SUPPLEMENT 3

HONG KONG MEDICAL JOURNAL 香港醫學雜誌

Volume 27 Number 4 August 2021

27(S3)

HONG KONG MEDICAL JOURNAL 香港醫學雜誌

The official publication of the
Hong Kong Academy of Medicine and
the Hong Kong Medical Association

27th Annual Scientific Meeting of The Hong Kong Neurosurgical Society

Smart Hospital and Artificial Intelligence in Neurosurgery

18 – 19 December 2020

第二十七屆
香港神經外科學會　週年學術會議
智慧醫院及人工智能於神經外科的應用

二零二零年十二月十八日至十九日

Volume 27 Number 4 August 2021

Supplement 3

ISSN 1024-2708

香港醫學專科學院出版社
HONG KONG ACADEMY OF MEDICINE PRESS

HONG KONG MEDICAL JOURNAL 香港醫學雜誌
Volume 27 Number 4 **August 2021**
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27th Annual Scientific Meeting of The Hong Kong Neurosurgical Society

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SCIENTIFIC PROGRAMME

18 December 2020, Friday

08:30 – 08:40	**WELCOME SPEECH** ***Dr Michael Lee***
08:40 – 09:20	**KEYNOTE LECTURE I** **Development of a Smart Neurosurgical Centre—Innovation and Challenges** ***Dr Neil A Martin*** Chairpersons: *Dr KH Chan, Prof W Poon*
09:20 – 09:50	**KEYNOTE LECTURE II** **Telemedicine and Neurosurgery** ***Dr Neil A Martin*** Chairpersons: *Dr Dawson Fong, Dr Alain Wong*
09:50 – 09:56	Tea Break
09:56 – 10:46	**FREE PAPER I** Chairpersons: *Dr Jason Chow, Dr SW Lee*
10:46 – 10:56	**HKNS & COC COMMISSIONED RESEARCH** **A Territory-wide Review of Clinical Outcome in Geriatric Head Injury** ***Dr Victor Hui*** Chairpersons: *Dr KY Pang, Dr SC Yuen*
10:56 – 11:02	Tea Break
11:02 – 11:42	**KEYNOTE LECTURE III** **Applications of Intraoperative Imaging in Neurosurgery** ***Dr Neil A Martin*** Chairpersons: *Dr Calvin Mak, Dr HT Wong*
11:42 – 12:22	**FREE PAPER II** Chairpersons: *Dr CC Wong, Dr Larry Wong*
12:22 – 13:22	Lunch Break & Symposium
12:55 – 13:22	**LUNCH SYMPOSIUM** **The Future of Stereotactic Radiosurgery (SRS)** ***Prof John Adler*** Chairpersons: *Dr CK Wong, Prof George Wong*
13:22 – 13:28	Tea Break
13:28 – 13:58	**SPINE CHAPTER LECTURE** **Past, Present and Future of HKNS Spine** ***Dr David Sun*** Chairpersons: *Dr David Chan, Dr Michael Lee*
13:58 – 14:33	**FREE PAPER III** Chairpersons: *Dr ST Chan, Dr Daniel Ng*
14:33 – 15:23	**FREE PAPER IV** Chairpersons: *Dr CF Fung, Dr CP Tsang*
15:23 – 15:53	**INVITED LECTURE IV** **Use of Big Datasets and Artificial Intelligence to Improve Outcomes in Patients with Stroke** ***Dr Gary Lau*** Chairpersons: *Dr YT Kan, Dr LF Li*
15:53 – 16:33	**FREE PAPER V** Chairpersons: *Dr KM Cheng, Dr TC Tan*

19 December 2020, Saturday

09:00 – 09:40	**KEYNOTE LECTURE V** **Hyper SCOT** ***Prof Yoshihiro Muragaki*** Chairpersons: *Dr YW Fan, Dr Michael Lee*
09:40 – 10:20	**KEYNOTE LECTURE VI** **Use of Artificial Intelligence in Neurosurgery** ***Prof Yoshihiro Muragaki*** Chairpersons: *Dr Clarence Leung, Dr WM Lui*
09:45 – 10:15	**INVITED LECTURE VII** **Augmented Reality/Virtual Reality in Neurosurgical Operations** ***Prof Walter Jean*** Chairpersons: *Dr Calvin Mak, Dr WK Wong*
10:50 – 10:56	Tea Break
10:56 – 11:46	**FREE PAPER VI** Chairpersons: *Dr WM Hung, Dr YC Po*
11:46 – 12:16	**FREE PAPER VII** Chairpersons: *Dr PH Chan, Dr YH Tse*
12:16 – 12:46	**KEYNOTE LECTURE VIII** **Innovative Treatment of Glioma** ***Prof Yoshihiro Muragaki*** Chairpersons: *Dr Danny Chan, Dr MK Lam*
12:46 – 13:46	Lunch Break & Symposium
13:00 – 13:15	**VIDEO TALK** **Initial Clinical Experience with Cranial Robotic Guidance Platform** ***Dr Vivek Mehta***
13:20 – 13:40	**LUNCH SYMPOSIUM** **Navigation and Digitalisation in the Neurosurgical OR—Pretense and Reality; Some Experience from a Long-term User** ***Prof Dietmar Krex*** Chairpersons: *Dr FC Cheung, Dr KM Leung*
13:46 – 13:52	President's Message
13:52 – 15:22	**NURSING SESSION** Chairpersons: *Ms SW Chau, Ms KY Lo*
15:22 – 15:52	**SRS CHAPTER LECTURE** **Stereotactic Radiosurgery Chapter—The Way Forward** ***Dr KY Yam*** Chairpersons: *Dr Michael Lee, Dr CP Yu*
15:52 – 16:22	**INVITED LECTURE IX** **Big Data Insights in Cerebral Aneurysm Rupture in Hong Kong** ***Prof David Lam*** Chairpersons: *Dr Alberto Chu, Dr Derek Wong*
16:22 – 16:28	Tea Break
16:28 – 16:58	**FREE PAPER VIII** Chairpersons: *Dr KH Pang, Dr ST Wong*
16:58 – 17:08	Concluding Remarks

FP 1.1

Making Biopsy Forceps with a Flexible Tip for Pineal Region Tumours: Collaboration between Neurosurgeons and Engineers

PT Yuen, Danny TM Chan
Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong SAR

Objective: To develop endoscopic biopsy forceps with a flexible tip in order to facilitate biopsy of pineal region tumours via a single burr hole.
Methods: From 2007 to 2020, data of 16 cases of pineal region tumour with endoscopic biopsy done in our centre were collected, with or without endoscopic third ventriculostomy at the same setting. By measuring several third ventricle parameters, including distance from foramen of Monro to floor of third ventricle, forceps bending angle, and perceived forceps length, we plan to produce biopsy forceps made from nickel titanium with a flexible tip, together with engineers from The Chinese University of Hong Kong. Stainless steel cables will be mounted onto the forceps tip thus providing the bending mechanism. Further experiments on kinematics, stiffness, and tip force with sensors and computerisation will be done to verify the product's performance. At last, a third ventricle and tumour model will be created using gelatine for simulation.
Results: Among the 16 cases of pineal tumour, the forceps tip length ranged from 10 to 24 mm, third ventricle height ranged from 10 to 19 mm, and bending angle ranged from 24° to 47°. The prototype forceps were designed to have inner diameter 1 mm and outer diameter 1.25 mm. Length of flexible tip was 15 mm, forceps was 5 mm, and required bending angle was 70°.
Conclusion: The making of endoscopic biopsy forceps with a flexible tip is in progress, hoping to facilitate biopsy of pineal region tumours.

FP 1.2

Diagnostic Accuracy of Frameless Stereotactic Biopsy: Review of 106 Biopsy Procedures

Elvin Z He[1], Danny TM Chan[1], XL Zhu[1], WS Poon[1], Tom CY Cheung[2], HK Ng[3]
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[2] Department of Imaging and Interventional Radiology, Prince of Wales Hospital, Hong Kong SAR
[3] Department of Anatomical & Cellular Pathology, Prince of Wales Hospital, Hong Kong SAR

Objective: To evaluate the diagnostic accuracy of frameless stereotactic biopsy performed in Prince of Wales Hospital and review the era for improvement.
Methods: This is a prospectively collected cohort study from 2007 to 2020. We reviewed patients who received frameless stereotactic biopsy in Prince of Wales Hospital and evaluated the diagnostic accuracy of the frameless stereotactic biopsy procedures. The biopsy result was classified into conclusive, inconclusive, or negative, based on the pathological, radiological, and clinical diagnosis concordance. For inconclusive or negative results, we further evaluated the preoperative planning and postoperative scan to review if further improvement could be made. The complication rate of symptomatic haemorrhage was also analysed.
Results: There were 104 patients with 106 biopsy procedures performed from 2007 to 2020. Conclusive diagnosis was reached in 94.3% patients; inconclusive diagnosis was noted in 3.8% patients; and negative diagnosis was yielded in 1.9% patients. Symptomatic haemorrhage was noted in one patient (0.9%). There was no mortality case in our case series. Registration errors occurred in three cases (2.8%), sampling of the non-representative part of the lesion occurred in two cases (1.8%), and one biopsy (0.9%) for lymphoma was negative after commencement of steroids. The diagnostic accuracy was comparable with that of other studies published in international journals.
Conclusion: The stereotactic biopsy is a safe procedure with high diagnostic accuracy only if meticulous preoperative planning and careful intraoperative registration is commenced. The common pitfalls in reaching inconclusive or negative biopsy results are errors during registration and non-representative biopsy sites.

FP 1.3

Retrospective Analysis of Patient Outcomes in Awake Craniotomies with Intraoperative Monitoring

CF Ng, Joyce SW Chow, Calvin HK Mak, TL Poon, FC Cheung
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR

Objective: Awake craniotomy with intraoperative mapping and monitoring has been reported to be associated with better neurological outcome, more extensive tumour resection, and shorter length of stay in hospital. The aim of this study was to retrospectively review the patient outcomes of awake craniotomies and role of intraoperative monitoring in order to review the causes of postoperative deficits and hence failure of intraoperative monitoring.

Methods: This was a 10-year retrospective review of patient undergoing awake craniotomies in Queen Elizabeth Hospital from January 2010 to September 2020. Information regarding patient's age, sex, location of tumour, and pathology were collected. Modalities of intraoperative monitoring were studied whereas extent of resection was measured by comparing preoperative and postoperative magnetic resonance imaging. Pathology included brain tumour (88%), focal cortical dysplasia (8%) and cavernoma (4%). Patient outcomes were assessed by the presence of transient and permanent deficits and modified Rankin scale at 1 week and 3 months.

Results: A total of 26 awake craniotomies were performed from 2010 to 2020. Permanent neurological deficit occurred in one patient (4%) whereas transient deficit occurred in 10 patients (38%). The majority of patients with transient deficits recovered in 1 month (70%). Mean time to recovery was 95.2 days (range, 20-618 days). Intraoperative seizure rate was 23%.

Conclusion: Awake craniotomy with intraoperative monitoring is effective to prevent permanent neurological deficit. However, despite intraoperative monitoring, a substantial portion of patients had transient deficits.

FP 1.4

Morphometric Analysis of Anatomy in Anterior Petrosectomy Using Computed Tomography

WL Cheung, KH Chow, YC Po
Department of Neurosurgery, Princess Margaret Hospital, Hong Kong SAR

Introduction: The Kawase approach provides a surgical corridor for accessing petroclival lesions.[1,2] Although Kawase's triangle and related anatomical landmarks have been described, surgeons sometimes still encounter the problems of the adequacy and safety of bone exposure. This study aimed to learn the anatomy through quantitative measurement of structures on computed tomography and to study the anatomical variants in our population.

Methods: Cases were selected randomly from subjects who had computed tomography (CT) of the brain in Princess Margaret Hospital. They all had fine-cut CT of the brain (≥625-μm section thickness) performed. Conditions which may affect the bony anatomy (such as skull base fracture, otic diseases, previous skull base surgery, and skull bone lesions) were excluded. Patients aged <18 years or >80 years were excluded. Software OsiriX was used for analysis. Three-dimensional reconstruction was performed and a plane that is parallel to the petrous surface of temporal bone was obtained. Petrous ridge, Meckel cave, internal acoustic meatus, and petroclival fissure (where the inferior petrosal sinus was located) could be seen in this plane. The distance between the posterior border of Meckel cave and anterior border of internal acoustic meatus on the petrous ridge was measured and defined as Meckel-meatus distance. Anterior and posterior depth of petrosectomy were defined as the distance from the petrous ridge to the petroclival fissure at the posterior border of Meckel cave and the anterior border and internal acoustic meatus, respectively. Meatal depth was measured from the petrous ridge to the upper border of the internal acoustic meatus. The presence of pneumatisation of the petrous apex was charted.

Results: A total of 100 brain CTs were obtained with 51 male patients and 49 female patients. The mean age was 59 years. In total, 97% of patients were ethnic Chinese. The anterior and posterior depth of petrosectomy were 13.9 ± 1.3 mm (mean ± standard deviation) and 16.2 ± 1.3 mm, respectively. Meckel-meatal distance was 5.85 ± 1.11 mm. Meatal depth was 4.51 ± 1.01 mm. There was no significant discrepancy between the right and left sides for the above measurements. Pneumatisation of petrous apex was observed in 21% of patients. In all, 9% of patients had unilateral pneumatisation and 12% had bilateral pneumatisation.

Conclusion: With these quantitative measurements as a reference, surgeons can be more confident to expose structures adequately and avoid complications when performing anterior petrosectomy.

References

1. Kawase T, Toya S, Shiobara R, Mine T. Transpetrosal approach for aneurysms of the lower basilar artery. J Neurosurg 1985;63:857-61.
2. Kawase T, Shiobara R, Toya S. Middle fossa transpetrosal-transtentorial approaches for petroclival meningiomas. Selective pyramid resection and radicality. Acta Neurochir 1994;129:113-20.

