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Membership:

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President, Asian Australasian Society of Neurological Surgery

President, International Conference of Cerebrovascular Surgery

President, World Federation of Skull Base Societies

Founder Member, World Academy of Neurosurgeons

Guest Member, Japan Neurosurgical Society

Corresponding Member, American Academy of Neurological Surgery

Past President, Cerebrovascular Society of India (2010-2011)

Past President (2009-2010), Bombay Neurosciences Association

Past President (2008), Neurological Society of India

Past President (2004-2006), Asian Conference of Neurological Surgeons

Past President (2002-2004), Skull Base Surgery Society of India

EC Member of Asian-Oceanian Skull Base Society

Congress of Neurological Surgeons, United States

WFNS Skull Base Committee, Education & Training Committee, Cerebro Vascular Disease & Therapy Committee

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Prof Yong-kwang TU

Prof Tu completed his medical education at the Medical School of the National Taiwan University, Taipei, Taiwan in 1976. He completed his neurosurgical resident training at the same university in 1981 and obtained his PhD degree at the Institute of Clinical Science, National Taiwan University in 1984.

He joined the Taiwanese Medical Mission to the Kingdom of Saudi Arabia and served as the Chief of Neurosurgery at the King Fahd General Hospital in Jeddah for a year. He then spent 4 years as a research fellow in neurosurgery of Harvard Medical School and Massachusetts General Hospital in Boston. In his last year in Boston, he served as a lecturer in surgery at Harvard Medical School. Since returning to Taiwan, he has been on the staff of the Department of Neurosurgery at National Taiwan University, and has become Professor and Chairman of the Department since 1998. He was appointed as the Deputy Director of Institute of Clinical Neuroscience and Behavioral Medicine of the National Taiwan University since 2011. Prof Tu retired from the National Taiwan University in 2013 and soon was appointed as an endowing chair professor of the Medical College of the Fu Jen Catholic University in Taipei.

His major clinical and research interests are the physiology of cerebral haemodynamics and metabolism, cerebral protection, cerebrovascular surgery, skull base surgery, and neurosurgical intensive care. He is the author of over 150 publications and has organised many national and international conferences. He is a member of the American Academy of Neurological Surgery and of the World Academy of Neurological Surgery. Prof Tu has been the President of the Taiwan Neurosurgical Society, the Taiwan Stroke Society, the Taiwan Society for Skull Base Surgery, the Asian-Oceanian Society for Skull Base Surgery, and the Asian-Australasian Society of Neurological Surgery. In 2011 he became President-elect of the World Federation of Neurosurgical Societies. His 4-year term as President started in September 2013. He was nominated to be the recipient of the Annual Award of the Formosan Medical Association as well as the Orator of Surgery at the 2012 Formosan Medical Association Annual Congress, an honour reserved for a surgeon who has made a major contribution to the country's surgical practice over his or her career.

SCIENTIFIC PROGRAMME

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

25 NOVEMBER 2016, FRIDAY

08:30 – 09:00	Registration	Poster Room
09:00 – 09:10	WELCOME SPEECH <i>Dr YC Po</i>	EXHIBITION AND POSTERS
09:10 – 09:50	KEYNOTE LECTURE I Surgery for Trigeminal Schwannoma <i>Prof Yong-kwang Tu</i> Chairpersons: <i>Dr Dawson Fong, Dr YC Po</i>	
09:50 – 10:30	KEYNOTE LECTURE II Treatment Strategy in Acoustic Neuroma <i>Prof Basant K Misra</i> Chairpersons: <i>Dr TS Tse, Dr CP Yu</i>	
10:30 – 11:00	Tea Break	
11:00 – 12:00	FREE PAPER I Chairpersons: <i>Dr HM Chiu, Dr SC So</i>	
12:00 – 12:30	FREE PAPER II Chairpersons: <i>Dr Wilson Ho, Dr Daniel Ng</i>	
12:30 – 13:40	Lunch — Shanghai Room on 8/F	
13:40 – 14:20	KEYNOTE LECTURE III Current Trends in the Management of Petroclival Meningioma <i>Prof Basant K Misra</i> Chairpersons: <i>Dr CF Fung, Dr KY Yam</i>	
14:20 – 15:00	KEYNOTE LECTURE IV Far Lateral Approach for Foramen Magnum and Jugular Foramen Lesions <i>Prof Yong-kwang Tu</i> Chairpersons: <i>Dr YT Kan, Dr HT Wong</i>	
15:00 – 15:25	Tea Break	
15:25 – 16:15	FREE PAPER III Chairpersons: <i>Dr KY Chan, Dr ST Chan</i>	
16:15 – 17:00	PANEL DISCUSSION ON SKULL BASE SURGERY BY ALL GUEST SPEAKERS Chairpersons: <i>Dr Gilberto Leung, Dr WK Wong</i>	
Venue for ASM Gala Dinner: 8/F, Shantung Room, Cordis Hong Kong at Langham Place		
18:00 – 19:00	Cocktail Reception	
19:00 – 21:00	ASM GALA DINNER & LECTURE <i>Mr James Tien</i>	

26 NOVEMBER 2016, SATURDAY

08:30 – 09:00	Registration	Poster Room
09:00 – 09:40	KEYNOTE LECTURE V Microsurgery of Complex Intracranial Aneurysms <i>Prof Basant K Misra</i> Chairpersons: <i>Dr Joseph Lam, Prof W Poon</i>	EXHIBITION AND POSTERS
09:40 – 10:20	KEYNOTE LECTURE VI Management of Dural Arteriovenous Fistula <i>Prof Yong-kwang Tu</i> Chairpersons: <i>Dr John Kwok, Dr WM Lui</i>	
10:20 – 11:00	Tea Break	
11:00 – 12:00	FREE PAPER IV Chairpersons: <i>Dr KH Chan,</i> <i>Dr Michael Lee</i>	VENUE: BALLROOM III NURSING SESSION Synergy in Neurosurgical Nursing Chairpersons: <i>Ms HY Ho,</i> <i>Mr ML Ng</i>
12:00 – 12:32	FREE PAPER V Chairpersons: <i>Dr KM Cheng,</i> <i>Dr ST Wong</i>	
12:32 – 12:40	Group Photo for All	
12:40 – 13:40	Lunch Buffet — Shanghai Room & Shantung Room on 8/F	
13:40 – 14:20	KEYNOTE LECTURE VII Long-term Results of High-flow Cerebral Revascularisation <i>Prof Yong-kwang Tu</i> Chairpersons: <i>Dr PH Chan, Dr SC Yuen</i>	
14:20 – 15:00	KEYNOTE LECTURE VIII Decision Making in the Management of Cerebral Arteriovenous Malformations <i>Prof Basant K Misra</i> Chairpersons: <i>Dr YW Fan, Dr CK Wong</i>	
15:00 – 15:25	Tea Break	
15:25 – 16:05	FREE PAPER VI Chairpersons: <i>Dr WM Hung, Dr Vincent Pang</i>	
16:05 – 16:50	PANEL DISCUSSION ON UNRUPTURED CEREBRAL ANEURYSMS BY ALL GUEST SPEAKERS Chairpersons: <i>Dr KM Leung, Dr Derek Wong, Prof George Wong</i>	
16:50 – 17:00	Lucky Draw and Concluding Remarks	

Extracranial-intracranial Bypass and Craniofacial Resection for Complex Skull Base Tumour Involving the Internal Carotid Artery

FP 1.1

Carol PY Chien, Anderson CO Tsang, Frederick CP Tsang, WS Ho, Gilberto KK Leung, WM Lui
Division of Neurosurgery, Department of Surgery, Queen Mary Hospital, Hong Kong SAR

Objective: Skull base tumours involving internal carotid artery (ICA) were traditionally deemed inoperable. We report on the surgical outcome, neurosurgical perspective and challenges of performing extracranial-intracranial (EC-IC) bypass for ICA sacrifice, followed by radical craniofacial resection for complex skull base tumours.

Methods: Patients treated with EC-IC bypass and ICA sacrifice followed by radical craniofacial resection from January 2004 to June 2016 were retrospectively reviewed for the surgical and oncological outcomes, as well as neurosurgical complications.

Results: A total of 26 patients (19 were male) with a mean age of 50 years were included. The mean follow-up period was 24.1 months. Most patients were treated for nasopharyngeal carcinoma (57.7%) and adenocarcinoma of paranasal sinus (11.5%). Early postoperative bypass graft patency rate was 88.5%, and the figure being 78.3% at 6 months postoperation. Clear resection margin was achieved in 42.3% of patients. One-year and 2-year survivals were 84% and 68%, respectively. Significant neurological complication requiring unplanned reoperation occurred in 50% of patients, with cerebrospinal fluid leak being most common (n=4), followed by ischaemic stroke (n=3), bypass graft narrowing (n=2), haemorrhagic stroke (n=2), and hydrocephalus (n=2). Tumour with dura and brain parenchymal involvement, ICA encasement, and those requiring brain resection appeared to be at risk for surgical complication.

Conclusion: EC-IC bypass followed by radical craniofacial resection represents a last resort for complex tumours of the skull base refractory to non-surgical therapies. This procedure, however, carries high operative risk and morbidity and should be performed in highly selected patients with reasonable expected survival.

Glioblastoma and Its Relationship with the Subventricular Zone—A Multicentre Retrospective Study

FP 1.2

Jason MK Ho^{1,2}, Peter YM Woo¹, Danny TM Chan³, ST Wong², WK Wong⁴, YC Po⁴, KY Yam², HM Chiu⁵, KY Chan¹, WS Poon³

¹ Department of Neurosurgery, Kwong Wah Hospital, Hong Kong SAR

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Glioblastoma is the commonest primary malignant tumour in adults. In spite of advances in the treatment and biomarker subclassification of these tumours in the past 20 years, the prognosis remains poor. Recent studies have advocated the neural stem cell theory in which the subventricular zone could play a role in gliomagenesis and recurrence.¹ We aimed to validate the proposed Chaichana's glioblastoma multiforme (GBM) classification system² founded on this theory, to determine overall survival in the local setting, and to identify risk factors for recurrence.

This was a multicentre retrospective study of consecutive patients with an established diagnosis of glioblastoma from 1 January 2008 to 31 December 2014. Assessments of clinical and drug records as well as radiological assessments were performed.

Data from over 300 GBM patients from five neurosurgery centres in Hong Kong, as well as the conclusion will be discussed.

References

1. Lim DA, Cha S, Mayo MC, et al. Relationship of glioblastoma multiforme to neural stem cell regions predicts invasive and multifocal tumor phenotype. *Neuro Oncol* 2007;9:424-9.
2. Chaichana K, Parker S, Olivi A, Quiñones-Hinojosa A. A proposed classification system that projects outcomes based on preoperative variables for adult patients with glioblastoma multiforme. *J Neurosurg* 2010;112:997-1004.

Venous Preservation in Parasagittal Meningioma Resection: Recurrence and Outcome

Remy SL Hung, Tony KT Chan, Simon SW Lee, WK Wong, YC Po
Department of Neurosurgery, Princess Margaret Hospital, Hong Kong SAR

Objectives: To evaluate the effect on outcome and recurrence rate of a venous preservation approach in parasagittal meningioma resection.

Methods: A retrospective single-centre review was conducted on 38 patients with parasagittal meningiomas undergoing primary resection from January 2007 to June 2014.

Results: Mean age of patients was 60 years. In all, 29% of the parasagittal meningiomas were located adjacent to anterior third superior sagittal sinus, 63% at mid-third, and 8% at the posterior third. Tumour size ranged from 2.5 cm to 9 cm in diameters. Eleven patients had Sindou V-VI tumours, 12 Sindou II-IV tumours, and 14 Sindou I tumour. Besides, 20 patients had World Health Organization (WHO) grade I meningioma and 18 had WHO grade II tumour. There was no 3-month mortality and morbidity rate was 10.5%. Recurrence rate was 10.5%. Mean follow-up period was 53 months.

Conclusion: Resection of parasagittal meningiomas with a venous preservation approach is a safe alternative with reasonably good tumour control to radical resection with/without venous reconstruction.

Stereotactic Radiosurgery Plus Whole-brain Radiotherapy Versus Surgery Plus Whole-brain Radiotherapy for Brain Metastasis—Ten Years' Result in Single Institute

CY Hung, Michael WY Lee, CK Wong
Department of Neurosurgery, Pamela Youde Nethersole Eastern Hospital, Hong Kong SAR

Objectives: To compare the treatment outcome of stereotactic radiosurgery (SRS) plus whole-brain radiotherapy (WBRT) versus surgery plus WBRT for brain metastasis.

