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Guest Faculties

The Organising Committee would like to thank the following guest faculties for their invaluable contributions to the 30th Annual Scientific Meeting

Michael G FEHLINGS, MD, PhD

Professor of Neurosurgery
Chair in Brain and Spinal Cord Research, Department of Surgery
University of Toronto

Peng ZHAO, MD, PhD

Assistant Professor
Neurosurgical Department, Beijing Tiantan Hospital
Capital Medical University

SCIENTIFIC PROGRAMME

VENUE: THE BALLROOM, 7/F, CORDIS HONG KONG, MONGKOK, KOWLOON

17 NOVEMBER 2023, FRIDAY

08:00 – 08:25	Registration	POSTER PRESENTATION / EXHIBITION
08:25 – 08:30	OPENING SPEECH <i>Dr Michael LEE</i>	
08:30 – 09:30	FREE PAPER I—Functional & Trauma Chairpersons: <i>Dr Jason CHOW & Dr C POON</i>	
09:30 – 10:00	KEYNOTE LECTURE I Neuroendoscopic anatomy of the craniocervical junction <i>Prof Peng ZHAO</i> Chairpersons: <i>Dr David CHAN & Dr YT KAN</i>	
10:00 – 10:30	FREE PAPER IV (Video) Chairpersons: <i>Dr WM HUNG & Dr Michael LEE</i>	
10:30 – 10:50	Tea break	
10:50 – 11:20	KEYNOTE LECTURE II Clinical treatment and key point for skull base chordoma <i>Prof Peng ZHAO</i> Chairpersons: <i>Dr Calvin MAK & Dr Larry WONG</i>	
11:20 – 11:50	KEYNOTE LECTURE III Role and timing of surgery for spinal cord injury: time is spine <i>Prof Michael FEHLINGS</i> Chairpersons: <i>Dr Dawson FONG & Dr TL POON</i>	
11:50 – 12:30	FREE PAPER II—Vascular Chairpersons: <i>Dr Alberto CHU & Dr ST WONG</i>	
12:30 – 13:30	Lunch	
13:30 – 14:10	KEYNOTE LECTURE IV Repair and regeneration of the injury spinal cord: a translational update <i>Prof Michael FEHLINGS</i> Chairpersons: <i>Dr Joseph LAM & Dr HY LAW</i>	
14:10 – 15:00	FREE PAPER III—Tumour Chairpersons: <i>Dr Tony CHAN & Dr Rebecca NG</i>	
15:00 – 15:20	Tea break	
15:20 – 15:50	KEYNOTE LECTURE V Prevention, diagnosis and management of intraoperative spinal cord injury (iSCI) <i>Prof Michael FEHLINGS</i> Chairpersons: <i>Prof Gilberto LEUNG & Dr WK WONG</i>	
15:50 – 16:50	FREE PAPER V—Spine Chairpersons: <i>Dr KY PANG & Prof WS POON</i>	
19:00 – 22:30	ASM Dinner Venue: Shantung Room, 8/F, Cordis Hong Kong at Langham Place Guest Speaker: <i>Dr Fei-chau PANG</i>	

18 NOVEMBER 2023, SATURDAY

08:30 – 08:45	Registration	POSTER PRESENTATION / EXHIBITION	
08:45 – 09:25	FREE PAPER VI—Vascular -Endovascular Chairpersons: <i>Dr PH CHAN & Prof George WONG</i>		
09:25 – 09:55	KEYNOTE LECTURE VI Systematic treatment for skull base chordoma of the craniocervical junction <i>Prof Peng ZHAO</i> Chairpersons: <i>Dr ST CHAN & Dr David SUN</i>		
09:55 – 10:25	KEYNOTE LECTURE VII Degenerative cervical myelopathy: state of the art and future directions <i>Prof Michael FEHLINGS</i> Chairpersons: <i>Dr YC PO & Dr YH TSE</i>		
10:25 – 10:35	Group photo & announcement		
10:35 – 10:50	Tea break		
10:50 – 11:30	FREE PAPER VII—Spine & General Chairpersons: <i>Dr KY CHAN & Dr WK MAK</i>		NURSING SESSION A commitment to quality: from emergency care to rehabilitation Chairpersons: <i>Ms Kwok-yan SUEN & Ms Kar-ying TO</i>
11:30 – 12:00	FREE PAPER VIII—Tumour Chairpersons: <i>Dr TC TAN & Dr XL ZHU</i>		
12:00 – 12:30	SPINE CHAPTER LECTURE Exoskeleton for spinal cord injury <i>Dr Sheung-wai LAW</i> Chairpersons: <i>Dr Simon LEE & Dr SC YUEN</i>		
12:30 – 14:00	Lunch		
14:00 – 14:20	HKNS Research Subcommittee <i>Dr James ZHUANG</i> Chairpersons: <i>Dr Danny CHAN & Dr SC SO</i>		
14:20 – 15:20	FREE PAPER IX—Tumour – Skull Base & Glioma Chairpersons: <i>Dr Kevin CHENG & Dr HT WONG</i>		
15:20 – 15:40	Tea break		
15:40 – 16:00	SRS LECTURE SRS chapter report on 2023 activities & the way forward <i>Dr KY YAM</i> Neurosurgery - Top paediatric paper of the year 2022 <i>Dr Elvin HE</i> Chairpersons: <i>Dr FC CHEUNG & Dr Michael LEE</i>		
16:00 – 16:50	FREE PAPER X—Paediatrics & Vascular –Endovascular Chairpersons: <i>Dr HM CHIU & Dr CK WONG</i>		
16:50 – 17:00	Concluding remarks		

A bleeding brain with a failing heart: incidence and clinical outcomes of intracranial haemorrhage in patients supported with left ventricular assist devices

WONG Cheuk Pang, CHENG King Fai Kevin, LEUNG Ka Kit Gilberto, LUI Wai Man
Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong SAR, China

Objective: To evaluate the incidence and clinical outcomes of intracranial haemorrhage (ICH) in patients supported by a left ventricular assist device (LVAD) in Hong Kong.

Methods: A 13-year record of patients with an LVAD implanted in our hospital was retrospectively reviewed.

Results: Records of 167 consecutive patients with an LVAD implanted were reviewed. 16 patients with 18 events of ICH were identified; the incidence was 3190 events per 100 000 patient-year. The median patient age at the time of ICH was 57 years. The median time from LVAD implantation to ICH was 198 days. Kaplan-Meier estimates for freedom from ICH at 1 and 2 years were 92.7% and 90.2%, respectively. The incidence of ICH was significantly lower in patients implanted with the Heartmate III models than in patients implanted with the Heartware models ($P < 0.01$, log-rank test). The most common site of ICH was the intracerebrum (38.9%). A combination of warfarin and antiplatelet agent was prescribed in 83.3% of patients with ICH. The international normalised ratio was >3.0 in 33.3% of patients with ICH. For the 18 events of ICH, 10 were managed surgically and eight were treated conservatively; the 30-day mortality rate was 60.0% and 50.0%, respectively ($P = 1.00$, Fisher's exact test), and the overall 30-day mortality rate was 55.6%. Patients with ICH had worse outcomes, with the 30-day mortality rate being 85.7%, compared with patients with subdural or subarachnoid haemorrhage.

Conclusion: ICH in LVAD recipients is a common and fatal complication and requires individualised management with a multidisciplinary approach.

Paediatric neurosurgical seizure control: a 5-year case series

HO Robert Tsi-Lok¹, LAU Sarah Sau-Ning^{1,2}, TAW Benedict Beng-Teck^{1,2}, HO Wilson Wai-Shing^{1,2}, CHENG Kevin King-Fai^{1,2}

¹ Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong SAR, China

² Department of Neurosurgery, Hong Kong Children's Hospital, Hong Kong SAR, China

Objective: To summarise our experience in neurosurgical management for paediatric epilepsies.

Methods: This was a 5-year retrospective case series of ten paediatric patients with improved seizure control following lesionectomy or vagal nerve stimulation (VNS) at the Hong Kong Children's Hospital.

Results: Five male and five female paediatric patients aged 4 months to 16 years at diagnosis were included; they underwent lesionectomy for poorly controlled lesional epilepsy ($n = 8$) or VNS for refractory epilepsy characteristic of Lennox–Gastaut syndrome ($n = 2$). The lesions in the eight patients with lesionectomy were either low-grade tumours ($n = 7$) or arteriovenous malformation ($n = 1$). Low-grade tumours were further classified into low-grade glioma ($n = 3$), ganglioglioma ($n = 2$), dysembryoplastic neuroepithelial tumour ($n = 1$), and glioneuronal tumour ($n = 1$). After 3 to 20 months of follow-up, six (75%) of the patients with lesionectomy were seizure-free, which suggests sufficient removal of the epileptogenic tissue, consistent with the 61% to 87% reported in the literature. Seizure abatement was achieved in the remaining two patients with lesionectomy. In one patient with a right frontal glioneuronal tumour, seizure semiology transitioned from status epilepticus and major generalised tonic-clonic seizures to mild focal aware seizures during weaning of topiramate. In another patient with a left temporal dysembryoplastic neuroepithelial tumour, focal aware seizures with intense facial flushing transitioned into brief episodes of fear. Both patients with VNS reported a reduction in the frequency and duration of tonic seizures typical in Lennox–Gastaut syndrome at 12-to-32-month follow-up.

Conclusion: Neurosurgical management for paediatric epilepsies has been successful.

Surgical outcomes of temporal lobectomy in patients with drug-resistant mesial temporal sclerosis epilepsy: a Hong Kong multicentre review

LAU Yu Him Zachary¹, CHEUNG Wing Lok¹, CHAN Kit Ying Emily¹, LEUNG Ho Wan², FUNG Lai Wah Eva³, WOO Yat Ming Peter¹, ZHU Xian Lun¹, CHAN Tat Ming Danny¹

¹ Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong SAR, China

² Division of Neurology, Department of Medicine and Therapeutics, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong SAR, China

³ Department of Paediatrics, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong SAR, China

Introduction: Drug-resistant epilepsy is defined as failure to achieve sustained seizure freedom after adequate trials of two tolerated, appropriately chosen antiepileptic drugs (AEDs). Around one-third of patients with epilepsy are drug-resistant; 60% to 70% of patients with temporal lobe epilepsy have mesial temporal sclerosis. These patients suffer from not only recurrent seizures and intellectual deterioration but also adverse effects of multiple AEDs and hence decreased quality of life. Anterior temporal lobectomy is a well-established surgical treatment for mesial temporal sclerosis epilepsy.

Methods: Records of patients who underwent temporal lobectomy for drug-resistant mesial temporal sclerosis epilepsy between January 2005 and May 2022 were reviewed. The diagnosis of mesial temporal sclerosis was based on radiological or histological findings. Primary outcome was seizure control rated by Engel Classification. Secondary outcomes included surgical complications, medication reduction, adverse events related to seizure. Basic demographic data included age, sex, handedness, education levels, age of seizure onset, age of referral to neurosurgery, and age of surgery. Clinical data included seizure frequency and control, semiology, aura, AEDs used, adverse effects of AEDs, prior medical history, preoperative investigations (imaging, electroencephalography, Wada test), and surgical record.

Results: In total, 110 patients were identified who were followed up for 2 to 17 years. As of the latest follow-up, 70 (63.6%) patients achieved seizure freedom (Engel Class I), and 17 (15.5%) patients had rare, almost seizure-free, <3 seizure days per year (Engel Class II). Most of these patients were able to wean down AEDs. Surgical complication rate was low; complications included visual field defect and transient weakness. There was no surgical mortality.

Conclusion: Temporal lobectomy is a safe and effective treatment for patients with drug-resistant mesial temporal sclerosis; most patients achieve seizure freedom or at least significant reduction in seizure occurrence.

Anatomical segmentation or local field potential: which leads the way in deep brain stimulation?

XUE William¹, SEE Ka Wing Michael¹, CHAN Hiu Fai², CHEUNG Yuk Fai², POON Tak Lap¹

¹ Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR, China

² Department of Medicine, Queen Elizabeth Hospital, Hong Kong SAR, China

Objective: New implantable pulse generators record local field potential from individual segments of deep brain stimulation electrodes. Subthalamic nuclei (STN) in patients with Parkinson's disease demonstrate prominent beta (13-30 Hz) oscillations, which can guide fine activation of directional leads to conform to STN morphology. The implantation of electrodes is often guided by preoperative segmentation of basal ganglia. This study investigates the correlation between beta signal amplitudes recorded from electrode segments and their proximity to the STN on postoperative magnetic resonance imaging.

Methods: 10 patients with medically intractable Parkinson's disease underwent implantation of directional leads targeting bilateral STN. Local field potential amplitudes were analysed. Patients' postoperative magnetic resonance imaging scans were imported into the BrainLab software, and the distance between lead segments and the mapped STN was measured.

Results: When comparing leads from the same electrode, the lead with strongest beta signal amplitude was found to be closest to the STN. After grouping leads from all electrodes, however, no significant correlation was found between beta signal amplitude and the distance between STN and individual leads.

Conclusion: The STN mapped by the BrainLab software may not accurately reflect its actual location as picked up by leads. The use of artificial intelligence may increase accuracy of STN mapping. Further studies are needed to evaluate the efficacy of directional lead activation that conforms to STN morphology.

Clinical effectiveness of blood-based biomarkers of GFAP and UCH-L1 in detecting acute intracranial injuries in patients with mild traumatic brain injury

FP 1.5

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Objective: We aim to determine the clinical usefulness of blood-based biomarkers in detecting acute intracranial injuries according to the ALERT-TBI trial results.

Methods: This is a single-centre prospective study. Between August 2022 and March 2023, 52 patients with mild non-penetrating traumatic brain injury (TBI) underwent computed tomography (CT) of the brain at the accident and emergency department of Tuen Mun Hospital. Venous blood sampling for GFAP and UCH-L1 was arranged within 12 hours of head injury. Blood samples were sent for analysis. Laboratory personnel were blinded to patients' diagnosis and clinical status. Associations between blood test results and CT results of the brain were analysed.

Results: Of 50 patients (mean age, 70 years) included, 33 showed intracranial haemorrhage on CT of the brain and 17 were negative for intracranial haemorrhage. The median time from injury to blood taking was 10 hours. For blood-based biomarkers of GFAP and UCH-L1 in detecting acute intracranial injuries, the sensitivity was 100% (95% confidence interval, 89.42%-100%) and the negative predictive value was 100%.

Conclusion: Our results are comparable to those in the ALERT-TBI trial. Blood-based biomarkers of GFAP and UCH-L1 are reliable in detecting acute intracranial injuries in patients with mild TBI.

Ageing brains matter: novel scoring system for predicting outcomes of geriatric traumatic brain injuries in Hong Kong population

FP 1.6

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Objective: To develop a novel scoring system (ie, HK-GERI-TBI) for predicting outcomes of geriatric traumatic brain injuries.

Methods: A retrospective analysis was conducted on 500 consecutive geriatric patients with traumatic brain injuries who admitted to the Prince of Wales Hospital since September 2020. Data collected included demographics, pattern of intracranial haemorrhage, concomitant injuries, Glasgow Coma Scale score, pupil size, vital signs, blood test results, comorbidities, antiplatelet or anticoagulant usage, and clinical outcomes. Multiple logistic regression analysis was used to identify independent predictors, which were assigned weighted scores in the HK-GERI-TBI scoring system to predict worse outcomes in geriatric traumatic brain injuries in Hong Kong.