FP 2.1

Outcome of Extended Endoscopic Endonasal Transsphenoidal Surgery for Patients with Suprasellar Tumour in 20 Consecutive Patients

LK Cheung, Calvin HK Mak, TS Tse, FC Cheung
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR

Background: There has long been a debate on the approach, between transcranial and transsphenoidal, for the excision of suprasellar tumour. With the equipment advancement and the mastery of skill, an increased amount of suprasellar tumour can be excised through the transsphenoidal approach.
Objective: To investigate the outcome of extended endoscopic endonasal transsphenoidal surgery in patients with suprasellar tumour.
Methods: Twenty consecutive patients with extended transsphenoidal surgery done from May 2017 to August 2020 were reviewed. The patients' preoperative and postoperative visual condition, complications, and extend of resection were reviewed.
Outcome: The mean lesion size was 3.3 cm. In all, 50% of them had internal carotid artery encasement. In total, 45% was pituitary adenoma, 30% meningioma and the rest were craniopharyngioma, chordoma, osteosarcoma, and nasopharyngeal carcinoma. Three-dimensional endoscope was used in 50% of them. All of them showed visual improvement and gross total removal was achieved in 40% of them. The cerebrospinal fluid leak rate was 5%, which was treated with lumbar drain for 8 days. No infection was noted. One patient had ophthalmoplegia. In all, 40% of patients had diabetes insipidus at early postoperative period, but only 15% had prolonged diabetes insipidus requiring long-term desmopressin.
Conclusion: Extended transsphenoidal surgery is a safe alternative approach to these otherwise deep-seated tumours. We have a low rate of complications and good visual outcome. Use of three-dimensional endoscope and angled instruments together with good dexterity may improve outcome. A multidisciplinary team approach with endocrinologists is useful to help achieve good outcomes for these patients.

FP 2.2

Pharmacological Inhibition of Phosphoglycerate Dehydrogenase Enhances Temozolomide Efficacy via Decreasing MGMT Expression and Reactive Oxygen Species-induced DNA Damage in Glioblastoma

L Jin, MY Kiang, Gilberto KK Leung
Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong SAR

Objective: To investigate whether and how pharmacological inhibition of phosphoglycerate dehydrogenase enhances temozolomide efficacy in glioblastoma.
Methods: MTT, flowcytometry and colony formation assays were used to measure the antiproliferative and pro-apoptotic effects of NCT503 treatment alone or in combination with temozolomide. Flowcytometry was used to detect the intracellular reactive oxygen species (ROS) levels. Western blot was performed to measure MGMT expression levels and molecular mechanisms.
Results: NCT503 or temozolomide treatment alone showed limited effects on proliferation and apoptosis of glioblastoma cells. But when combined together, NCT503 synergistically augmented the antiproliferative and pro-apoptotic effects of temozolomide. Mechanistically, on the one hand, NCT503 decreased MGMT expressions by inhibiting beta-catenin pathway. On the other hand, intracellular ROS levels were elevated after NCT03 treatment or TMZ treatment alone and to a greater extent when combined and addition of N-acetylcysteine partially rescued the effects.
Conclusion: Pharmacological inhibition of phosphoglycerate dehydrogenase enhances temozolomide efficacy via decreasing MGMT expression by inhibiting beta-catenin pathway and ROS-induced DNA damage in glioblastoma.

FP 2.3

Early Experience with Tumour Treating Fields for Glioblastoma in Hong Kong: Interim Prospective Observational Study Analysis

Peter YM Woo[1], LF Li[2], Jason MK Ho[3], Joyce SW Chow[4], Teresa PK Tse[5], Louisa Lui[6], Michael WY Lee[7], Danny TM Chan[8], Herbert HF Loong[9], TC Lam[10], Jenny KS Pu[2] (on behalf of the Hong Kong Neuro-Oncology Society)
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[9] Department of Clinical Oncology, Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong SAR
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Objective: Tumour treating fields (TTF) is a novel adjuvant treatment modality for glioblastoma that uses alternate electric fields of intermediate frequency (100-500 kHz) and low intensity (1-3 V/cm) to disrupt cell division. The aim of this study was to determine the quality of life of glioblastoma patients receiving TTF.
Methods: This is a prospective, observational, multicentre study of Hong Kong patients with glioblastoma that received TTF from January 2018 to September 2020. Adult patients with a new pathological diagnosis of glioblastoma were recruited. Clinical, radiological and tumour molecular data were collected. Quality of life, caregiver stress, safety and compliance evaluations were performed. The primary endpoint for this interim analysis was the European Organisation for Research and Treatment of Cancer (EORTC) QLQ-C30 and QLQ-BN20 quality of life assessments at 3 months. Secondary endpoints were the caregiver stress index (CSI), adverse effects, and treatment compliance. The 6-month progression-free survival (PFS) was evaluated by a comparing a historical cohort of glioblastoma patients treated with standard temozolomide chemoradiotherapy.
Results: A total of 24 patients were prescribed TTF of which 14 (58%) were analysed. The mean age was 48 ± 13 years and the male:female ratio was 1:1.4. The mean duration of TTF was 259 ± 93 days. The EORTC QLQ-C30 and QLQ-BN20 scores for the global, functional and symptom domains before starting TTF were similar to after 3 months ($P>0.05$). The CSI was ≤7 for all assessment time points indicating that self-perceived stress was not high and was significantly reduced by 9 months (pre-TTF median CSI=3.5 vs 9-month TTF median CSI=1.0; $P<0.05$). The only adverse effect documented was grade I scalp dermatitis in 57% of patients (8/14). Monthly treatment compliance was high (84% ± 10%). There was no significant difference in conventional predictors for survival between the TTF and non-TTF glioblastoma groups in terms of age, functional performance, extent of resection and MGMT methylated status. A significant difference in 6-month PFS for TTF patients (86%) compared with non-TTF patients was observed (49%; odds ratio=0.3; 95% confidence interval=0.15-0.6).
Conclusion: Glioblastoma patients receiving TTF had preserved quality of life and their caregivers did not experience excessive stress. Scalp dermatitis was prevalent, but all cases were mild and TTF compliance remained high. Tumour treating fields may improve 6-month PFS.

FP 4.1

Image-guided Deep Brain Stimulation Programming in Patients with Parkinson's Disease

Germaine HF Chan[1], YF Cheung[1], TL Poon[2], MH Yuen[2], FC Cheung[2], WL Poon[3], WC Fong[1]
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[2] Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR
[3] Department of Radiology, Queen Elizabeth Hospital, Hong Kong SAR

Objective: To compare the clinical efficacy and adverse effects of deep brain stimulation (DBS) programming results by the conventional method versus the novel image-guided programming method in patients with Parkinson's disease (PD) with DBS implanted.
Background: Traditional DBS programming can be time-consuming and exhausting to patients with PD. It involves withholding anti-parkinsonian medications and a detailed monopolar screening of the contacts in the first programming session in order to identify the electrode contact with the best clinical efficacy and highest side-effect threshold. At present, there are new neuroimaging software programmes which allow fusion of preoperative and postoperative neuroimages and so provide information on electrode placement and offer simulated electrical field stimulation. Therefore, they may serve as a tool that supports DBS programming.
Methods: This was a retrospective review conducted at Queen Elizabeth Hospital between 2018 and 2019. The results obtained from the conventional contact screen in the first programming visit were compared with those obtained from the novel image-guided programming method.
Results: Fourteen patients with PD were recruited. One patient was excluded because of suboptimal electrode location. Otherwise, the DBS leads were properly located and had normal impedance. There was no significant difference in the location of best contacts selected by either the conventional programming method or the novel image-guided programming method.
Conclusion: This novel image-guided programming method was useful in the identification of clinically effective contacts on DBS leads and hence may be helpful in DBS programming in patients with PD. Large-scale trials investigating the use of fusion neuroimaging assisted programming should be conducted in the future.

FP 4.2

Leksell Vantage: The Future of Stereotactic Neurosurgery?

Dawnie HH Lau, XL Zhu, WS Poon, Danny TM Chan
Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong SAR

Objective: The Leksell G-frame system has been commonly used for performing stereotactic neurosurgery. However, it has many limitations, including imprecision and limited room for airway manipulation. The Leksell Vantage system has therefore been designed to tackle these issues. This study aimed to compare the Leksell Vantage system against the conventional G-frame.
Methods: The new Leksell Vantage system was compared against the conventional Leksell G-frame system with consideration of their clinical utility.
Results: The Leksell Vantage system preserved the well-established Leksell coordinate system and centre-of-arc principle, with a click-on mechanism, visible X-scale around the arc and the ability to adjust the x, y, z coordinates within the sterile field, enhancing operational convenience. By incorporating an open-face design, it enabled easier and more flexible airway manipulation and facial mapping, likely allowing for use in more challenging operations. Additionally, the Vantage head frame was constructed using glass fibre reinforced epoxy instead of aluminium, providing better and more rigid positioning. This, along with the Vernier calliper, improved its precision with submillimetre accuracy, while minimising imaging artefacts. The clip-on ring anchorage and central X-coordinate may also eliminate the intrinsic error of the left-sided target. Nonetheless, the Vantage system does not yet have a validated phantom device for calibrating magnetic resonance images, nor is there any dedicated screwdriver for calibrating torque, predisposing the system to torque imbalance, thereby limiting its precision.
Conclusion: The Leksell Vantage system incorporated a number of significant improvements over its predecessor. Nonetheless, its utility and impact remain to be proven clinically.

FP 4.3

Spinal Cord Stimulation is Effective for Advanced Parkinson's Disease with Deep Brain Stimulation

David YC Chan[1], XL Zhu[1], Venus YH Tang[1,2], Anne YY Chan[3], Claire KY Lau[1,3], KY Ma[3], Amelia Y Ng[4], Patricia KY Kan[4], Jonas HM Yeung[5], Danny TM Chan[1], Vincent CT Mok[3], WS Poon[1]

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[5] Division of Neurology, Department of Medicine, Alice Ho Miu Ling Nethersole Hospital, Hong Kong SAR

Objective: Spinal cord stimulation (SCS) for freezing of gait in advanced Parkinson's disease (PD) had not been reported in Hong Kong. Our study aimed to evaluate the clinical outcome of SCS in treating a patient with advanced PD with deep brain stimulation (DBS) in Hong Kong at Prince of Wales Hospital.

Methods: Clinical assessment was performed for patients with advanced PD with DBS at Prince of Wales Hospital, Hong Kong. Preoperative and postoperative gait analyses were performed as well. The first operation for SCS implantation was performed on 24 August 2020 at Prince of Wales Hospital, Hong Kong. Postoperative evaluation including gait analysis and functional outcomes were performed.

Results: To the best of our knowledge, this was the first SCS implantation in Hong Kong for a patient with advanced PD for the treatment of freezing of gait. He had an initial successful operative outcome with DBS implantation 8 years ago in 2012 but currently deteriorated with freezing gait. There was a substantial improvement in his gait for this patient with advanced PD with DBS in situ after receiving SCS implantation in 2020. Clinical evaluation and gait assessment such as the timed-up-and-go test had shown significant improvement after SCS.

Conclusion: To the best of our knowledge, we are reporting the first successful case of SCS implantation in Hong Kong for treatment of freezing of gait in patients with advanced PD.

FP 4.4

Subthalamic Nucleus Deep Brain Stimulation under Local Anaesthesia versus General Anaesthesia for Patients with Parkinson's Disease: The Way Ahead?

XL Zhu[1], Claire KY Lau[1,2], Venus YH Tang[1,3], Anne YY Chan[2], KY Ma[2], Patricia KY Kan[4], Amelia Y Ng[4], Jonas HM Yeung[5], WL Cheung[1], David YC Chan[1], Danny TM Chan[1], WS Poon[1], Vincent CT Mok[2]

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Background: Traditionally, deep brain stimulation (DBS) operation for Parkinson's disease (PD) patients is under local anaesthesia for the part of DBS lead implantation.[1,2] With improving DBS targeting technology, there is a worldwide trend towards performing the operation under general anaesthesia (GA)[3-7] which may improve patients' comfort and experience during the procedure. Here we report our preliminary result of performing the operation under GA during 2018 to 2019. The aim was to explore whether GA can be used for all cases in the future.

Methods: Deep brain stimulation registry (protocol-driven prospectively data collection) data of all PD patients receiving subthalamic nucleus (STN) DBS in our institute from 2018 to 2019 were analysed. The percentage of improvement measured by the unified Parkinson's disease rating scale (UPDRS) Part III and levodopa equivalent dose (LED) at 1 year after operation were the outcomes to compare the local anaesthesia (LA) and the GA groups. The Mann-Whitney test was used for between-group comparisons for both outcomes.

Results: There were 22 PD patients who received STN DBS during 2018 to 2019. Four cases were excluded from analysis owing to unavailable 1-year outcome assessment (LA n=2; GA n=1) or intracranial haemorrhage as operative complication (LA n=1). A total of eight patients received LA and 12 patients received GA were analysed. There were no significant differences in age, duration of disease, or cognitive function as categorised by the presence or absence of mild cognitive impairment at baseline.

At 1 year after operation, the percentages of improvement in UPDRS Part III when comparing medication off/DBS off versus medication off/DBS on were 62% and 56% in the LA and GA group, respectively. There was no significant difference between the two groups (U=110, P=0.238). The mean LED reduction rate was 54% and 62% in the LA and GA groups, respectively, with no significant difference (U=40.5, P=0.571). There was no significant difference between the two groups in the absolute values of UPDRS Part III at medication off/DBS off and medication off/DBS on (Table).

Discussion and Conclusion: In 2019, we set up criteria for STN DBS under GA for patients who were likely to be intolerant of the procedure conducted under LA. The criteria were (1) above cut-off scores on anxiety and depression as assessed by the Hospital Anxiety and Depression Scale (HADS), and (2) psychiatric disorders not contradictive to DBS but still requiring active psychiatric follow-up. In this study, the overall outcome was comparable to international good outcome.[7] There is no statistical significance between the two groups in the UPDRS III improvement and LED reduction. On the other hand, the UPDRS III outcome was slightly better in the LA than the GA group bearing in mind that this is a small group cohort. The main limitations of the current study are the small number of cases and non-randomisation study. Vigilant continuous auditing of the results is needed.