Methods: This is a 10-year retrospective review of outcome of patients with brain metastasis receiving either SRS plus WBRT or surgery plus WBRT from 2006 to 2015 in Pamela Youde Nethersole Eastern Hospital. Data were retrieved from electronic patient record. Potential factors that might affect outcome were analysed, including age, Eastern Cooperative Oncology Group performance status score, recursive partitioning analysis (RPA) class, primary tumour, number of metastasis, extracerebral metastasis, and WBRT schedule. These potential factors were evaluated for effect of overall survival (OS) and local control (LC). OS and LC rates of treatment groups was compared with Kaplan-Meier (KM) curve.

Results: There were 23 cases for SRS group and 63 cases for surgery group. Mean age for each group were both 60 years. In all, 78.3% of SRS group and 76.2% of surgery group had RPA classes 1 and 2. The most common primary source of brain metastases was carcinoma of lung. Besides, 95.7% of SRS group and 100% of surgery group had one to three brain metastases. Extracranial metastasis was absent in 65.2% of SRS group and 61.9% in surgery group. The mean OS were 18.78 months in SRS group and 17.25 months in surgery group (Student's *t* test, $P=0.765$), while the corresponding mean LC being 14.09 months and 15.95 months (Student's *t* test, $P=0.713$). Further analyses for association of various factors with OS and LC, as well as KM curve will be presented.

Conclusions: SRS and surgical treatment for brain metastasis did not have significant difference in terms of OS and LC rates.

Simpson Grading Revisit. Retrospective Review of Recurrence Rate of Meningioma after Surgical Excision

FP 1.5

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Objective: Dr Donald Simpson published 'The recurrence of intracranial meningiomas after surgical treatment' in 1957 in which he emphasised the completeness of surgical clearance and classified it into five grades. Until now we still utilise Simpson grading to gauge the extent of excision in intracranial meningioma surgery. One of the major implications of Simpson grading is recurrence. However, other factors especially the histological grading are also important in determining the recurrence rate. This retrospective review aimed to examine if Simpson grading is still fully reproducible and applicable to current practice and to include other factors to the prediction of recurrence after surgery for intracranial meningioma.

Methods: Patient data with intracranial meningioma between 2008 and 2011 with follow-up time at least up to 5 years were retrieved. Only those patients who underwent surgical excision with histological proof were included. Intraventricular, spinal, intraocular, and neurofibromatosis 2 patients were excluded. Patients' demographics, tumour location, histological grading, resection grading, and tumour recurrence were documented and analysed. Resection grading was assessed by description on operative record and postoperative imaging. Adjunctive treatments including radiotherapy and radiosurgery were also documented. Recurrence was defined as increase in tumour size as evident in subsequent magnetic resonance imaging.

Results: A total of 147 consecutive patients with intracranial meningioma who underwent operations for tumour excision were included. Mean follow-up time was 80 months. There was a female predominance of 70%, and the mean age was 59 (range, 22-91) years. More than two thirds of operations achieved radical resection (Simpson grade I or II). In all, 75%, 22% and 3% of patients had World Health Organization (WHO) histological grade I, II and III meningioma, respectively. Overall recurrence rate was 30.6%. Recurrence rates for Simpson grading I/II/III/IV were 8%, 33.3%, 41.7% and 37.1%, respectively. The recurrence rates of WHO histological grade I/II/III were 17.3%, 66.7% and 100%, respectively ($P < 0.001$). Histological grading but not the resection grading was identified as independent predictor.

Conclusion: Our series could not demonstrate a clear relationship between recurrence rate and Simpson grading as previously described. Histological grading, on the other hand, was a significant predictor for recurrence.

Histopathology Classification of Meningioma (World Health Organization Grade I/II) and Its Clinical Profile Correlation

FP 1.6

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Background: The criteria for meningioma grading were renewed in the revised 2016 World Health Organization (WHO) classification of tumours of the central nervous system. Specifically, brain invasion has become an important grading feature to provide better prognostic and therapeutic implications. We reviewed our meningioma case series to study the significance of brain invasion on their clinical behaviour.

Methods: From January 2006 to December 2015, patients with meningioma resected in Tuen Mun Hospital were identified from operation logbooks. Operation records and histopathology reports were reviewed. Patients with intracranial meningioma were included. Those with WHO grade III meningioma or spinal meningioma were excluded. All patients were followed up till the present or death. Recurrence and survival rates were used to assess the outcome.

Results: A total of 273 patients (median age, 56 years) were identified from record. In all, 201 patients were classified into WHO I group and 26 into WHO II group. There were nine fibrous, one secretory, two angiomatous, one metaplastic, and one transitional meningioma in WHO I group, whereas there were three chordoid and 22 atypical meningiomas in WHO II group. Histologically, brain invasion, Ki-67 value, and mitotic figure were reviewed. Three brain invasion cases were classified into WHO II group and one into WHO I group. Three of them were histologically benign, and none of these four cases needed reoperation. In WHO II group, 52% of patients received adjuvant radiotherapy after first operation. The reoperation rate was 32% and 5-year survival rate was 80%. Median Karnofsky Performance Scale status score was 80 at last follow-up.

Conclusion: Brain invasion is a rare histopathological feature. From our limited data, we suggest that it is not a poor prognostic indicator for recurrence in meningioma. We were unable to determine statistical significance due to the rarity of such cases.

Diversity of Tumour Pathology in the Pineal Region, a Review of Pathology and Evolving Minimally Invasive Surgical Approach

FP 2.1

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Tumours in the pineal region often present as obstructive hydrocephalus. We reviewed all the tumour cases (with negative tumour markers) in this region between the period of 1 January 2011 and 31 October 2016. The pathology, surgical approach, and clinical outcomes were assessed.

Validation of Unruptured Intracranial Aneurysm Treatment Score in Southern Chinese

FP 2.2

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Objectives: To validate the unruptured intracranial aneurysm (UIA) treatment score in a local Southern Chinese population.

Methods: This is a single-centre retrospective review to validate the recently proposed UIA treatment score published in *Neurology* in 2015. Patients were recruited from Radiology Information System III of Kwong Wah Hospital, from June 2015 to June 2016, using the keyword search of 'aneurysm' among all CTA/MRA/DSA within the period. Patient demographics, aneurysm details, and intervention-related risks were collected from Clinical Management System. The UIA treatment score was calculated for each aneurysm.

Results: A total of 307 patients were identified, with a mean follow-up period of 2.5 years. Our centre had a lower threshold for UIA repair, while maintaining a low percentage (~1%) of intervention-related risks. Besides, the median size of ruptured aneurysms in our series was 5 mm, and 40% of them were <4 mm in diameter.

Conclusions: The UIA treatment score correlated fairly with our findings. However, we had lower intervention-related risks and there was a significant proportion of ruptured aneurysms of <4 mm. Therefore, we suggest shifting down aneurysm size categories in aneurysm domain and reducing the constant of five points in intervention-related risks.

Management of Subarachnoid Haemorrhage due to Ruptured Intracranial Aneurysms: A Dual-centre Review

FP 2.3

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Objectives: With the publication of the International Subarachnoid Aneurysm Trial (ISAT) in 2002, endovascular coiling has been gaining popularity as a choice of treatment for ruptured intracranial aneurysms resulting in subarachnoid haemorrhage (SAH). However, the accepted standard of neurosurgical clipping is still widely practised and sometimes the preferred modality of treatment due to variations in logistics, manpower, or resources. Hence, we reviewed and compared clinical characteristics and outcomes of acutely ruptured aneurysms treated in two local centres with predilection for surgical clipping and endovascular embolisation.

Methods: A retrospective review of consecutively treated ruptured aneurysms from 1 January 2012 to 30 April 2016 in Kwong Wah Hospital (KWH) and Tuen Mun Hospital (TMH) was conducted. Baseline characteristics concerning patient demographics, location of aneurysm, mode of treatment, and SAH grading were collected. Primary outcome was defined as functional dependence and death as charted by modified Rankin Score at 6 months. Secondary outcomes included rebleeding, residual aneurysm, and reruptured aneurysms that required intervention on subsequent follow-up. Complications including vasospasm, seizures, development of cerebral salt wasting, and hydrocephalus were also compared.

Results: During the study period, 112 ruptured aneurysms were treated in KWH and 151 in TMH. Surgical clipping was the allocated management in 19 (17.0%) patients in KWH and 120 (79.5%) in TMH. Patient demographics were similar. Univariate and multivariate analyses did not reveal any significantly different factors affecting clinical outcome and risk profiles.

Conclusions: In agreement with ISAT findings, ruptured aneurysms treated by endovascular coiling did not have worse clinical outcomes or worse risk profiles compared with neurosurgical clipping. Understandably, these findings are heavily confounded by differences in clinical practices in the two centres.

Persistence of Aneurysms after Pipeline Embolisation Device—A Local Centre's Experience

FP 3.1

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This study aimed to identify the factors affecting persistence of aneurysms after pipeline embolisation device (PED) deployment.

A retrospective review of 170 patients from 2012 was conducted. The aneurysm obliteration rate will be reported. Factors affecting failure of PED, including location of aneurysm, morphology, dome-to-neck ratio, adequacy of coverage of aneurysm by the stent, any incorporation of branch vessel into aneurysm, and presence of pre-existing stent were studied.

A total of 118 patients were identified from the Kwong Wah Hospital neurovascular registry. In all, 125 aneurysms were identified in these patients and had been treated with PED. The follow-up time ranged from 0.5 to 4 years with digital subtraction angiogram or computed tomographic angiogram. Residual aneurysms were found in 25.6% of these aneurysms. The factors involved will be analysed and results are pending.

Awake Craniotomy for Excision of Arteriovenous Malformations. Technical Challenges, Surgical Safety, and Treatment Outcomes

FP 3.2

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Objectives: Treatment of high-grade arteriovenous malformations (AVMs) located at an eloquent area has been a challenge. Awake brain mapping allows identification of a non-eloquent gyrus for intervention and potentially 'downstage' an AVM by one grade. This study aimed to review the surgical outcome and complications of this procedure.

Methods: We conducted a 13-year retrospective review of AVMs excision under awake craniotomy performed at Prince of Wales Hospital, Hong Kong, from 2003 to 2016. Patients' presentation, Spetzler-Martin (SM) grading, complications, and outcome were reviewed and analysed.

Results: Six patients had excision of AVMs under awake mapping during the study period. Five presented with intracranial haemorrhage while one presented with seizures. Two had SM grade II and four had SM grade III. Five were located at the periorolandic region while one located at the temporal language area. None had failed mapping. There was no intra-operative seizure. All cases with SM Grade II had complete excision of AVMs with no new neurological deficit, whereas three (75%) cases with SM Grade III had complete excision of AVMs. One had intra-operative haemorrhage with new neurological deficit. One SM Grade III had subtotal excision. There was no mortality. Five (83.3%) had improvement in functional outcome in terms of modified Rankin Scale. None had rebleeding or new neurological deficit during a mean follow-up period of 45 months.

Conclusions: Awake mapping in carefully selected patients with AVMs at the eloquent area could potentially 'downstage' the grading, making a high-risk excision safer, and an inoperable AVM operable.

Endovascular Treatment for Acute Ischaemic Stroke: Review of a Single-centre Experience

FP 3.3

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Endovascular treatment has been established as an effective therapy for acute ischaemic stroke caused by proximal intracranial occlusion. Variability in treatment protocols exists among recently published clinical trials, however, timely successful reperfusion has been shown to improve clinical outcome. By studying into each critical step of patients undergoing endovascular treatment, we aimed to review the workflow of our current practice, in particular to investigate the factors influencing clinical outcome.

This is a retrospective review of all patients admitted for acute ischaemic stroke due to proximal intracranial occlusion with endovascular treatment performed from January 2013 to May 2016. The angiogram findings, endovascular treatment technique, workflow time interval (stroke onset to hospital arrival, computed tomography suite, groin puncture, reperfusion), neurological outcome, and complications were studied. Primary outcome was assessed using the modified Rankin scale at 90 days.

A total of 28 patients aged from 46 to 81 years were included. Median stroke-to-puncture time interval was 223 minutes. Complete recanalisation was achieved in 19 (68%) patients. The overall mortality rate was 10.7%. Further analysis will be discussed.

Treatment Outcomes of Unruptured Brain Arteriovenous Malformations with Respect to the ARUBA (A Randomised trial of Unruptured Brain Arteriovenous malformations) Study: A Regional Retrospective Review

FP 3.4

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Objectives: To review the treatment outcomes of arteriovenous malformations (AVMs) with respect to the ARUBA (A Randomised trial of Unruptured Brain Arteriovenous malformations) study in our institution.

Methods: Patient data with a diagnosis of congenital vascular malformation admitted between January 2010 and December 2015 were retrieved. Those with a diagnosis of arteriovenous fistula or cavernoma, a history of haemorrhage or untraceable history back in the 1990s were excluded. The Spetzler-Martin grading of the AVMs, treatment methods, and complications were documented. Outcomes of these patients by modified Rankin Scale scores and mortality were investigated. Obliteration was defined as no residual nidus seen on either magnetic resonance angiogram or digital subtraction angiogram.