Results: Predictors for mortality were age ($P=0.03$), sex ($P=0.01$), Glasgow Coma Scale score ($P<0.001$), pupil size ($P=0.033$), mean arterial pressure ($P=0.021$), hypoalbuminaemia ($P=0.002$), anaemia ($P=0.002$), leukocytosis ($P<0.001$), loss of consciousness ($P=0.003$), past history of atrial fibrillation ($P=0.001$), valvular replacement ($P<0.001$), malignancy ($P<0.001$), and use of non-vitamin K antagonist oral anticoagulants ($P=0.022$). Predictors for low Glasgow Outcome Scale score at 3 and 6 months were age ($P<0.001$), premorbid mobility ($P<0.001$), Glasgow Coma Scale score ($P<0.001$), tachycardia ($P=0.007$), tachypnoea ($P<0.001$), renal impairment ($P=0.0032$), hypoalbuminaemia ($P<0.001$), anaemia ($P<0.001$), past history of atrial fibrillation ($P<0.001$), stroke ($P=0.003$), valvular replacement ($P=0.014$), malignancy ($P<0.001$), and use of non-vitamin K antagonist oral anticoagulants ($P=0.001$), whereas the predictor for low Glasgow Outcome Scale score at 6 months was renal impairment ($P=0.016$). In addition, protective factors for mortality and favourable Glasgow Outcome Scale score at 3 months were use of Transamin ($P=0.047$) and Beriplex ($P=0.045$).

Conclusion: The HK-GERI-TBI scoring system is a viable tool to identify high-risk patients after traumatic brain injury and enable better resource allocation and patient care.

Revascularisation strategies for intracranial atherosclerosis-related occlusions and cerebral blood volume index as a novel predictor for perfusion

FP 2.1

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Background: Intracranial atherosclerosis-related large vessel occlusion (ICAS-O) secondary to in-situ thrombo-occlusion is a common stroke mechanism in Asian populations. This study aimed to investigate clinical features and outcomes of intra-arterial thrombectomy for ICAS-O and to determine the best frontline recanalisation approach, pattern of rescue treatments, and predictors for ICAS-O.

Methods: Between 2016 and June 2023, 406 patients underwent intra-arterial thrombectomy at Queen Mary Hospital. ICAS-O was defined as either >70% fixed-residual stenosis at the target lesion or mild-to-moderate stenosis with re-occlusion tendency. Clinoradiological and technical outcomes such as technique-switching, intraprocedural re-occlusion, and rescue stenting/angioplasty were evaluated. Associations of cerebral blood volume index and hypoperfusion intensity ratio with stroke aetiology were investigated.

Results: ICAS-O was the stroke mechanism in 23.9% (97/406) patients, who had lower first-pass success (23.5% vs 40.7%, $P=0.004$). Frontline contact aspiration was associated with switching to alternative thrombectomy techniques ($P<0.001$), greater number of passes (3.4 vs 2.6, $P=0.042$), and longer puncture-perfusion time (115 vs 76 min, $P=0.01$). Different forms of rescue strategies achieved similar rates of thrombolysis in cerebral infarction grade 2b/3 ($P=0.15$) and safety outcomes. Multivariate logistic regression showed that acute stenting ($P=0.71$) or intra-arterial globus pallidus internus ($P=0.55$) did not predict symptomatic haemorrhage. Cerebral blood volume index had good discrimination for ICAS-O (area under the curve=0.77, $P=0.032$), with >0.85 as the optimal cut-off.

Conclusions: Stentriever/solumbra may be a better frontline thrombectomy technique in ICAS-O. Cerebral blood volume index can help strategise the upfront modality and anticipate the need for adjuvant therapies.

Artificial intelligence-derived routine blood test signature for detection of intracranial aneurysms

FP 2.2

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Objective: Screening for intracranial aneurysms (ICA) is reserved for high-risk individuals only. This study aimed to identify a signature derived from routine blood tests for the detection of ICA.

Methods: This was a territory-wide retrospective cohort study; 1 856 928 records between 2000 and 2017 were retrieved from the Hong Kong Hospital Authority Data Collaboration Laboratory. The presence of an ICA was based on cerebral angiography. Routine blood tests for complete blood count and liver and renal functions were performed before ICA diagnosis (ICA-positive) or within 1 month of absence of an ICA (ICA-negative). Data from 2000 to 2015 were split into training and testing cohorts in an 8:2 ratio, whereas data from 2017 were used as the validation set. De-identified and normalised data were subject to various machine-learning models, and their performances were compared.

Results: The cohort yielded 2511 ICA-positive (with an incidence of 1.2%) and 206 320 ICA-negative blood test results. In the 2017 validation dataset ($n=15\ 021$), 48 patients were ICA-positive. Our artificial intelligence-derived routine blood test signature demonstrated high sensitivity (77.1%) and specificity (99.5%), with a negative predictive value of 99.9% and a positive predictive value of 31.9%.

Conclusion: Our artificial intelligence-derived routine blood test signature has high sensitivity and specificity in detecting an ICA among the general population. This paves the way for the development of an ICA risk score for subsequent image screening prioritisation.

Patients with spinal dural arteriovenous fistula and their outcome

FP 2.3

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Background: A spinal dural arteriovenous fistula (SDAVF) is a direct communication between a spinal artery and a spinal vein with the absence of an intervening capillary bed that leads to venous congestion of the spinal cord. Patients typically present with progressive lower limb weakness, gait disturbances, sensory loss, and sphincter disturbances. Diagnosis is guided by magnetic resonance angiography and confirmed by digital subtraction angiogram. Treatment is by interrupting the shunting zone through surgical or endovascular means, thereby stopping the progression of disease and symptoms; however, prognosis is highly variable. This study reviewed patients with a SDAVF and their outcome.

Methods: Records of patients with SDAVF were reviewed.

Results: As of June 2023, 13 men and six women with SDAVF were identified. Their mean age at the initial operation was 56 years. They initially underwent open disconnection (n=16) or embolisation of the SDAVF (n=3); 15 patients had thoracic SDAVF involvement. The time from symptom onset to the first operation ranged from 1 month to 4 years. At 1 month after operation, 68% of patients were able to ambulate independently (modified McCormick Scale grade 1 to 3), whereas 32% of patients had modified McCormick Scale grade 4 to 5.

Conclusion: SDAVF is a rare but treatable cause of progressive neurological deficit. Investigation of associations between preoperative factors and postoperative outcomes may provide further insight.

Shunt-dependent hydrocephalus in patients with aneurysmal subarachnoid haemorrhage with or without serial lumbar drainage: a two-centre study

FP 2.4

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Objective: Hydrocephalus is common in patients with aneurysmal subarachnoid haemorrhage (SAH). This study investigated whether early and serial lumbar puncture can lower the rate of shunt-dependent hydrocephalus.

Methods: This was a three-year retrospective study of adult patients with good-grade aneurysmal SAH who were admitted to either Queen Mary Hospital or The University of Hong Kong – Shenzhen Hospital between January 2020 and December 2022. The former did not usually perform lumbar puncture if external ventricular drainage was performed, whereas the latter routinely performed early and serial lumbar puncture until cerebrospinal fluid became clear or intracranial pressure normalised. The protocol to shunt was similar in both centres. Patients with poor-grade SAH and follow-up <30 days were excluded.

Results: Of 89 patients included, 51 were from Queen Mary Hospital and 38 were from The University of Hong Kong – Shenzhen Hospital. The external ventricular drainage rate was 55% and 61%, respectively. The lumbar drainage rate was 25% and 97%, respectively. The shunt rate was 29% and 0%, respectively. The rate of asymptomatic hydrocephalus was similar in both centres.

Conclusion: Early and serial lumbar drainage can lower the rate of shunt-dependent hydrocephalus.

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Objective: This study reviewed the results of central nervous system (CNS) lymphoma biopsy and the role of Ommaya reservoir insertion in our hospital.

Methods: A 5-year retrospective analysis was conducted on patients with CNS lymphoma who underwent biopsy or Ommaya reservoir insertion at Queen Mary Hospital. Clinical data collected included patient demographics, lymphoma subtypes, biopsy techniques, and complications. Biopsy results were compared with the prior systemic histology, if present.

Results: Of 57 patients included, 27 underwent biopsy and 30 underwent Ommaya reservoir insertion. Open biopsy was most commonly used, followed by stereotactic biopsy. Biopsy yielded a positive tissue diagnosis in 92.6% of patients, of which 63% showed a new histological diagnosis comparing with prior systemic histology. The most common histology was diffuse large B cell lymphoma (DLBCL) [85.2%]. For patients with prior non-DLBCL histology, the odds of obtaining a new histology from biopsy was 20 times more likely (95% confidence interval=2.961-135.107). For patients with Ommaya reservoir insertion, the mean frequency of use was 6±4 (range, 1-16). Eight complications occurred, including suboptimal position (n=5), infection (n=1), and haemorrhage (n=2). The overall survival after Ommaya reservoir insertion was 11±12.4 (range, 0-36) months.

Conclusion: Biopsy for CNS lymphoma demonstrates high efficacy in obtaining a positive tissue diagnosis. Patients with prior non-DLBCL histology have 20 times more likely to yield a new diagnosis; this may help guide subsequent management. The overall survival after Ommaya reservoir insertion was not increased, compared with international data.

Linear accelerator–based frameless stereotactic radiosurgery in multiple brain metastasis: a single-centre review

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Objective: Stereotactic radiosurgery (SRS) delivers conformed radiation to targets while minimising adverse radiation effects. This study evaluated the treatment outcomes after linear accelerator–based SRS for multiple brain metastasis in terms of disease control, survival, and adverse radiation effects.

Methods: This was a retrospective review of patients with ≥3 brain metastasis who underwent linear accelerator–based SRS at Tuen Mun Hospital between 2019 and 2022. Primary outcomes were intracranial disease control, survival, adverse radiation effects, and cognitive impairment. Secondary outcomes were the predictors of primary outcomes and survival analysis.

Results: In total, 24 patients were included. The median Karnofsky performance score was 90. The mean time from diagnosis of brain metastasis to SRS was 1.6 month. Of the patients, 72% had single-fraction SRS. The mean gross tumour volume and planning target volume were 8.5 and 11.4 mL, respectively. The mean prescription dose was 21 Gy. Regarding intracranial disease control, 67% demonstrated responsive disease; 81% were completely responsive. The median time to reach complete response was 7 months. The 1-year and 2-year complete response rates were 67% and 75%, respectively. The median overall and progression-free survival were 21 and 19 months, respectively. Among all patients, 21% had radionecrosis; all were transient; 50% of them showed symptoms improvement post-SRS. Predictors for better survival were good Karnofsky performance score, responsive disease, and complete response.

Conclusion: SRS for multiple brain metastasis achieved an overall survival of 21 months with minimal cognitive decline. Predictors for survival included a younger age, good Karnofsky performance score, and complete response to SRS.

Cirq robotic arm for brain biopsy in patients with suspected brain tumours: a single-centre experience

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Objective: The Cirq robotic arm system enables automatic and accurate alignment of surgical instruments along a preplanned trajectory. This can shorten operation time and improve accuracy of biopsy.

Methods: Between August 2022 and September 2023, 10 patients underwent brain biopsy using the Cirq robotic arm system. They were compared with 10 patients who underwent brain biopsy using the non-robotic VarioGuide system in terms of patient demographics, imaging findings, tumour characteristics, and operative details.

Results: Accurate biopsy with tumour-tissue retrieval was achieved in all patients using the Cirq robotic system, which was non-inferior to the non-robotic VarioGuide system. Time from positioning to tissue retrieval varied from 0.5 to 2 hours. In each patient, 4 to 12 cores were retrieved. There were no major postoperative complications.

Conclusion: The Cirq robotic system is non-inferior to the non-robotic VarioGuide system in terms of accuracy; it is generally safe with no major complications.

Excision of brain metastases: a single-centre experience

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Objective: To review outcomes of patients with brain metastases in our centre.

Methods: This was a retrospective review of patients with brain metastasis who underwent craniotomy at Pamela Youde Nethersole Eastern Hospital between 2018 and 2022. Patients' demographics, pre-morbid Karnofsky performance score, primary pathology, brain metastasis locations, adjuvant treatment, and outcomes were analysed.

Results: The median progression-free survival was 6.4 months, whereas the median overall survival was 16.1 months. The median overall survival was longer in patients with pre-morbid Karnofsky performance score of ≥ 80 (31.8 vs 8.7 months, $P=0.001$) and in patients who underwent stereotactic radiosurgery (35.3 vs 15.4 months, $P=0.004$). The median overall survival was not correlated with age, dexamethasone use, tumour size, number of brain metastases, location of metastases, dose and timing of stereotactic radiosurgery, whole-brain radiotherapy, chemotherapy, or targeted therapy.

Conclusion: Patients with pre-morbid Karnofsky performance score of ≥ 80 who underwent stereotactic radiosurgery had a longer median overall survival.

Adjuvant targeted therapy for early recurrent brain metastasis

FP 3.5

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Objective: To compare treatment outcomes of brain metastasis in patients who underwent surgical excision with or without adjuvant targeted therapy.

Methods: Patients with brain metastasis who underwent tumour excision at Queen Elizabeth Hospital between 2018 and 2023 were included. Patients' demographics, primary malignancy, location, time to recurrence, and overall survival were collected. Patients with or without adjuvant targeted therapy were compared in terms of outcomes and recurrence rates of lung, breast, and kidney cancers.

Results: Among 150 patients with brain metastasis, 75% had lung cancer and 10% had breast cancer as the primary malignancy. Other less common primary malignancy included renal cell carcinoma and colorectal cancer. After treatment, 10% and 32% of patients had recurrence at <3 months and 9 months, respectively. 17% of patients survived for >5 years; half of them had lung cancer; and 70% of them were >70 years old. Patients with adjuvant targeted therapy or radiotherapy were comparable in terms of disease control. Recurrence-free survival was prolonged after introduction of targeted therapy in recent 2 years.

Conclusion: Conventional adjuvant radiosurgery is comparable with adjuvant targeted therapy in terms of treatment outcomes. Multidisciplinary treatments improve the survival rate in patients with brain metastasis.

Facetectomy, fusion, and function preservation for recurrent dumbbell spinal tumours with cord compression

FP 5.1

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Aim: For recurrent dumbbell spinal tumours (ie, spinal tumours with foraminal and extraforaminal extension), laminectomy is adequate for most patients but may not be sufficient in some patients who may need facetectomy for tumour exposure and decompression and posterior spinal fusion for stabilisation. This study aimed to evaluate the treatment outcomes of facetectomy and posterior spinal fusion for patients with recurrent dumbbell spinal tumours.

Methods: Records of patients who were operated for recurrent dumbbell spinal tumours at Prince of Wales Hospital during the period 2018 to 2023 were reviewed. The primary outcome was the degree of tumour resection. Secondary outcomes included cerebrospinal fluid leak, bleeding, infection (superficial, deep), vascular injury, accuracy of screw placements, and any new neurological deficits.

Results: In total, 10 women and 5 men underwent facetectomy and posterior spinal fusion for recurrent dumbbell spinal tumours during the 5-year study period. The mean patient age was 60 (range, 38-76) years. Most (67%) tumours were located at the cervical spine. The mean operating time was 460 minutes. Of the 15 patients, 12 (80%) achieved gross total resection. Regarding complications, five patients developed transient neurological deficits; one developed Horner's syndrome; and one had postoperative pseudo-meningocele. None of the patients required re-operation. There was no mortality. The accuracy for screw placement was 100%, with the use of intraoperative computed tomography.