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Table. General and outcome data between the local anaesthesia (LA) and general anaesthesia (GA) group

	LA (n=8)	GA (n=12)	P value*
Age, years, mean (range)	60 (52-69)	59 (45-68)	-
Sex: male:female	8:0	3:9	-
Duration of disease, years, mean (range)	10 (8-16)	13 (7-20)	-
Mild cognitive impairment at baseline	5	6	-
Unified Parkinson's disease rating scale (UPDRS) III medication off/ deep brain stimulation (DBS) off, mean	46/108	54/108	0.305
UPDRS III medication off/DBS on, mean	18/108	24/108	0.115
UPDRS III improvement by DBS, mean (range)	62% (23%-79%)	56% (42%-80%)	0.238
Levodopa equivalent dose reduction, mean (range)	54% (22%-90%)	62% (18%-91%)	0.571

* Mann-Whitney test

Outcomes in Patients Receiving Resective Surgery for Extratemporal Epilepsy: Case Series

FP 4.5

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Objective: To investigate the outcomes in patients receiving resective surgery for extratemporal epilepsy.
Methods: This was a 20-year retrospective review of a consecutive series of patients receiving resective surgery for epilepsy in a single institute from 1998 to 2018, with an emphasis over the results of the group receiving surgery for extratemporal epilepsy. The primary outcome was the epileptological results measured by the Engel classification system. Secondary outcomes included the complication rates and the prognostic factors influencing seizure outcome.
Results: There were a total of 75 patients receiving resective surgeries for epilepsy, with 10 patients being extratemporal and 65 being temporal. Overall rate of patients attaining Engel Class I at 1-year and 2-year follow-up were 65.2% and 71.0%, respectively. Seizure control of the patients receiving extratemporal surgery (1-year Engel Class I: 30%; 2-year Engel Class I: 25%) was not as favourable as those receiving temporal surgery (1-year Engel Class I: 71.2%; 2-year Engel Class I: 77.8%). None of patients receiving extratemporal surgery reported new neuropsychiatric symptoms which occurred in 16.9% of patients receiving temporal surgery. Complete resection of lesion was found to predict good epileptological result, while the effect of age at surgery and duration of epilepsy were not demonstrated.
Conclusion: Resective surgery for extratemporal epilepsy provides a reasonable epileptological result with good complication profile. Complete resection of lesion was the only statistically significant prognostic factor identified for good epileptological result.

Revascularisation Surgery Improves Cognitive Function in Patients with Cerebral Hypoperfusion

FP 5.1

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Objective: To investigate if there is any short-term and long-term improvement in cognitive function after revascularisation surgery in patients with cerebral hypoperfusion.
Methods: This was a prospective observational study of all patients with documented cerebral hypoperfusion and had revascularisation surgery performed from 1 January 2014 to 31 December 2018. Patient demographics were collected, and these patients received cognitive and functional assessment immediately prior to the operation, and 3 months, 6 months, and 12 months after the operation. Paired *t* test and univariate and multivariate analyses were done to assess the significance of the cognitive improvement and the factors associated with favourable outcome.
Results: A total of 45 patients were identified and statistically significant cognitive improvement was observed at 3 months after the operation and the improvement was noted up to 12 months after the operation.
Conclusion: Revascularisation surgery helps improve the cognitive function of the patients with cerebral hypoperfusion.

Surgical Revascularisation of Moyamoya Disease: 20 Years of Experience

FP 5.2

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Objective: Moyamoya disease is a progressive steno-occlusive cerebral vasculopathy with a formidable natural history if not intervened. A paradigm shift with more direct bypasses were performed in the past 5 years at our centre. Revascularisation outcomes were studied, and comparison was made between the indirect and direct revascularisation groups.
Methods: Retrospective review of all surgically treated patients with moyamoya disease in a single neurosurgical unit from November 2000 to September 2020.
Results: A consecutive series of 53 patients with a mean follow-up of 73.0 months were included. In all, 70.9% of the 86 operated hemispheres involved direct bypasses. For the past 5 years, perioperative (<1 week) stroke rate was 6.82% per-operated hemisphere. There was no significant difference in perioperative stroke (P=0.278) or hyperperfusion syndrome (P=0.099) between the revascularisation groups. Delayed stroke occurred in 8% of indirect and 1.67% of direct groups (P=0.144). In total, 94% of those who presented with transient ischaemic attacks and underwent bypass had complete resolution of symptoms, compared to 60% in the indirect group (P=0.056). The bypass cohort had lower mean modified Rankin scale at last follow-up (0.63 vs 0.96, P=0.033). Improved cerebral perfusion with adequate cerebral reserve was reached in 84% and 50% of the direct and indirect groups, respectively (P=0.005). Patency of bypass grafts was 94.6% at mean follow-up time of 29.4 months.
Conclusions: Direct bypass for treatment of moyamoya disease confers low perioperative stroke and comparable incidence of hyperperfusion syndrome, with high rate of TIA symptom resolution, low stroke recurrence and superior angiographic outcomes. Long-term graft patency rate is high.

Predicting Factors of Good Outcome of Mechanical Thrombectomy in Anterior Circulation Stroke

FP 5.3

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Objective: Mechanical thrombectomy is performed in selected patients with acute ischaemic stroke in order to achieve recanalisation. However, predictors for outcome have yet to be elucidated. The aim of this study was to identify the clinical and procedural factors associated with good outcome after mechanical thrombectomy in patients with acute anterior circulation ischaemic stroke.
Methods: Clinical and radiological data of 84 patients with anterior circulation stroke treated with mechanical thrombectomy in a single institution from 1 January 2015 to 31 May 2020 were evaluated. Using the rapid processing of perfusion and diffusion (RAPID) programme, an automated image processing software, the Alberta stroke program early CT score (ASPECTS) was calculated from the presenting non-contrast enhanced computed tomography brain scan. Good clinical outcome was defined as modified Rankin scale (mRS) of 0-2 at discharge and at 90 days.
Results: Using a multivariate logistic regression model, age (odds ratio [OR]=1.1; 95% confidence interval [CI]=1.0-1.1; P=0.02) was identified as predictor of good clinical outcome after mechanical thrombectomy at discharge. Age (OR=1.0; 95% CI=1.0-1.1; P=0.04) and successful revascularisation which was defined as modified TICI 2b or above (OR=5.9; 95% CI=1.0-34.3; P=0.04) were associated with good clinical outcome at 90 days. Receiver-operating curve analysis revealed that an age cut-off of 65 years was associated with good clinical outcome upon discharge (OR=4.4; 95% CI=1.6-12.3; P<0.01) and at 90 days (OR=3.3; 95% CI=1.3-8.5; P=0.02). The ASPECTS, which was generated by the RAPID programme, was found to be a significant factor associated with clinical outcome. A score >7 was an independent predictor of good clinical outcome both upon discharge (adjusted OR=0.19; 95% CI=0.1-0.7; P=0.01) and at 90 days (adjusted OR=0.2; 95% CI=0.1-0.8; P=0.03).
Conclusion: Among the studied variables, age and the ASPECTS were independent predictors of good clinical outcome after mechanical thrombectomy for acute anterior circulation stroke both at discharge and at 90 days. Successful revascularisation was also associated with good clinical outcome at 90 days.

Revascularisation Procedures Improve Cognitive Function of Patients with Moyamoya Disease

FP 5.4

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Objective: To prospectively review the cognitive outcomes of patients with moyamoya disease who underwent revascularisation procedures.
Methods: This was a 5-year prospective study of patients undergoing revascularisation procedures in Queen Elizabeth Hospital from December 2014 to June 2019. Information regarding patient's age, sex, year of education, and pathology were collected. Cognitive outcomes were assessed by Mini-Mental State Exam (MMSE), Montreal Cognitive Assessment (MoCA), Hong Kong List Learning Test (HKLTT), Rey Complex Figure Test (RCFT), Frontal Assessment Battery (FAB), Verbal Fluency Test, and Trail Making Test. Quality of life and activities of daily livings were also assessed.
Results: A total of 34 patients underwent revascularisation procedure were evaluated. There were significant improvements in MMSE (P=0.023), MoCA (P=0.004), HKLTT (P=0.049), RCFT (P=0.017) and FAB (0.003) for patients with moyamoya disease. Whereas there were also significant improvements in MoCA (P=0.017), HKLTT (P=0.014), RCFT (P=0.022) and FAB (P=0.009) in patients with other indications for revascularisation.
Conclusion: Revascularisation procedures are effective in improving cognitive outcomes, especially in patients with moyamoya disease.

Does Neck Remnant Matter? A Study of Vascular Factors Associated with Progression of Endovascularly Treated Intracranial Aneurysms

FP 6.1

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Objective: To compare the differences in progression of Raymond–Roy Occlusion Classification (RROC) Class I and II aneurysms after endovascular treatment, and to study the vascular factors associated with post-treatment aneurysm progression.
Methods: This was an 8-year retrospective review of aneurysms treated by endovascular approaches in Department of Neurosurgery, Kwong Wah Hospital from 2012 to 2020. A total of 198 cases fulfilled the selection criteria, in which 116 were RROC Class I and 82 were Class II. Primary outcome was the percentage of aneurysm progression between the two classes. Secondary outcomes were retreatment rate, re-rupture rate and vascular factors associated with aneurysm progression. In this study, aneurysm neck, aneurysm size, dome-to-neck ratio, aspect ratio, aneurysm location and rupture status were analysed by Cox regression model with univariate analysis. Statistical analysis was performed by SPSS (Window version 26; IBM Corp, Armonk [NY], United States).
Results: The overall progression rate of Class I aneurysms was higher than that of Class II. Class II aneurysms progressed within a shorter time with the majority within 6 months after the first endovascular treatment; while Class I aneurysms showed a wider range of progression time with duration ranging in 44 months. The retreatment rate of Class II was higher in all progressed Class II cases. However, when calculating from all cases, the retreatment rate of Class II was not significantly higher. The re-rupture rates of the two classes were similar. Among the vascular risk factors being studied, aneurysms with larger size, wider neck, a dome-to-neck ratio less than 1.5, and higher aspect ratio, and those located in branching vessels were found to be associate with higher rate of progression. Each of the vascular factors possessed a different degree of significance, among which the aneurysm size, wide neck status, and location of aneurysm in basilar artery showed the highest significance in post-embolisation progression.
Conclusion: The RROC Class I and II aneurysms progressed differently, with the former demonstrating a higher progression rate and the latter faster progression. The overall retreatment and re-rupture rates were comparable between the two classes. Large aneurysm size, wide neck status, and basilar artery locations were found to be most significantly associated with progression after the first embolisation.

FP 6.2

Management of Large and Giant Intracranial Aneurysms: A Single-centre Experience

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Background: The management of large and large intracranial aneurysms are one of the most challenging conditions encountered in neurosurgical practice. Different treatment strategies have been proposed in dealing with these aneurysms, each with their distinct merits. We performed a retrospective review of all giant and large aneurysms presented to our hospital with regard to the treatment method utilised and the clinical outcome of these patients.

Methods: All patients that underwent neurosurgical treatment of a large or giant intracranial aneurysm from January 2012 to July 2020 were reviewed. Most patients were followed up with 6-month cerebral digital subtraction angiography to assess the obliteration status of the aneurysm. Data regarding the treatment method, aneurysm location, residual or recurrent lesions and patient clinical outcome were collected.

Results: A total of 16 patients were identified with a male:female ratio of 1:4. Ten (63%) presented with aneurysm rupture and the rest were diagnosed incidentally. Two patients (13%) had a giant aneurysm, defined as a size larger than 2.5 cm while the rest had large aneurysms (1.5-2.5 cm). Four (25%) patients were treated with clipping while 12 received endovascular treatment. In all, 31% (5/16) achieved complete obliteration by 6 months. Half (6/12) of patients managed by endovascular therapy were able to achieve complete obliteration with repeated intervention.

Conclusion: Endovascular therapy of large and giant intracranial aneurysms achieved an acceptable obliteration rate with multiple, staged treatment sessions.

FP 6.3

Early Outcome after Insertion of Flow Divertor for Management of Unruptured Aneurysm or Residual Neck of Previously Ruptured Aneurysm: A Single-centre Experience in Hong Kong

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Background: Use of flow divertors has become more common in the treatment of intracranial aneurysms in the past few years. In this retrospective study, we aimed to evaluate the clinical and early angiographic outcomes of unruptured aneurysms or residual neck of previously treated ruptured aneurysms by using flow divertors in our centre. We also aimed to identify factors that may affect the aneurysmal obliteration rate.

Methods: We reviewed medical records of patients who underwent intracranial flow divertor insertion in Princess Margaret Hospital of Hong Kong from July 2014 to June 2019. All aneurysms without rupture or recent acute haemorrhage (<1 month), and with follow-up angiograms within 1 year after surgery were included in this study. The overall rate of complete and near complete occlusion (<2 mm residue) and timing to obliteration were calculated. Factors including aneurysm shape, size, presence of side branches at the aneurysmal neck, aneurysmal location, history of embolisation, types of flow divertors used, use of coils, and length of antiplatelet medications were analysed for any effect on the obliteration rate.

Results: Of 131 intracranial flow divertor operations, 54 were excluded: 50 for acute rupture and four that did not have angiogram within 1 year after surgery. In total, 65 patients (52 women, 13 men, mean age 58.8 years) with 73 aneurysms were included. Four aneurysms had residual that needed second flow divertor insertion, so 77 flow divertor operations were included. Mean follow-up period was 38 months. In all, 63% of patients had hypertension, 20% had diabetes mellitus, 51% had hyperlipidaemia, and 26% were using antiplatelet medication for other indications. Of the aneurysms, 84% were saccular in shape and 16% were fusiform, 11% had branching from the aneurysm neck, 36% had a history of rupture, and 38% had history of embolisation. Aneurysm locations were 88% in anterior circulation (57 in internal carotid artery, 4 in middle cerebral artery, 3 in anterior cerebral artery) and 12% in posterior circulation (8 in vertebral artery, 1 in posterior cerebral artery). Of the stents used, 73% were Pipeline and 27% were FRED, with 42% of Pipeline stents having shield technology. In 84% of operations only one stent was used. We achieved an obliteration rate of 73%, with 74% of these achieved within 6 months and 81% within 1 year. Sex (P=0.17), smoking status (P=0.3), and drinking status (P=0.27) did not affect obliteration rate. Increased age (P=0.024) and use of antiplatelet medication (P=0.038) decreased obliteration rate. Posterior circulation (P=0.043), fusiform shape (P=0.013), branch from neck (P=0.003), and increased aneurysm size (P=0.005) were associated with less obliteration. There was no significant effect for stent used (P=0.58). No patients had intracerebral haemorrhage or new infarct on computed tomography of the brain after surgery.