Results: A total of 108 patients were included in the study, of whom 40 had unruptured AVMs diagnosed since January 2010 with a mean follow-up of 40 months. Initial treatments included medical treatment in 40% (n=16), radiosurgery in 25% (n=10), surgical excision in 20% (n=8), and embolisation in 15% (n=6) of cases. In all, 72.5% of AVMs had Spetzler-Martin grade 1 or 2. Treatment outcomes were similar in all treatment groups. There were no mortality but one episode of rupture in the embolisation group and finally requiring surgical excision. Obliteration rates was only 40% in the radiosurgery group and none in the embolisation group.

Conclusions: Unruptured AVMs with low Spetzler-Martin grading could be safely treated with surgical method with no increase in morbidity or mortality. Interventional therapy did not result in higher stroke or death rates compared with medical management.

Outcome of Endovascular Treatment in the Management of Traumatic and Spontaneous Carotid-cavernous Fistula: A Single-centre Review

FP 3.5

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Objectives: We primarily aimed to explore the angiographic cure rate and clinical outcomes of consecutive carotid-cavernous fistulas (CCFs) treated in our centre using endovascular therapy.

Methods: In this single-centre retrospective study, consecutive patients with a CCF treated in our institution between 1 January 2010 and 31 December 2015 were recruited. All patients were evaluated by our endovascular team for their feasibility of treatment and preferred endovascular approach. Demographics, presentation, technical results, complications, and subsequent long-term clinical and angiographic follow-up were collected.

Results: Among the 32 patients identified, 14 had CCFs on the right, 15 on the left, and three had bilateral CCFs. The most common presenting symptom was ophthalmological symptoms of proptosis, chemosis, and reduced visual acuity. None of the patients had undergone previous surgery or radiotherapy for their CCFs before the study. Successful cannulation either transarterially or transvenously was achieved in 91% (n=29) of our patients.

Conclusions: While both transarterial and transvenous approaches are feasible, transarterial approach is still the preferred route of choice for direct fistulas, whereas transvenous embolisation is becoming the preferred approach for indirect fistulas due to its higher obliteration success rate and long-term durability.

Angiographic-negative Subarachnoid Haemorrhage—Data from a Local Neurosurgical Centre and Review of Literature

FP 4.1

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Objective: To determine the rate, clinical course, and outcome of patients with angiographic-negative subarachnoid haemorrhage (SAH) in Tuen Mun Hospital (TMH), and to compare with the results from literature.

Methods: Patients with spontaneous SAH known to Department of Neurosurgery of our hospital and symptom onset within 72 hours from August 2014 to July 2016 were recruited. Patients without angiographic work-up were excluded. The clinical records and imaging were retrospectively analysed for presenting grades, blood distribution in plain computed tomographic scan, as well as angiographic findings and outcomes. English literature was searched from MEDLINE database.

Results: A total of 64 patients were recruited, with eight (12.5%) having initial negative finding in digital subtraction angiography (DSA). The SAH distribution was perimesencephalic in two, cortical in two, and diffuse in four cases. All of them had repeat DSA. One patient in the diffuse SAH group was noted to have an aneurysm upon repeat DSA (ie 12.5% false negative rate of the initial DSA). Those with angiographic-negative SAH had a significantly different SAH pattern (P=0.017) and better outcomes (P=0.021) at 3 months. The result concurred with international studies. In view of very low false negative rate of repeat DSA in patients with perimesencephalic type of SAH, repeat DSA was not necessary for this group of patients.

Conclusion: In conclusion, 12.5% of spontaneous SAH patients belonged to the initial angiographic-negative group, which had different SAH patterns and better outcome. The yield of repeat DSA was very low in those patients with perimesencephalic SAH pattern. Repeat DSA was not necessary for this group of patients.

Knowledge and Expectations of the General Public in Hong Kong on the Symptomatology, Risk Factors, and Contemporary Management of Acute Stroke

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Stroke is one of the leading causes of disability and death locally. As a result, emphasis has been placed on public education to foster early detection of the symptoms with a view to expedite access to treatment and improve outcome. Yet there have been few studies in evaluating the public's capacity to absorb and apply such vital information. We aimed to assess and evaluate the general public's knowledge and expectations on contemporary stroke treatment, to identify knowledge gaps, as well as investigating correlations between demographics, social and medical history on their perception of stroke.

A questionnaire survey was conducted on a convenient sample of 462 patients recruited in the surgical out-patient department of Queen Mary Hospital. They completed a questionnaire containing 17 multiple-choice questions on the symptomatology and risk factors of stroke and action that might be taken when they suspected themselves of suffering from one.

Results of this study will be discussed. We hope to provide insights on the general public's current perception on stroke, and to propose a more comprehensive stroke education programme tailored for the needs of different population subgroups.

Transluminal Angioplasty for the Treatment of Cerebral Vasospasm Following Subarachnoid Haemorrhage: A Ten-year Retrospective Review

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Objective: To report the outcome of patients with cerebral vasospasm following subarachnoid haemorrhage treated with transluminal angioplasty.

Methods: A retrospective review of 26 patients treated with transluminal angioplasty between January 2004 and October 2014 was conducted. Vasospasm was manifested either as clinical deterioration (reduction in Glasgow Coma Scale and/or limb power, or emergence of other new-onset focal neurological signs including homonymous hemianopia) and/or accelerating transcranial Doppler velocities. All patients had definite vasospasm affecting at least one large intracranial artery confirmed with angiography. The majority of patients underwent transluminal angioplasty in 6 hours after confirmation with angiography.

Results: Over 50% of patients with clinically evident neurological signs of delayed cerebral ischaemia had corresponding improvement or resolution within 10 days of angioplasty. Of those in whom new-onset focal neurological signs were absent but accelerated transcranial Doppler velocities were demonstrated, around 65% showed non-inferior clinical status (in terms of Glasgow Coma Scale and limb power) within 90 days of angioplasty compared to pre-vasospasm states. Improvement in transcranial Doppler velocities was demonstrated by serial measurements in the first few days immediately after angioplasty. Radiological outcomes (with computed tomographic brain) and complication rates were also assessed.

Conclusion: Transluminal angioplasty confers benefits to patients who sustained a subarachnoid haemorrhage developing new-onset focal neurological signs and/or demonstrating increasing transcranial Doppler velocities attributable to delayed cerebral ischaemia secondary to vasospasm.

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Objectives: Atherosclerotic intracranial arterial stenosis is an important cause of ischaemic stroke. It has been increasingly treated with percutaneous transluminal angioplasty and stenting to prevent recurrent stroke. Meanwhile, carotid artery stenting is an alternative in the management of extracranial carotid occlusive diseases. We performed a prospective study of both intracranial and extracranial stenting in our centre on the clinical outcome as well as possible risk factors for recurrent/in-stent stenosis of these patients.

Methods: All patients having elective intracranial or extracranial stenting from January 2012 to March 2016 were reviewed. All patients were followed up with a 6-month cerebral angiography to study the status of the stent. Clinically most of the patients were followed up for at least 1 year. Data regarding the location of stent, restenting, risk factors of recurrent stenosis, complications, and outcomes were collected and studied.

Results: A total of three female and 28 male patients were recruited, with 39 stents deployed. Among these, 12 were intracranial and 27 were extracranial. Three patients required another stent deployment due to in-stent stenosis within 1 year after initial stenting. None of them had disabling stroke/death within 30 days of stenting. Two patients experienced same-side symptomatic secondary haemorrhagic stroke within 1 year after initial stenting (1 extracranial, 1 both intracranial and extracranial as 2 stents), otherwise no other secondary bleeding complications noted which was less than international studies for post-intervention stroke/death rate for stenting (1%-4%) or endarterectomy (1%-5%). Restenosis rate for intracranial artery stenting was 16.7%, comparable to the international standard (7.5%-29.7%), whereas the figure for extracranial carotid artery stenting was 14.2% also comparable to other international studies (0.5%-14%) but slightly higher when compared with carotid endarterectomy (0.7%-7.9%).

Conclusion: Intracranial stenting in our centre was comparable to international studies while extracranial stenting was at least not inferior to endarterectomy upon surgical risks with a possible slightly higher stenosis rate.

A Prospective, Territory-wide, Observational Study of External Ventricular Drains Outcome and Complication after Introduction of Antibiotics and Silver-impregnated Catheters in Hong Kong (The HKNS EVD Study)

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Objective: External ventricular drainage (EVD) is one of the most common neurosurgical procedures. The efficacy of antibiotics and silver-impregnated catheters in routine clinical setting and their impact on EVD-related complications is uncertain. The Hong Kong Neurosurgical Society initiated a prospective, territory-wide, multi-centre cohort study on EVD infection and complications in all public neurosurgical centres.

Methods: Patients requiring EVD from January to December 2015 in public neurosurgical centres were recruited. Choice of EVD catheters depended on surgeon's discretion. Clinical and surgical data were prospectively collected. EVD-related infections and complications were studied. Risk factor analysis for complications was performed.

Results: A total of 500 EVDs were included from seven public neurosurgical centres: 48% were conventional catheters, 40% antibiotics-impregnated, and 12% silver-impregnated. Stroke (61%), tumour (17%), and trauma (15%) were the most common indications for EVD. The mean duration of EVD was 8.7 days. The EVD-related infection rate was 1.4% (1.5% of impregnated catheters vs 1.3% of conventional catheters; P=0.78). Other complications included blockage (5%), malposition (1.6%), tract haematoma (0.8%), dislodgement (0.6%), and cerebrospinal fluid leak (0.2%), leading to an overall complication rate of 9.6%. There was no significant difference in complication rate between types of catheters.

Conclusion: In this territory-wide prospective cohort study, EVD-related infection rate was low at 1.4% in public neurosurgical units in Hong Kong. Our data suggested that usage of antibiotics or silver-impregnated catheters were safe but did not appear to further reduce infection rate. The non-randomised nature of this study limits definitive conclusion regarding the clinical benefit of impregnated catheters over conventional catheters.

Case Series of Surgical Decompression for Cervical Spinal Involvement in Mucopolysaccharidosis IVA (Morquio-Brailsford or Morquio A Syndrome)

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Mucopolysaccharidosis IVA (MPS IVA), also known as Morquio A syndrome, is a lysosomal storage disorder caused by deficiency of enzyme N-acetylgalactosamine-6-sulphate sulphatase. MPS IVA is multisystemic but manifests primarily as progressive skeletal dysplasia. Cervical spinal involvement is a major cause of morbidity and mortality in patients with this condition. In severe cases, paralysis from cervical myelopathy contributes to a shortened lifespan, often in the second or third decade. In contrast, patients with attenuated MPS IVA may have normal or near-normal life expectancies. Early diagnosis and timely treatment of cervical spine problems are therefore critical in preventing neurological deterioration and loss of function.

Three cases of cervical spinal manifestations of MPS IVA were retrospectively studied. The clinical presentation, preoperative radiography, computed tomography, and magnetic resonance imaging were analysed. Surgical intervention, operative technique, anaesthetic considerations, and the use of neurophysiological monitoring were reviewed. Surgical outcome was assessed. Results of this study will be discussed.

Lateral Lumbar Interbody Fusion—Five-year Clinical Experience

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Objective: To review the clinical experience with lateral lumbar interbody fusion (LLIF), a new surgical approach in spinal fusion.

Methods: Prospective audit record of first 100 cases of LLIF performed in 5 years by the author were reviewed to assess the effectiveness, safety profile, optimal indication, potential complications, and methods to improve clinical outcome.

Results: Direct lateral lumbar interbody fusion (DLIF) and oblique lateral lumbar interbody fusion (OLIF25) were similar minimally invasive spinal fusion techniques using the lateral and anterolateral retroperitoneal approach to reach the side of the lumbar intervertebral disc. The surgical procedure will be presented. The risks of lumbar plexus injury were markedly reduced with the use of intra-operative electrophysiology monitoring and oblique approach. Standalone cage without supporting screw fixation was adopted in selected cases. These techniques could be combined and without direct decompressive laminectomy, facetectomy or foraminotomy. Over the last 5 years, 33 DLIF and 64 OLIF25 were performed without assistant surgeon. The mean (range) age was 65 (40-88) years with single-level in 69, two-level in 27, three-level in one. In all, 23 cases were with standalone cage and 74 with screw fixation. No patient deteriorated in mobility after surgery. Over 90% of the patients were satisfied with the outcome and symptomatic relief. Complications and treatment will be discussed.

Conclusions: LLIF is an effective and safe approach in lumbar interbody fusion. There is a learning curve in OLIF25 and DLIF. Accumulation of experience will help judging cases to be treated without direct decompression and with standalone cage, and how to place the cage in optimum position.