Conclusion: In selected patients with recurrent dumbbell spinal tumours, facetectomy and posterior spinal fusion can achieve good outcome with function preservation.

Skull tong retraction for closed reduction with combined anterior and posterior spinal fusion for cervical spinal fracture dislocation

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Traumatic spinal injury can be fatal. Cervical spinal fractures can be classified according to the mechanism (flexion, flexion-rotation, extension, and vertical compression). A 73-year-old man with a history of ankylosing spondylitis presented to the neurosurgical unit of the Prince of Wales Hospital with cervical spine injury after a fall from bed. He was tetraplegic (American Spinal Injury Association category A). Computed tomography of the cervical spine demonstrated three-column fracture at C4 with bilateral C4/5 facet dislocation. Magnetic resonance imaging showed severe cord compression at the C4 level with cord oedema. The patient underwent closed reduction of bilateral C4/5 facet dislocation with skull tongs under fluoroscopy, followed by combined C3-5 anterior spinal fusion and flipped C3-6 posterior spinal fusion. Postoperative computed tomography showed restored alignment. Skull traction is important for temporary stabilisation of cervical spinal fracture dislocation. After fracture reduction and stabilisation, anterior and posterior spinal fusions are often required if the fracture involves all three columns. By using the Mizuho OSI operating table, the patient can be stabilised and 'sandwiched' and turned prone for posterior spinal fusion after anterior spinal fusion, with good stability.

S2 alar-iliac screws in complex posterior spinal fusion with intraoperative computed tomography

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Aim: Management of lumbo-sacral spinal alignments and pathologies requires considerations of decompression, stability, and sagittal balance. The use of S2 alar-iliac (S2AI) screws is discussed.

Methods: Records of patients who underwent complex posterior spinal fusion with the use of S2AI screws at Prince of Wales Hospital between 2022 and 2023 were reviewed. The primary outcome was the placement accuracy of S2AI screws based on intraoperative computed tomography.

Results: In total, eight patients aged 48 to 68 years were treated with the S2AI screw. One patient underwent revision surgery. All patients underwent posterior spinal fusion involving ≥ 5 levels; most involved T10 to S2. Two patients had screw protrusion and were intraoperatively revised under fluoroscopic guidance. No patient required postoperative revision surgery or had other complications.

Conclusion: Intraoperative computed tomography-guided placement of S2AI screws for complex posterior spinal fusion is accurate and safe.

Outcomes of surgical treatment for craniocervical junction pathologies: long-term case series

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Objective: Craniocervical junction (CCJ) pathologies are technically challenging to operate. CCJ is a complex biomechanical region with critical neurovascular structures. Transoral approach is the gold standard for removal of C0-C2 pathologies. Recently, the endoscopic endonasal approach is increasingly popular. We reviewed outcomes of surgical treatment for CCJ pathologies in our centre in the past 25 years.

Methods: This is a retrospective case series. Records of patient who underwent surgical treatment for CCJ pathologies in the neurosurgical department of our hospital between January 1998 and September 2023 were retrieved. Patients' age, diagnosis, surgical approach, and postoperative management were collected. Outcome measures included length of stay, complications, functional improvement, and mortality.

Results: In total, 31 patients aged 20 to 84 years were included. Pathologies of CCJ included infection, degeneration, autoimmune, tumour, congenital disease, and trauma. The surgical approach was microscopic in 20 patients and endoscopically assisted in 11 patients. There was gradual shift of ventral CCJ aetiology: fewer cases of rheumatoid arthritis and more cases of infection. Aetiology of infection was associated with prolonged hospitalisation ($P < 0.001$) and prolonged halo use ($P = 0.027$). Aetiology of tumour was least associated with halo use ($P = 0.002$) and spinal fixation ($P = 0.004$).

Conclusion: Both microscopic and endoscopic approaches are effective treatment options for ventral CCJ pathologies, with no significant difference in complications.

Syringomyelia in Chiari malformation: a 10-year cohort with long-term outcomes

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Objective: Syringomyelia can develop in patients with Chiari type 1 malformation, which is a congenital condition in which cerebellar tonsils herniate below the foramen magnum. These patients can present with neurological symptoms in adulthood. This study reviewed the long-term surgical outcomes of these patients.

Methods: This was a 10-year retrospective study of long-term outcomes of patients who underwent surgery for syringomyelia at Prince of Wales Hospital between 2013 and 2023. Operative techniques included posterior fossa decompression with duraplasty, cerebellar tonsillectomy, and adhesiolysis.

Results: In total, seven women and two men (mean age at operation, 39 years) were included. Seven patients had limb sensory disturbance or motor weakness; five patients had cerebellar symptoms (eg, dizziness, gait instability, and nystagmus); two patients had neck pain; one patient had straining headache; and one patient had incidental magnetic resonance imaging finding. The syrinx length ranged from being focal at C2 to being extensive from C1 to conus. All nine patients underwent posterior fossa decompression with duraplasty; three patients also underwent cerebellar tonsillectomy; one patient also underwent syringomyelia drainage; one patient also underwent atlanto-occipital posterior spinal fusion; and one patient also underwent arachnoid cyst fenestration. All patients had improved clinical outcomes with symptomatic relief; one had symptomatic recurrence. 78% of patients showed radiological improvement, whereas one patient showed similar extensive syrinx length and extent, and another developed new syrinx after a period of partial regression. Two patients were complicated with vocal cord palsy; two patients developed hydrocephalus and required a second operation for shunting; one patient developed pseudomeningocele and required re-opening for adhesiolysis at the craniocervical junction; one patient developed recurrent arachnoid cyst and required cysto-peritoneal shunting.

Conclusion: For selected patients with syringomyelia and Chiari I malformation, surgical intervention can achieve clinical and radiological improvement.

Recurrent spinal tumours: risk factors for recurrence and reoperations

FP 5.6

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Aim: Spinal meningiomas have risks of recurrence. This study evaluated the long-term outcome of patients who underwent surgical treatment for spinal meningiomas and to determine the risk factors for reoperations.

Methods: This was a 9-year cohort study of patients who were surgically treated for spinal meningiomas at Prince of Wales Hospital during the period 2013 to 2022. Outcome measures included the degree of excision, the reoperation rate, the interval between the index operation and the reoperation, and complications such as cerebrospinal fluid leak, bleeding, infection (superficial, deep), and new neurological deficits. Treatment efficacy in terms of neurological improvements was analysed. Radiological outcomes (residual tumours and tumour recurrence) were evaluated.

Results: In total, 28 women and five men aged 34 to 84 (mean, 63.5) years were included. The commonest region involved was the thoracic spine. The mean operating time was 183.3 minutes. Intraoperative findings showed that 30 (90.9%) patients achieved gross total resection; the Simpson grade of resection was grade 1 in two (6.1%) patients, grade 2 in 28 (84.8%) patients, and grade 4 in three (9.1%) patients. At 6 months, 15 (88.2%) patients had neurological improvement. In the latest follow-up, 29 (87.9%) patients had no residual or recurrent tumour. The mean interval between the index operation and the reoperation was 2445 days. Regarding complications, one (11.8%) patient developed new neurological deficits. None had cerebrospinal fluid leak, pseudo-meningocele, infection, or haematoma. There was no mortality. The risk factor for recurrence was Simpson grade 4 resection ($P < 0.001$).

Conclusion: Good long-term surgical outcome was achieved in most patients with spinal meningiomas. Long-term follow-ups are recommended, especially in patients with Simpson grade 4 resection.

Carotid-cavernous fistula: a 10-year retrospective review

FP 6.1

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Objective: To review treatment results of carotid-cavernous fistula at a single centre in the past 10 years.

Methods: This was a retrospective review of patients with carotid-cavernous fistula who were treated at a single centre during the past 10 years. Clinical and angiographic records of patients were retrieved.

Results: In total, 17 women and two men were treated for carotid-cavernous fistula in the past 10 years. Most (89.4%) of the fistulas were non-traumatic in nature. Endovascular treatment achieved good success rate (84.2%). Angiographic records revealed that incomplete treatment was common in extensive dural arterio-venous fistula with cavernous sinus involvement (100%, 2 of 2), which is a different entity with similar presentation of carotid-cavernous fistula.

Conclusion: Carotid-cavernous fistula has good prognosis after endovascular treatment.

Clinical outcome of staged treatment for ruptured wide neck aneurysm

FP 6.2

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Objective: Ruptured wide neck aneurysms are difficult to treat endovascularly. The aneurysm morphology increases the risk of coil protrusion to the parent vessel leading to ischaemic events. It can be treated with stent-assisted coiling (SAC), but this necessitates the use of antiplatelets, which increase haemorrhagic risks, especially in ruptured cases. We therefore propose treatment in a staged manner (dome protection with coiling, followed by delayed flow diverter placement). We reviewed the clinical outcomes of patients with a ruptured wide neck internal carotid artery (ICA) aneurysm who underwent staged procedures, compared with conventional SAC.

Methods: This was a retrospective review of clinical outcomes of patients with ruptured wide neck ICA aneurysm who underwent staged procedures during the past 5 years. These patients were compared with patients treated with SAC (historical controls).

Results: Of 43 patients with ruptured wide neck ICA aneurysm who were treated endovascularly, 25 (mean age, 56 years; 88% females) underwent staged procedures (dome protection with coiling, followed by delayed flow diverter placement). Most patients had ruptured aneurysms of posterior communicating arteries. Compared with historical controls who underwent SAC, patients who underwent staged procedures had a lower incidence of thromboembolic or haemorrhagic events, while having comparable rebleeding risk and mortality.

Conclusion: Staged procedures for ruptured wide neck ICA aneurysms is a safe alternative.

Outcome analysis of carotid-cavernous fistula: a 15-year single-centre retrospective observational study

FP 6.3

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Objective: Carotid-cavernous fistula (CCF) is an abnormal shunt from the carotid artery to the cavernous sinus, causing a variety of symptoms including proptosis, ocular bruit, chemosis, visual disturbances, and ophthalmoplegia. Surgical and endovascular interventions are viable options. This study reviewed treatment outcomes of patients with CCF.

Methods: This was a retrospective observational review of patients with carotid-cavernous fistula who were treated at Queen Elizabeth Hospital during 2008 to 2022. Data collected included patients' demographics, radiological features (such as arterial feeders and draining veins of fistulas), clinical presentation, types of interventions received, and clinical outcomes (fistula obliteration rate, improvement in symptoms, complications rate, recurrence rate, and reoperation rate).

Results: In total, 65 patients were included; 86% had indirect CCF and 14% had direct CCF; 91% underwent fistula occlusion through the endovascular approach and 9% through the transcranial or transorbital hybrid approach. The transvenous approach was used in 95% of patients with indirect CCF, and the inferior petrosal sinus was the access route in 75% of these patients. The complete fistula obliteration rate was 79%, and 94% of patients had resolution or improvement of symptoms. The recurrence rate was 6%. The most common complication was transient worsening of ocular manifestation (9%).

Conclusion: Both the conventional endovascular and hybrid interventions are safe and effective options for CCF.

Tandem occlusion in anterior circulation stroke: challenges and treatment strategies

FP 6.4

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Objective: Tandem occlusion is defined as a combination of stenosis in the extracranial carotid artery and concomitant intracranial large vessel occlusion. There is no standard guideline regarding the optimal management. This study compared the outcomes of different management strategies for tandem lesions.

Methods: Records of patients with tandem occlusion of >50% and extracranial carotid pathology who were treated at Pamela Youde Nethersole Eastern Hospital or Queen Elizabeth Hospital between 31 July 2013 and 30 June 2023 were reviewed. Functional outcome, recurrent stroke risk, intracranial bleeding risk, and mortality rate were analysed. Good functional outcome was defined as modified Rankin Scale scores of 0 to 2 at 3 months. The percentage of carotid stenosis were measured according to the North American Symptomatic Carotid Endarterectomy Trial criteria.

Results: Of 607 patients who underwent endovascular thrombectomy for intracranial vessels during the study period, 36 were included in the analysis. Of these, 16 underwent acute surgical treatment with balloon angioplasty (n=7) or stenting with or without balloon angioplasty (n=9). Favourable functional outcome was observed in 56% of patients with acute surgical treatment and in 25% of patients with conservative treatment. The mortality rate was lower in the intervention group than the control group (12.5% vs 25%). The risk of intracranial haemorrhage was comparable among those with or without intervention (31.25% vs 30%). Patients were stratified according to the percentage of stenosis into three groups: >90% (n=8), 70% to 89% (n=10), and 50% to 70% (n=18). Favourable functional outcome was more common in those with >90% stenosis and those with 70% to 89% stenosis than those with 50% to 70% stenosis (50% vs 50% vs 27.8%). Particularly for patients with 70% to 89% stenosis, those who underwent balloon angioplasty had more favourable functional outcome than those who underwent stenting or those who were managed conservatively (100% vs 33% vs 25%). The mortality rate was higher in patients with 50% to 70% stenosis than in patients with ≥90% stenosis or in patients with 70% to 89% stenosis (27.8% vs 12.5% vs 0%). None of the patients had recurrent stroke.

Conclusion: For tandem occlusion, acute surgical treatment for extracranial carotid pathology in addition to thrombectomy is beneficial in improvements in functional outcomes without significant increase in the complication rate.

Operative outcome of intramedullary spinal tumours: 15-year experience in a tertiary neurosurgical centre

FP 7.1

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Objectives: Spinal tumours comprise 15% of all central nervous system tumours; of which, only 2% to 4% are intramedullary spinal cord tumours (IMSCT). This study evaluated the operative outcome of IMSCT.

Methods: This was a single-centre retrospective review of patients with IMSCT who underwent surgical excision at Prince of Wales Hospital during 2009 to 2023. Clinical data included demographics, index tumour size, degree of excision, use of intraoperative neurophysiological monitoring, histological diagnosis, postoperative outcome, and recurrence rate.

Results: In total, 11 women and nine men (median age, 53 years) were included. Regarding vertebral segments involved, 37% were cervical, 48% were thoracic, and 15% were lumbosacral. Intraoperative neurophysiological monitoring was used in all patients. Regarding surgical outcome, 79% achieved gross total resection and 21% achieved subtotal resection. Regarding pathology, 32% were ependymomas, 32% were hemangioblastomas, and 16% were astrocytomas. At 6 months, 94% of patients demonstrated neurological improvement. At 1 year, 68% showed treatment success with no residual or recurrence tumour on imaging. Regarding complications, two patients had limb weakness or paraesthesia and one patient had tumour recurrence and underwent reoperation at 3 years. There was no postoperative cerebrospinal fluid leak or operative mortality.

Conclusion: IMSCTs are difficult to treat and require long-term follow-up. Further research with a larger sample size is required to determine independent predictors for tumour recurrence.

Functional outcome after surgery for Arnold Chiari malformation: a >20-year retrospective review

FP 7.2

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Objective: To review functional outcomes of patients who underwent surgical treatment for Arnold Chiari malformation type 1.

Methods: This was a retrospective review of 21 patients with Arnold Chiari malformation type 1 who underwent surgical treatment between 2001 and 2023 at Tuen Mun Hospital.

Results: The pre- and post-operative functional scores of patients were similar in terms of the Goel clinical grading score (median, 1 vs 1) and the Japanese Orthopaedic Association score (median, 10.5 vs 11). Nonetheless, 76% patients reported a subjective sustained improvement in symptoms after operation. The median postoperative Chicago Chiari Outcome Scale score of patients was good (14 of 16). Better functional outcome was associated with a wider craniectomy ($P < 0.01$), whereas worse functional outcome was associated with a wider C1 laminectomy ($P < 0.018$).