Conclusion: Lower obliteration rate was seen in patients with advance age or taking long-term antiplatelet medication, and in aneurysms in posterior circulation, with fusiform shape, with branch from neck, or of larger size. Our slightly high non-obliteration rate might be due to the higher ratio of posterior circulatory and fusiform aneurysms.

Carotid Artery Stenting and Angioplasty in Radiation-induced Carotid Artery Stenosis

FP 6.4

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Objective: Radiation therapy to head and neck region has been shown to induce stenosis of carotid artery in the proximity. Carotid artery stenting and angioplasty is a safe treatment modality in managing patients with radiation-induced carotid artery stenosis. However, restenosis is one of the major complications which lead to recurrent stroke and mortality. This study aimed to investigate the restenosis rate after carotid artery stenting and angioplasty and factors associated with higher risk of restenosis.
Methods: This was a retrospective study of all adults with radiation-induced carotid artery stenosis undergoing first carotid artery stenting and angioplasty admitted to the Department of Neurosurgery in Queen Elizabeth Hospital from July 2012 to June 2020. Patients were followed up with regular Doppler ultrasound after procedure. Restenosis was screened upon Doppler ultrasound and confirmed with either computed tomography angiogram or magnetic resonance angiogram of head and neck. Clinical records, laboratory data and medication prescription records were reviewed. Statistical analysis was performed with SPSS (Windows version 25.0; IBM Corp, Armonk [NY], United States).
Results: A total of 43 patients with radiation-induced carotid artery stenosis were treated with carotid artery stenting and angioplasty with male to female ratio of 5.14:1 (male=36; female=7) and mean age of 62 (range, 37-78) years. Forty patients (93%) received radiation therapy for nasopharyngeal carcinoma. The mean time interval between radiation therapy and carotid artery stenting and angioplasty was 217 months (range, 6-415 months). Thirty-five patients (81%) has severe carotid stenosis of greater than 70% stenosis. Eight patients (18.6%) was diagnosed with restenosis with mean duration of 26.5 months after the procedure (range, 9-44 months).
Conclusion: Restenosis after carotid artery stenting and angioplasty for radiation-induced carotid artery stenosis is a significant complication and risk factors for restenosis will be discussed in the meeting.

Coil Embolisation thorough a Liquid Embolic Delivery Microcatheter (Marathon®): Case Report

FP 6.5

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Endovascular coil embolisation for intracranial aneurysms, arteriovenous malformations, dural arteriovenous fistulas, and hypervascular tumours are recognised as an effective adjunctive or curative treatment. Pathology involving distal, small, or tortuous vessel poses technical challenges in safe delivery of embolic coil. The Marathon® microcatheter is a liquid embolic delivery catheter that is often used for arteriovenous malformation embolisation in combination with the liquid agent NBCA or Onyx®. It has a smaller distal tip (1.5-F or 0.013 inch), which enables access to small and distal vessels. We herein present a case of successful left posterior cerebral artery aneurysm embolisation using an extremely soft bare, electro detachable coil (ED ExtraSoft® coil) through the Marathon® microcatheter. We believe that this technique can provide safe and efficient embolisation for selected patients.

FP 7.1

Burr Hole Localisation and Ventricular Catheterisation Accuracy for Ventriculoperitoneal Shunts: A Clinico-anatomical Study of Conventional Craniometric Approaches

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Objective: There is considerable variation practice with regard to selecting the best craniometric burr hole entry point for ventriculoperitoneal (VP) shunting. This may affect ventricular catheter positioning, which is an important predictor of shunt function. This study aimed to determine the localisation precision of conventional craniometric burr holes and to identify factors influencing optimal catheter placement.
Methods: This is a retrospective single-centre study of 110 consecutive adult patients who underwent VP shunting from 2014 to 2020. The first postoperative computed tomography scan was reviewed by two independent clinicians and shunts were categorised to the following craniometric approaches: frontal: Kocher's point, occipital: Frazier's point, parietal: Keen's point and the parieto-occipital point (POP). The accuracy of burr hole placement, ie, within 10 mm of standard anatomical descriptions, was determined. Optimal catheter placement was defined when the tip was within the frontal horn of the ipsilateral lateral ventricle. A model subject for burr hole entry location and catheter trajectory was selected for each standard approach. Patient scans were registered to this model template on three-dimensional Slicer (www.slicer.org). Catheter trajectories were plotted on MATLAB® (MathWorks Inc., Natick [MA], United States). The Frechet distance for catheter trajectories was calculated with reference to the model template to derive the degree of variability.
Results: The mean age of patients was 56 ± 15 years with the male:female ratio of 1:1.7. The commonest aetiology for hydrocephalus was aneurysmal subarachnoid haemorrhage (45%, 49/110). None of the procedures utilised intraoperative imaging or neuronavigation. Accurate craniometric burr hole siting was achieved in 58% (64/110) of procedures. The approach with the highest accuracy was Keen's (65%, 11/17), followed by Kocher's (65%, 37/57), Frazier's (60%, 3/5) and the POP (42%, 13/31). Factors for accurate burr hole localisation was laterality and approach: right-sided ventricular access (odds ratio [OR]=0.4; 95% confidence interval [CI]=0.1-0.9) and Keen's point (OR=0.3; 95% CI=0.1-0.9). The approach with the highest reliability with regard to the model catheter trajectory was via Kocher's point with a mean Frechet distance of 19 ± 10 mm, followed by Frazier's point (28 ± 16 mm), POP (31 ± 17 mm) and Keen's point (38 ± 21 mm). Adopting Kocher's point (P<0.001) and having an accurately positioned burr hole (P=0.01) were predictors for reduced trajectory variability. Overall, 63% (69/110) of catheters were at an optimal catheter position with 88% (15/17) of Keen's point shunts achieving this. Keen's point (adjusted OR=0.04; 95% CI=0.01-0.67) and neurosurgical trainees (adjusted OR=0.24; 95% CI=0.06-0.90) were the only independent significant predictors for optimal placement.
Conclusion: Craniometric burr hole localisation for VP shunting was inaccurate. Among the standard approaches, Keen's point was the most accurately sited. Although catheter trajectory variability did not affect optimal positioning, ventricular cannulation via Keen's point was a significant predictor.

FP 7.2

Vitamin D, a Novel Treatment for Intracerebral Haemorrhage: A Preclinical Study

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Objective: Intracerebral haemorrhage (ICH) is second most common deadly central nervous system disease with high mortality rate up to 60%. Current treatments for ICH are limited in therapeutic significance and resulted in poor prognosis. Studies in recent decades revealed that vitamin D (Vit D) would significantly benefit in ischaemic stroke. However, actions of Vit D in ICH have yet to be explored. Our study aimed to fill this knowledge gap.
Methods: We employed a standardised collagenase-induced ICH model in male mice. 1000 IU/kg/day of Vit D were given to post-ICH mice orally with Vit D normal and Vit D deficient status for 4 weeks. To evaluate the therapeutic effects of Vit D in ICH, three neurofunctional assessments were performed every 7 days after ICH. Underline pathophysiological mechanisms in neuronal survival, astrogliosis and myelination were investigated with histology and western blot.
Results: Overall, significantly better functional outcomes were achieved with Vit D treatment mice. We recorded that higher mortality in Vit D deficient group and measured with 12% larger in haematoma volume. Immunohistochemical staining to the brain slides on day 28 revealed more survived neurons and less reactive astrocytes in the peri-lesion area in Vit D treatment group and higher expression level of neuronal myelination markers in Vit D treatment. Western blot studies confirmed the above findings.
Conclusion: These results indicate that Vit D may serve as neuroprotective agent in promoting neurofunctional recovery after ICH. Actions of Vit D in ICH include promoted neuronal survival; reduced proliferation of reactive astrocytes; and enhanced neuronal myelination.

FP 7.3

Health-related Quality of Life of Patients with Glioblastoma Multiforme Receiving Postoperative Concomitant Chemoradiotherapy: A Prospective Longitudinal Study

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Background: Glioblastoma is an aggressive primary malignant brain tumour with a dismal prognosis, despite the improvement from the new establishment of postoperative treatment protocol of concomitant chemoradiotherapy (CCRT) plus adjuvant chemotherapy. This study aimed to evaluate the health-related quality of life (HRQoL) in patients with glioblastoma treated with postoperative CCRT plus adjuvant chemotherapy with subjective standardised questionnaires at various time points.
Methods: Patients with newly diagnosed glioblastoma who were treated at our centre with postoperative CCRT plus adjuvant chemotherapy were included. Their HRQoL scales were measured with the European Organisation for Research and Treatment of Cancer (EORTC) CLC30 and BN20 questionnaires. Assessments were made before the beginning of postoperative CCRT, and at 0 (within 2 weeks), 3 and 6 months after the end of CCRT. A mixed-level linear model was used to analyse the change in each HRQoL scale over time.
Results: In total, 21 patients were recruited with a median overall survival of 27 months (range, 4-55 months). There was no significant change in the global health status over time. An improvement in insomnia and an aggravation in communication deficit were found with statistical significance and clinical meaningfulness. Greater improvement in insomnia was associated with methylated MGMT gene promoter in the tumour while worse aggravation in communication deficit was associated with older age (≥65 years).
Conclusions: The global health status did not worsen during postoperative CCRT plus adjuvant chemotherapy, while the severity of insomnia lessened and that of communication deficit aggravated. This may provide insight for clinicians to formulate treatment plan for patients with glioblastoma.

Stereotactic Radiosurgery for Intracranial Meningioma: 10-Year Review

FP 8.1

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Objective: To investigate the cases of stereotactic radiosurgery (SRS) for intracranial meningioma and analyse the predictive factors of outcome.
Methods: This was a 10-year retrospective review of patients receiving SRS or radiotherapy for intracranial meningioma in Queen Elizabeth Hospital from July 2009 to June 2019. Demographics, tumour characteristics, extent of resection and teletherapy metrics were charted. Primary outcome was defined by the size of the tumour on follow-up imaging in 1-, 2- and 5-year intervals. Static size and shrunken tumour were defined as good outcome. Tumour progression was regarded as poor outcome. Functional outcome in modified Rankin scale and reoperation rate were also recorded. Analysis was performed with SPSS and statistical significance was defined as $P<0.05$.
Results: Forty patients were included with 45 tumours irradiated. Good outcome was achieved in 82%, 79% and 66% in 1-, 2- and 5-year intervals, respectively. Stereotactic radiosurgery was performed in 49% cases. In total, 27% was done as primary treatment while 73% was done as postoperative adjuvant treatment. Mean radiation dose was 22.4 ± 7.2 Gy. Mean target volume was 6.0 ± 5.7 cc. Reoperation rate was 9% and more than 80% patients enjoyed modified Rankin scale 0-1. Stereotactic radiosurgery was associated with better tumour control in 1- and 2-year intervals; however, it was confounded by smaller target volume and higher conformity. Multiple meningiomata was associated with poor tumour control in 5 years (20% vs 82%, P=0.025). Parasagittal/parafalcine locations predicted reoperation (21% vs 0%, P=0.026). However, neither histology grade nor extent of resection predicted tumour control.
Conclusion: Stereotactic radiosurgery provides satisfactory tumour control as both primary and adjuvant treatment for intracranial meningioma. Stereotactic radiosurgery for smaller tumour leads to good tumour control while parasagittal/parafalcine locations and multiple meningiomata predict poor outcome.

Stereotactic Radiotherapy on Large Brain Arteriovenous Malformation: A Single-centre Experience

FP 8.2

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Objective: To present the clinical outcome of stereotactic radiotherapy on large (>12 mL) brain arteriovenous malformation (AVM) in Tuen Mun Hospital.
Methods: This was a retrospective review of on safety and efficacy of stereotactic radiotherapy 4 Gy × 11 Fr on large brain AVM treated in Tuen Mun Hospital from 2012 to 2019.
Results: There were 18 large AVMs treated during 2012 to 2019 with 4 Gy × 11 Fr stereotactic radiotherapy. Median age was 37.5 years. In all, 3% of patients presented with prior haemorrhage. Median AVM diameter and volume was 4.4 cm and 19.0 cm^3, respectively. In total, 16 (88.9%) AVMs were located at eloquent areas, and 13 (72.2%) AVMs were Spetzler-Martin Grade IV-V. Median radiosurgery-based AVM score was 3.1. Obliteration rate was 11.1%, which is comparable to literature reports based on the same radiosurgery-based AVM score. Percentage of AVM volume reduction was 50%. One (5.6%) AVM had post-treatment haemorrhage and four AVMs had permanent radiation-induced changes.
Conclusion: 4 Gy × 11 Fr stereotactic radiotherapy on large brain AVM is a safe treatment with effect comparable to literature reports.