Mild Traumatic Brain Injury Patients with Post-concussion Symptom have a Reduced Incidence of Returning to Work: A Prospective Cohort Study with Risk Factor Analysis and Six-month Clinical Outcome Investigation

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Objectives: To investigate if post-traumatic work ability could be affected by the presence of post-concussion symptom (PCS) and to identify risk factors correlated with PCS outcome in mild traumatic brain injury (mTBI) patients.

Methods: In this prospective cohort observational study, patients with mTBI admitted to Prince of Wales Hospital during 2011 and 2015 were recruited. A total of 267 patients presented with mTBI defined by a Glasgow Coma Score of 13 to 15 were enrolled into the study. Patients were divided into PCS or non-PCS group. Statistical analysis was performed using the SPSS 23.0 and Prism 7.0.

Results: Proportion of work-related injury cases, patients aged <40 years, and mean (\pm standard deviation) length of hospital stay were significantly higher in the PCS group (28.7% vs 9.8%, $P=0.0001$; 71.3% vs 51.4%, $P=0.0026$; 6.20 ± 6.05 days vs 4.93 ± 4.34 days, $P=0.039$). At 6 months post-mTBI, only 63.8% of patients in the PCS group returned to work when compared with 86.1% in non-PCS group ($P<0.0001$). In addition, 76.6% of patients in the PCS group had their work ability impaired, compared with 34.7% in the non-PCS group ($P<0.0001$).

Conclusions: Patients presented with PCS had reduced work ability 6 months postoperatively. Younger age and injury at work might prompt a higher risk of PCS.

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Survey on Non-surgical Management of Traumatic Brain Injury among Local Neurosurgeons

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Background: Traumatic brain injuries of mild-to-moderate severity account for the majority of neurosurgical admissions in Hong Kong. Many of these patients are treated conservatively. There is lack of consensus on the use of anticonvulsant, haemostatic medications, as well as the timing and need for subsequent radiological follow-up.

Methods: All members of the Hong Kong Neurosurgical Society were invited to complete an online survey from August to October 2016. Standard case scenarios of patients from different age-groups were presented. Questions on timing, indication, and choice of anticoagulant reversal agents, use of anticonvulsants, and schedule of subsequent follow-up were asked.

Results: Results from 43 respondents (58% specialists, 42% trainees) were collected to date. Among these, 95% practised in public hospitals in which all seven centres were represented. Majority of surgeons would not give tranexamic acid or prophylactic anticonvulsant, regardless of pre-existing antiplatelet or anticoagulant use. Most would not transfuse platelet even though patient was on aspirin. If patient was on warfarin, partial prothrombin complex was the agent of choice for reversal. If patient was on dabigatran, 69% would like to give idarucizumab for reversal, however, this specific reversal agent was not available to 40% of respondents.

Conclusion: There were discrepancies in the non-surgical management practice of traumatic brain injury patients in Hong Kong among the local neurosurgical community. Further research into the efficacy and optimal choice of haemostatic agents in the setting of traumatic brain injury is warranted.

Chronic Subdural Haematoma: A Trainee's Perspective

FP 6.1

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Chronic subdural haematoma is one of the first neurosurgical procedures mastered by trainees newly embarked into training programme. In this retrospective study, we aimed to review the operative outcomes of chronic subdural haematoma drainage by a young neurosurgeon in their first year of training and identify factors which might predispose to complications.

A total of 23 chronic subdural haematoma drainages were performed from July 2015 to June 2016, with a follow-up period of up to 1 year. Six were bilateral and 17 were unilateral. Thirteen operations had specialist neurosurgeon scrubbed in, nine had fourth-year neurosurgeon scrubbed in, and a junior trainee operated alone in one operation. There were one case of residual haematoma, two recurrences, two postoperative seizures, and one reoperation.

In conclusion, the complication rate of surgery by local junior trainee fell within normal range compared with contemporary literature on chronic subdural haematomas. Although operation by trainee without specialist supervision seemed to increase the incidence of complication, this is confounded by patient factors such as history of the use of antiplatelet or anticoagulant agents. With new implementation of surgical competency assessments, it is hoped that better outcomes can be achieved for junior trainees in the future.

Combined Treatment of Baicalein and Low-dose Levodopa Improves Gait Deficits in Experimental Parkinson's Disease

FP 6.2

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Objective: Parkinson's disease (PD) is the second commonest neurodegenerative disease with the clinical characteristic of gait deficits. Low-dose levodopa (L-DOPA) is currently the standard treatment for PD. However, its therapeutic effect can be gradually lost and the associated side-effects are considerable. Traditional Chinese medicine has been studied for the treatment in PD. Baicalein is the major extract of *Scutellaria baicalensis* and has a neuroprotective effect. Therefore, this study aimed to investigate the effect of combined baicalein with L-DOPA (25 mg/kg) on the 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine-induced (MPTP-induced) PD murine model.

Methods: PD models were induced by daily intraperitoneal injection of 30 mg/kg MPTP into C57BL/6 mice for 5 days. The parkinsonian mice were treated with: (1) 10 mg/kg baicalein and L-DOPA (25 mg/kg; n=14); (2) L-DOPA only; and (3) high-dose L-DOPA (50 mg/kg; n=12). Gait assessment was quantified by the gait analysis using the computer-generated CatWalk System. Variations between the three treatment groups and the control group (MPTP alone) were analysed by one-way analysis of variance.

Results: The gait analysis suggested that the treatment outcome of the mice with baicalein and L-DOPA was comparable to those treated with high-dose L-DOPA ($P>0.05$). Both groups had significant improvements in gait deficits compared with the control group ($P<0.05$). In addition, the combined treatment had a significant improvement in gait deficits compared with the L-DOPA ($P<0.05$).

Conclusions: This study suggests that baicalein combined with L-DOPA had an ameliorative effect on parkinsonism and it might decrease the side-effects of high-dose L-DOPA.

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It is found that MicroRNAs are implicated in neuronal development and maturation. The neuronal maturation, including axon outgrowth and dendrite tree formation, is regulated by complex mechanisms and related to some neurodevelopmental disorders.

We demonstrated that one neuron-enriched microRNAs, miR-182, has a significant role in regulating neuronal axon outgrowth and dendrite tree formation. Overexpression of miR-182 promoted axon outgrowth and complexity of dendrite tree meanwhile increased the expression of neurofilament M and neurofilament L, which provides structural support for neurite outgrowth. However, a reduction in miR-182 had opposite effects.

In addition, we showed that miR-182 activated AKT pathway by increasing AKT phosphorylation at S473 and T308, and inhibiting PTEN activity through increasing phosphorylation at S380. Inhibiting AKT activity with the PI3-K inhibitor LY294002 could downregulate AKT and PTEN phosphorylation and suppress axon outgrowth. Furthermore, we showed that BCAT2 might be the target of miR-182 to take part in regulating neuronal maturation.

These findings indicate that miR-182 regulated axon outgrowth and dendrite early maturation involving activation of PTEN/AKT pathway.

Natural History of the Neck Remnant of Cerebral Aneurysm Treated with Endovascular Coiling in Tuen Mun Hospital

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Objectives: To study the natural history of coiled intracranial aneurysm in our hospital, and risk factors associated with recurrence or bleeding and salvage procedures employed in recurrence.

Methods: In this retrospective review of the endovascular coiling of cerebral aneurysm performed in Tuen Mun Hospital during 2010 to 2014, clinical information and long-term follow-up angiograms were obtained. Univariate and multivariate subgroup analyses were performed to identify risk factors.

Results: A total of 25 (22 ruptured, 3 unruptured) endovascular coilings were performed from 2010 to 2014 with a median follow-up of 3.4 years. In all, 84% aneurysms were <10 mm. Aneurysms were mainly over anterior communicating artery and internal carotid artery. Angiographic recurrence occurred in five patients with further management (3 clipping, 1 flow-diverter, 1 stent + coiling). Recurrences were associated with first follow-up digital subtraction angiography results according to Raymond-Roy occlusion classification but not other risk factors (neck or fundus size, co-morbidities, etc). Patients after endovascular coiling had satisfactory Mini-Mental State Examination and Modified Barthel Index scores.

Conclusions: Endovascular treatment of intracranial aneurysm is an effective and safe treatment with satisfactory follow-up results. Angiographic recurrence occurred in a minority of patients that can be managed with further surgery or endovascular treatment successfully.

See-saw Nystagmus in a Patient with a Giant Pituitary Macroadenoma: A Description of the Pathogenesis of this Rare Sign

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See-saw nystagmus is characterised by the cyclic movement of the eyes with a conjugate torsional component and a dissociated vertical component. In the first half of the cycle, one eye elevates and intorts while the other eye depresses and extorts. The movement pattern is reversed in the remaining half of the cycle. This is a rare ocular phenomenon with only 50 cases reported in the literature. We report a patient with a pituitary macroadenoma who presented with this sign.

A 55-year-old female was admitted for progressive drowsiness and headache over 1 month. Several months prior to admission, she began to develop oscillopsia and blurring of vision. Neuro-ophthalmic examination showed reduced bilateral visual acuity to 6/60 (Snellen reading chart). Visual perimetry revealed bitemporal hemianopia. Fundoscopy showed bilateral optic atrophy. The most striking feature was the presence of see-saw nystagmus with counter-clockwise torsion. Magnetic resonance imaging discovered a giant pituitary tumour extending to the parasellar region and compressing against the optic chiasm, optic tract, and mesodiencephalon.

Disturbance in the visuovestibular interaction system is postulated to contribute to see-saw nystagmus. Lesions compressing the optic chiasm and the accessory optic tract could lead to interruption in the transmission of retinal error signals to the inferior olivary nucleus. We postulate that this could interfere with the adaptive mechanism of the vestibulo-ocular reflex, giving rise to the development of see-saw nystagmus.

Chordoid Glioma : A Case Report and Review on Different Surgical Approaches

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Objective: To review different approaches for surgical excision of chordoid glioma and their potential complications.

Methods: We present a case of a 63-year-old female patient with chordoid glioma of the third ventricle. Two-staged operation was arranged for the patient. Respective postoperative magnetic resonance images and surgical outcomes were reviewed.

Results: The first-stage operation adopted interhemispheric translamina terminalis approach to the tumour. However, suboptimal exposure limited the surgical dissection and therefore subtotal excision was done. Postoperatively the patient had transient hypothalamic syndrome, but showed gradual improvement over time. Second operation employed the interhemispheric transcassal interforaminal approach to reach the third ventricle. Gross total excision was achieved but was complicated by postoperative diabetes insipidus. Optimal pharmacological therapy was adopted and the patient showed biochemical and clinical improvement.

Conclusion: We hereby postulate the use of interhemispheric translamina terminalis approach for small-sized tumour is a feasible option, but careful dissection is essential to reduce the chance of postoperative complications like hypothalamic syndrome and diabetes insipidus.

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Introduction: Whole-brain radiotherapy (WBRT) for one to three brain metastases has been extensively studied and shown to have limited survival benefits. Evidence of its efficacy, when compared with stereotactic radiosurgery (SRS) in patients with more than three cerebral metastases, is limited. Our study aimed to review the outcome and survival of all patients with more than three brain metastases treated by WBRT irrespective of systemic disease, and to compare our local results with the existing overseas literature.

Methods: This is a single-centre, retrospective study performed in a local tertiary teaching hospital. Patients with all types of cancer irrespective of systemic disease with more than three brain metastases treated with WBRT with no prior surgical or radiation therapy between 2011 and 2013 were included. Patient's cancer type, number and size of lesions, and complications were included. The Eastern Cooperative Oncology Group (ECOG) status and survival period were used as outcome measures.

Results: Over 200 patients were screened and at least 40 fulfilled the inclusion criteria. The mean survival period was approximately 6 months. No significant improvement in ECOG status before and after the WBRT was noted.

Conclusion: ECOG status showed no significant change with treatment. Compared to available data from the literature, our study did not suggest any superiority of WBRT compared with SRS in terms of survival benefits. Our study concluded that no significant ECOG improvement or survival benefits for WBRT was noted. A local comparison of the efficacy of WBRT and SRS for more than three brain metastases should be conducted in the future.

Incidence of Pathologically Confirmed Central Nervous System Neoplasms in New Territories West Cluster: An Epidemiological Study Based on 2000 Cases over 20 Years

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Objectives: To study the change in the incidence of different central nervous system (CNS) neoplasms that received surgical excision or biopsy over the past 20 years in the Hospital Authority New Territories West Cluster (NTWC), and to postulate possible causative factors for the observation.