Conclusion: Differences in the widths of craniectomy and laminectomy are associated with functional outcome among patients who underwent surgical treatment for Arnold Chiari malformation type 1.

Comparative analysis of molecular and histological glioblastomas according to the 2021 World Health Organization classification of central nervous system tumours

FP 7.3

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Objective: To compare molecular glioblastomas with histological glioblastomas in terms of clinical and radiological characteristics and outcomes.

Methods: This was a 3-year single-centre retrospective review of patients with glioblastomas who were treated at Queen Elizabeth Hospital during 2021 to 2023. The primary outcome measure was survival. Molecular glioblastomas were compared with histological glioblastomas, H3K27M glioblastomas, and anaplastic astrocytoma in terms of patient demographics and tumour characteristics. Univariable and multivariable analyses were performed to identify predictors for survival.

Results: Among 76 high-grade gliomas, 54 were glioblastomas (41 histological glioblastomas, nine molecular glioblastomas, and four H3K27-altered glioblastomas). All diagnoses of molecular glioblastomas were based on telomerase reverse transcriptase mutation. Of these, eight did not show any high-grade histological features (such as necrosis and microvascular proliferation), and most did not show any high-grade radiological features (such as contrast enhancement and restricted diffusion). The median overall survival of molecular glioblastomas was 12 months, similar to histological glioblastomas. However, most molecular glioblastomas were detected in the recent 2 years and hence the follow-up duration was short.

Conclusion: Compared with histological glioblastomas, molecular glioblastomas have distinct genetic features and may have different clinical manifestations and may require de novo targeted therapies.

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Background: The brain germinates from the neural plate, as the spinal cord does, and therefore can be affected by the same embryological defects. The embryogenesis of some cranial dysraphic lesions remains controversial. This study aimed to derive a pathoembryogenetic-based classification for cranial dysraphic and paradysraphic lesions.

Methods: Records of patients with cranial dysraphic or paradysraphic lesions who were treated at Tuen Mun Hospital during 2010 to 2023 were retrieved. Entities included were cranial neurenteric cyst, dermoid/epidermoid cyst, dermal sinus tract, lipoma, encephalocele, anencephaly, and other potentially relevant malformations. Features of the lesions (location, constituents, skin stigmata) were analysed with respect to their potential embryogenetic mechanisms, based on the classification of spinal dysraphic and paradysraphic lesions. Published case reports/case series were also reviewed and analysed.

Results: In total, 17 patients with cranial dysraphic/paradysraphic lesions were included: pons neurenteric cyst (n=1), posterior fossa dermoid (n=1), frontonasal dermal sinus tract (n=1), encephaloceles (n=4), atretic encephaloceles (n=2), anterior encephaloceles (n=2), and lipomas (n=6). These cranial lesions could be categorised by a pathoembryogenetic-based classification as their spinal counterparts as grade I (gastrulation defects – neurenteric cyst) and grade II (primary neurulation defects). The latter could be further divided as grade IIA (open neural tube defects – anencephaly), grade IIB (focal non-disjunctional defects), and grade IIC (premature disjunctional defects – lipomas). In addition, focal non-disjunctional defects could further be divided as grade IIB1 (limited cranioschisis – atretic encephaloceles, true encephalocele, encephaloceles with defective skin) and grade IIB2 (dermoids/ dermal sinus tracts).

Conclusion: Cranial dysraphic/paradysraphic lesions, accounting for most of midline cranial congenital malformations, should be categorised by the classification system akin to their spinal counterparts.

Patterns of care and overall survival among patients with primary central nervous lymphoma in Hong Kong

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Objective: To describe the patterns of care and outcomes of patients with primary central nervous system lymphoma (PCNSL) in Hong Kong.

Methods: A territory-wide retrospective cohort of patients with histologically confirmed PCNSL during 1999 to 2023 was reviewed. Kaplan-Meier survival analysis and multivariate Cox regression analysis were performed. A P value of <0.05 was regarded as statistically significant.

Results: In total, 218 patients with PCNSL (mean age at time of diagnosis, 63.6±11.1 years) were reviewed. The median progression-free survival was 6.0 (interquartile range, 29.0) months, and the median overall survival was 9.0 (interquartile range, 36.8) months. Surgery was performed in 214 (98.2%) of patients; of these, biopsy was performed in 108 (50.5%) patients and debulking was performed in 106 (49.5%) patients. Both the median Eastern Cooperative Oncology Group score (1 vs 2) and the median Karnofsky Performance Status score (90 vs 60) significantly worsened at first follow-up (P<0.05). Of the 218 patients, 173 (79.4%) were referred to oncologists for primary treatment and 41 (18.7%) were referred to haematologists; the latter was associated with a significantly higher proportion of rituximab and high-dose methotrexate use (P<0.001), which was associated with a longer overall survival (P=0.04) but not progression-free survival (P=0.17), compared with high-dose methotrexate use alone. Independent predictors for longer progression-free survival were preoperative serum albumin, postoperative Karnofsky Performance Status, and radiotherapy as the firstline treatment (P<0.05). The independent predictor for longer overall survival was intrathecal chemotherapy (P<0.05).

Conclusion: There is considerable heterogeneity in PCNSL management in Hong Kong. The therapeutic role of rituximab in addition to high-dose methotrexate in selected patients warrants further investigation.

Stereotactic radiosurgery for brain lesions and its risk of radionecrosis: a Pamela Youde Nethersole Eastern Hospital experience

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Background: Stereotactic radiosurgery (SRS) is effective for treatment of brain lesions including brain metastasis, vascular malformations, and primary tumours. It has good tumour control outcome, especially at the cognitive and functional levels, and a lower toxicity profile, compared with whole-brain radiation therapy. Radionecrosis is a major adverse effect of SRS. This study aimed to identify predictors for radionecrosis in patients who received SRS for brain lesions.

Methods: This retrospective observational study included patients who underwent SRS for brain lesions (including brain metastasis from any cancer, arteriovenous malformation, and meningioma) at the Pamela Youde Nethersole Eastern Hospital between January 2014 and December 2018. Radionecrosis was assessed using magnetic resonance imaging and defined as the occurrence of contrast-enhancing necrotic lesions, surrounded by oedema, localised within fields of irradiation, at 6 months after SRS.

Results: Of 132 cases identified, 86 were included in analysis. There were ten cases of radionecrosis. The rate of radionecrosis did not significantly differ across different types of lesions. Male and older age were risk factors for radionecrosis. The size of the planning target volume was not associated with radionecrosis. None of the patients with radionecrosis required neurosurgical intervention.

Conclusion: Identifying risk factors for radionecrosis may help in counselling patients for SRS. A multicentre study with a larger sample size is needed to determine risk factors for radionecrosis secondary to SRS.

Cerebrospinal fluid liquid-based diagnosis of leptomenigeal disease from non-small cell lung cancer using droplet digital polymerase chain reaction against epidermal growth factor receptor mutations

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Objective: Magnetic resonance imaging and cerebrospinal fluid (CSF) cytology are conventional methods for detecting leptomenigeal disease (LMD), but they may not be sensitive enough. This study tested the feasibility of using cell-free DNA from CSF to detect LMD.

Methods: We collected 39 CSF samples from patients suspected of having LMD secondary to non-small cell lung cancer. Cell-free DNA was extracted; hotspot epidermal growth factor receptor (EGFR) mutations (G719X, S768I, T790M, C797S, L858R, L861Q, 19 del) were tested by multiplexed droplet-digital polymerase chain reaction. The EGFR mutation status of the primary non-small cell lung cancer was previously tested by real-time polymerase chain reaction using formalin-fixed paraffin-embedded tissues.

Results: In total, 33 cases yielded sufficient DNA. EGFR mutations were detected in 16 (48%) of the cases. Of these, identical mutations were found in the matched tissue samples in 15 cases, and the EGFR status of one case was unknown. In 11 of the 17 negative cases, the corresponding tumour tissues lacked EGFR mutations. Six (35%) of them were eventually found to have no LMD. In one case, the lung tissue was found to have EGFR mutation, but the mutation was not found in CSF cell-free DNA. Cytology was negative in 10 cases, atypical in five cases, and positive in one case. In selected cases, the genomics of cell-free DNA were studied, together with the primary tumour tissues with low-pass whole genome sequencing; similar copy number variations were found in both.

Conclusion: CSF cell-free DNA from LMD can be a useful tool for clinical diagnosis.

Outcome of surgical treatment for primary brain abscess in a hospital

FP 9.1

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Objective: Brain abscess remains a life-threatening infection despite improvement in antibiotics and surgical drainage. We reviewed outcomes of patients with brain abscess who underwent surgical treatment at our hospital during 2010 to 2023.

Methods: We retrospectively reviewed patients with primary brain abscess who underwent drainage at Tuen Mun Hospital during January 2010 to October 2023. Demographics, clinical features, laboratory values, radiological images, and abscess culture were collected. Clinical outcome was assessed in terms of 1-year mortality and Glasgow Coma Scale.

Results: In total, 52 patients were included. Gram-positive aerobe and Gram-negative anaerobic bacilli were present in 36.5% of patients with brain abscess, without resistance to ceftriaxone except for nocardia. The 1-year mortality was 19.2% and was associated with older age, Glasgow Coma Scale score, erythrocyte sedimentation rate, basal ganglia, multifocal/bilateral, and Klebsiella involvement. However, all these were not significant in multivariate analysis.

Conclusion: Based on antibiotic resistance in Hong Kong, ceftriaxone and metronidazole remains the empirical antibiotics of choice for brain abscess.

Effect of tumour treating fields on overall survival and quality of life in patients with grade-4 astrocytoma: a prospective study

FP 9.2

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Background: World Health Organization grade-4 astrocytoma is the commonest primary high-grade brain tumour in adults. The use of tumour treating fields (TTF) is associated with improved overall survival. This study assessed the effect of TTF on quality-of-life (QoL).

Methods: This was a matched prospective multicentre study of patients with World Health Organization grade-4 astrocytoma during 2018 to 2023 who underwent TTF for >1 month after completing standard therapy. Patients were asked to complete the European Organisation for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire -Brain Neoplasm module before TTF and at 3-month follow-up. Patients with TTF were compared with historical controls who underwent standard therapy alone. Primary outcomes included QoL, and secondary outcomes included overall survival and caregiver stress at 3 months.

Results: Of 88 patients reviewed, 48 (mean age, 54±13 years) received TTF and 40 (mean age, 52±13 years) were historical controls. The mean duration of TTF use was 10±8 (range, 1-28) months. Respectively in the TTF group and control group, 60% and 53% of patients were male (P=0.41); 73% and 62% of patients had a preoperative Karnofsky Performance Scale score of ≥80 (P=0.36); five (10%) and 10 (25%) of patients had IDH1 mutation (P=0.44); 19 (40%) and 23 (58%) of patients were pMGMT methylated (P=0.12); and 21 (44%) and 18 (45%) of patients had gross total resection (P=0.91). In terms of QoL, there was no significant change in overall EORTC scores in the TTF group from 0 to 9 months. The TTF and control groups were comparable in terms of EORTC functional and symptom scores at 3 months (P=0.45). After adjusting for confounders, the median overall survival was significantly longer in the TTF group than in the control group (22.4 vs 17.2 months, P=0.01). Caregiver strain index reduced at 9 months (P=0.02).

Conclusion: The QoL was similar between patients with TTF and historical controls. The use of TTF is an independent predictor for overall survival. TTF is a novel and effective outpatient treatment with minimal systemic adverse effects.

Surgical excision of vestibular schwannoma: a single-centre 10-year review

FP 9.3

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Objective: To review the operative outcome and complications associated with different approaches for vestibular schwannoma excision in a neurosurgical centre over a 10-year period.

Methods: This was a 10-year retrospective review of patients who underwent excision of vestibular schwannomas at Kwong Wah Hospital during July 2013 to June 2023.

Results: In total, 84 operations in 73 patients aged 23 to 84 (median, 56) years were included in the analysis; 16 of the operations were re-operations. Five patients with neurofibromatosis type 2 presented at an earlier age with bilateral tumours. 88% of patients presented with brainstem compression on preoperative imaging. Hearing loss was the most common presenting symptom, occurring in 57% of patients. 18% of patients presented with preoperative facial nerve palsy, and the rate increased to 46% postoperatively. The most common surgical approach was the retrosigmoid approach (70%), followed by the translabyrinthine approach (21%); both approaches had similar complication rates in terms of postoperative facial nerve palsy and cerebrospinal fluid leak. 10% of patients developed persistent hydrocephalus requiring ventriculoperitoneal shunt insertion. 18% of patients received adjuvant radiosurgery, and another 18% subsequently received re-operation.

Conclusion: It is difficult to strike a balance between facial nerve preservation and the extent of tumour removal. Both the retrosigmoid and translabyrinthine approaches showed similar performance in terms of facial nerve preservation.

Hearing preservation after stereotactic radiosurgery in patients with vestibular schwannoma

FP 9.4

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Objective: To determine factors associated with hearing preservation in patients with vestibular schwannoma who underwent stereotactic radiosurgery.

Methods: We retrospectively reviewed medical records of 96 patients who underwent stereotactic radiosurgery for vestibular schwannoma between August 2013 and August 2023. Clinical history, consultation notes, and radiological images were reviewed. Demographics were matched in terms of age, sex, presence of neurofibromatosis type 2, tumour characteristics (size, Koos grading), preoperative hearing status, radiosurgery techniques (stereotactic surgery or stereotactic radiotherapy with or without cochlear segmentation). Clinical outcomes included tumour reduction, hearing preservation, and postoperative neurological complications. The primary endpoint was complete hearing loss.

Results: Serviceable hearing after stereotactic radiosurgery was positively associated with lower dose and higher fractions of radiation delivered, cochlear segmentation, and a smaller tumour.

Conclusion: Hearing preservation could be achieved by fractionation and cochlear preservation.

Multidisciplinary team in the management of functioning pituitary adenoma

FP 9.5

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Objective: To evaluate the effect of a multidisciplinary team on postoperative outcomes of functioning pituitary adenoma.

Methods: Records of patients with functioning pituitary adenoma who were treated at Queen Elizabeth Hospital by a multidisciplinary team of neurosurgeons and endocrinologists were reviewed.

Results: In total, 15 patients with functioning pituitary adenomas, which included growth hormone-producing tumours (n=8), prolactinomas (n=5), and adrenocorticotrophic hormone-producing tumours (n=2), were treated after the implementation of the multidisciplinary team in Queen Elizabeth Hospital in May 2020. Of the 15 patients, 11 (73%) were referred from the Kowloon Central Cluster (n=6) or the Kowloon East Cluster (n=5). Postoperative outcomes (including unplanned readmission, clinical symptom improvement, the need for further hormonal suppression, and the duration required for biochemical cure) before and after implementation of the multidisciplinary team were compared.

Conclusion: The multidisciplinary team for treatment of functioning pituitary adenoma improves patient outcomes and benefits the healthcare system.

Surgical and endocrinological outcomes of patients with acromegaly following endoscopic transsphenoidal surgery: a single-centre follow-up study

FP 9.6

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Objective: Endoscopic transsphenoidal surgery (ETS) is the main treatment modality for patients with acromegaly caused by growth hormone-secreting pituitary adenoma. We reviewed the surgical and endocrinological outcomes of patients with acromegaly following ETS.