FP 8.3

Follow-up Analysis of Patients Who Received Frameless Stereotactic Radiosurgery for Brain Metastasis in a Regional Neurosurgical Centre

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Objectives: We have used frameless stereotactic radiosurgery (SRS) since May 2015 for patients with brain metastases. We would like to review this group of patients and conduct subgroup analysis to see whether we can formulate a model to predict the likelihood of survival after SRS. We aimed to simplify the selection process for SRS candidates.
Methods: This was a single-centre, retrospective study conducted in our hospital from May 2015 to April 2020. Primary treatment outcome was defined by survival rate. Secondary outcomes included rate of overall survival (OS), progression-free survival and local control. Outcomes were measured at 6, 12, 18, and 24 months. Prognostic factors (patient factors, disease factors, SRS factors, treatment-related factors, and prognostic tools) were studied by univariable and multivariable analyses. Subgroup analysis was performed to identify disease-specific factors in patients with primary lung carcinoma and primary breast carcinoma.
Results: In total, 79 patients with 121 brain metastases received SRS in the study period. The local control rate was 81.6% at 6 months. In the subgroup analysis of primary lung carcinoma, there was better OS in patients with prognostic tool Lung-molGPA (molecular graded prognostic assessment) score of ≥2.5 (P=0.005), with a sensitivity of 66% and a specificity of 94%. Other factors associated with better OS at 12 months included female sex (P=0.008) and primary tumour excision (P=0.05). Use of target therapy was associated with better OS at 24 months (P=0.024).
Conclusions: Stereotactic radiosurgery is effective in local disease control. Lung-molGPA score of ≥2.5 is associated with better survival. For borderline case, other factors such as female gender, primary tumour excision and the use of target therapy may guide the selection of SRS candidates.

P 1

Clinical Importance of ADD3 in Glioblastoma

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Objective: To investigate the diagnostic and prognostic implication of adducin 3 (ADD3) loss in glioblastoma.
Methods: To determine 10q loss of heterozygosity (LOH) on five different polymorphic DNA loci in glioma tissues, specimens of non-neoplastic World Health Organization grade II, III, and IV glioblastoma were included. DNA fragments were evaluated by using a polymerase chain reaction–based microsatellite capillary electrophoresis and analysed by a fragment analyser. The LOH status was correlated with patient survival for potential prognostic and diagnostic implications.
Results: This study is ongoing. It is expected that downregulation of ADD3 expression in glioblastoma multiforme is associated with genetic instability of LOH in ADD3.
Conclusion: This study will provide significant implications, particularly for understanding pathogenesis of glioblastoma and add valuable credits on the diagnostic as well as prognostic implications.

P 2

Vitamin D_3 as a Possible Therapeutic Agent for Promoting Remyelination after Intracerebral Haemorrhage

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Objective: Although the long-term neurological deficits of intracerebral haemorrhage (ICH), the pathophysiology of which may include neuronal death and demyelination, contributes to poor functional recovery, treatments targeting neurogenesis and remyelination in the subacute phase of ICH remain sparse. In this study, the role of vitamin D_3 in promoting functional and histological recovery via stimulating remyelination after ICH will be investigated.
Methods: Using a mouse ICH model, the behaviour of oligodendrocyte precursor cells (OPCs) in the perihaematomal region and surrounding striatum after stroke will be described through quantification of OPC proliferation and differentiation in immunofluorescence staining and western blot. The effect of OPC-derived oligodendrocytes on remyelination of the cervical spine corticospinal tract will also be described with images obtained from a transmission electron microscope. Such will be coupled with behavioural tests for assessing motor function. The effects of vitamin D_3 on promoting endogenous OPC proliferation and differentiation and remyelination will be assessed at multiple experimental endpoints (D7, 14, 21), alongside assessment of any potential effects on the contralesional striatum and normal brain.
Results: Based on previous studies on OPC behaviour after ICH and vitamin D_3 action on the central nervous system, we hypothesise that vitamin D_3 promotes OPC differentiation into oligodendrocytes, thereby upregulating remyelination of the corticospinal tract and promoting recovery of motor function after ICH.
Conclusion: This study is ongoing, so evidence for the role of vitamin D3 in promoting remyelination remains preliminary. Further investigations on possible signalling pathways upregulated by vitamin D_3 will also be conducted upon completion of preliminary trials.

P 3

Does Pantoprazole Lead to a Reduced Clopidogrel Antiplatelet Function? A Single-centre Retrospective Study

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Introduction: With the advancement of endovascular treatment, demand of antiplatelet agent has risen. Patients on antiplatelet agent are usually put on either proton pump inhibitor or H2 antagonist to prevent gastrointestinal adverse effects. However, concern has been raised regarding reduced clopidogrel efficacy by interacting with pantoprazole.
Objective: This study aimed to evaluate whether there is drug interaction between clopidogrel and pantoprazole leading to reduced antiplatelet function. Primary outcome is the relationship between pantoprazole use and clopidogrel resistance. Secondary outcome is whether use of pantoprazole results in reduced incidence of gastrointestinal adverse effects.
Methods: This is a single-centre retrospective study. Data search was performed using CDARS with keywords including clopidogrel, pantoprazole, aspirin between years 2015 to 2019. Clopidogrel efficacy was evaluated by VerifyNow system with cut-off value of 208 platelet reactivity units. Patients on clopidogrel who underwent VerifyNow testing were included in this study. Gastrointestinal adverse effects include either clinical gastrointestinal bleeding or presence of peptic ulcers diagnosed endoscopically.
Results: Clopidogrel resistance was found to be 44.4%. Pantoprazole was not found to be a significant factor in determining clopidogrel resistance (P=0.594). Gastrointestinal adverse effects were noted to be 9.3%. Pantoprazole was not associated with a decreased incidence of gastrointestinal adverse effects (P=0.468).
Conclusion: Pantoprazole does not reduce clopidogrel efficacy or the incidence of gastrointestinal adverse effects. Future prospective study with larger sample size would be warranted.

Cerebral Mast Cells as a Potential Therapeutic Target in Intracerebral Haemorrhage

P 4

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Objective: Mast cells (MCs) are immune effector cells characterised by the rapid release of preformed inflammatory mediators when activated. They are present within the perivascular regions of penetrating arterioles in the central nervous system, and in recent years their pathogenic role in various forms of brain injury are increasingly recognised. Owing to their acute release of histamine, interleukin-6, tumour necrosis factor-alpha, heparin, and matrix metalloproteases upon activation, MCs are hypothesised to affect the neuroinflammatory cascade upstream of microglial activation in intracerebral haemorrhage (ICH). In vivo and in vitro studies have suggested causal links between certain vitamin deficient states and increased MC activation; our research group has shown increased damage in animal models of spinal injury under vitamin-deficient states. In this study, we aimed to establish MCs as a therapeutic target for reducing acute damage in ICH through vitamin-based neuroprotective strategies.
Methods: Striatal haemorrhage was surgically induced in mice models to replicate spontaneous intracerebral bleeding. Mast cell presence and activation were detected by molecular analyses including western blotting of MC-specific proteases and will be further quantified by immunohistochemistry and immunofluorescence staining. Vitamin deficiency was also induced via diet in mice to investigate any changes to ICH outcomes.
Results: We found that MC-specific proteases were significantly higher in ICH mice compared to sham surgery. Diet-induced vitamin-deficient mice showed greater haematoma size, worse neurological function, and worse mortality. Vitamin-deficient mice that received vitamin supplementation shortly prior to ICH showed better outcome overall than their untreated, deficient counterparts.
Conclusion: This is an ongoing study; our initial results firstly add compelling evidence of MC activation in ICH, and secondly suggest an exacerbating effect of a vitamin-deficient state in ICH. This is the first study to investigate the potential mechanism of MCs and vitamin-based modulation in the acute stages of ICH. Modulation of cerebral MCs by vitamin-based therapy may serve as a novel neuroprotective strategy in ICH and deserves further investigation.

Radiological Latency in Pineal Germinoma: Case Report and Literature Review

P 5

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Objective: To report a case of pineal germinoma presenting with dorsal midbrain syndrome with no evidence of tumour growth on initial imaging despite symptoms, and to review the literature on this clinical latent period in the context of intracranial germinomas.
Methods: Literature review completed with search via PubMed using the following keywords: germ cell tumour, germinoma, pineal, pineal gland, magnetic resonance imaging, neuroimaging, dorsal midbrain syndrome, Parinaud syndrome, diplopia, diabetes insipidus, diagnosis. Search limited to full-text English articles and included other relevant sources from the reference lists of identified articles.
Results: Suprasellar germinomas can present with non-diagnostic, or even normal results on magnetic resonance imaging. Spectrum of reported cases can range from normal imaging results, to thickened pituitary stalks, to discrete tumour growths. This similar phenomenon is less commonly seen in pineal region, or bifocal germinomas. The literature is sparse and only a few case series or reports have mentioned a similar presentation of signs and symptoms preceding radiological evidence of diagnosis.
Conclusion: In patients presenting with cranial diabetes insipidus with no radiological evidence of neoplasm, follow-up imaging is useful to identify interval development of germinomas. This applies to patients with dorsal midbrain syndrome, or even other unexplained ophthalmoplegia, as the initial sign of pineal region germinoma, despite normal imaging results.

P 6

Role of CXCR3 (Chemokine [C-X-C motif] Receptor 3) in Intracerebral Haemorrhage

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Objective: To investigate the role of CXCR3 (chemokine [C-X-C motif] receptor 3), a chemokine receptor, in intracerebral haemorrhage (ICH).
Methods: Experimental ICH was induced by the injection of Type IV collagenase into the right striata of both wild-type C57BL/6 mice and CXCR3 knockout mice. Neurological deficits were measured by several behavioural tests including modified neurological severity score, cylinder test, rotarod test and grid walking test at days 3, 7 and 14 after ICH. Other phenotypes, such as brain oedema, injury area of the corticospinal tract within the spinal cord, protein and mRNA expression levels were measured.
Results: The CXCR3-knockout mice demonstrated better motor functions particularly at day 7 and day 14 after ICH. The average damaged area of the corticospinal tract within the spinal cord appeared to be smaller in the knockout mice compared with that in the wild-type mice. Other phenotypes are still undergoing investigations.
Conclusion: The CXCR3 may play a pathological role in ICH, as evidenced by the in vivo knockout experiment. The antagonism of CXCR3 may be a novel strategy to treat ICH.

P 7

Muscle Synergies Retrieved by Multi-muscle Electromyographic Responses from Direct Brain Stimulations Applied during Awake Brain Surgery

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Objective: During voluntary movement, the human motor system may generate complex motor commands by recruiting muscle synergies that co-activate muscle groups as discrete activation units. But direct neurophysiological evidence for the existence of muscle synergies in humans is lacking. We ask whether it is possible to retrieve muscle synergies observed in daily motor tasks by direct electrical stimulation (DES) of focal motor cortical loci during awake brain surgery for glioma resection.
Methods: Before surgery, we recorded surface electromyographic data (EMGs, 12 upper-limb muscles) from a patient during single- and multi-joint upper-limb movements. Behavioural muscle synergies were identified by applying a machine-learning algorithm to the EMGs. During tumour resection, motor mapping over the motor cortical areas was performed while EMGs of the same muscles were recorded. Cortical loci yielding positive motor responses were identified. The DES-evoked muscle synergies were then extracted from EMGs of the positive loci and compared with the preoperative behavioural synergies.
Results: Seven preoperative behavioural muscle synergies were identified. Among them, two could be matched to DES-evoked synergies with high similarity, and three could be explained by merging multiple DES-evoked synergies. The remaining two preoperative synergies could not be accounted for, presumably because the motor areas were not exhaustively stimulated.
Conclusion: It is possible to access muscle synergies observed during natural motor behaviours by direct stimulations applied to the motor cortical areas. Our data argue that EMG-derived muscle synergies are neuromotor control units encoded in the human motor system and utilised by the motor system for movement construction.

P 8

Stroke-like Migraine Attacks after Radiation Therapy Syndrome Mimicking Glioblastoma Recurrence 6 Years after Surgical Excision and Radiotherapy: A Case Report

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Objective: To highlight this unusual stroke-like migraine attacks after radiation therapy (SMART) syndrome to avoid incorrect diagnosis.
Methods: Case report.
Results: A 35-year-old man presented to our unit for left-sided headache. Computed tomography brain showed a 4-cm right parieto-occipital tumour with perilesional oedema and mass effect. Magnetic resonance imaging (MRI) showed a malignant and vascular right parieto-occipital tumour. Craniotomy and excision of brain tumour was performed in 2014. Ventriculoperitoneal shunt was inserted 6 days after the first operation for hydrocephalus. Pathology was glioblastoma multiforme with negative MGMT status. Postoperative MRI brain showed residual tumour. We performed gliolan fluorescence guided excision for him 2 weeks after the first operation. Postoperative chemoradiotherapy and adjuvant temozolomide were completed in 2015. He presented to us 6 years postoperatively with fever and transient left upper limb weakness. The MRI brain in 2020 showed gyriform enhancement pattern over right cerebrum. There were no signs of infection revealed by lumbar puncture and no clinical seizure. Follow-up MRI brain 3 months later showed resolved abnormal gyriform signal change and swelling in the right cerebrum. He could still work as a table tennis coach. History of brain irradiation for cancer, reversible symptoms and characteristic reversible MRI finding helped to distinguish SMART syndrome from tumour recurrence.
Conclusion: The occurrence of SMART syndrome as a rare delayed complication of brain tumour irradiation may be potentially misdiagnosed as tumour recurrence. Given its self-limiting nature, early recognition of this syndrome is paramount. It has a favourable response to conservative treatment with reversal of their radiological findings within months.

P 9

Dural Arteriovenous Fistula at The Lateral Foramen Magnum: Report of Two Microsurgical Cases

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Objective: Dural arteriovenous fistulae (DAVFs) are pathological shunts between arterial and venous system within the dura. The DAVFs at foramen magnum, however, is an uncommon site for spinal vascular malformation. We present two cases of effective microsurgical repair for DAVFs at foramen magnum presenting with acute subarachnoid haemorrhage (SAH) in the past year (2019-2020). Specific feeding arteries and draining veins were studied.
Methods: Two men presenting with sudden-onset severe headache were admitted in the past year. Imaging including computed tomography (CT) brain, digital subtraction angiography (DSA) and magnetic resonance imaging (MRI) were studied and compared. The DSA with selective injection to external carotid artery was particularly explored to trace main feeding arteries and draining veins of the DAVF.
Results: Initial CT brain both showed diffuse acute SAH. The DSA further traced branches of ascending pharyngeal artery as one of the main feeding arteries for both cases. Draining veins include anterior/posterior spinal veins and pterygopalatine venous plexus. The MRI also confirmed DAVF at the level of foramen magnum to C1 level. Complete occlusion of DAVF was achieved with coagulation of feeders and shrinkage of venous pouch using far-lateral microsurgical approach. Intraoperative indocyanine green injection confirmed no filling of venous pouch. Postoperative DSA demonstrated no angiographic evidence of residual DAVF or new haemorrhages.
Conclusion: Dural arteriovenous fistulae at foramen magnum could present as acute SAH. A combination of CT brain, DSA and MRI aid diagnosis and identification of underlying feeding arteries and draining veins. Satisfactory outcomes with complete occlusion were achieved with microsurgical approach.