Methods: We retrospectively retrieved, from our operation record database, all patients with CNS neoplasm who underwent neurosurgical operation at Tuen Mun Hospital from January 1996 to August 2016. Patients with primary or secondary intracranial or spinal neoplasms were included. Individual patients' medical records were then reviewed to assess clinical, radiological, and pathological parameters. Epidemiology results were categorised based on the pathologies and locations of neoplasms, relevant symptoms, and patients' demographics. NTWC catchment area mid-year population data were retrieved from government publications. Catchment area for our Neurosurgery Department included Tuen Mun, Yuen Long, and North District before 2002, and later Tuen Mun and Yuen Long only. The estimation was based on the assumption that a relatively fixed majority of patients from NTWC received neurosurgical treatment in the public hospital and the fact that Tuen Mun Hospital is the only centre in this Cluster that provides neurosurgical service.

Results: Among the 2112 cases with CNS neoplasms that received surgical management in the study period, 1922 were identified as intracranial neoplasms and 190 as spinal neoplasms. There were 324 patients with metastatic intracranial tumours. Among the 1598 patients with primary CNS neoplasms, 551 (34.5%) had meningioma, 322 (20.2%) had gliomas, 281 (17.6%) had pituitary tumours, 189 (11.8%) had schwannomas, and 149 (9.3%) had glioblastoma multiforme (GBM). There were 301 cases of intracranial tumours from 1996 to 2000, 407 cases from 2001 to 2005, 502 cases from 2006 to 2010, 618 cases from 2011 to 2015, and 93 cases from January 2016 to August 2016. The mean annual population increase rates in Yuen Long and Tuen Mun were 2.76% and 0.35% respectively, resulting in a population growth from 826 300 to 1 117 500 in the NTWC. The incidence of meningioma and schwannoma increased over the past 20 years, with the latest incidences of 2.90/100 000 and 1.35/100 000, respectively. An increased incidence of surgically managed intracranial metastasis was also noted, from 0.54/100 000 to 2.56/100 000. The incidence for GBM increased from 0.50/100 000 to 0.92/100 000 while the figure for glioma was relatively static (1.45/100 000). We also observed a linear increment of meningioma (0.45/100 000), with a recent decrement of glioma (0.05/100 000). In general, the incidence of intracranial neoplasms increased from 5.24/100 000 to 11.32/100 000 and that of spinal neoplasms decreased from 0.59/100 000 to 0.45/100 000.

Conclusions: The incidence of intracranial neoplasms requiring surgical intervention increased over the recent 20 years in NTWC. For intracranial neoplasms, metastatic tumours progressively constituted a higher percentage of the new cases every year. There was a progressive increment in the incidence intracranial meningioma and schwannoma. The GBM incidence increased with a small scale comparatively, while the percentages constituted by the other major categories of intracranial neoplasms remained similar. The incidence of spinal neoplasms remained static but a linear increment of meningioma was observed.

A Rare Case of Pituitary Chondrosarcoma, an Usual Presentation with Unusual Histology

P 1.5

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We report a case of pituitary chondrosarcoma presenting as pituitary macroadenoma. A 27-year-old female patient presented with oligomenorrhoea for 4 years and bitemporal hemianopia. Magnetic resonance imaging showed a 3.8 cm pituitary mass with suprasellar extension. A two-stage transsphenoidal excision of the pituitary tumour was done, with histology proof of the tumour being a myxoid chondrosarcoma.

Staged resection was planned in view of the extent of the tumour. Frozen section reported intraoperatively showed chondroid cells. Further adjuvant radiotherapy was necessary in view of high risk of local recurrence.

The case illustrates the presentation, diagnosis, and management of chondrosarcoma, which can often mimic other tumours at presentation. Local recurrence is commonly seen, but complete surgical resection and postoperative radiation therapy remains the most important prognostic indicator of the long-term outcome.

A Rare Cause of Sciatica and the Importance of Digital Rectal Examination: Case Report of an Intrapelvic Sciatic Notch Schwannoma

P 1.6

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Intrapelvic sciatic nerve schwannomas are rare lesions that can occasionally cause non-discogenic sciatica. They can evade detection when patients complain of typical symptoms with negative lumbar spine neuroimaging. Traditional management to these lesions is via transabdominal approach, but this route is decidedly more complex. We adopted a transgluteal subpiriformis approach, an increasingly popular surgical corridor, and the surgical technique is discussed.

A 44-year-old female experienced a 3-year history of left sciatica with lower extremity muscle wasting. Magnetic resonance imaging (MRI) of the lumbar spine did not reveal accountable disc herniation. During digital rectal examination a firm lesion was palpable beyond the anterolateral wall of the rectum. Percussion of the lesion reproduced her sciatica. Pelvic MRI showed an intrapelvic neurogenic tumour at the left sciatic notch. Transgluteal gross total excision of the tumour was performed with preservation of the sciatic trunk. The histological diagnosis of schwannoma was confirmed. The patient had no procedure-related complications and remained asymptomatic 1 month postoperatively.

The clinician should be cognizant of neurogenic tumours causing non-discogenic sciatica. Meticulous physical examination including a digital rectal examination of patients with negative lumbar spine MRI is recommended. A palpable mass with Tinel's sign is essentially diagnostic of an intrapelvic neurogenic tumour. The transgluteal approach is a simple, direct approach to sciatic notch lesions and excellent outcomes can be achieved.

Clinical Review of Transnasal Endoscopic Transsphenoidal Surgery for Pituitary Adenoma, Single-centre Experience

P 1.7

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Microsurgical transsphenoidal operation has been established as the standard surgical treatment for pituitary adenomas. For the past two decades, however, there is increasing use of transnasal endoscopic transsphenoidal technique as well. We conducted a clinical review of a single-centre experience over the endoscopic technique upon the clinical outcome and associated complications.

A retrospective review was conducted from January 2015 to December 2015 on the clinical outcome of transnasal endoscopic transsphenoidal surgery for pituitary adenoma in a single centre. Data regarding the complications, outcomes, and recurrence were collected and studied.

A total of seven female and seven male patients were recruited into the study. The age of patients ranged from 25 to 81 years. Six of them were having functional pituitary adenomas. With a follow-up scan up to 1 year postoperation, none had significant residual/recurrence of tumour requiring a second operation. Two of them experienced cerebrospinal fluid leak, and none experienced permanent diabetes insipidus. Further data will be discussed.

A Case of Tumefactive Demyelinating Lesion in a Young Woman Mimicking Brain Tumour or Abscess

P 1.8

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Tumefactive demyelinating lesions are rare manifestations of demyelinating diseases which may mimic brain tumours or abscesses. Such entities have only been described in case studies or retrospective reviews and have unclear nosology and disease course.

We report a case of a 42-year-old Chinese female presented with progressive right-sided weakness over 1 week. Magnetic resonance imaging (MRI) demonstrated a T2 hyperintense lesion with complete ring enhancement on post-contrast study at the left frontal lobe. Diffusion weighted imaging showed no restrictive diffusion. Brain tumour or abscess was suspected initially and open biopsy was performed.

Histopathological analysis revealed demyelination changes, with foamy histiocytic infiltration, decreased myelin stain, and preserved axons in immunostained neurofilament. The patient was subsequently treated with a course of methylprednisolone with gradual improvement in limb power and near-complete resolution of the lesion on follow-up MRI 1 month later.

Radiological features of tumefactive demyelinating lesions are variable and may not always be typical of demyelination. In fact, our case, like others reported in literature, had atypical MRI features of demyelinating disease, instead favouring brain tumour. Diagnosis of such cases can be challenging, and without a history of demyelinating disease, often requires histopathological confirmation by biopsy or surgical excision. Nevertheless, our case demonstrates that in monofocal tumour-like lesions, it is important to consider demyelinating lesions in the differential diagnosis.

Recurrent Meningitis as Initial Presentation of Pituitary Adenoma

P 1.9

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Objectives: To review a case of recurrent meningitis subsequently diagnosed to have pituitary adenoma.

Methods: We report a case of pituitary adenoma with recurrent meningitis from our centre, a patient with two episodes of meningitis in 6 months with imaging showing large pituitary adenoma with through the floor of sella into sphenoid sinus. Case reports of similar presentations from publications were reviewed.

Results: Meningitis often happens after treatment of tumour secondary to cerebrospinal fluid fistula. Recurrent meningitis as the presentation of pituitary tumour was rare and only documented in six articles. All were associated with prolactinoma or non-functioning pituitary adenoma. Meningitis could be culture-positive or aseptic, and there may not be clear documentation of cerebrospinal fluid fistula on imaging studies. Most of these patients showed good response to antibiotic treatment followed by transsphenoidal surgery. Differential diagnoses include pituitary abscess or pituitary apoplexy, which were differentiable by serial imaging.

Conclusions: Recurrent meningitis is a rare but important manifestation for pituitary macroadenoma. Prompt treatment by antibiotics and surgery would lead to favourable prognosis in most cases.

5-Aminolevulinic Acid Fluorescence-guided Resection of Glioma: A Single-centre Experience

P 1.10

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Objectives: To investigate outcomes of resection of brain lesions using 5-aminolevulinic acid (5-ALA, Gliolan) and their correlation with extent of resection (EOR).

Methods: A total of 15 patients underwent 16 Gliolan-assisted surgeries. All patients ingested Gliolan 3 to 4 hours prior to surgery, at a dosage of 20 mg/kg. Neurosurgical microscope with violet-blue excitation was used to visualise the red fluorescence. Duration from ingestion of Gliolan to adoption of the microscope was recorded. Resection was guided by fluorescence until no residual. The patients were monitored for general condition, especially new neurological deficit. Postoperative magnetic resonance imaging served as the gold standard for EOR.

Results: The mean age of the cohort was 48.31 years. Gliolan was given to a recurrent high-grade tumour in 10 cases and to six without known pathological diagnosis. There were 13 high-grade gliomas, two low-grade gliomas, and one inflammation. The patients ingested 5-ALA at a mean of 3.93 hours before microscope was brought in for fluorescence, which was perceivable in 15 surgeries. Intensity was graded as 'strong' in eight cases and 'moderate' in seven. Intensity was associated with presence of necrosis in tumour. Total resection was achieved in seven (43.75%) cases. Strong fluorescence did not contribute to a higher incidence of total resection ($P=0.608$, Fisher's exact test). EOR was correlated with time between ingestion and visualisation of 5-ALA ($P=0.045$, $r=0.535$). Three patients encountered new neurological deficit after surgery.

Conclusion: 5-ALA is an effective agent in assisting tumour excision. Careful selection of the patients is essential to avoid surgically induced deficit.

Magnetic Navigation–guided Endoscopic Transventricular Biopsy for Pituitary Stalk Lesions

P 1.11

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Objectives: To review an endoscopic approach in obtaining biopsy for pituitary stalk lesions.

Methods: This study reviewed two females aged 28 and 38 years respectively who presented with diabetes insipidus and amenorrhoea. Preoperative magnetic resonance imaging for both patients revealed hyperintensity over the pituitary stalk, which was thickened and gradually enlarging in size. Pituitary gland remained normal in size and appearance. There was no obliteration of the optic chiasm by the lesion. Biopsy was planned and different modes of biopsy were discussed.

Results: Endoscopic transventricular biopsy was employed in these two cases in view of the relatively small-sized lesions with small ventricles and normal foramen of Monro. Risk of cerebrospinal fluid leakage caused by transsphenoidal approach could also be prevented. Magnetic navigation was utilised in guiding the endoscope for correct positioning. Biopsy was successful and accurate with pathology revealing final diagnosis of Langerhans cell histiocytosis.

Conclusions: Magnetic navigation-guided endoscopic transventricular biopsy is one of the approaches in obtaining incisional biopsy of pituitary stalk lesions. It is an accurate and short procedure with minimal complications.

Atypical Intracranial Dermoid Cyst in an Adult Patient

P 1.12

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Objective: To review an atypical intracranial dermoid cyst in an adult patient.

Methods: A 47-year-old male with intracranial dermoid cyst in the right cerebellum was admitted to our hospital with atypical presentation. The course of the disease will be described, along with the radiological imaging and operative finding of the cyst.

Results: Computed tomographic (CT) finding was unusual, showing a hyperattenuating large lesion measuring 6.5 cm x 4.5 cm x 5.3 cm. Radiologically, intracranial dermoid cyst usually appears as a low-attenuating well-circumscribed lobulated mass on CT, and a hyperintense mass with no contrast enhancement on magnetic resonance imaging. Excision of the cyst found a pedunculated intralésional nodule inside which was also a rare presentation.

Conclusions: Atypical presentation on radiological imaging and gross examination of the intracranial dermoid cyst made the initial diagnoses different. It is a rare but important characteristic to recognise.

Spinal Lipoma of the Filum Terminale: Review of 30 Patients in Queen Mary Hospital

P 1.13

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Objectives: Spinal lipoma of the filum terminale (LFT) is a congenital lumbosacral anomaly that can cause tethered cord syndrome. This study aimed to: (1) illustrate preoperative characteristics of LFT; (2) demonstrate the effects of surgical untethering; and (3) discuss the role of prophylactic surgery for asymptomatic patients.