Methods: A single-centre retrospective analysis was performed; 20 patients with acromegaly who underwent ETS for resection of growth hormone-secreting pituitary adenoma between 2012 and 2020 were included. Patient demographics, pre- and post-operative endocrinological and tumour characteristics (such as serum level of growth hormone and insulin-like growth factor-1), tumour size, and Knosp grade were evaluated. Biochemical remission, defined as postoperative insulin-like growth factor-1 levels at or below the age-normalised values, at first and latest follow-ups was evaluated. Potential predictors for biochemical remission after ETS were determined.

Results: In total, 10 women and 10 men (mean age, 51.4 years) were included in the analysis; 11 patients had macroadenomas and nine patients had microadenomas. The biochemical remission rate after ETS was 60%. Following multidisciplinary treatment, 80% of patients achieved biochemical remission at the latest follow-up. Complications included cerebrospinal fluid leak requiring second operation (5%) and epistaxis (5%); no patient had diabetes insipidus, vascular injury, or cranial nerve palsy. The procedure- and disease-related mortality rate was 0%. Postoperative initial growth hormone levels were negatively associated with biochemical remission after ETS (P=0.05).

Conclusion: ETS is a safe and effective treatment modality for patients with acromegaly. High rate of overall long-term biochemical remission is achieved with multidisciplinary treatment. Postoperative initial growth hormone levels are negatively associated with biochemical remission after ETS.

Predictors of postoperative outcomes of posterior fossa decompression for Chiari malformations: two-decade experience

FP 10.1

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Objective: To determine the predictors of treatment outcomes after posterior fossa decompression (PFD) for Chiari malformations.

Methods: Records of patients with Chiari malformations who underwent PFD at Queen Mary Hospital or Hong Kong Children's Hospital during 2003 to 2023 were reviewed retrospectively. Clinical outcomes were measured according to the Chicago Chiari Outcome Scale. The posterior fossa and syrinx were measured. Uni- and multi-variate analyses were performed to determine predictors for postoperative outcomes.

Results: 53 patients were identified. Their mean age at diagnosis was 18.8 years; 62.3% were aged <18 years at presentation. 58.5% of patients had typical Chiari symptoms. Upon review of preoperative magnetic resonance images, 86.8% (n=46) had syringomyelia and 20.8% (n=11) had hydrocephalus. PFD with duraplasty was performed in all patients. Laminectomy of C1 or beyond was performed in 98.1% (n=52) of patients. Bilateral tonsillectomy was performed in 39.6% (n=21) of patients. Early complications occurred in 15.1% (n=8) of patients; most were postoperative haematomas/pseudomeningoceles that did not require intervention. Radiologically, extent reduction or complete resolution of syrinx was noted in 69.2% (n=36) of patients. Clinically, 58.5% (n=31) of patients had complete resolution of symptoms/remained asymptomatic. The mean total Chicago Chiari Outcome Scale score was 14.1. The overall re-operation rate was 9.4% (n=5). Uni- and multi-variate analyses showed a significant regression model ($R=0.94$, $R^2=0.88$, $F=9.03$, $p=0.001$). Predictors for outcomes were age at diagnosis ($\beta= -0.78$, $p=0.001$), syrinx length ($\beta= -0.27$, $p=0.047$), and clivus-torcula distance ($\beta=0.56$, $p=0.01$).

Conclusion: Posterior fossa decompression is a safe procedure with satisfactory radiological and functional outcomes. Preoperative measurements of posterior fossa and syrinx can potentially predict treatment outcomes.

Admission factors associated with surgical management plans and outcomes in paediatric arteriovenous malformations

FP 10.2

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Objective: Prognosis and management plans for paediatric patients with arteriovenous malformations vary widely. Alternative treatment options are increasingly popular, including embolisation and radiosurgery as adjunct or definitive treatment options in addition to microsurgical excision. We aimed to determine admission factors that were associated with surgical management plans and outcomes in paediatric arteriovenous malformations in our centre.

Methods: This was a single-centre retrospective case series. Between January 2008 and October 2023, 75 patients aged ≤ 18 years with intracranial arteriovenous malformation confirmed by magnetic resonance imaging or digital subtraction angiography were admitted to Tuen Mun Hospital.

Results: Admission factors (including premorbid medical conditions, clinical parameters, and Spetzler-Martin grading) were correlated with surgical management options and outcomes (including functional status, reoperation rates, and mortality rates).

A comparative study of endovascular techniques for the management of wide neck intracranial aneurysms

FP 10.3

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Objective: Endovascular treatments for wide neck aneurysms are technically challenging and involve stent-assisted coiling, balloon-assisted coiling, or double microcatheters to increase the occlusion rate. This study compared these techniques for wide neck aneurysms.

Methods: This was a 5-year retrospective single-centre observational study of 238 wide-neck anterior-circulation aneurysms (defined as neck width ≥ 4 mm or dome-to-neck ratio < 2 mm) in 228 patients who underwent embolisation during 2017 to 2022. Aneurysm characteristics, initial occlusion rates, recurrence, periprocedural complications, and outcomes (modified Rankin scale) were analysed. Dissecting and previously treated aneurysms were excluded.

Results: The mean patient age was 59.6 ± 11.6 years; 70% of patients were female. The median neck width was 3 ± 1.4 mm and the median dome-to-neck-ratio was 1.29 ± 0.71 mm. 63% of aneurysms were ruptured. 111 (46.6%) of aneurysms were located at the internal carotid artery and 49 (20.6%) at posterior communicating artery. 122 (51.3%) of aneurysms were treated with simple coiling, 14 (5.9%) with balloon-assisted coiling, 17 (7.1%) with double microcatheters, and 85 (35.7%) with stent-assisted coiling. The latter three techniques were used for aneurysms with larger neck width or dome-to-neck ratio, compared with simple coiling ($P < 0.001$). Double microcatheters technique was mainly used for ruptured aneurysms, compared with stent-assisted coiling ($P < 0.0001$).

Conclusion: Simple coiling is not enough for aneurysms with very wide necks; additional techniques are required. The double microcatheters technique is safe and effective for ruptured wide neck aneurysms, without needing anti-platelet therapy or risking stent complications.

Effectiveness of endovascular treatment for unruptured intracranial wide neck aneurysms: a 10-year single-centre retrospective review

FP 10.4

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Objective: To evaluate the effectiveness of various endovascular treatments for unruptured intracranial wide neck aneurysms.

Methods: This was a single-centre retrospective review of patients who underwent endovascular management for unruptured intracranial wide neck aneurysms during January 2012 to December 2021. Wide neck aneurysm was defined as aneurysm with a neck diameter ≥ 4 mm or a dome-to-neck ratio < 2 or an aspect ratio < 1.6 . The rate of complete obliteration versus residual aneurysms were analysed, together with the need for re-intervention. Characteristics of aneurysms with complete obliteration were evaluated and compared across various treatment modalities.

Results: Of 208 wide neck aneurysms in 183 patients, 153 and 55 were located in anterior and posterior circulation, respectively. The highest complete obliteration rate (85.3%) was achieved after flow diverter-assisted coiling (with a mean dome-to-neck ratio of 1.34 [range, 0.66-3.02]). The residual aneurysm rate was higher after simple coiling (56%) or ballooning with or without stent-assisted coiling (60%) than after other treatment modalities. Only seven patients required re-intervention of residual aneurysm. The overall complication rate and mortality rate were 1.6% and 2.2%, respectively.

Conclusion: Unruptured intracranial wide neck aneurysms can be safely and effectively treated with various endovascular techniques.

Patient outcome after Comaneci mesh–assisted coiling for intra-cerebral aneurysms: a single-centre experience

FP 10.5

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Objective: To review outcomes of patients who underwent Comaneci mesh–assisted coiling for ruptured or unruptured intracerebral aneurysms, and compared them with case-matched controls who underwent primary and stent-assisted coiling.

Methods: The Comaneci-mesh device was approved by the US Food and Drug Administration in April 2019. The first case in Hong Kong was performed in December 2021 in our centre. Records of patients who were treated in our hospital during December 2021 to September 2023 were retrospectively reviewed. Patients were followed up for ≥ 3 months for clinical and angiographic outcomes. They were compared with case-matched controls who were treated with primary or stent-assisted coiling.

Results: Of 15 patients included, six had unruptured aneurysms and nine had ruptured aneurysms. Comaneci mesh-assisted coiling was successful in 11 patients; the remaining four patients required switching to stent-assisted or balloon-assisted coiling or flow diverters. 12 aneurysms occurred at the anterior circulation and three at the posterior circulation. The mean dome-to-neck ratio was 1.25. In patients with angiographic follow-up, all required second-stage treatment for residual aneurysm. Case-matched controls treated with primary coiling and stent-assisted coiling showed advantages in terms of the primary angiographic occlusion rate and the modified Rankin Scale score.

Conclusion: Comaneci mesh–assisted coiling is a viable option for wide-neck aneurysms, with the advantage of avoiding dual anti-platelet therapy in ruptured cases. However, a larger sample size is needed to address the safety considerations and treatment success.

Mind in Progress: a comparative study between traditional and mobile application versions of the Montreal Cognitive Assessment

P 1

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Objective: To assess the validity and reliability of the mobile application version of the Montreal Cognitive Assessment (MoCA) called Mind in Progress.

Methods: This prospective observational study compared the traditional MoCA (paper-based with face-to-face instructions) with the Mind in Progress. Pearson correlation coefficients were calculated to determine correlations between scores of the two versions of MoCA. The Bland-Altman plot was used to analyse the agreement between the two versions of MoCA. Receiver operating characteristic curve was used to assess whether both versions could differentiate the cognitively impaired and cognitively normal patients. Patients' opinions on the Mind in Progress were evaluated using questionnaires.

Role of cuproptosis in intracerebral haemorrhage

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Objective: Intracerebral haemorrhage (ICH) is characterised by bleeding into brain parenchyma. Cuproptosis refers to copper-induced cell death. In ICH, disruption of blood-brain barrier followed by infiltration of copper from plasma into brain, resulting in copper overload and cuproptosis. Oligomerisation of dihydrolipoamide S-acetyltransferase (DLAT) is a hallmark of cuproptosis. We aimed to determine whether ICH can induce cuproptosis as a result of DLAT accumulation.

Methods: ICH was induced in C57BL/6 mice by collagenase injection into the right striatum of brain. Controls underwent sham surgery without collagenase injection. Copper levels in haematoma and peri-haematoma regions were measured using the colorimetric copper assay kit. Western blot was performed to detect DLAT oligomer. Copper chelator tetrathiomolybdate was used to eliminate copper accumulation, and then neurological function was assessed.

Results: Copper levels were higher in brains with ICH than in controls. The hallmark of cuproptosis was detected in brains with ICH. Functional outcomes (in terms of modified neurological severity score and rotarod test) improved in mice treated with tetrathiomolybdate.

Conclusion: Cuproptosis contributes to cell death in ICH. Inhibition of cuproptosis by copper chelation can be a novel therapeutic option for ICH.

Association of yes-associated protein with glioblastoma temozolomide chemoresistance

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Objective: Glioblastoma is associated with high mortality and poor clinical prognosis, mainly attributed to chemoresistance to temozolomide (in firstline treatment). Overcoming chemoresistance is the key in managing glioblastoma. Therefore, this study investigated whether the yes-associated protein (YAP) signalling pathway contributes to temozolomide resistance in glioblastoma cells.

Methods: Temozolomide chemoresistance was induced in U87 and U251 glioblastoma cell lines. Western blot and qPCR analysis of the molecular targets were performed to compare temozolomide-sensitive and temozolomide-resistant cells. Subsequently, gene knockdown of YAP1 was performed. The outcomes of YAP inhibition were validated through cell viability assays (in vitro) and intracranial tumour mouse models (in vivo).

Results: Analysis of The Cancer Genome Atlas and Chinese Glioma Genome Atlas showed that YAP1 overexpression resulted in poorer overall survival in patients with glioblastoma (ie, treatment failure with temozolomide). YAP1 was overexpressed in temozolomide-resistant glioblastoma cells. YAP1 knockdown cells showed higher susceptibility with temozolomide and decreased cell viability. In addition, mice with tumour injection of the knockdown cells had better overall survival with temozolomide administration.

Conclusion: YAP signalling pathway contributes to glioblastoma temozolomide resistance, and thus YAP can serve as a molecular target to resensitise glioblastoma cells to temozolomide.

Middle meningeal artery embolisation for recurrent chronic subdural haematoma: a single-centre review

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Objective: To review outcomes of middle meningeal artery (MMA) embolisation for recurrent chronic subdural haematoma (CSDH) after traditional burr hole drainage.

Methods: Records of seven patients who underwent MMA embolisation for CSDH during October 2022 to July 2023 at Tuen Mun Hospital were retrospectively reviewed. The primary outcome was the resolution of CSDH on follow-up computed tomographic scans of the brain. Secondary outcomes included the length of stay, duration of follow-up, and clinical outcomes in terms of modified Rankin Scale, treatment-related complications, and rate of revision surgery.

Results: All patients showed either static or decreased thickness of CSDH on follow-up scans.

Conclusion: MMA embolisation is a minimally invasive and safe treatment for CSDH, especially for patients with recurrent CSDH after surgical drainage. Further studies should be conducted to determine whether MMA embolisation can be the primary treatment for CSDH.

Novel programmed cell death protein-1/programmed cell death-ligand 1 signalling pathway in glioblastoma

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Objective: To investigate whether the intrinsic programmed cell death protein-1 (PD-1) contributes to the temozolomide (TMZ) resistance in glioblastoma and whether TMZ activates this intrinsic PD-1 signalling pathway.

Methods: In vitro studies were performed using TMZ-sensitive and -resistant human glioblastoma cell lines (U87 and U251). PD-1 expression analysis was performed using western blot and quantitative reverse transcription polymerase chain reaction. The intrinsic PD-1 signalling was abolished by PDCD1 knockdown to examine its effect on glioblastoma progression in terms of cell proliferation, colony formation, and cell migration.

Results: PD-1 was found on both cell lines, with higher expressions on the TMZ-resistant cell lines. PDCD1 knockdown led to decreased progression of TMZ-resistant glioblastoma. Treatment with TMZ for both TMZ-sensitive and TMZ-resistant cell lines upregulated PD-1 expression.

Conclusion: Intrinsic PD-1 expression contributes to TMA resistance in human glioblastoma. PD-1 inhibition resensitises resistant glioblastoma to TMZ, suggesting that PD-1 and its downstream signalling pathways (SHP-2 and IKK) may be potential therapeutic targets for TMZ resistance. Co-administration of TMZ and agents inhibiting the intrinsic PD-1 signalling pathway could produce synergistic therapeutic effects. The higher expression of PD-1 on TMZ-resistant glioblastoma than on TMZ-sensitive glioblastoma also suggests that the intrinsic PD-1 level can be a predictor of TMZ outcome.

Prehabilitation for patients with Parkinson's disease undergoing deep brain stimulation

P 6

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Objectives: To investigate the associations between prehabilitation and outcomes in patients with Parkinson's disease undergoing deep brain stimulation.

Background: Parkinson's disease is the most common neurodegenerative movement disease. Deep brain stimulation (DBS) of the subthalamic nucleus is an adjunctive treatment for Parkinson's disease with disabling motor symptoms. Prehabilitation may optimise patient outcomes.

