setting. Participants were chosen randomly from the duty list and role was in a random assignment. A debriefing session was carried out after the scenario. A 4-point Likert scale satisfaction survey was performed to evaluate the scenario-based simulation training.
Results: Nine participants took part in the scenario-based simulation training, all of them reflected that the training was relevant to their job. The mean score was between 3.11-3.44 in the following aspects: "the simulation meets the objectives", "organization", "duration", and "level of difficulty". The mean score on "equipment and facility" was 2.78. Overall, 33.33% of them reported that the simulation training was of excellent quality, while 66.67% of them rated the training as good quality. Participants described that the SBAR (situation-background-assessment-recommendation) communication and speak up culture were reinforced.
Conclusion: Although the scenario-based simulation training was not run in a high-fidelity model with the use of life-like manikins, the participants can identify "what they know" and "what they do not know" through the simulation training in order to avoid doing harm to patients and to maintain the safety and quality of care delivered. Besides, the training allows review of the current nursing practice and the needs of the newcomers of the department, and hence allows to make a more comprehensive training and development plan in the department.

N 2

Improving Nurse's Compliance of Ventilator Care Bundle Continuous Quality Improvement Programme in Neurosurgery

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Objective: To increase the compliance rate on ventilation care bundle through enhancing nurses' knowledge level and raising their awareness.
Methods: Ventilator-associated pneumonia (VAP) is associated with high morbidity and mortality. The Ventilator Care Bundle protocol consisting of evidence-based recommendations is an effective method for VAP reduction when compliance is maintained. In order to reduce the VAP rate and to improve nurse's compliance of the protocol, from July 2021 to September 2021 regular group-based educational talks were held weekly to increase nurses' knowledge level of VAP prevention. Electronic posters were also used to raise staff awareness of VAP bundle. Spot check audit of compliance in VAP bundle was also performed.
Results: Nurses' compliance rate of VAP bundle drastically increased 54.8% after intervention. The scores of pre- and post-test questionnaire showed improvement of nurses' knowledge over prevention of VAP incidence. The passing rate of the questionnaire increased 52.5%.
Conclusion: Educational talks, electronic posters, and spot check audit enhanced nurses' knowledge level and raised their awareness. Continuous education and long-term display of electronic posters are recommended to keep a high compliance rate of VAP bundle.

N 3

High Fidelity Simulation Learning for Healthcare Professionals: an In-Situ Simulation Training

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Objective: Simulation-based learning is an indispensable element in the education and training among healthcare professionals, assisting in developing clinical competence and crew resource management skills. To achieve optimal behavioural, emotional, and cognitive engagement for the learners, an immersive learning environment with high-fidelity design should be considered. With the combination of physical, conceptual, and environmental fidelity, simulation education can produce a perception of realism. Traditional simulation-based learning is usually carried out in an unfamiliar laboratory, which might hinder the learner involvement, deconstruct the learning activities and result in a disengaging learning experience. Therefore, collaborative effort should be implemented to drive the learners' engagement as well as the fidelity in healthcare simulation. The objective of this study was to improve healthcare professionals' clinical competence and team cooperation through the high-fidelity in-situ simulation with neurosurgical-based scenario.
Methods: ADDIE mode was adopted to guide the development process of the training. A series of in-situ ward-based neurosurgical simulation scenario was designed, resembling the actual neurosurgical emergencies. An all-rounded evaluation was conducted to evaluate the whole education design, training needs, simulation content, debriefing session, instructor' feedback, learners' satisfaction, and psychological capacities.
Results: The learning objectives of simulations were well achieved. Comparing with simulation in laboratory, the in-situ simulation provided better clinical immersion and involvement to promote the learning process, clinical competence, and team cooperation. The comment of "simulation in an actual ward setting can provide a higher confidence in work" was received.
Conclusion: High-fidelity in-situ simulation provides better learner's engagement, which assist in transitioning the knowledge into practice, thus promoting clinical competence.

N 4

Development of Neurosurgery Integrated Model Nurse Clinic

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Objective: Nurse clinic is an integral component of Hospital Authority specialist out-patient services. The nursing team in neurosurgical clinic aimed to provide multidisciplinary care by monitoring of patient's health progress and appropriate care management, and to improve the quality of care, clinical outcomes, and patient satisfaction, as well as to reduce admission and length of stay and to optimise resources utilisation. The first Integrated Model of Specialist Outpatient Service (IMSN) through a neurosurgical nurse clinic in Hong Kong was established in October 2021 at Queen Elizabeth Hospital. The objective of this review was to evaluate the effectiveness of IMSN neurosurgical clinic services and to formulate improvement measures and future development plan.
Methods: There were 858 attendances as of 31 August 2022. Data were retrospectively reviewed for patients who were admitted electively. Electronic satisfaction survey was conducted after the utilisation of clinic service.
Results: Nurse clinic trial run was started in 2020. Ward follow-up activities decreased 47% in 2021, compared with 2020. After commencement of the nurse clinic services in October 2021, there was a 99% reduction in ward follow-up activities in 2022. Good patient preparation and education prior to surgical procedure optimised clinical outcomes and patient satisfaction. There was a decrease in 1.21 bed day for patients who underwent elective surgical procedure, compared with previous services model. A 90% of overall satisfaction to nurse clinic services was reported.
Conclusion: Existing ward follow-up activities and clinical staff workload were relieved by the nurse clinic services. Unexpected cancellation of surgery and reduction of the length of stay can be achieved. Through the patient satisfaction survey, improvements occurred in the waiting time and location and the space of the nurse clinic.

AUTHOR INDEX

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