P 10

Neurofibromatosis 1 Patient with Multiple Spinal Tumours and Cord Compression: Is Magnetic Resonance Imaging Adequate as a Diagnostic Method?

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Objective: To emphasise the importance of computed tomography (CT) as a complementary diagnostic approach of neurofibromatosis (NF) patient presenting with spinal stenosis.
Methods: This is a case report to review a NF-1 patient presented with spinal tumours as well as ossification of posterior longitudinal ligament (OPLL) causing cord compression and mixed upper and lower motor neurological symptoms.
Results: A 43-year-old man with newly diagnosed NF1 initially presented with chest wall mass and café-au-lait spots in his 30s. He had known multiple spinal tumours and was managed by observation with interval scan. In 2016, he presented to Orthopaedics and Traumatology for LL numbness, subsequent magnetic resonance imaging showed enlarged multiple spinal tumours. The culprit of cord compression by OPLL was subsequently confirmed on CT. In view of the presence of OPLL, an anterior approach was adopted for C4 corpectomy which C3-5 anterior spinal fusion for excision of OPLL as well as spinal tumours at that level. For an NF young patient presenting with mixed upper and lower motor signs and symptoms, differential diagnosis other than nerve sheath tumour should not be overlooked. The OPLL, usually in C spine, appears more common in Asians, whose typical presentation is in the fifth to sixth decades of life. However, in this young patient, it still worth actively rule out OPLL which is better delineated by CT.
Conclusion: Usage of CT in assisting diagnosis can help prevent overlooking other potential causes of spinal stenosis. The diagnosis of OPLL from the CT also guided the surgical approach for anterior decompression and anterior spinal fusion.

P 11

Predictive Factors for Development of Bleeding Carotid Artery Pseudoaneurysms in Patients with Previous Radiations for Head and Neck Cancers: Retrospective Cohort of 32 Cases

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Objective: To evaluate the treatment outcome and predictive factors for bleeding carotid artery pseudoaneurysms in head and neck cancer survivors.
Methods: We retrospectively reviewed patients with history of radiation therapy for head and neck cancers and with torrential nasal, oral or ear bleeding requiring in-patient treatment from hospital database. Demographics, concomitant medical condition, cancer staging and treatment details, index episode presenting symptoms and treatment modalities were analysed.
Results: There were 41 admissions for profuse nasal, oral or ear bleeding from July 2016 to June 2020 with 17 bleeding pseudoaneurysms identified, including 11 internal carotid artery (ICA) pseudoaneurysms and six external carotid artery branch pseudoaneurysms. Among ICA pseudoaneurysms, there were six patients passed balloon occlusion test with trapping of ICA performed. Two patients underwent trapping due to ongoing bleeding, one patient received stenting, and two patients were not treated. All involved branches of external carotid artery territory pseudoaneurysms were embolised. Baseline hypertension (relative risk=4.90, P=0.044) and hypotension on presentation (relative risk=6.00, P=0.046) were statistically significant predictive factors for pseudoaneurysmal bleeding. Cardiac arrest on presentation was likely to suggest pseudoaneurysmal bleeding (P=0.064). The degree of haemoglobin drop was not significantly different between pseudoaneurysmal bleeding and tumour bleeding (2.11 g/dL vs 1.58 g/dL, P=0.234).
Conclusion: We identified baseline hypertension and hypotension on presentation as predictive factors for pseudoaneurysmal bleeding among patients who received pervious radiation for head and neck cancers.

P 12

Brain Abscess Associated with Asymptomatic Pulmonary Arteriovenous Malformations: Case Report and Review of Literature

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Objective: To investigate the association between brain abscess and asymptomatic pulmonary arteriovenous malformations (PAVMs).
Methods: We report three brain abscess cases without prior diagnosis of PAVMs and review the literature which also describe similar association. PubMed was employed to identify all published reports of PAVMs presented initially with brain abscess without diagnosis of hereditary haemorrhagic telangiectasia.
Results: The above three cases were middle-aged ladies who developed brain abscess with no definite septic sources identified from ear, nose and throat, dental or cardiac investigation. The PAVMs were incidental findings during hospital stay. All underwent surgical drainage and abscess specimen yielded streptococcus species bacteria. Two of them underwent endovascular embolisation with satisfactory results. All made recovery from brain abscess. From the literature, 10 related articles are identified. In total 16 cases of PAVMs presented initially with brain abscess are described. In all, 7/16 (43.8%) cases also yield streptococcus species bacteria. In total, 10/16 (62.5%) cases made full recovery after surgical drainage, antibiotics and endovascular embolisation of PAVMs. Transthoracic contrast echocardiography is recommended for initial screening for suspected cases and further non-enhanced computed tomography of the chest can be offered for diagnostic imaging depending on severity of shunt found on transthoracic contrast echocardiography.
Conclusion: Despite PAVMs are rare conditions, they can be manifested without symptoms of hereditary haemorrhagic telangiectasia and need to be considered in those brain abscess cases with no definite causes confirmed.

P 13

Predictive Factors of Difficult Tracheostomy Weaning and Neurological and Hospital Outcomes of Neurosurgical Patients

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Objectives: This study was a retrospective study to investigate factors related to difficult tracheostomy weaning, and to evaluate outcomes of tracheostomised neurosurgical patients.
Methods: All tracheostomised neurosurgical patients in the Prince of Wales Hospital between 1 September 2016 and 31 August 2019 were reviewed retrospectively. Patients were grouped into easy weaning and difficult weaning groups using 3 months as cut-off time. Multiple factors were analysed to review their association with difficult weaning. Outcomes between easy weaning and difficult weaning groups were compared.
Results: One hundred thirty-one patients were included. In univariate analyses, male gender (P=0.019), Glasgow Coma Scale (GCS) ≤8 on admission (P=0.017), the presence of vocal cord palsy at 3 months (P<0.001), and pneumonia within 1 month post-tracheostomy (P<0.001) were associated with difficult weaning. In multivariable logistic regression for difficult weaning, GCS on admission (P=0.016), the presence of vocal cord palsy at 3 months (P<0.001), and the presence of pneumonia within 1 month post-tracheostomy (P<0.001) remained statistically significant.

Easy weaning group had shorter length of in-patient stay (median: 130 [91-211], interquartile range [IQR]=120 days vs median: 279 [210-929], IQR=719 days), significantly higher survival rate (95% vs 36%; P<0.001), and more favourable neurological outcome (Glasgow Outcome Scale 4 to 5) than difficult weaning group at both 6 months and 1 year (P<0.001). Among survivors, GCS upon discharge was significantly higher in easy weaning group (median: 15 [13-15], IQR=2) as compared to difficult weaning group (median: 11 [8-15], IQR=7; P<0.001). Majority of easy weaning group patients (54%) were discharged to home, while majority of difficult weaning group (42%) of patients were discharged to infirmary.
Conclusions: For GCS ≤8 on admission, the presence of vocal cord palsy, and the presence of pneumonia were associated with difficult weaning in tracheostomised neurosurgical patients. Difficult weaning is associated with poor neurological and hospital outcomes.

Spinal Epidural Abscess in a Healthy Teenage Girl without Risk Factor: Case Report and Literature Review

P 14

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Objective: To raise the awareness for rare spinal epidural abscess (SEA) in immunocompetent young patient.
Case report: A 15-year-old girl with good past health and normal development presented to emergency unit for 2-day history of severe back pain. On the second emergency unit attendance, she developed paraplegia and urinary retention. She was admitted and urgent magnetic resonance imaging revealed a T8-10 spinal epidural mass with cord compression. Emergency laminectomy for cord decompression was performed. The intraoperative specimen growing methicillin-sensitive *Staphylococcus aureus* (MSSA). Workup for primary source was negative without dental abscess, valve vegetation. Precipitating factor for invasive MSSA infection was all negative such as IV drug use, HIV, hepatitis B/C, diabetes mellitus. However, computed tomography abdomen and pelvis revealed features of bilateral sternoclavicular joint septic arthritis. Clinically, the patient was asymptomatic of the arthritis. She received with more than 6-week course of antibiotics. Her lower limb power gradually improved. By 2 months after the operation, she was able to walk with elbow crutches with assistance.
Discussion: Spinal epidural abscess in an immunocompetent paediatric patient without risk factors is an extremely rare condition. In a case report and literature review (Houston 2019),[1] there were only 31 reported cases. Early diagnosis, prompt surgical decompression and appropriate antibiotics are the key treatment for functional recovery. For the current case, the imaging diagnosis of bilateral sternoclavicular joint septic arthritis is suspected to be part of the infection foci.
Conclusion: Although SEA in an immunocompetent paediatric patient without risk factors is rare, awareness of it with early diagnosis is the key towards prompt treatment.

Reference

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Indocyanine Green–assisted Endoscopic Transorbital Resection of Orbital Apex Cavernous Haemangioma: The First Reported Case

P 15

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Background: The application of indocyanine green (ICG) in medical field is common. Its use in ophthalmology included assessment of the retinal and choroidal circulation. While posterior orbital tumour is very challenging to orbital surgeon due to the poor surgical access, limited visualisation, and close proximity to important neurovascular structure, we would like to illustrate the use of ICG fluorescence integrating with endoscopic transorbital technique to facilitate the removal of posterior orbital pathology by this case report.
Methods: A 64-year-old Chinese woman was diagnosed with orbital cavernous malformation of right eye, causing compressive optic neuropathy. Initially, she presented with painless blurry vision of right eye. On examination, she demonstrated a superior and infratemporal visual field of right eye with right optic disc swelling. Computer tomography showed 1-cm oval lesion in posterior intrazonal space near orbital apex. Radiological features suggested diagnosis of orbital cavernous malformation. Right endoscopic transorbital excision of orbital apex tumour was performed with ICG-assisted endoscopic techniques, jointly operated by oculoplastic surgeon and endoscopic skull base neurosurgeons.
Results: The use of ICG during operation resulted in delayed enhancement of the lesion at around 1 min 30s, while surrounding recti muscles showed rapid enhancement at around 30s. The incision of periorbita was guided by ICG enhancement. Total excision of tumour was achieved. The patient enjoyed good visual recovery and cosmetic results.
Conclusion: This case report demonstrated good results of the use ICG integrated endoscopic transorbital technique for orbital cavernous malformation successfully. To our knowledge, this is the first case report of this integrating technique in management of orbital cavernous malformation.

Sectioning of Filum in Occult Cord Tethering Presenting with Neurogenic Bladder: Two Paediatric Case Reports

P 16

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Objective: The presence of urinary incontinence with normal magnetic resonance imaging (MRI) has been termed occult tethered cord syndrome (OTCS). There have been mixed reports on the efficacy of intradural sectioning in these patients, with a recent pilot randomised controlled study showing no difference between surgical and non-surgical treatment. According to the latest recommendations from the International Children's Continence Society, there is still insufficient evidence to support routine use of untethering in OTCS. This study is to report on the efficacy for cord untethering for paediatric patient with spinal dysraphism but normal conus level.
Methods: Report on the outcome of cord untethering for two cases of filum lipoma with normal clonus level (L1-2), who presented with neurogenic bladder. Also review on literatures which report on the presentation and outcome of surgery for patients with cord tethering.
Results: The two patients reported both presented with secondary urinary incontinence. They were managed in collaborated effort of paediatric neurosurgeon and urologist. On MRI, both patients showed fatty filum with normal conus level, with no evidence of cord tethering. However, urodynamic studies of both patients showed neurogenic bladder. They both received cord untethering with improvement in urinary continence. No adverse effect was reported.
Conclusion: Cord untethering is a safe and relatively low-risk procedure and effective in improving urological or neurological manifestations of occult cord tethering. No conclusive data points to the optimal age and timing for surgery in these patients; but our case report demonstrates that early surgery can spare patient from developing irreversible physical or neurological damage.

Combined Multidisciplinary Approach to Skull Base Tumours

P 17

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Introduction: Skull base tumours have historically been considered to carry a poor prognosis. Incomplete resections, postoperative complications including neurological deficits, cerebrospinal fluid (CSF) fistulas and surgical site infections can contribute to shortened progression-free survival, significant morbidity or mortality. Advancements in surgical techniques, in particular by adopting a combined multidisciplinary approach through the collaborative efforts of neurosurgeons (NS) and otorhinolaryngology (ENT) surgeons have enabled improved outcomes. We reviewed the outcomes of all skull base tumour patients that were treated by the NS-ENT combined approach from 2017 to 2020.
Methods: Data on the initial presentation, tumour size and location, histology were documented. The postoperative management of complications including CSF leak, tumour recurrence and subsequent further management were also collected and reviewed.
Results: Ten patients with mean age 54 years were identified. The histological diagnoses were: meningioma (4 cases, 40%), chordoma (2 cases, 20%), carcinoma (3 cases, 30%), chondroma (1 case, 10%), and neuroblastoma (1 case, 10%). The presenting symptoms included nasal (epistaxis, nasal mass, nasal obstruction) and visual complaints (diplopia, blurred vision, pain, visual field loss). Tumours originated at the sella (3 cases), nasal cavity, and ethmoid (3 cases), and one each at the cribiform, sphenoidal ridge and clivus. Postoperative complications included a single case of internal capsule infarction with uneventful recovery, and another (10%) with CSF rhinorrhoea on day 7 post-resection of sinonasal undifferentiated carcinoma with a pericranial flap repair and the patient was treated with lumbar drain insertion. Gross total excision was achieved in 70% of patients (7/10) of which two (29%, 2/7) developed recurrence at 6.8 months and 22.5 months, respectively. The patient with sinonasal undifferentiated carcinoma developed radiological recurrence at 6.8 months and overall survival (OS) was 13 months. A patient with an atypical meningioma and partial resection declined further intervention and OS was 26 months. Median OS was 32 months (6.5-46 months), median disease-free survival was 18.9 months and median symptom-free survival was 25.5 months. Six patients (75%) achieved Eastern Cooperative Oncology Group 0-1 functional performance status.
Conclusion: Skull base tumours managed with a combined NS-ENT approach can yield good gross total resection outcomes with a low complication rate and an excellent outcome in terms of disease-free survival and functional status.