Methods: This was a single-centre retrospective study. Eligible patients included patients who underwent DBS during January 2021 to August 2023. Prehabilitation programme with standardised multidisciplinary pre-DBS assessment and intervention by clinicians and allied health workers was started in May 2022. Primary outcome measures included length of hospital stay, readmission rate, complications (chest infection, wound infection, clinically significant bleeding), and 30-day mortality. Secondary outcome measures included disease control, activity of daily living, cognitive performance, lung function spirometry, nutritional status, and satisfaction of patients. Patients were followed up for 6 months after operation.

Results: 28 patients were included in the analysis. In patients with Parkinson's disease undergoing DBS, prehabilitation was associated with reduced chest infection and improved activity of daily living and cognitive performance. There was no significant difference in length of hospital stay, readmission rate, complications rate, and 30-day mortality.

Conclusion: In patients with Parkinson's disease undergoing DBS, prehabilitation is associated with reduced chest infection and improved activity of daily living and cognitive performance.

Vertebroplasty with intraoperative computed tomography and SpineMask navigation for osteoporotic vertebral fractures: a case report

P 7

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Osteoporotic vertebral fracture is common among the ageing population. Most vertebral fractures used to be treated conservatively with immobilisation, analgesics, spinal orthoses, and physiotherapy. Vertebroplasty is a viable option for patients with acute vertebral fractures. We used a case illustration to discuss on the indications, techniques, benefits, and application of intraoperative computed tomography (CT) and percutaneous navigation for vertebroplasty. A 91-year-old woman presented to the Prince of Wales Hospital with low back pain and head injury after a fall. CT of the thoracolumbar spine demonstrated a T12 osteoporotic collapse fracture with mild retropulsion, a T5 collapse fracture, a mild T9 collapse, and mildly reduced vertebral heights of T6-8. Magnetic resonance imaging confirmed the above findings and showed no cord compression or oedema. The patient underwent bilateral percutaneous vertebroplasty with polymethyl methacrylate injection to restore the T12 vertebral body height, with guidance by intraoperative CT and SpineMask navigation. Fluoroscopy confirmed excellent cement placement with no extravasation. Patients reported immediate improvement of back pain after the operation. Vertebroplasty is an imaged-guided procedure that involves percutaneous injection of bone cement to stabilise the fractured vertebral body. It has benefits of pain relief, restoration of mobility, and prevention of re-hospitalisation due to pain. The overall risk of the procedure is low; however, rare but severe complications such as cord compression and paravertebral venous leakage of cement leading to pulmonary embolisation and even cardiac perforation have been reported. Intraoperative CT and SpineMask navigation enable higher accuracy of instrumentation placement, shorter and less invasive operation, and lower reoperation rate, while achieving good clinical and radiological outcomes in osteoporotic vertebral fractures.

Complete spontaneous resolution of a large cerebral arteriovenous malformation: a case report and literature review

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Cerebral arteriovenous malformations (AVM) have variable natural history. Complete spontaneous resolution of cerebral AVM is rare, with an incidence of 0.1% to 1.3%. Factors associated with spontaneous resolution of AVM are not clearly understood. We report one such case in a 64-year-old man who presented with a 1-month history of headache, cognitive decline, speech disturbance, and progressive right-side weakness. Digital subtraction angiography and magnetic resonance imaging showed a left parieto-occipital cerebral AVM with nidus diameter of 6.7 cm located in the eloquent region and deep venous drainage to vein of Galen and straight sinus (Spetzler-Martin grade V). Digital subtraction angiography at 1 month showed complete spontaneous resolution of the cerebral AVM. Angioarchitecture of AVM, coagulation state, and haemodynamic changes are postulated factors for spontaneous resolution of cerebral AVM. Follow-up cerebral angiography is important for monitoring of recurrence of cerebral AVM.

Functional neurological outcomes of patients with subarachnoid haemorrhage complicated with hydrocephalus

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Objective: Hydrocephalus is a complication after aneurysmal subarachnoid haemorrhage and may require ventriculoperitoneal shunting, which is important in improvements of neurological functional outcomes. This study compared outcomes of patients who underwent treatment for aneurysmal rupture with or without ventriculoperitoneal shunting.

Methods: A retrospective analysis was conducted for the period 2018 to 2023. Patients aged >18 years with aneurysmal rupture who underwent treatment with or without ventriculoperitoneal shunting were compared. The usefulness of shunting was determined, based on the functional neurological scores. Glasgow Coma Scale, Barthel Index, Modified Barthel Index, and Abbreviated Mental Test scores were assessed prior to intervention and at 3 to 6 months follow-up.

Results: Over the 5-year period, there were 109 cases of subarachnoid haemorrhage. Of these, 39 required ventriculoperitoneal shunting. The shunting group had good recovery in terms of neurological functions. Prior to shunting, the shunting group had lower functional scores but could eventually catch up to similar levels, compared with the non-shunting group.

Conclusion: Patients with subarachnoid haemorrhage and complicated with hydrocephalus can benefit from ventriculoperitoneal shunting. This underlines the importance of prompt treatment for hydrocephalus.

L5/S1 anterior lumbar interbody fusion with intraoperative computed tomography and contrast aortogram: technical notes

P 10

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Spondylolisthesis at the L5/S1 level can cause severe back pain with instability and foraminal stenosis leading to nerve root compression. Initial treatments include analgesia, bracing, and physiotherapy. Some patients require surgical managements including various combinations of decompression and fusion. Lumbar interbody fusion is an increasingly popular option. We used a case to illustrate the techniques and potential benefits of anterior lumbar interbody fusion (ALIF). We described a case of ALIF for L5/S1 spondylolisthesis with a pars defect. Magnetic resonance imaging of the lumbosacral spine revealed significant narrowing of the bilateral L5 neural foramina with impingement of the L5 nerve roots. The patient did not respond to conservative treatment, and her back pain progressively worsened and she could walk only up to 7 minutes at a time. She underwent ALIF of L5/S1 at the Prince of Wales Hospital with guidance of intraoperative computed tomography (iCT) and aortogram. iCT confirmed restoration of the disc height with good interbody cage placement. The spondylolisthesis was reduced. Postoperative recovery was excellent with swift improvements in pain control and mobility. The benefits of lumbar interbody fusion include reduction of spondylolisthesis and restoration of stability, thereby improving symptomatic control and functional status. Compared to other forms of fusion, ALIF has superior restoration of disc height and lordosis. Specific risks of ALIF include vascular, visceral, and nerve injuries. Such risks are reduced when iCT and aortogram are used, which enable accurate instrumental navigation and assessment of vascular integrity throughout the surgical procedure. The excellent postoperative outcome highlights ALIF as a promising treatment for L5/S1 spondylolisthesis, especially with the guidance of iCT and aortogram for safety.

Skull and brain metastasis in SMARCA4-deficient non-small cell lung cancer: a case report

P 11

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SMARCA4-deficient non-small cell lung cancer (SMARCA4-dNSCLC) is a distinct subtype and is characterised by aggressive clinical course, lack of actionable gene alterations, shorter overall survival, and poor prognosis. We reported a case of skull and brain metastasis in a 60-year-old Chinese man with advanced SMARCA4-dNSCLC. He initially presented with left temporal headache and a progressively enlarging left temporal tender mass. Brain imaging showed an expansile osteolytic lesion centred at the left parietal bone near the pterion and a separate focal brain metastasis. Immunostaining of the excised skull lesion confirmed the histological diagnosis. Systemic imaging revealed a stage-IV lung cancer with mediastinal invasion and extensive nodal metastasis. Skull metastasis is an uncommon first presentation of non-small cell lung cancer. This case is the first report of SMARCA4-dNSCLC that manifests as an enlarging skull mass and provides a perspective on the behaviour of such tumour in a Chinese patient.

Intraoperative computed tomography–guided occipitocervical decompression and fusion for mucopolysaccharidoses: a case report

P 12

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Mucopolysaccharidoses (MPS) constitute a group of rare inherited lysosomal enzyme deficiencies in which the accumulation of glycosaminoglycans can result in spinal deformities such as cervical stenosis and atlantoaxial instability. Surgical intervention is the only effective option for MPS-associated spinal deformities. We used a case to illustrate the timing and surgical technique of prophylactic occipitocervical decompression and fusion (OCDF) in a child with MPS. A 6-year-old boy with MPS type IVA-associated cervical stenosis (but without neurological symptoms) was referred to our hospital for neurosurgical evaluation. Preoperative magnetic resonance imaging of the brain and cervical spine revealed C3-4 spinal canal stenosis with mild cord indentation and suspicious T2-hyperintensities in the cervical spinal cord suggestive of early cervical myelopathy. Neuronavigation and intraoperative neuromonitoring were used. Intraoperatively, atlantoaxial subluxation was observed with the C1 laminae compressing into the foramen magnum with cord compression. C1 laminectomy and C3-4 laminotomy were performed to achieve foramen magnum and cord decompression, followed by intraoperative computed tomography (iCT)–guided occipital, C2 laminar, and C3-4 lateral mass screw placements. Postoperatively, the patient had an uneventful neurological recovery. This is the first case of iCT–guided OCDF for MPS in Hong Kong. Prophylactic OCDF is safe in expert hands and is recommended in patients with suspected spinal cord compression to prevent irreversible spinal cord injury.

Superior orbital fissure syndrome: a case report

P 13

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Superior orbital fissure syndrome (SOFS) is a rare clinical entity that presents with a constellation of symptoms in nearby anatomical structures anterior to the orbital apex. A 60-year-old man presented to Prince of Wales Hospital after a fall from ten concrete steps and landing on his left face and orbital region. He had a Glasgow Coma Scale score of 15 and presented with diplopia, ptosis, and facial numbness. The patient was admitted to the ophthalmology department in view of periorbital injuries. Examination showed a loss of left cheek projection, periorbital oedema, and ecchymosis. Left complete ptosis and isolated paraesthesia over the ophthalmic branch of trigeminal nerve were also observed. Ophthalmological examination showed intact visual acuity and visual field, anisocoria, and frozen left globe. Computed tomography (CT) of the brain, sinus, and face showed zygomaticomaxillary complex fracture with medial displacement of the greater wing of sphenoid causing narrowing of the superior orbital fissure. CT angiogram ruled out a carotid-cavernous fistula. A diagnosis of SOFS secondary to traumatic zygomaticomaxillary complex fracture was made. Management options were discussed with the patient by a multidisciplinary team (of neurosurgery, plastic surgery, reconstructive and aesthetic surgery, and ophthalmology) and included corticosteroid use and open-reduction internal-fixation for the tripod fracture. The patient opted for non-operative intervention and was given a course of high-dose methylprednisolone. The patient was followed up by the ophthalmology team as an outpatient. SOFS secondary to traumatic zygomaticomaxillary complex fracture is a rare entity that warrants further evaluation for standardised treatment options.

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Odontoid fractures can occur after low-energy trauma in older adults or after high-energy trauma in younger patients. Treatment options range from non-operative treatment with rigid neck collar and halo immobilisation to open surgery with anterior or posterior fixation. We reported two cases of odontoid screw fixation for type II or III odontoid fractures that achieved satisfactory healing and motion preservation. A 39-year-old man with a displaced fracture of the odontoid peg was initially treated with a halo jacket; however, computed tomography at 2 and 3 months revealed delayed non-union of the odontoid fracture. He then underwent anterior spinal fixation with odontoid screw fixation. Four months later, the patient had complete healing of the fracture with satisfactory alignment. A 15-year-old boy sustained a displaced odontoid fracture and was treated with anterior spinal fixation and odontoid screw fixation; he had complete healing of the fracture 2 months later. Odontoid fracture can be caused by forceful flexion or extension of the head in the sagittal plane. Type I fractures are stable, whereas type II and III fractures are unstable and may be complicated by non-union if treated by a halo jacket alone. Generally, non-operative management is the preferred initial treatment for young patients with no risk factors for non-union. The need for operative treatment is determined by follow-up imaging. Operative treatments can be considered in patients with high risk of non-union. Satisfactory healing with motion preservation was achieved after odontoid screw fixation, which can be a treatment option for patients who failed conservative treatment or with displaced odontoid fractures.

Subarachnoid haemorrhage in cisterna magna and cervical spinal canal with hydrocephalus after upper posterior neck and suboccipital acupuncture

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Acupuncture is a form of traditional Chinese medicine. It involves non-image-guided needle insertion and can pose risks, which can be life threatening. We described a case of iatrogenic subarachnoid haemorrhage in cisterna magna and cervical spinal canal with hydrocephalus after acupuncture at the upper neck and the suboccipital region in a thin patient. A 65-year-old woman presented to our unit with progressively increasing headache, dizziness, vomiting and generalised weakness after receiving acupuncture to the scalp and posterior neck on the same day. She had a medical history of nasopharyngeal carcinoma in remission with radical radiotherapy performed >20 years ago. She is sarcopenic with a body mass index of ~20 kg/m². Prior to this acupuncture session, she had had multiple sessions for headache and neck pain relief. She reported to experience deeper needle insertion into the neck this time and was symptomatic right after the therapy. There was no head injury, hypertensive urgency, or bleeding diathesis. Clinically she had full Glasgow Coma Scale score, generalised weakened limb power at 4/5, and nystagmus. Computed tomography (CT) of the brain showed subarachnoid haemorrhage in cisterna magna and cervical spinal canal, and hydrocephalus. CT cerebral angiography and digital subtraction angiography demonstrated no culprit sizeable aneurysm or vascular malformations. Serial CT of the brain revealed extending subarachnoid haemorrhage to the right precentral sulcus and developing hydrocephalus, which resolved gradually. Clinically she had stable neurological status with full Glasgow Coma Scale score and symptomatic relief gradually. Acupuncture, which involves insertion of fine needles at various anatomical points and depths, is not risk-free. Variations in needling localisation affect acupuncture accuracy and precision. With regards to the needling depth at each acupuncture point, there is a lack of standardisation and there is great inconsistency in different body builds and in different measuring tools such as cun (ie, body inch measured by patient's middle phalanx or width of thumb), ultrasonography, CT, and magnetic resonance imaging. Adverse events related to acupuncture include pneumothorax, infection, and haemorrhage. Dangerous points at head and neck area can pose risks of injury to the medulla oblongata if needles inserted too deeply, or risks of haemorrhage if vertebral arteries are injured. For example, DU-20 "Feng chi 風池", located at the lower occipital border retro-mastoid between the trapezius and the sternocleidomastoid muscle, should be needled at 0.5 to 1.0 cun perpendicularly towards the tip of the nose. DU-16 "Feng fu 風府", located at the midline between occipital prominence and C1 posterior tubercle, should be needled at 0.5 to 1.0 cun perpendicularly for relieving headache, dizziness, seizure, vertebrobasilar insufficiency, and diseases caused by wind. GV-15 "Ya men 亞門", located superiorly to the spinous process of the second cervical vertebra, should be needled at 0.5 to 1.0 cun perpendicularly. BL-10 "Tian Zhu 天柱", located at 1.3 cun lateral to midline and 0.5 cun above posterior hairline, has effects to improve headache, neck pain, and other ailments. Incorrect needling at these sites could result in subarachnoid haemorrhage and its complication of hydrocephalus and obstruction of cerebrospinal fluid circulation, which can cause significant neurological deficit and even death. To improve safety of acupuncture, ultrasound-guided needle insertion and pre-procedural anatomical mapping by CT or magnetic resonance imaging followed by projection of personalised acupuncture points might be considered to improve accuracy in terms of location and depth and to avoid injuring major vessels or organs. Subarachnoid haemorrhage in cisterna magna and cervical spinal canal with hydrocephalus is a life-threatening adverse event after acupuncture. Practitioners should be aware of this, especially in thin patients with low body mass index undergoing upper posterior neck or suboccipital acupuncture. Facilities to manage such complications should be readily available.