Methods: Medical data of 30 paediatric patients (≤ 18 years on the day of operation) who underwent surgical untethering were prospectively recorded and reviewed. Data of interest included prevalence of symptoms, skin stigmata and associated perineal malformations, conus level, and surgical outcome.

Results: Thirteen (43.3%) patients had skin stigmata detected at birth and 16 (53.3%) were either syndromic or have associated perineal malformations. Besides, 17 (56.7%) patients were symptomatic mainly in terms of increased lower limbs tone, hyperreflexia, and gait disturbance. Preliminary data analysis showed association between the presence of skin stigmata, isolated or syndromic cases, associated perineal malformations, and the preoperative conus level. Further detailed data analysis is under progress. There was only one case of postoperative cerebrospinal fluid leakage without long-term complication. The mean follow-up period was 4.13 years. Majority of symptomatic patients improved.

Conclusion: Surgical untethering is a simple, safe, and effective option for symptomatic patients. It improved a portion of symptomatic patients and stopped the deterioration of the others. The role of prophylactic surgery in asymptomatic patients warrants further discussion.

The Role of Long Non-coding RNA Colorectal Neoplasia Differentially Expressed in Gliomagenesis

P 1.14

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Long non-coding RNAs (lncRNAs) are emerging as important regulators in different types of cancers. Given that colorectal neoplasia differentially expressed (CRNDE) is the most highly upregulated lncRNA in glioma, its dysregulation is strongly implicated in gliomagenesis. Previous bioinformatics analyses have revealed transcription factor binding sites in CRNDE promoter region, while c-Myc is one of the oncoproteins that may potentially bind to CRNDE promoter and regulate its expression. This study aimed to investigate the mechanisms of lncRNA CRNDE in promoting glioma progression.

To determine whether the oncogenic function of CRNDE was mediated by c-Myc, knockdown and overexpression studies were performed and the effects on CRNDE expression were determined. We also studied the downstream mechanistic pathway of CRNDE through its forced expression.

CRNDE expression was altered after manipulating c-Myc expression. Current study is ongoing, and we believe our data will provide evidence to facilitate understanding the mechanism of lncRNA in glioma pathogenesis.

Quinacrine may Increase the Cytotoxicity of Temozolomide in Glioblastoma via Autophagy Inhibition

P 1.15

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Objectives: The chemotherapeutic agent temozolomide (TMZ) is widely used in the treatment of glioblastoma multiforme (GBM). The antimalarial drug chloroquine (CQ) harbours antitumor properties. As one of CQ analogues, the role of quinacrine (QNX) in glioma cells remains unclear. This study aimed to investigate the efficacy of QNX alone and in combination with TMZ in glioma cells, as well as the underlying mechanisms.

Methods: The therapeutic effects of QNX and TMZ, alone or in combination, in human GBM cells were evaluated by in-vitro cell viability assay and colony formation assay. The underlying mechanisms of QNX-mediated cell death were investigated by immunoblotting analysis.

Results: QNX exerted cytotoxic effect and enhanced TMZ efficacy on both TMZ-sensitive and TMZ-resistant glioma cells. Moreover, immunoblotting analysis showed that QNX activated the autophagy marker LC3II expression and downregulated GRP78 expression. These results suggested that endoplasmic reticulum stress and autophagy induction may play roles in QNX-mediated cytotoxic effect in glioma cells.

Conclusions: The antimalarial drug QNX may hold promise as a new autophagy inhibitor for the treatment of newly diagnosed TMZ-sensitive and recurrent TMZ-resistant gliomas.

Progesterone Benefits Experimental Non-operable Glioma-bearing Rats in Aspects of Survival and Neurofunctional Deterioration

P 1.16

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Objectives: To investigate the therapeutic effects of progesterone (PRO), a neuroprotective agent, in glioblastoma multiforme (GBM), the highly malignant primary brain cancer, in a standard rodent orthotopic GBM graft that mimics the clinical scenario of non-operable GBM patients.

Methods: The experimental tumour-bearing rats were established from standard orthotopic allografts model of rat C6 glioma cell line under a stereotactic device. A total of 36 adult male Sprague-Dawley rats (350-400 g) received a precise needle implantation of 1×10^6 C6 cells per rat in the striatum of right hemisphere. Every 12 rats were randomly selected into three experimental groups after cell implantation: (1) controls (drug vehicle, intraperitoneally); (2) PRO 10 mg/kg intraperitoneally; and (3) PRO 20 mg/kg intraperitoneally. Tumours were allowed to grow for 14 days after implantation prior to their corresponding treatment and drugs were given daily until the subject was died or too weak to sustain treatment. Their survival and body weight changes were recorded. Motor function deterioration was studied by cylinder test on every 3 days from the day of treatment started (day 14).

Results: The mean survival in PRO 10 mg/kg group markedly prolonged 5 days ($P=0.01$) compared with the controls, however, percentage body weight changes measured no significance with 4% differences from 96.5% to 92.3% decline. Furthermore, cylinder test recorded significantly lower in motor deterioration scores in PRO 10 mg/kg of 42 ($P=0.00$), compared with the score of 57 in PRO 20 mg/kg group and 78 in control group.

Conclusions: The therapeutic effects of PRO were positive and beneficial in non-operable GBM rats but its efficacy was dose-dependent.

Caffeine Sensitises Temozolomide's Chemo-efficacy by Impeding Cell Cycle Arrest in the Glioma Cell Line

P 1.17

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Objectives: To address the effects of caffeine on the chemo-efficacy of temozolomide (TMZ) in the U87MG glioma cell line.

Methods: We treated the U87MG cells with TMZ (500 uM) with or without caffeine (1 mM) in vitro. To further mimic the long-term coffee drinking, we divided these two cohorts into two subgroups—with or without 24-hour pre-exposure of caffeine (1 mM) before TMZ. Cell viability and proliferation ability were assessed by MTT assay and colony formation assay. Regarding cell cycle analysis, Western immunoblotting was conducted to determine the underlying mechanisms.

Results: Compared with TMZ alone, combined treatment showed an enhanced cytotoxicity. Additionally, the proliferation ability of cells was much lower after treating with TMZ and caffeine. Interestingly, with the pretreatment of caffeine for 24 hours, these effects were even more significant. Cell cycle analysis indicated that caffeine impaired the G₂/M arrest induced by TMZ. In line with it, Western blotting showed a decrease in the DNA repairing system including the levels of phosphorylated ATM and p21. Meanwhile, cyclin B1, the key factor in charge of cellular entry from G₂ to mitotic phase, was increased.

Conclusion: Our study for the first time demonstrates that caffeine can sensitise the chemo-cytotoxicity of TMZ by impeding the G₂/M cell cycle arrest. It may provide an option as an adjuvant treatment in addition to TMZ.

Basal Ganglia Germinoma: Magnetic Resonance Imaging Features and Clinical Outcome

P 1.18

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Objectives: Basal ganglion is not a common site for germinomas and diagnosis is often delayed because they are non-specific in neuroimaging. This study aimed to introduce the features of germinoma arising from basal ganglia and clinical outcome was evaluated.

Methods: This is a 10-year retrospective review of basal ganglia germinomas diagnosed in Tuen Mun Hospital. Clinical data were retrieved including demographics, signs and symptoms, magnetic resonance imaging (MRI) findings, as well as treatment and outcome.

Results: Our case series demonstrated that the MRI classification by Phi et al was useful in predicting clinical outcome.

Conclusions: The neuroimaging features are very informative for diagnosis. Treatment protocol is well established and long-term clinical outcome is favourable.

In Trauma Patients with Moderate-to-severe Head Injury, What are the Risk Factors Associated with Extracranial Injuries?

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Objectives: To investigate risk factors associated with extracranial injuries in patients with moderate-to-severe head injury.

Methods: A retrospective review of adult patients with moderate-to-severe head injuries (Glasgow Coma Scale [GCS] ≤ 12) presented to Accident and Emergency Department of Prince of Wales Hospital over a 3-year period (2013-2015) was conducted. Factors including patients' age, sex, mechanism of injury, initial assessment including blood pressure (BP), heart rate (HR), respiratory rate (RR) and GCS, past health and associated injuries charted with Abbreviated Injury Scale were analysed.

Results: Older patients were more likely to have moderate-to-severe head injury due to fall < 2 metres, and more likely to have associated thoracic, abdominal, and extremity injuries and mortality. Among older patients, risk factors of having major extracranial injuries were presenting with low GCS, fall from height ≥ 2 metres, and road traffic accident as pedestrian. Fall from height ≥ 2 metres and road traffic accident as pedestrian were associated with thoracic injury (odds ratio [OR]=32.69, $P < 0.001$ and OR=6.67, $P = 0.006$) and extremities injury (OR=14.33, $P = 0.005$ and OR=12.91, $P < 0.001$). Among the six older patients having abdominal injury, all presented with GCS of ≤ 8 and died within 30 days. Among younger patients with head injury, major extracranial injuries were mainly attributable to presentation with unstable systolic BP, HR, and RR. Road traffic accident as motor vehicle driver or passenger was more likely to have thoracic injury (OR=4.90, $P = 0.015$), while road traffic accident as pedestrian was more likely to have abdominal injury (OR=4.79, $P = 0.030$).

Conclusions: Mechanisms of injury due to fall from height ≥ 2 metres and road traffic accident were associated with extracranial injuries. Older patients were more prone to have moderate-to-severe head injury after minor fall < 2 metres and might present atypically with stable vitals even after major injuries, possibly leading to difficulty in diagnosis.

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Objectives: Aspirin is associated with 1.6-fold increased risk in subdural haematoma (SDH) after head injury.¹ It is also associated with higher mortality.² As a result, aspirin is often withheld upon diagnosis of traumatic SDH and platelet concentrates are transfused in selective cases.³ However, there is no consensus over the time of resumption of aspirin. This study aimed to investigate the thromboembolic complications before resumption of aspirin after traumatic SDH, as well as the risk of rebleeding after resumption of aspirin.

Methods: We conducted a 2-year retrospective study on 100 patients who were taking aspirin at the time of diagnosis of SDH. Data including baseline demographics, thromboembolic complications, and rebleeding after resumption of aspirin were analysed. Patients with spontaneous SDH were excluded. Thromboembolic complications included acute coronary syndrome, stroke, and limb or bowel ischaemia. Rebleeding was defined by recurrence of bleeding in follow-up computed tomographic scan with or without surgery performed. Paired t test was used to compare continuous variables.

Results: Aspirin was withheld upon admission in 98% of patients. Among these, 14.3% (n=14) developed thromboembolic complications including ischaemic stroke and acute coronary syndrome. Half (n=7) of the complications occurred in early post-SDH period (<30 days). Four of them had multiple vascular comorbidities and two of them had a history of coronary stenting. Besides, 11% (n=11) of the patients suffered from rebleeding, in which 45.5% occurred after resumption of aspirin. The difference was statistically insignificant ($P>0.05$). There was radiological recurrence without clinical deterioration, and none required surgery.

Conclusions: With strong indications, early resumption of aspirin should be considered to prevent thromboembolic complications, which is not associated with increased risk of rebleeding.

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Antiplatelet Resistance in Patients Undergoing Flow-diverter Treatment for Intracranial Aneurysm

P 2.3

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Objectives: To identify the local rate of antiplatelet agent resistance and the use of platelet function test in patients undergoing flow diverter insertion.

Methods: Patients who received standard loading regimen with aspirin and clopidogrel for 7 days before endovascular stenting from February 2014 to June 2016 were retrospectively reviewed for their preoperative VerifyNow platelet assay results. We classified patients as 'aspirin responder' if their aspirin response unit (ARU) was <550, 'clopidogrel hyperresponder' if their P2Y12 reaction unit (PRU) is ≤ 95 , and 'clopidogrel hyporesponder' if PRU is ≥ 208 . Patients who were identified as above had their antiplatelet agents adjusted accordingly before the procedure.

Results: We identified 96 patients who underwent the VerifyNow assay before endovascular interventions. Of these, ARU results were available in 90, PRU results in 91, and both ARU and PRU results in 91 patients. In all, 16 (17.8%) patients were 'aspirin hyporesponder', 42 (46.2%) were 'clopidogrel hyporesponder', and eight (8.8%) were 'aspirin and clopidogrel hyporesponder'. Besides, 45 patients underwent flow diverter insertion.

Conclusions: The local rate of antiplatelet agent resistance was higher than that in the literature. More data are needed to evaluate the role of platelet function test in predicting and preventing major complications.

Tuberculous Arachnoiditis with Kyphotic Deformity and Syringomyelia: Case Report and Literature Review

P 2.4

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We report an uncommon case of tuberculous arachnoiditis with kyphotic deformity and syringomyelia of thoracic spine after childhood anterior spinal fusion, and review the contemporary literature regarding the prevalence and management.