Intracranial Angiomatoid Fibrous Histiocytoma: Case Report

P 18

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Objective: To present the first case of intracranial angiomatoid fibrous histiocytoma (AFH) in Asia and of the oldest patient with intracranial AFH so far.
Methods: This is a case report presenting a case of intracranial AFH being treated and followed up at Princess Margaret Hospital, Hong Kong, since 2018.
Results: Our case is a 67-year-old woman who first presented with worsening vertigo which had persisted for a few years in mid-2018. Magnetic resonance imaging (MRI) brain showed an extra-axial torcular lesion with mild hydrocephalus. There was no evidence of any primary malignancy on positron emission tomography–computed tomography. Tumour excision was done with a small residual tumour left behind due to close adherence to torcular sinus by the tumour. The diagnosis of intracranial AFH was confirmed with pathology of the resected specimen yielded features consistent with AFH. Fluorescence in-situ hybridisation demonstrated *EWSR1* gene rearrangement in >50% of tumour cells, while reverse transcription and real-time polymerase chain reaction for EWSR1-ATF1 and EWSR1-CREB1 fusion transcripts were negative. Nevertheless, the patient developed worsening vertigo again with MRI brain revealing interval enlargement of the residual tumour 7 months after the first excision. Re-excision was then performed. Clear resection margin was achieved this time with opening of torcular sinus. No recurrence was detected on subsequent MRI scans.
Conclusion: In conclusion, the behaviour of AFH could be locally invasive with rapid growth. Gross total resection is the treatment of choice. Regarding diagnosis of AFH, *EWSR1* gene rearrangement with or without EWSR1-ATF1 fusion gene is a typical feature to support the diagnosis of AFH.

Preliminary Technique and Planning of a Cost-effective Customised Cranioplasty Implant Using Three-dimensional Printing and Bone Cement

P 19

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Introduction and Objective: Cranioplasty is a common neurosurgical operation performed for the repair of cranial skull defects. In cases where an autologous bone graft cannot be used, an artificial prosthetic implant can be used instead. Polymethyl-methacrylate (PMMA) bone cement is a commonly used material for this purpose. However, intraoperative moulding of the bone cement often cannot provide optimal cosmetic results.

Customised cranioplasty implants have been available on the market for some time, however they are often expensive. Prior studies have outlined the use of computer-aided design and three-dimensional (3D) printing technology for a more cost-effective method of producing a customised cranioplasty implant, by prefabrication of a 3D printed mould which can be used intraoperatively to shape the PMMA bone cement.

This study aimed to test the feasibility of applying this method at our centre in Hong Kong prior to operative application of the technique on a patient.
Methods: DICOM (Digital Imaging and Communications in Medicine) data from computed tomography scans of the patient were used to obtain 3D images of the skull and formulate a 3D model of the skull defect. A mould of the skull defect was constructed by computer 3D milling rapid prototyping technology. The moulds were wrapped with sterilised plastic, PMMA bone cement was applied to the mould during the viscous liquid state, and the prosthesis was formed after hardening of the bone cement.
Results: This method is technically feasible and can be applied to patients requiring cranioplasty with an artificial prosthetic implant in the future.

Transcranial Magnetic Stimulation Improves Motor Recovery after Spinal Insult: Case Series

P 20

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Objective: The aim of this case series was to explore effect of transcranial magnetic stimulation (TMS) on motor recovery after spinal insult.
Methods: This is a retrospective single-centre case series for spinal insult in Queen Elizabeth Hospital. There were three cases of spinal insult without significant neurological recovery receiving TMS with intermittent theta burst pattern in 2019. Total 10 sessions of TMS were performed for each case. Limb power and functional level were analysed before treatment, immediately after treatment, and at 3 months and 6 months after treatment.
Results: All three cases had clinical and functional improvement after TMS and the effect was sustained at 6 months after treatment.
Conclusion: All three cases selected had already reached a plateau of motor rehabilitation with traditional physiotherapy for at least 2 months to unmask the effect of natural recovery or pure physiotherapy. Traditionally peripheral stimulation is advocated in spinal insult cases. We postulate that by stimulating the any part of the motor pathway can induce similar motor rehabilitation effect as peripheral stimulation. This postulation is echoed by different papers. In all three of our cases there were no major adverse effects, and there was sustained improvement both clinically and functionally. Transcranial magnetic stimulation in spinal insult cases appeared to be safe and effective yet large-scale randomised controlled trials are required for confirmation.

Conus Perimedullary Arteriovenous Fistula: Case Report

P 21

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Acquired spinal pial arteriovenous fistula (AVF) is rare. Here we report a case of a conus perimedullary AVF in a 72-year-old Chinese man who presented with back pain and progressive myelopathy (lower limb numbness and weakness) and was treated with surgery of L1/2 laminectomy for microsurgical disconnection. The radiological features and surgical techniques are highlighted. Patients presented with atypical back pain and symptoms should be further investigated to exclude spinal pathology.

Role of Neurosurgery in Erdheim-Chester Disease: Case Report

P 22

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Erdheim-Chester disease (ECD) is a rare form of non-Langerhans cell histiocytosis. ECD is aggressive with multisystem involvement, and often difficult to diagnose. Tissue involved includes long bones, brain, lung, skin, pituitary gland, and tissue posterior to the eyeballs. Different involvement site will give different clinical presentation, hence it also relies on other modality of investigation for diagnosis. Diagnosis of ECD is generated through evaluation of clinical presentation and imaging, including plain radiograph, computed tomography, and magnetic resonance imaging. However, sometimes these results are still inconclusive, which will require a biopsy to provide histological diagnosis for ECD. A multidisciplinary approach will provide a more efficient diagnosis of ECD and facilitate prompt treatment initiation effectively. In this case report, we will discuss a 52-year-old woman who presented with lower limb weakness and visual disturbance, who underwent multiple imaging and clinical procedures before diagnosis. A nerve root biopsy was performed by our neurosurgery team, and the sample yielded was confirmed ECD. The patient soon started treatment from the neurology department after the biopsy and is now under active management.

Bilateral Globus Pallidus Internus Deep Brain Stimulation for a 4-Year-Old Girl with *GNAO1* Mutation Related Status Dystonia: Case Report and Literature Review

P 23

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Introduction: *GNAO1* mutation is rare and can present with hyperkinetic movement disorder during childhood with life-threatening exacerbations refractory to medical treatment. Deep brain stimulation (DBS) is emerging as an effective treatment for dyskinetic crises in such patients. Fifteen cases of *GNAO1* mutation–associated hyperkinetic movement disorder treated with DBS have been reported in the literature as of 2019.
Methods: We report the case of a 4-year-old girl with de-novo *GNAO1* mutation, who had a severe exacerbation of dystonia refractory to medical treatment and complicated by rhabdomyolysis requiring paediatric intensive unit care. She underwent bilateral globus pallidus internus (GPi) DBS.
Results: Bilateral GPi DBS was performed in January 2020. The DBS was switched, and medications stepped down in the early postoperative period. Significant improvement of hyperkinetic movement was noted. There were no more exacerbations of dystonia. The Abnormal Involuntary Movement Scale (AIMS) score was 4/4 during paediatric intensive care unit (PICU) stay (August 2019), 3/4 prior to DBS (January 2020), and 2/4 at 10-month follow-up examination after DBS. Fahn-Marsden total score was 108/120 during PICU stay, 106.5/120 prior to DBS and 64.5/120 at 10-month follow-up examination.
Discussion: Our result is encouraging, and consistent with existing literature. The DBS in young children is challenging. High wound and hardware-related complication rates have been reported, and there is potential for lead migration as the child grows.
Conclusion: We report a case of effective bilateral GPi DBS for a 4-year-old girl with *GNAO1* mutation–associated severe hyperkinetic exacerbation. Long-term follow-up is needed.

P 24

Mobile Learning Platform "Classroom" for Specialty Training of Staff in Neurosurgical Unit

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Objectives: To sustain junior staff specialty training via the mobile learning platform "Classroom" during the outbreak of COVID-19.
Methods: The problem-based peer learning programme is a systematic specialty training programme for junior nurses, which was firstly organised in general neurosurgical unit of Queen Elizabeth Hospital in December 2018. The programme includes four components—problem-based scenario, group discussion, practical skills workshop, and simulation—which are all held face-to-face. This year, eight junior nurses were recruited to join the programme. During the outbreak of COVID-19, the majority of staff training activities were suspended, including our tutorial sessions. Yet, our junior staff learning and teaching were sustained through the application "Classroom", which is a mobile learning platform for dissemination of learning materials, self-directed study, online discussion, assessment, and programme evaluation. The difference in pre-and post-test score and degree of change of the score before and after implementation of "Classroom" were compared to evaluate the effectiveness of the programme, and the impact of using "Classroom" on junior staff training.
Results: The pre- and post-test scores were 31.25 and 85.625, respectively, indicating an increase of 174%. The improvement in knowledge level was 44% higher than that before using "Classroom". Junior nurses and tutors commented that "Classroom" was user-friendly, and that it allowed flexibility and facilitated mutual communication.
Conclusion: The mobile learning platform "Classroom" enhanced the efficacy of specialty training and sustained self-directed learning among junior nurses in neurosurgical units.

P 25

Comprehensive and Multidisciplinary Fall Prevention Programme SAFE for Patients and Caregivers is Effective in Reducing Fall Incidence

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Objectives: To reduce the incidence of falls in neurosurgical unit, improve the efficacy of fall prevention education of patients and caregivers, and enhance the compliance of frontline staff on fall preventive measures.
Methods: A comprehensive and multidisciplinary fall prevention programme SAFE (Skills Refreshment Workshop, Animation of fall prevention, Fall Prevention Discharge Planning & Education) was implemented in the neurosurgical department in 2020. There were three components, divided into three phases, namely, Phase 1: fall prevention education animation; Phase 2: skills refreshment workshop on fall prevention and management co-organised by nurse and physical therapists; and Phase 3: patient-centred fall prevention discharge planning and education by occupational therapists. Phase 1 was implemented in the male neurosurgical unit, while conventional education method was used in the female ward as control. Primary outcome was fall incidence rate; secondary outcomes were change in knowledge level of patient and caregivers (measured with pre/post-test) and staff compliance (measured with audit). The changes of these outcomes before and after the interventions were compared.
Results: There were total eight fall incidents in the department after Phase 1 of the SAFE programme, compared with 12 incidents in 2019, indicating a reduction of 33.3%. Other secondary outcomes will be evaluated in Phase 2 and Phase 3.
Conclusion: Engaging patients and caregivers into a comprehensive and multidisciplinary fall prevention programme SAFE was effective in reducing the number of in-patient fall incidents.

P 26

Vitamin D Enhances Temozolomide Anti-tumour Efficacy in Human Glioblastoma Multiforme: In Vitro and In Vivo Studies

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Objective: Grade IV glioma, known as glioblastoma multiforme (GBM), is among the most malignant primary brain tumours. Its high proliferation and common resistance to conventional therapies complicate treatment, making it lethal in many. Calcitriol is an active metabolite of vitamin D_3, which regulates many cellular physiological processes including cell proliferation, differentiation, and apoptosis. Supraphysiological doses of calcitriol have shown anti-tumour efficacy in the pancreas, liver, breast, and prostate. There is however a lack of studies in human GBM. This study aimed to characterise the anti-tumour efficacy of vitamin D supplementation in human GBM, to determine whether combination with temozolomide can further improve disease outcome and to explore a potential application on vitamin D deficient subjects.
Methods: In vitro studies were performed to determine the anti-tumour efficacy of calcitriol, in combination with or without temozolomide in human U87 GBM cells. Cytotoxicity of calcitriol is identified via MTT and clonogenic assays. In vivo studies will be performed using a mice subcutaneous xenograft model, by implanting U87 cells subcutaneously in immunocompromised mice, to investigate how vitamin D supplementation affects GBM growth.
Results: Current findings validated the role of calcitriol in reducing human GBM proliferation and inducing apoptosis and lay the groundwork for further in vivo investigations on calcitriol and human GBM.
Conclusion: This ongoing study investigates the role of vitamin D supplementation against human GBM and is the first to raise an interest in its effect in a vitamin D deficient environment. Results may serve as a guide towards treating GBM in vitamin D deficient patients and hence deserve further investigation.

P 27

Same-day Spontaneous Reduction of a Traumatic Infantile Depressed Skull Fracture: Case Study

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Introduction: A depressed skull fracture refers to a focal caving of the calvaria. Conservative management in the paediatric population is advised in the absence of brain injury as the deformity will often correct itself as the skull grows over the following months. Herein, we present a case of an infantile traumatic depressed skull fracture that spontaneously resolved within 24 hours of the injury. To the best of our knowledge, this is the first case of its kind to be described.
Case presentation: A 9-month-old boy presented with a 6.4-mm deep traumatic depressed skull fracture after falling from sofa height. The fracture spontaneously reduced during a crying episode whilst waiting for the computed tomography scan. The computed tomography of brain confirmed complete resolution of the fracture with no brain injury.
Outcome: The child was monitored in the out-patient setting. Subsequent skull X-rays showed complete resolution of the fracture.
Discussion: It is postulated that the infant's skull plasticity and the increased intracranial pressure from his crying allowed for the spontaneous resolution of the skull deformity.