Cervical-thoracic anterior spinal fusion with sternotomy: anterior exposure for decompression and fusion at the cervical-thoracic junction

P 16

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Anterior spinal fusion (ASF) and posterior spinal fusion can achieve the surgical goals of decompression, stabilisation, and restoration of alignment in well-selected patients. Postoperatively, some patients developed adjacent segment pathology and recurrent stenosis or even instability at the cervical-thoracic junction. This case illustration describes the treatment of adjacent segment disease down to cervicothoracic level with ASF down to upper thoracic with sternotomy. In 2011, a 74-year-old obese man presented with four-limb numbness and neck pain and underwent C3-C6 laminectomy with posterior spinal fusion for spinal stenosis and cord compression at C3-C6 levels. He had good recovery and only mild residual numbness at 5 years postoperatively. From 2016, he gradually developed increased numbness and weakness of the left upper limb. His mobility gradually worsened to wheelchair-bound in 2021. He subsequently became dependent on daily living, with quadriparesis and spasticity. Follow-up magnetic resonance imaging in 2021 showed posterior disc extrusion at C6/7, ventral cord compression at C6/7, and grade 1 spondylolisthesis of C6 on C7. He was readmitted for revision surgery for C6-C7 corpectomy and C5-T1 ASF with sternotomy. Postoperatively, the patient had good recovery of the motor power and numbness of all four limbs. Intraoperative monitoring with motor evoked potential and somatosensory evoked potential showed 100% recovery of all four limbs. Symptomatic adjacent segment pathology is a challenge, particularly with involvement of the cervicothoracic level. In this patient, kyphotic deformity secondary to the collapse of C6/7 further narrowed down the surgical view at the thoracic inlet. With sternotomy, surgical view and exposure were greatly optimised by opening up the thoracic inlet, and vital structures (including major vessels, aortic arch, common carotid artery, recurrent laryngeal nerves) can be visualised and protected. With a wider field of view, instrumentation (placement of ASF implants and expandable) will require less forceful retraction of nearby tissues. Salvage options in revision operations for fusion extension to the upper thoracic spine were feasible, including cervical ASF with sternotomy. These options can achieve decompression, stabilisation, and restoration of alignment with good outcome in well-selected patients.

Primary central nervous system lymphoma with spinal leptomeningeal involvement: a case report

P 17

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Leptomeningeal lymphoma is a rare entity, accounting for 7% of primary central nervous system lymphomas (PCNSL). Lumbosacral spine is the most common level of involvement; presentations include limb weakness and/or bladder and bowel dysfunction. As leptomeningeal involvement in parenchymal PCNSL is more severe than primary leptomeningeal lymphoma, it is essential to check for intracranial or systemic involvement once leptomeningeal lymphoma is diagnosed. A 63-year-old man with good past health presented with a 2-month history of progressive worsening of bilateral lower limbs weakness, worse in right side, with no sphincter dysfunction. Test results for inflammatory, infectious, and metabolic causes were unremarkable. Contrast magnetic resonance imaging of the thoracic and lumbosacral spine showed diffuse thickening over cauda equina, increased enhancement over conus medullaris and cauda equina, and mild central canal stenosis from L2/3 to L5/S1 levels. Cerebrospinal fluid cytology through lumbar puncture showed atypical lymphoid cells. L3 laminectomy and biopsy was performed. Intraoperative findings showed thickened nerve root with thickened arachnoid adhesions. Biopsy of the specimen revealed involvement of high-grade B-cell lymphoma; immunohistochemistry results were compatible with diffuse large B-cell lymphoma. Positron emission tomography-computed tomography showed a hypermetabolic lumbar intraspinal lesion compatible with known lymphoma. There was no intracranial or systemic involvement. Subsequent treatments prescribed by a haematologist included high-dose intravenous methotrexate, immunochemotherapy, and haematopoietic stem cell transplant. PCNSL with spinal leptomeningeal involvement has high morbidity and mortality. Myelopathy leading to sphincter dysfunction and limb weakness are potentially debilitating and irreversible. Early recognition and prompt treatment (nerve decompression and chemotherapy) are essential to prevent neurological deterioration.

Stryker navigation-guided splanchnic nerve block and neurolysis for upper gastrointestinal cancer pain

P 18

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Severe pain from advanced upper gastrointestinal (GI) cancer affects the quality of life; patients often need high dose of opioid for pain relief, but opioid has multiple adverse effects. The celiac plexus and splanchnic nerves are the usual targets for neurolysis for pain relief in patients with advanced upper GI cancer. Fluoroscopy is conventionally used to determine the safe location for neurolysis. We describe a new technique for splanchnic nerve block to achieve longer-lasting pain relief with few complications, using the intraoperative computed tomographic (iCT) and the Stryker Spine mask navigation system. A 64-year-old man was diagnosed with advanced inoperable pancreatic carcinoma with extensive vascular involvement. He had persistent severe epigastric pain despite taking regular opioids. His pain score was 10/10. He underwent bilateral splanchnic nerve neurolysis using this new technique. The patient was placed in the prone position and under mild sedation. The Stryker spine mask was placed on the back of the patient during iCT. Two Touhy needles size 16 gauge were used owing to its needle shaft stiffness for accurate navigation. Touhy needles were registered with the Stryker navigation system as instruments. T12 was identified with navigation, and Touhy needles were inserted with a single try under local anaesthetic and the trajectories were determined with real-time navigation. Another iCT was performed to confirm needle placement with contrast injection. Once needles placement deemed satisfactory, 0.25% levobupivacaine was injected, followed by 8 mL of 100% pure alcohol injected at each side with normal saline flush. Needles were removed and dressing was applied. Postoperatively, his pain score decreased to 1/10 and he was discharged the next day. He continued to be pain-free without taking many opioids until he died from hepatobiliary sepsis 2 months later.

Longitudinal evaluation of functional recovery in older patients with mild traumatic brain injury: a prospective study

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Objective: To report the presentation and functional recovery progress of patients with mild traumatic brain injury (mTBI) and determine the predictors of prognosis and the efficacy of telemedicine longitudinal functional rehabilitation.

Methods: This is an ongoing prospective study. From June 2023, patients with mTBI with potential for telemedicine rehabilitation were recruited at Queen Elizabeth Hospital. Patients were included if they had a trauma to the head, with a Glasgow Coma Scale score of 13 to 15 on presentation, and with loss of consciousness for <30 minutes or post-traumatic amnesia for <24 hours. Computed tomography (CT) of the brain were performed within 24 hours of injury. Patients were randomly allocated to receive telemedicine rehabilitation by the occupational therapy team.

Results: Four women and three men aged 38 to 92 (mean, 75±19) years with mTBI were included. All head injuries were caused by falls on a level ground (n=5) or falls from height (n=2). Three patients had loss of consciousness for 5 to 20 minutes, and two patients had antegrade amnesia. Computed tomography of the brain showed traumatic subarachnoid haemorrhage in two patients (one with coexisting epidural haematoma with overlying skull vault fracture), acute subdural haematoma in two patients, occipital scalp haematoma in one patient, and normal findings in two patients. Six of the seven patients were managed conservatively. Craniotomy for evacuation of haematoma was indicated in the patient with skull fracture. Follow-up periods ranged from 3 to 21 weeks. Functional recovery progress was variable and comorbidity-dependent. For example, an 87-year-old woman with good past health made significant recovery within 3 months, regaining mobility. In contrast, a 75-year-old woman with diabetes had slower progress with persistent lower back pain and mobility issues even after 4 months. Five patients with diabetes and hyperlipidaemia demonstrated slower recovery (based on the Post-Concussion Symptoms Questionnaire score) and more complications (such as lower back pain and occipital region swelling). Patients' perceptions of telemedicine motor and cognitive rehabilitation were positive.

Conclusion: Short-term functional recovery progress in patients with mTBI is variable. We hypothesise that telemedicine occupational therapy will provide benefits in terms of clinical and resource-management perspectives. Longitudinal functional progress will be reported.

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Giant aneurysms arising from extracranial portion of internal carotid artery (ICA) are rare. Symptoms are more often caused by cerebrovascular insufficiency, rather than rupture or local compression. Treatment options include open ligation, surgical reconstruction, endovascular parent artery occlusion, stenting, and hybrid operation. Herein we present two such cases treated with parent artery remodelling through flow diverter or open trapping. A 37-year-old man and an 81-year-old woman presented with neck discomfort and Horner's syndrome. Magnetic resonance imaging revealed a large aneurysm arising from the extracranial ICA with mural thrombus and local mass effect. Balloon occlusion test was performed and showed good cross flow via anterior communicating artery. The 37-year-old patient underwent endovascular stenting to preserve the parent artery in view of his young age. Four Pipeline Vantage flow divertors were placed across the aneurysm in a telescopic fashion. Digital subtraction angiography showed contrast stasis of the aneurysm. The 81-year-old woman underwent open trapping. The proximal ICA was ligated and the distal petrous ICA was clipped. Arteriotomy was made over the aneurysm sac followed by suction thrombectomy. Postoperatively, both patients recovered well without new focal neurological deficits. The follow-up angiogram showed the aneurysms were largely obliterated. Treatment of giant aneurysm is challenging. Endovascular reconstruction through stenting and open trapping are both viable treatment options with good angiographic results and fair neurological outcomes.

Spinal fusion for Chiari malformation

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Theories regarding the cause of syringomyelia include hydrodynamic theory, craniospinal dissociation theory, and intramedullary pulse pressure theory. In 2015, Dr Atul Goel suggested that atlantoaxial instability may be a cause of syringomyelia, with Chiari malformation as a secondary disease. The volume change theory states that spinal canal volume changes with posture; in spinal flexion, there is narrowing of ventral subarachnoid space (SAS) and widening of dorsal SAS. Spinal canal volume should equal to the sum of central canal, spinal cord, and SAS volume at any given time. In syringomyelia with occlusion of SAS, SAS volume remains constant, and hence only spinal cord and central canal could contribute to volume change in spinal canal. The volume of central canal is the best option to compensate for rapid change in volume disturbances during spinal movement, and tonsillar herniation may be posterior fossa's contribution to this compensatory mechanism. If this hypothesis is true, spinal immobilisation would cease any dynamic volume changes, thereby preventing further damage from syrinx. A 48-year-old man with a history of Chiari malformation underwent posterior fossa decompression and C1 laminectomy 15 years ago. Recently, he complained of worsening of right upper limb symptoms, with increase in syrinx size. He underwent C1/2 fusion with Harms instrumentation and had symptomatic improvement and reduction of syrinx size. Posterior fossa decompression with or without duraplasty should be the gold standard treatment for syringomyelia associated with Chiari I malformation. However, in selected patients who failed the firstline treatment, the theory of spinal instability may be applicable.

Carotid blowout: a single-centre case series

P 22

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Objective: To review records of patients with carotid blowout in a centre.

Methods: Records of patients with carotid blowout treated at Pamela Youde Nethersole Eastern Hospital during 2021 to 2023 were retrospectively reviewed. Data including demographics, primary pathology, radiotherapy, management, and outcome were analysed.

Results: Six patients with carotid blowout were managed during the 3-year period, with follow-up intervals ranging from 11 to 232 months. Radiotherapy dose ranged from 40 to 144 Gy. Three patients were managed by trapping and another three by stenting. Half of the patients achieved the modified Rankin Scale score of 6 within 6 months of management. The overall survival ranged from 0.76 to 8.4 months. The causes of death included intracerebral haemorrhage and nasopharyngeal carcinoma recurrence with repeat blowout, and nasopharyngeal carcinoma recurrence with ventriculitis.

Conclusion: Carotid blowout is not an uncommon pathology and has poor prognosis. It can occur at short interval after radiotherapy, despite within guideline dosage.

Spinal cord revascularisation by omental transposition: a case report

P 23

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We report the outcomes of revascularisation procedure using an omentum to treat spinal cord atrophy. A 33-year-old woman presented with progressive myelopathy and spasticity 2 years after thoracic laminectomy for excision of a spinal meningioma at T4-5. The procedure was complicated by the formation of an arteriovenous fistula in the surgical site, which was surgically treated 1 year later. However, the patient continued to have neurological deterioration, with unsteady gait, paraesthesia, and sphincteric dysfunction. Magnetic resonance imaging showed myelomalacia at T5 level. Revascularisation surgery was performed, using a pedicled omentum flap, which was inserted intradurally at T5 spinal level and augmented with bone marrow aspirate concentrate and platelet rich plasma. The patient had gradual clinical improvements over the following year. Spinal cord revascularisation using an omentum transposition flap can be considered in selected patients with spinal cord atrophy.

Endoscopic transoral approach to C0-C3: a versatile anterior access to the cranial-cervical junction

P 24

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Aim: Management of cranial-cervical pathology is challenging, with considerations of decompression, stability, and alignment. Operative technical pearls of the endoscopic transoral approach are discussed.

Methods: Records of patients who underwent C1 anterior arch osteotomy and C2 odontoidectomy through the endoscopic transoral approach at Prince of Wales Hospital during 2019 to 2022 were reviewed.

Results: The endoscopic transoral approach allowed direct anterior access to C0-3. The midline anterior opening at the oropharynx was relatively thin and avascular. Throat packs were used to minimise the risks of aspiration. The anterior tubercle of C1 could be identified by direct palpation of the anterior tubercle, intraoperative fluoroscopy, stereotactic navigation, and/or intraoperative computed tomography. The incision at the oropharynx was down to bone with subperiosteal dissection. The soft palate was elevated with two silicon tubes. With the use of an endoscope, incision of the soft palate was not required. Laterally, the dissection and osteotomy should not exceed 15 mm from the midline. Insertion of the nasogastric tube was performed at the end of the operation under endoscopic guidance immediately after closure. Postoperatively, the endotracheal tube was kept for 12 to 24 hours. All patients had functional improvement and were discharged within 1 week. Other key components included patient selection and the consideration of stabilisation with fusion.

Conclusion: The endoscopic transoral approach is effective and safe in carefully selected patients.

Performance of ChatGPT in writing clinical letters in neurosurgery

P 25

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Objective: To evaluate the performance of OpenAI's ChatGPT in generating clinical letters based on clinical notes.

Methods: Based on anonymised clinical notes from the Division of Neurosurgery, Prince of Wales Hospital, 20 cases were presented to ChatGPT to generate a referral letter for each case. The performance of ChatGPT in writing a referral letter in terms of readability, correctness, and humanness was evaluated. The readability was assessed by an online tool called Readable, whereas the factual correctness and humanness were assessed by two independent clinicians using a Likert scale from 0 (completely incorrect or inhuman) to 10 (completely correct and human). Error analysis was performed using linear regression.

Results: The overall median correctness of the clinical information in the letter was 8 and the overall median humanness of the writing style was 7. The weighted κ for correctness was 0.83 ($p < 0.0001$) and for humanness was 0.76 ($p < 0.0001$). The mean readability age for the letters was the US ninth grade.

Conclusion: ChatGPT is capable of generating referral letters in neurosurgery with moderate readability, high correctness and humanness. It has potential in assisting clinicians in writing of clinical letters.

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Objective: Glioblastoma is a malignant brain tumour that rarely metastasises extracranially. The prevalence of spinal metastasis is estimated to be 1% to 2%. The major routes of spinal metastasis include leptomeningeal, intramedullary, and drop metastases. We reviewed records of patients with glioblastoma and spinal metastasis in Hong Kong.