A 51-year-old lady had known Pott disease involving the mid-thoracic spine with anterior spinal fusion performed during childhood. She developed progressive kyphotic deformity at T5/6 level with gradual deterioration of lower limb function for several months. Magnetic resonance imaging showed cord oedema and atrophy with syringomyelia around the internal kyphus. She therefore underwent thoracic laminectomy with lysis of subarachnoid adhesions and decompression of syrinx. The patient exhibited fair recovery postoperatively with impaired proprioception and balancing capability.

Syringomyelia associated with adhesive arachnoiditis could be secondary to spinal tuberculosis and tuberculous meningitis. Scoliosis-related syringomyelia has been widely published in the literature, but thoracic kyphosis of such extent with syrinx formation at the internal kyphus is not commonly seen. Studies have suggested that good outcome after syrinx operation is associated with basal or focal spinal arachnoid scarring, no history of spinal meningitis, microsurgical dissection of the arachnoid scar, and decompression of the subarachnoid space. Expansive duraplasty and laminoplasty following microlysis of adhesions have also been shown to improve surgical outcome by maintaining continuity of reconstructed subarachnoid space.

Complications of Ventricular Overshunting: Cervical Myelopathy in the Background of Cervical Prolapsing Intervertebral Discs

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We report and review a rare complication of ventricular overshunting-associated myelopathy (OSAM) in patients with ventriculoperitoneal (VP) shunt and management.

A 62-year-old female patient, who presented with communicating hydrocephalus and aqueductal stenosis with endoscopic third ventriculostomy in 2007 and subsequent VP shunting done (CODMAN HAKIM programmable right angle valve at 18 cmH₂O) in 2014, developed symptoms of generalised limb weakness and unsteady gait 2 months post-shunting. The shunt pressure was reduced twice from 18 cmH₂O to 14 cmH₂O with initial improvement of ataxic symptoms. However, symptoms of unsteadiness reoccurred with additional complaint of hand clumsiness despite adjustment of valve pressure, and signs of cervical myelopathy was evident. Magnetic resonance imaging (MRI) of cervical spine showed multilevel cervical stenosis with prolapsing intervertebral discs at C2-3/C4-5/C6-7; engorged vertebral venous plexus was also seen. Hence we suspected the clinical condition to be a mixed picture of the degenerative changes and OSAM. The CODMAN shunt pressure was raised from 14 cmH₂O to 16 cmH₂O, and improvement of unsteadiness was noted by the patient. Subsequent MRI showed reduced engorgement of epidural veins, apparently relieving the cord indentation. She was still offered surgery for her cervical prolapsing disc as definitive treatment to fully relieve her symptoms.

With the adjustment of VP shunt pressure to higher readings, improvement of myelopathic features was seen both clinically and radiologically. We wish to arouse awareness and the recognition of OSAM, as this rare complication of is often overlooked, particularly when there is the presence of other pathology. Its effect might be as advertent as a genuine prolapsing disc, therefore efforts to deal with it before proceeding to other definitive treatment of cervical stenosis would be ideal and maximise the clinical outcome of such patients.

Simple Frameless Stereotactic Guider for Frontal External Ventricular Drainage Placement

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External ventricular drainage (EVD) placement is a common procedure for ventricular cerebrospinal fluid drainage and intracranial pressure monitoring in many conditions. One of the common positions used as entry point for EVD is the Kocher's point. However, the accuracy is dependent on surgeon's experience, patient's position, and whether significant midline shift or ventricular distortion is present. Malposition of EVD may cause extra procedures on the patient, and exposes the patient to risk of multiple puncturing and risk of intracerebral haemorrhage. Therefore, a new frameless stereotactic guidance for frontal EVD placement is designed to improve accuracy while not significantly increasing the cost and duration of operation. In this study, EVD placement guider was made with card board and assembled. Illustrations of principle of using the stereotactic guider were shown.

A Systemic Review on the Use of Atorvastatin for Chronic Subdural Haematoma

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Objectives: The use of atorvastatin in chronic subdural haematoma (CSDH) has shown initial promising results in animal studies and preliminary clinical trials. New study results have been published in the literature. We aimed to determine the efficacy and safety of atorvastatin for CSDH.

Methods: We conducted a systemic review and meta-analysis on the use of atorvastatin for CSDH. PubMed and EMBASE were searched using electronic search strategies for ([atorvastatin] or [Lipitor] or [3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor]) AND (chronic subdural hematoma) in October 2016. Exclusion criteria were studies without involving human subjects (ie animal studies) or lack of reporting of clinical or radiological outcomes. Patients' demographics, treatment, complications, as well as clinical and radiological outcomes were reviewed and analysed using a structured data extraction form.

Results: The literature search identified eight articles reporting on the use of atorvastatin for CSDH. Three articles were excluded: two had no human subjects (one was an animal study while the other was on the molecular and cellular hypothesis on the pathogenesis), while the other was a study protocol of an ongoing trial with no published results or outcome. Five eligible articles¹⁻⁵ with a total of 404 patients were included for analysis. For the use of atorvastatin as an initial non-surgical treatment for mild or minimally symptomatic CSDH, the odds ratio (OR) of deterioration requiring drainage was 0.0635 (95% confidence interval [CI], 0.0249-0.1617, P=0.01) compared with the controls, which favoured the use of atorvastatin. The number needed to treat (NNT) was 1.7. For those symptomatic CSDH with burr hole drainage performed upon admission, the OR of recurrence with the use of atorvastatin versus controls was 0.2924 (95% CI, 0.1322-0.6468, P=0.02), which also favoured atorvastatin. The NNT was 7.5. There were no reported adverse effects with the use of atorvastatin.

Conclusions: The results indicated that atorvastatin can benefit patients with CSDH, particularly in a selected group of patients who have mild or minimal symptoms.

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Autologous Skull Bone for Cranioplasty. A Study on Cranial Bone Flaps' Viability and Microbial Contamination

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Objectives: Craniectomy is a life-saving procedure. Subsequent cranioplasty has potential complications such as infection (up to 26%)¹ or bone resorption (up to 6.5%). Materials for cranioplasty ranged from patients' own skull bone to artificial substances such as titanium or acrylic. There are concerns with the microbial contamination of autologous skull bone as well as their viability when they are out of the body for a long period of time. However, there is no strong evidence to support these beliefs.

Methods: Cranial bone flaps stored at Prince of Wales Hospital Skull Bone Bank during the period from June 2011 to March 2016 were identified to be disposed. Inclusion criteria included bone flaps of those patients either already having artificial substance for cranioplasty or passed away after craniectomy. Swabs and bone chips were collected for microbial and osteoblast culture. Ethics approval was obtained (CUHK-NTEC CREC No 2015.708).

Results: During the study period, 18 pieces of skull bone which fulfilled the inclusion criteria were identified. Tissue Bank was kept at -80°C under strict aseptic technique. The storage period ranged from 4 months to 55 months. For the bacterial culture, five (27.8%) had positive bacteria growth; three of which were *Pasteurella multocida*. The mean durations of storage of non-contaminated and contaminated bone flaps were 22.5 months and 38.4 months, respectively (P=0.0987). For the osteoblast culture, none had viable osteoblast growth. One fresh intra-operative bone specimen was sent as control with positive osteoblast growth.

Conclusions: Autologous skull bone flap bacterial contamination rate was 27.8% in this study. None had viable osteoblasts.

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How Doctors should Approach Risk Disclosure when Informing Patients of Their Surgical Operation during a Preoperative Meeting

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Objective: In Hong Kong, the content of the consent to a surgical treatment has been discussed extensively from the viewpoints of law, medical ethics, and policy experts. However, the viewpoints of patients are less represented. This study aimed to collect patients' views on the information provided to them about the risk and complications of surgical procedures with the special emphasis on how doctors should present information about operations to patients.

Methods: A cross-sectional study, approved by the Institutional Review Board of The University of Hong Kong / Hospital Authority Hong Kong West Cluster, was conducted using questionnaires to assess the adult patients' views on the process, content, and depth of information provided to them before a surgical procedure at the Department of Neurosurgery, Queen Mary Hospital, Hong Kong, during the period from January 2016 to September 2016. Gender and age differences were analysed using the independent-samples *t* test, analysis of variance, and X^2 test.

Results: A total of 94.5% of operation-awaiting patients (n=91; 53.7% male and 47.3% female) expected surgeon-in-charge to discuss the surgical risks with them, but 41.8% would accept others to conduct the risk disclosure meeting. Besides, 54.9% of patients preferred that both doctors and patients should have a decisive role in determining what information should be disclosed and 36.3% of them thought that the level of risks was irrelevant to information disclosure. Moreover, 94.5% wanted doctors to tell them about rare but serious complications and 59.3% thought that doctors would fail their duties if not telling patients about all potential complications. Besides, 20.0% would take a legal action if they had non-disclosed complications, and 40.7% remained undecided in terms of legal action. Both female and male patients expected discussion about, in descending order of means, consequences of undergoing and not undergoing an operation, likelihood of complications, management after operation, technical operation details, alternative treatments, surgeons' experience, likelihood of chronic pain and death, cosmetic side-effects, impact on work, leisure and sexual activities, social relationship, and risk of prolonged stay in the hospital. Female patients demanded more information about surgeons' experience ($P<0.008$), alternative treatments ($P<0.001$), risk of reoperation ($P=0.047$), and risk of long-term dependency ($P=0.048$). There were no significant differences between the age groups in terms of patients' expectation from the risk disclosure meetings.

Conclusions: This study may help doctors to prepare for the risk disclosure meeting before a surgical procedure and optimise the informed consent process by adopting a patient-centred approach. This research may have practical implications on drafting guidelines on writing informed consent in hospitals.

Endoscopic Third Ventriculostomy—A Single-institute Experience

P 2.10

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Objectives: Endoscopic third ventriculostomy (ETV) and ventriculoperitoneal shunt are both treatment options for hydrocephalus. ETV can be a superior option for selected patients for its ability to alter cerebrospinal fluid (CSF) flow dynamic without implanting a foreign body. However, its generalisability is limited by the variable successful rate. One commonly adopted prediction method was the ETV success score (ETVSS), which takes into account patient age, aetiology of hydrocephalus, and a history of CSF shunt. However, in our experience, the anatomy of the third ventricle may also play a role in predicting the successful rate. This study aimed to investigate the role of the anatomy of the third ventricle in predicting the success rate of ETV.

Methods: This was a retrospective study on 69 patients undergoing ETV in a single institute over a 15-year period. Data were obtained through Clinical Management System and Electronic Patient Record. Primary outcome was the success rate defined as an absence of further CSF diversion procedure performed.

Results: The overall success rate of ETV in our study was 72.4%. The ETVSS was calculated for individual patient and validated against the success rate. In all, 17 patients had preoperative magnetic resonance imaging of the brain available, the anatomy of the third ventricle in these cases were evaluated, with an emphasis over the effect on surgical outcome.

Conclusions: The anatomy of the third ventricle could be a potential predictor for the success rate of ETV.

Neuroprotection of Hypoxic Preconditioned Mesenchymal Stem Cells in Experimental Traumatic Brain Injury

P 2.11

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Objectives: To investigate whether hypoxic preconditioning can enhance the efficacy of mesenchymal stem cells (MSCs) in the treatment of traumatic brain injury (TBI).

Methods: TBI was induced at the right parietal cortex by an electromagnetic-controlled cortical impact in Sprague-Dawley rats. 2×10^6 hypoxic green fluorescent protein MSCs (GFP-MSCs) were topically applied to the surface of exposed cerebral cortex and fixed in position with fibrin glue. Neurological recovery was assessed with motor rod, water maze, and gait analysis. The results were compared between those treated with cells (n=30) and those without (n=30). The rats were sacrificed at different time points for histological examinations including immunohistochemistry staining of astrocytes, microglia, and biomarkers determination (n=30). The underlying molecular mechanism was studied using Western blot, real-time polymerase chain reaction, and proteomic analysis (n=8).

Results: Within 7 days, the rats transplanted with topical hypoxic preconditioned GFP-MSCs had shown reduced sensorimotor and cognitive impairments with less neuronal death in both hippocampus and penumbra. Early reactive astrocytosis was activated and neuroinflammation was suppressed (one-way analysis of variance, $P < 0.05$).

Conclusions: Hypoxic preconditioning enhances therapeutic potential of MSCs for the treatment of TBI.