Reengineering Service during the COVID-19 Pandemic: Ambulatory L-Dopa Challenge Test

N 1

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Background: Historically, our centre arranged potential deep brain stimulation candidates to be admitted for the L-Dopa Challenge Test (LCT). During the COVID-19 pandemic, non-emergency admission was suspended. We had to reengineer the service delivery model in an appropriate setting to meet patients' needs and achieve clinical outcomes. We reengineered the LCT as ambulatory in the deep brain stimulation clinic, with the nurse specialist acting as a coordinator to collaborate multidisciplinary professionals' assessment.
Objective: This retrospective observational study aimed to analyse the benefits of the ambulatory LCT from hospital and patient views.
Methods: For all cases involved in ambulatory LCT, we reviewed the hospital benefit and explored the patients' feedbacks.
Results: From June to October 2020, we had five patients for ambulatory LCT. Under ambulatory LCT, the length of stay was reduced to 1 day per case. It is expected to save at least 12 days per year. For patients' benefits, they are less exposure to infection risk when compared to in-patient setting. No complaint or adverse event was noted. There are positive feedbacks from the patients in which they feel less anxious as the caregiver can stay with them in the whole process. They feel safer as the test in out-patient setting.
Conclusion: From the study, we found that the ambulatory LCT reduces the reliance on in-patient care and improve access to services. The reengineering of clinical pathway achieves the clinical outcome and got satisfaction from the patients. The ambulatory LCT brings benefits to both hospital and patients, we plan to continue launching LCT as ambulatory service.

Smart Documentation System in Kwong Wah Hospital High Dependency Unit: Introduction of Clinical Information System

N 2

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Objective: For neurosurgical patients, especially those in the High Dependency Unit (HDU), a significant amount of information and vital signs data are needed to be gathered. There is a growing need to improve efficiency in gathering and documenting vital signs data to ensure patient safety, to enhance nurse-to-doctor communication as well as to improve clinician workflows. However, the time between vital signs collection and documentation can be lengthy owing to numerous factors, including nurse-to-patient ratios, vital signs machines' errors, and emergency patient care. Thanks to the health informatics technology, this problem could be alleviated. In Kwong Wah Hospital, Clinical Information System (CIS) has been adopted in neurosurgery HDU. The system automatically records blood pressure, heart rate, respiratory rate, oxygen saturation and ventilator parameters' values. Other patient data such as central venous pressure, arterial blood pressure, and electroencephalogram are automatically documented. This study investigated nurses' perceptions of current vital signs collection and documentation method, and promotion of usage of CIS.
Methods: A questionnaire was conducted to investigate the time differences used in vital signs collection and documentation by N7 HDU and N11 general ward from September to October 2020. Twenty nursing staff participated in this study. They recorded time spent on the tasks of vital signs collection and documentation and gave feedback to the respective systems adopted to perform the tasks.
Results: Results showed a notable reduction in time involved in vital signs collection and documentation using CIS compared to the traditional paper-based method. It saved each nurse nearly 50% of time on the task of vital signs documentation. This implied each nurse could spare more time for other important tasks and therefore improve patients' welfare. It also recorded generally positive feedback towards the adoption of the electronic system.
Conclusion: The CIS helps minimise documentation error and greatly reduce the documentation time. Nurses can spare more time on emergency care and patient education. Despite its many benefits, CIS has some limitations that need to be overcome. For example, the data collected by CIS may not be comprehensive and it is not 100% error-free. However, with the ongoing redevelopment of Kwong Wah Hospital, CIS will continue to be improved, for example, by upgrading software and implementing 5G network connection. With continual effort and dedication, HDU can be forging ahead in the future.

Clinical E-Platform

N 3

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Objective: To improve delivery of information and reduce searching time of digital information through launching of Clinical E-Platform in neurosurgical wards.
Background: Information delivery is an important element in healthcare services for provision of guidelines, policies updates and the ever-changing clinical practices. Currently, digital information in hospital intranets is scattered across different webpages. Clinical staff need to spend a relatively long searching time to locate specific documents. The Clinical E-Platform is therefore designed, with a dedicated module to centralise unit-specific documents. The Clinical E-Platform currently composed of four modules around clinical services: Clinical Updates, Department Documents, Newcomers/Preceptorship programme, and Carer/Patient Education. The E-Platform was designed to be able to access through various devices including CMS computers, iPads, IPMOE tablets and smartphones through 'HA Chat'.
Methods: Value stream mapping was conducted to analyse the process involved in future state versus the current state with the purpose to reduce non-value added processes. Twenty frontline colleagues were involved to compare the use the E-Platform with current methods.
Results: The E-platform streamlined three wasteful processes in the current state value stream map. It decreased time needed for locating specific documents from an average of 5 min to 1 min 20 s, in which the total lead time was reduced by 73.3%.
Conclusion: The E-Platform can reduce time needed for locating documents, provides a customisable platform for specialty use, clinical updates and unit-specific documents. It also facilitates staff trainings by incorporating the preceptorship module, and potentially increase academic involvement of frontline staff in the future.

N 4

Nasal Douching Relieves Nasal Symptoms after Endonasal Transsphenoidal Surgery

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Objective: To provide nasal douching education to patient who undergoes endonasal transsphenoidal surgery to relieve nasal symptoms.
Methods: Nasal douching education programme was introduced to nursing staff. Patients were advised to have nasal douching to clear nasal secretions, clots and infective debris from the nasal cavity to improve nasal symptoms and thus better quality of life postoperatively. Training programme on nasal douching was given to nursing staff including advanced practice nurses and registered nurses from August to September 2019. The inclusion criteria for the patient who were involved in the education programme were those Glasgow Coma Scale (GCS) 15. Recruited patients were trained on Day 5 postoperatively. Doctor's prescription was required to confirm there was no risk of cerebrospinal fluid leakage before commencing of nasal douching. Patients were required to have returned demonstration of nasal douching after watching a video-taped illustration under nurse's supervision. Leaflet was given on discharge. Patients were asked about the nasal morbidity to measure the frequency and severity on telephone by nurses. Questions on frequency of nasal douching, improvement of nasal crusting, nasal discharge, and loss of smell and pain were included in numeric scale before nasal douching and 2 weeks after nasal douching. Mean scores for each item were calculated.
Results: In total, 38 nursing staff were educated for the nasal douching education programme. There were 18 eligible patients recruited in the programme from September 2019 to August 2020. Telephone interview was done 2 weeks after discharge. Among the 18 patients, two patients did not perform nasal douching after discharge because they did not feel nasal discomfort. Thirteen patients performed nasal douching for a week and stopped after improvement of nasal symptom. Three patients continued to do nasal douching twice a day at the time of phone interview. Nasal crusting and nasal discharge was improved by 81.1% (from 3.0 to 3.7). The loss of smell was improved by 76% (from 3.2 to 4.2) while the pain was also improved by 48% (from 4.8 to 3.7).
Conclusion: Endoscopic transsphenoidal surgery is a common surgical approach to remove pituitary adenomas. However, patents often report nasal symptoms such as nasal discharge, congestion, bleeding, crusting, pain and loss of smell afterwards. A number of studies have shown the ability to smell decreases 1 month after surgery and becomes normal 2 to 3 months after surgery. Nasal douching was introduced to patients who underwent endoscopic transsphenoidal surgery to relieve these symptoms. The sinonasal symptoms are improved after the nasal douching programme was introduced.

N 5

Staff Compliance with a Workflow for Patients Transferring from Other Hospitals to Interventional Suites Undergoing Intra-arterial Thrombectomy

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Objective: The benefit of reperfusion therapy in acute ischaemic stroke is strongly time-dependent. In an acute ischaemic stroke due to large vessel occlusion, every minute goes by, 1.9 million neurons die leading to irreversible brain damage. In order to re-establish cerebral perfusion, intra-arterial thrombectomy (IAT) is recognised the gold standard therapy in stroke treatment. Coordination of safe, rapid and smooth patient transfer to an interventional suite is of vital importance for saving brain tissue. Therefore, a structured patient transfer workflow has been developed. This study aimed to measure the compliance of staff with the workflow.
Methods: This study was implemented in Queen Mary Hospital from March 2020 to September 2020. Interviews were conducted with nurses responsible for admissions of patient receiving IAT. Questions were categorised into five major workflow steps of "Decided for IAT", "Notification by 1st call medical officer/neurosurgeon", "10 minutes before patient arrival to Queen Mary Hospital", "Patient arrival to venue" and "Post-IAT".
Results: A total of 10 clinical admissions were reviewed. Two of them were excluded as patients involved were ineligible IAT candidates. Overall compliance with the workflow was 99.6%.
Conclusion: High staff compliance with the workflow enabled seamless patient transfer to the interventional suites for IAT.

N 6

Preoperative Virtual Reality Orientation Programme for Awake Craniotomy Patients: Initial Experience

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Background: The success of an awake craniotomy is largely dependent on the close collaboration between the operating neurosurgeon and the patient. The level of patient cooperation directly affects procedure outcomes[1] and the degree of anxiety has been identified as one of the factors influencing intraoperative brain mapping accuracy.[2] Appropriate and supportive nursing interventions can reduce preoperative patient anxiety.[3] A pilot programme adopting virtual reality (VR) was introduced to address this issue for awake craniotomy patients.

Objective: To evaluate the effectiveness of reducing preoperative anxiety by utilising the "VR Orientation for Awake Craniotomy" programme.

Methods: This pilot programme was initiated in October 2020. Consecutive adult patients scheduled for an awake craniotomy were subject to a preoperative procedure orientation followed by an immersive experience utilising a head-mounted VR display with audio input (Oculus Quest All-in-one VR Gaming System™, Oculus, Irvine [CA], United States). Patients that were unable to comprehend orientation instructions, with significant visual acuity deficits uncorrectable with prescription glasses, visual field defects as severe as haemianopia and dysphasia were excluded. The audiovisual content comprised of a brief presentation introducing the procedure and a point-of-view in-house produced video exhibiting the patient experience immediately before and during an awake craniotomy. Pre- and post-orientation assessments were performed by using the Hospital Anxiety and Depression Scale (HADS)[4] 24 to 48 hours before the scheduled procedure.

Results: A total of four patients participated in the programme. Preoperatively all patients were neurologically intact with no visual field, language and cognitive deficits. 75% (3/4) of patients were diagnosed to have glioblastoma and all were scheduled for tumour resection. Before the orientation, one patient (25%) had extremely severe anxiety as determined by the HADS, and another had severe anxiety. The remaining patients had anxiety levels within the normal range. The orientation programme was performed uneventfully and no adverse effects especially with regard to nausea were observed. Post-orientation assessments showed a reduction in HADS score levels for all patients. Those that previously had severe anxiety reported to have only moderate levels afterwards. However, there was no statistically significant reduction in HADS scores after the VR orientation (paired *t* test; P=0.10). The subsequent awake craniotomy procedure was performed successfully, and none experienced any additional neurological deficits postoperatively.

Conclusions: Patients undergoing awake craniotomies for tumour resection may undergo severe preoperative anxiety. The VR orientation offered an immersive experience to alleviate such symptoms. The programme was well-tolerated, and more patients need to be recruited to ascertain its effect on anxiety.

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Point-of-Care Platelet Function Test in Dual Antiplatelet Therapy Monitoring for Neurovascular Interventions: Single-centre Experience

N 7

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Introduction: Dual antiplatelet therapy is the standard of care for flow diverter placement and stent-assisted neurovascular interventions. However, individual's response to the antiplatelet varies. Recently, our centre had adopted the VerifyNow® System, a point-of-care platelet function testing system for the monitoring of this group of patients.
Objective: This study acts as an interim review of our current monitoring protocol to look for any area of improvement.
Methods: Medical records of patients with elective flow diverter placement or stent-assisted neurovascular interventions from August 2018 to September 2020 were retrospectively reviewed. All patients were managed according to a preset protocol, which required repeated platelet function testing and subsequent dose adjustment. The items of review included medication dosage, aspirin reaction units and P2Y12 reaction units, number of medication adjustments, and complication rates.
Results: A total of 32 samples were retrieved, including seven men (22%) and 25 women (78%) aged 30 to 80 years. Eighteen samples (56%) required dose adjustment which came to a total of 32 events (38 clopidogrel adjustments and four aspirin adjustments). Two of the samples (6%) developed intracerebral ischaemic complications.
Discussion: In the study, aspirin showed a more stable aspirin reaction unit value while the individual's response to clopidogrel varies. Ten samples (31%) finally switched from clopidogrel to ticagrelor which revealed a benchmark with other larger-scale studies. Besides, the two complicated cases revealed that more frequent or lengthy monitoring may be required for cases with special considerations.
Conclusion: The current protocol could satisfactorily monitor general patients' antiplatelet response. For cases with special considerations, a regimen on top of the current protocol could be considered. This interim review could also serve as a guideline for future larger-scale studies.

Carer Burden in Caring for Patients with Spasticity Receiving Botulinum Toxin Injection

N 8

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Objective: Spasticity is a common condition after stroke, brain, or spinal injury. Muscle stiffness, impaired range of joint movement, increased pain, and muscle spasm are distressing factors contributing dependence on carers for carrying out activities of daily living and nursing care procedures for the patients. This study aimed to investigate carer burden among caregivers for caring patients after injection of botulinum toxin with rehabilitation regimen of physical therapy and use of orthoses.
Methods: This is a prospective study conducted in Queen Mary Hospital from January 2017 to September 2020. Carer burden was measured using a four-point Likert scale (1=no difficulty, 4=a great deal of difficulty). Baseline and three assessments were made at 1, 2, and 3 months after first injection.
Results: A total of 11 patients with spasticity received injection of botulinum toxin were included. Three patients had second injection due to recurring problems. Before the injection, the scale showed carer burden for patients with spasticity over upper limbs and lower limbs were "3" (moderate difficulty) and "4" (a great deal of difficulty). After 3 months of injection, reduction of carer burden was evident. Ratings of "1" (no difficulty) and "2" (a little difficulty) were shown indicating improvement in functional outcomes to facilitate care activities.
Conclusion: The findings confirmed carer burden is reduced among caregivers for caring patients after injection of botulinum toxin with rehabilitation regimen.

AUTHOR INDEX

Acknowledgements

The Organising Committee would like to extend their gratitude to the following sponsors (in alphabetical order) for their continuing support:

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