Methods: This was a territory-wide, multi-centre, retrospective review of the Hong Kong high-grade glioma registry from 2006 to 2020. Data of patients diagnosed with glioblastoma were collected. Patients with diagnostic imaging for the spine were reviewed for further analysis. The disease course and clinical managements for patients with spinal metastasis of glioblastoma were summarised.

Results: Of 1043 patients, ten men and five women (1.43%) were diagnosed with spinal metastasis. Seven (46.7%) had drop metastasis, six (40%) had leptomeningeal metastasis, and two (13.3%) had intramedullary metastasis. The median time from operative diagnosis of glioblastoma to detection of spinal metastasis was 7.3 (95% confidence interval [CI]=4.2-13.1) months. The overall survival from index operation was 8.3 (95% CI=6.9-15.5) months. Four (26.7%) had metastasis at the cervical spine, six (40%) had metastasis at the thoracic level, three (20%) had multiple spinal level involvement, and two (13.4%) had extensive spinal metastasis. Seven (46.7%) patients were treated with spinal radiation, three (20%) were given chemotherapy, and five (33.3%) did not receive further treatment.

Conclusion: Spinal metastasis is rare in glioblastoma and has highly varied clinical courses.

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Aim: Diagnosing idiopathic normal pressure hydrocephalus encompasses clinical, radiological, and invasive testing such as the lumbar infusion test, which has good positive and negative predictive values. Patients treated with surgery typically have significant improvements. This study aimed to determine the clinical and post-shunt parameters that can predict outcomes in patients with normal pressure hydrocephalus.

Methods: This was a retrospective study of neurosurgical patients with normal pressure hydrocephalus who underwent lumbar infusion at Prince of Wales Hospital during 2017 to 2023. Pre- and post-operative parameters and efficacy of improvements were analysed. Outcome measures included the cerebrospinal fluid resistance rate, operation rate, shunt settings and types, and complications rates. Radiological outcome measures included pre- and post-operative ventricular size.

Results: In total, 15 women and 10 men aged 47 to 85 (mean, 70.48) years underwent lumbar infusion test during the study period. Eight (32%) patients were surgically treated, six (24%) were pending surgery, and 11 (41%) were not surgically treated. Six of those who were not surgically treated showed no subjective or objective improvement in symptoms after the tap test. The most common symptoms of the surgical candidates were ataxia (100%), urinary incontinence (75%), and memory deficit (62.5%). The mean cerebrospinal fluid resistance in those surgically treated was 15.6 (range, 7-24) mL/min, compared with 13.6 (range, 6-22) mL/min in those not surgically treated, whereas the mean Evans index was 0.395 (range, 0.376-0.443) and 0.385 (range, 0.3-0.5037), respectively. Six of the surgical candidates underwent shunting with the Medtronic Strata II shunt and two with Codman Certas Plus. None of those with Strata II shunt experienced overshunting symptoms or signs. Seven (87.5%) patients had improvements in gait and five (62.5%) had cognitive recovery. Seven patients showed normalisation of ventricular size on postoperative imaging. Two (25%) developed overshunting symptoms or signs. There was no mortality, postoperative infection, or new neurological deficits. All non-surgically treated patients had persistent or worsening symptoms.

Conclusion: Cerebrospinal fluid lumbar infusion test, together with various clinical parameters, can be used to determine candidates that can be benefited from shunting.

Misdiagnosis as neurocysticercosis: a case report

P 28

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A patient with neuroendocrine tumour was misdiagnosed as having neurocysticercosis. The clinical presentation, radiological features, empirical management, and pathological findings of this patient with multiple rim-enhancing cystic brain lesions are described. A 57-year-old woman initially presented with repeated vomiting. Computed tomography and magnetic resonance imaging were highly suggestive of neurocysticercosis. Despite negative serology, she received two courses of standard antiparasitic agents. Six months later, interval imaging showed suspicious growth of a cerebellar lesion. Suboccipital craniotomy for excision of lesions was performed. Pathological results of the lesions were compatible with grade 3 neuroendocrine tumour. The patient was subsequently evaluated using DOTATATE positron emission tomography–computerised tomography and received systemic treatment by oncologist. Radiological findings of multiple cystic brain lesions can cause diagnostic difficulty. Histological diagnosis should be considered when there is a doubt.

Left jugular paraganglioma requiring multi-stage operative approach: a case report

P 29

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Jugular paragangliomas are rare non-functional but highly vascular neoplasms that arise from the carotid body and jugulotympanic paraganglia. Optimal treatment remains controversial, particularly for advanced tumours. A 60-year-old man with a 3-year history of hoarseness of the voice and easy choking was referred to the Queen Mary Hospital. A highly vascular 6-cm tumour was identified at the left cervical region with extension to the left skull base. Examination showed left 9th-12th cranial nerve palsy but no other deficits. Preoperative scans showed a large tumour mainly supplied by small branches of the left internal carotid artery, but no sizeable branches were identified. The ascending pharyngeal artery and the occipital artery were identified as minor suppliers, and the former was selectively cannulated and embolised. Stage 1 operation through the far left lateral approach exposed the jugular bulb, and a left vertebral artery to left M2 bypass was performed using a radial artery graft. Stage 2 operation involved removal of a gross total tumour by the neurosurgical and head and neck teams. The patient was discharged 4 weeks after surgery. At the last follow up, the patient was well, despite having some residual hoarseness. The treatment for jugular paragangliomas remains controversial due to the high risk of postoperative cranial dysfunction. Most of the literature advocates radiotherapy for tumour control. Here, we present a case with good outcome after surgical treatment through a multi-staged, multi-disciplinary approach. Surgical management of jugular paragangliomas requires careful planning and a multimodal and multidisciplinary approach.

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The clinical presentation, radiological features, histopathological findings, and management of a patient with Erdheim-Chester disease (ECD) are presented, with relevant literature review. A 63-year-old man presented with pyrexia of unknown origin, progressive left eye proptosis, extensive dural mass, and bilateral intraconal soft tissue swelling. Microcraniotomy for biopsy was performed. Biopsy results of the dura demonstrated xanthogranulomatous inflammation with Touton giant cells consistent with ECD, correlating with radiological findings. The patient received systemic treatment with Peginterferon alfa-2a and demonstrated clinical response. ECD is a non-Langerhans cell histiocytosis; approximately 800 cases are documented worldwide. Common manifestations include musculoskeletal and ophthalmological symptoms. Involvement of the central nervous system is found in approximately 50% of patients. Its multisystemic presentation and rarity pose diagnostic difficulty. ECD can be differentiated from other histiocytic neoplasms based on clinical, radiological, and histopathological features. Genetic studies have shown BRAF V600E mutations in around 55% of ECD. ECD is associated with high mortality, but recent studies have reported that targeted therapies with vemurafenib may be efficacious. ECD is a rare non-Langerhans cell histiocytosis with potential intracranial manifestation, proper diagnosis is the key to successful management.

Surgical outcome in children with tethered cord syndrome

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Objective: To illustrate clinical characteristics of children with tethered cord syndrome and to determine risk factors associated with poor surgical outcomes and functional grading.

Methods: Medical records of patients who underwent untethering of cord between 2020 and 2023 at a tertiary referral centre were reviewed retrospectively. Demographic data, disease characteristics, and pre- and post-operative neurological and urological status were evaluated. Subgroup analysis using Mann-Whitney *U* test was performed to identify potential factors for poor functional grading at latest follow-up.

Results: To be followed.

Conclusion: To be followed.

Cervical artificial disc replacement as a hybrid construct for motion preservation in cervical prolapsed intervertebral discs

P 32

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Aim: Artificial disc replacement is a treatment option for anterior cervical discectomy to improve functional outcomes, compared with spinal fusion. Disc height has a significant effect on the range of movement of the cervical spine. We describe a patient treated with a 4.5-mm artificial disc and demonstrated good surgical outcomes. A young patient with prolapsed intervertebral disc (PID) over C4/5 and C5/6 presented with disabling sensorimotor deficits. Short Form Health Survey and Neck Disability Index showed significant impairment. Magnetic resonance imaging showed broad-based PID over C5/6 causing spinal stenosis, more on the right, and central PID over C4/5 with cord indentation. Radiography showed that her neck range of motion was preserved at C4/5 level. After 4 months of failed conservative treatment, the patient underwent C4/5 artificial disc replacement and C5/6 anterior cervical discectomy and fusion. A 6-mm anterior cervical discectomy and fusion cage was inserted into C5/6 and a 4.5-mm artificial disc was inserted into C4/5. All implants were confirmed fluoroscopically in situ and safe. Postoperatively, her limb function and activities of daily living greatly improved. She experienced no complications such as intraoperative cerebrospinal fluid leak, infection, or bleeding. At 1 year, the patient remained to be relieved of symptoms, and dynamic X-ray showed motion-preservation of the cervical spine. Artificial disc replacement in the cervical spine can achieve motion preservation with good functional outcomes in well-selected patients.

Is the use of combined compression method (manual and mechanical compression device) safe and effective to achieve haemostasis and minimise complications after removal of femoral arterial sheath in patients who underwent neuroendovascular procedures?

N 1

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Objective: Endovascular treatment is a popular minimally invasive surgery worldwide, especially for neuro-endovascular procedures. More than 85% of vascular punctures are femoral artery punctures. Its complications include haematoma formation and pseudoaneurysm. This study investigated the effectiveness and safety of the combined compression method (manual compression and mechanical compression device) in terms of decreasing time to haemostasis and minimising complication rates in patients who underwent endovascular procedures to remove the femoral arterial sheath.

Methods: This was a pilot study of patients who underwent endovascular procedures to remove the femoral arterial sheath between April 2023 and October 2023 at our department. Patients were excluded if they had pre-existing oozing over groin before removal of femoral arterial sheath or if they were non-compliant with the protocol owing to foreseeable high bleeding risk. A procedure checklist was formulated as a quick reference. The combined compression method is defined as manual compression for 15 minutes, followed by C-clamp application for another 15 minutes. The time to haemostasis and complications (such as oozing and haematoma formation) were evaluated.

Results: Of 71 patients, 12 were excluded owing to pre-existing oozing or non-compliance with the protocol owing to high foreseeable bleeding risk and 59 were included in the analysis. Totally, 55 patients were successfully treated and had no major adverse events, whereas four patients had complications of oozing or haematoma. Six of 55 patients needed extra time (a mean of 13.5 minutes) for compression, which was associated with the use of heparin infusion and a larger catheter for puncture.

Conclusion: The combined compression method is a safe and effective option to achieve haemostasis and minimise complications after femoral sheath removal.

Enhancement of learning atmosphere in emergency clinical settings

N 2

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Objectives: Continuous professional education can improve staff's competence and confidence in managing various clinical situations and hence the quality of care, patient safety, and job satisfaction. Traditional teacher-centred education provides a large volume of specific knowledge with minimum interpersonal involvement, which might hinder learners' engagement and result in demotivating learning experience. This study evaluated the effects of a programme on enhancing learning atmosphere, improving junior staffs' neurological knowledge, and creating same vision and diversion for learning in emergency clinical settings.

Methods: A learner-centred specialty training programme was adopted. It used social media and smart technology to promote conducive and self-directed learning environment. The programme focused on habitual and succinct continuum of learning, utilising the attention span of learner, promoting adult learning, and creating same vision and diversion for learning in emergency clinical settings. A pair of cranial nerve was cyclically introduced per month with different prior learning material provided. Clinical practice and return demonstration were performed. With positive engagement and learning experience, the nurse learners improved their readiness to learn and their desire to acquire the knowledge continually, hence enhancing their nursing care related to cranial nerves pathology.

Results: The programme ended on 31 December 2023; staff were evaluated using a 5-point Likert scale.

A journey of scents: a proactive care to identify patient with smell disorders

N 3

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Background: Smell loss can result in poorer food enjoyment and personal hygiene and thus poorer quality of life. The sense of smell is an early warning system for potential hazards and a sign of health problems. A reduced sense of smell is associated with neurological disorders. Smell loss is often associated with head trauma, post-endoscopic surgery, and brain tumours. Reliable and objective tools to assess the sense of smell are vital for comprehensive care. Therefore, the '4-item pocket smell test' was implemented in our neurological unit. Early identification of patients with hyposmia can facilitate proactive and multidisciplinary care to enhance activities of daily living and safety and reduce olfactory-related hazardous events. This study evaluated the usefulness of the 4-item pocket smell test for early identification of patients with hyposmia.

Methods: The 4-item pocket smell test was used to assess patients with smell impairment. It was a qualitative test to identify patients at risk of hyposmia. Patients with head injury, brain tumour, or post-nasal surgery were recruited; patient with psychiatric disease or a Glasgow Coma Scale rating of not fully conscious were excluded.

Results: After training, staff knowledge in caring patients with smell impairment significantly improved. The pre- and post-test score was 60% and 90%, respectively. Patients who were admitted to our department received a standard smell test assessment as well as nursing education and collaborative care. Patients rated higher satisfactory scores about nursing care during hospital stay and better support after discharge.

Conclusion: It is worthwhile to continue the programme to facilitate early identification and collaborative care of patients with smell impairment and thus to enhance patient safety.

Nurse-initiated early splintage programme for managing patients with spasticity

N 4

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Objective: This study evaluated the effectiveness of a nurse-initiated early splinting programme for managing spasticity in neurosurgical patients.

Methods: A 2-month project was conducted in three neurosurgical wards; 46 patients were included. Patients were excluded if having a limb power ≥ 3 , a modified Ashworth Scale (MAS) score of 4, skin breakdown, or on sedation. Data collected included diagnosis, limb power, MAS score, joint alignment, skin condition, interval from admission or sedation cessation to splint referral. Patients were reviewed in regular intervals after splint application.

Results: The median and mean intervals from admission or sedation cessation to splint referral were 3 and 5.065 days, respectively, for nurse-initiated cases (n=46), compared with 10 and 25.31 days, respectively, for doctor-initiated cases (n=35). 67.4% and 95.7% of patients maintained their MAS scores and joint alignment, respectively, throughout the project. None of the patients had skin breakdown.

Conclusion: The nurse-initiated early splinting programme improved timeliness of care among patients with spasticity, thereby preventing contractures and facilitating functional recovery. Although multiple factors affect timely referrals, our findings support the feasibility of the nurse-initiated programme. Further studies to enhance the care and outcomes of at-risk patients with spasticity are warranted.

Integration of transcranial magnetic stimulation in rehabilitation of patients with neurosurgical disorders

N 5

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Background: Transcranial magnetic stimulation (TMS) can enhance motor recovery and relieve symptoms of neurological diseases. Repeated TMS can modulate neuronal plasticity in neurological disorders such as stroke, Parkinson's disease, psychiatric disorders, and Alzheimer's disease. TMS service has been implemented in our department since March 2018. This study evaluated the usefulness of our TMS service.

Methods: Stroke patients with rehabilitation potential were selected for TMS. Rehabilitation progress of patients was optimised by a multidisciplinary team involving neurosurgeons, nurses, physiotherapists, and occupational therapists. Outcomes of TMS services were evaluated in terms of patients' motor function and satisfaction and procedure-related complications.

Results: From March 2018 to September 2023, 33 patients received TMS. Most patients showed satisfactory functional outcomes and symptom relief after TMS. No severe complication was noted.

Conclusion: TMS can safely enhance clinical outcomes of stroke patients. Patients were highly satisfied with the TMS services. Multidisciplinary coordination is essential to produce the best rehabilitation results. TMS may be included in the rehabilitation programme for patients with stroke.

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