The Effect of Glucagon-like Peptide 1 Receptor on Axon Regeneration in a Murine Stroke Model

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Objective: Stroke ranks as the second most frequent cause of death in the world. Among the entire stroke population, 85% are ischaemic and having permanent neurological disabilities both mentally and physically resulting from reduction of blood supply. Glucagon-like peptide 1 (GLP-1) is a neuropeptide that has been shown to have neuroprotective properties.¹ In this study, we used GLP-1 receptor agonist to assess its neuroprotective effects in a murine global cerebral ischaemia stroke model.²

Methods: Adult male C57BL/6 (25-30 g) mice were subjected to transient global ischaemia (tGBI) by bilateral internal carotid artery occlusion for 20 minutes. The rats were divided into three groups (10 for each): (1) normal controls; (2) tGBI alone; and (3) tGBI+GLP-1 receptor agonist. Behavioural tests (open field) were performed on days 1 and 7 after tGBI was induced. The rats were sacrificed on day 7 and molecular markers of neuron damage were identified by real-time polymerase chain reaction.

Results: The tGBI model was established and confirmed by open field ($P < 0.01$). A trend of reducing hyperactivity ($P = 0.1$) was revealed in those receiving GLP-1 receptor agonist on both days 1 and 7 compared with the tGBI alone group.

Conclusion: This study suggests that GLP-1 receptor agonist may have neuroprotective effect as evidenced by the open field behavioural tests. This should be further confirmed by the measurement of biomarkers for axon regeneration.

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Clinical Outcomes after Lumbar Laminectomy and Spinal Fusion

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Objectives: To compare the clinical outcomes of performing lumbar spinal fusion to decompressive laminectomy in patients with symptomatic lumbar spinal stenosis.

Methods: This is a 5-year retrospective review of the medical records of New Territories East Cluster neurosurgical patients who underwent first-time laminectomies or spinal fusions at one or two adjacent vertebral levels for stable degenerative lumbar disease. The outcome measure was the score on the Oswestry Disability Index (ODI; score range 0-100, with higher scores indicating more disability related to back pain).

Results: A total of 87 patients between 43 and 85 years were followed up for a mean of 31 months. There was no significant difference between the groups (46 in the laminectomy group and 41 in the fusion group) in the mean ODI score at 6 months. The fusion group had longer hospital stay than the decompression alone group.

Conclusions: Among patients with lumbar spinal stenosis, fusion surgery did not result in better clinical outcomes than decompression surgeries alone.

A Case of Sodium Valproate–induced Hyperammonaemic Encephalopathy

P 2.14

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Sodium valproate is widely used in a range of disorders including epilepsy, psychiatric conditions, and chronic pain syndromes. Although it has a relatively favourable safety profile, it is associated with a rare but potentially lethal adverse effect: valproate-induced hyperammonaemic encephalopathy (VHE).

A 71-year-old female with known hypertension and Child-Pugh A hepatitis B cirrhosis presented with status epilepticus. Computed tomographic brain scan showed left frontal lobe hematoma with subarachnoid haemorrhage. The patient was treated conservatively and was started on valproate. She demonstrated significant neurological recovery. On day 10 after admission, the patient experienced progressive lethargy and subsequent generalised seizures. Serum liver function remained normal and valproate levels were within the therapeutic range. However, ammonia level was markedly elevated. In spite of cessation of valproate and continuous venovenous haemofiltration, the patient rapidly deteriorated with development of diffused cerebral oedema and subsequently succumbed with multi-organ failure.

Clinicians should be cognizant of the effects of VHE. Plasma ammonia levels should be determined in patients on valproate therapy presenting with altered consciousness or new neurological symptoms regardless of underlying normal liver function and valproate levels. Prompt diagnosis and discontinuation of valproate may be life-saving.

Delayed Coil Migration after Embolisation of Ruptured Posterior Communicating Artery Aneurysm: A Case Report

P 2.15

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There are few clinical cases on coil migration and an overwhelming majority reported occurrence in the perioperative period. Our case illustrates a rare occurrence of delayed coil migration 2 weeks from index procedure.

We report a 63-year-old female who presented with World Federation of Neurological Societies grade 1 subarachnoid haemorrhage from a ruptured 10 mm multilobulated right posterior communicating artery aneurysm. Subtotal occlusion of the aneurysm was achieved with small residual aneurysm neck. Postoperatively the patient had good neurological recovery. Sudden onset of left hemiparesis occurred 2 weeks later. The computed tomographic brain showed a dislodged coil at the right middle cerebral artery with no major cerebral infarcts. Diagnostic angiogram confirmed coil dislodgement with the distal end of coil in the right M2 branch. Two solitaire stents were deployed in tandem to protect the dislodged coil and the coil mass in aneurysm, successfully restoring blood flow. The patient recovered with no residual neurological deficits, despite several small areas of cerebral infarcts on imaging. Follow-up magnetic resonance angiogram revealed a growth of residual aneurysm neck. We performed a second embolisation the following year and achieved complete occlusion.

The complication of delayed coil migration is rare. Our case reflects an unprecedented presentation of this complication, having occurred as late as 2 weeks from index procedure. We discuss the methods employed to protect the dislodged coil to minimise neurological deficit in such a rare circumstance.

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We report a case of hearing loss as the chief presenting symptom of aqueductal stenosis. Hearing loss is a rare presentation of aqueductal stenosis. A 30-year-old female presented with late onset of bilateral sensorineural hearing loss (SNHL) as chief complaint with underlying hydrocephalus. Investigation revealed aqueductal stenosis. Endoscopic third ventriculostomy was performed with improvement in hearing. Hearing loss can be a rare presentation of hydrocephalus. Based on this case, the authors suggest that the diagnosis of hydrocephalus be considered as a cause of SNHL. Underlying mechanisms between cerebrospinal fluid dynamics and hearing loss require further investigation.

Spontaneous Acute Spinal Subarachnoid Haematoma as a Complication of Warfarin Therapy

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We report a complication of spontaneous acute spinal subarachnoid haematoma associated with warfarin therapy and to review the aetiology, management, and outcome in the literature.

A 74-year-old female patient with a history of valve replacement surgery on warfarin therapy presented with sudden-onset lower back pain and bilateral lower limb weakness. There was no history of trauma. Blood tests revealed an international normalised ratio of 3.5. An urgent magnetic resonance imaging (MRI) result showed T1 isointense, T2 hyperintense lesion at L2/3 level with fluid level. Emergency surgical decompression revealed subarachnoid blood at L1-L4 level with haematoma adherent to cauda equina. No vascular abnormalities or tumours was seen. Histological examination of the lesion was consistent with blood clot. There was no vasoformative or malignant component. The patient showed only minor neurologic improvement 2 months postoperatively.

Coagulopathy is the principal cause of spinal subarachnoid haematoma. Other causes include tumour bleeding and vascular malformation. MRI is the diagnostic method of choice. In cases with high clinical suspicion, even with negative MRI, lumbar puncture must be performed to rule out blood in cerebrospinal fluid. Decompressive laminectomy is the mainstay of treatment. However, only 40% of these patients can achieve neurological recovery.

Acute spinal subarachnoid haematoma can occur spontaneously in patients on anticoagulation therapy. Without timely management, neurological outcome can be poor.

The Use of Suction Toothbrush to Enhance Oral Hygiene of Critically Ill Patients

N 1

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Objectives: To promote better oral hygiene to patients under mechanical ventilation by using suction toothbrush, to prevent the incidence of ventilator-associated pneumonia, and to understand their relatives' feeling and satisfaction level on the oral hygiene care provided.

Methods: The programme was conducted from March 2016 to May 2016. All patients in High Dependency Unit of Department of Neurosurgery, Princess Margaret Hospital under mechanical ventilation were recruited. Selected patients were receiving oral hygiene care by using suction toothbrush with chlorhexidine solution twice a day. Questionnaires were distributed to their relatives to examine their feeling and satisfaction level on the oral hygiene care provided.

Results: A total of 19 questionnaires were collected during the implementation period. Among these, 47% felt that previous care by just normal saline and gauze for oral care was not enough, while 84% of the recruited relatives were satisfied with the regimen by providing oral hygiene care twice a day. Besides, 74% of them were satisfied with the oral hygiene condition of the patients. Towards the use of suction toothbrush, all interviewees voted satisfactory or above. Overall, nearly 96% of the relatives agreed that this programme was beneficial to the patients.

Conclusions: Acquiring ventilator-associated pneumonia can be fatal and lead to an increase in the length of hospital stay. All relatives showed their support in implementing the new oral care regimen. It is important to deliver oral care to mechanically ventilated patients not only to maintain their oral health status, but also to preserve their dignity. Therefore suction toothbrush should continue to be used in performing oral care in order to prevent ventilator-associated pneumonia.

Continuous Quality Improvement Project: Reduction of Tracheostomy Peristomal Breakdown by Using New Dressing Protocol

N 2

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Objectives: Tracheostomy is a common procedure in neurosurgical unit. However, tracheostomy peristomal skin breakdown has been identified as an important patient care issue. The promotion of healing and prevention of skin breakdown are essential. A new standardised protocol for immediate postoperative care of tracheostomy patients was initiated in November 2015 in our unit. This study aimed to review the effectiveness of new dressing protocol on prevention of tracheostomy skin breakdown.

Methods: Historical control data from a 6-month period (June 2015 to November 2015; old dressing protocol) and data from a subsequent 6-month intervention phase (December 2015 to May 2016; new dressing protocol) were compared. We retrospectively reviewed patient medical records for each group on the number of skin breakdown per patient for each protocol. An evaluation of each dressing protocol was completed.

Results: During the period from June 2015 to November 2015, nine patients had skin breakdown. The number decreased to four patients from December 2015 to May 2016. In other words, tracheostomy peristomal breakdown dropped from the baseline of 45% to 22.2%.

Conclusion: The new dressing protocol was effective and the film dressing plays a significant role on the prevention of skin breakdown of tracheostomy wound. It improves patient satisfaction and enhances service quality.

Pilot Study of Neuro-modified Early Warning Score—Early Detection of Deteriorating Patients

N 3

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Objective: Modified early warning score (MEWS) is a tool to aid clinical staff in early recognition of deteriorating patients, which is based on common clinical physiological parameters for scoring, including blood pressure, pulse rate, conscious state, respiratory rate, and temperature. However, for patients with neurological impairment, the scoring system underestimates the degree of consciousness. Neuro-modified early warning score (Neuro-MEWS) incorporates Glasgow Coma Scale into the MEWS system, to facilitate neurological monitoring of patients and early detection of deterioration. This study aimed to investigate the feasibility and application of Neuro-MEWS in neurologically impaired patients clinically.

Methods: A pilot study of Neuro-MEWS was implemented in Queen Elizabeth Hospital E8 ward in August 2016,¹ which consisted of neurosurgical and medical acute stroke unit patients. Neuro-MEWS were monitored twice per day to all patients in the ward. According to the calculated Neuro-MEWS, patients were divided into three tiers (low, medium, and high risk), which had different response pathways.

Results: A total of 42 sessions of Neuro-MEWS were carried out during 21 days of pilot study, from 1 August 2016 to 21 August 2016. The mean number of patients per session was 38. Medium- or high-risk patients were identified in 33 sessions, in which nurses informed case doctors for assessment. Among these sessions, 24 did not result in alteration of existing management whereas nine involving one to two patients triggered escalation of care and level of monitoring, such as increased frequency of vital signs monitoring, septic work-up, and urgent computer scan arrangement.

Conclusions: Neuro-MEWS monitoring and its three-tier system is able to detect deteriorating patients with neurological impairment early. It can help clinical staff to identify medium- and high-risk patients for further assessment and management.

Reference

1. QEH Resuscitation Committee. Guideline on early detection of deteriorating patients for piloting wards. Hong Kong: Queen Elizabeth Hospital, Kowloon Central Cluster, Hospital Authority; 2016.

Preoperative Patient Education Programme in Neurosurgery

N 4

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Objectives: Patients awaiting neurosurgery generally experience anxiety. To prepare the patients physically and psychologically for surgery is proved to have better surgical outcomes. A programme has been set up which comprises development of an evidence-based preoperative patient education programme and video for patient undergoing neurosurgery using a recently conducted systematic review of delivery methods and the content for preoperative education. This study aimed to implement evidence-based practice on preoperative patient teaching programme for neurosurgery patients, and to develop such programme for these patients to promote patient satisfaction in perioperative period.

Methods: This preoperative education programme was guided by the evidence-based practice model. This pilot study was on all brain tumour admissions for operation in January to March 2016. Subjects were included if he/she was scheduled for neurosurgery with general anaesthesia. Patients were excluded if they were not fully conscious. Content of the programme and an education video were designed based on the pre-programme survey. Outcome measures were assessed by evaluation survey.

Results: A total of 23 patients responded to the evaluation on the preoperative patient education programme during the study period. All were satisfied with the programme; 87% agreed that it can allay anxiety about the surgery; and 96% agreed that the content of the programme suits them.

Conclusion: The preoperative patient education programme is worthwhile to incorporate with our routine practice.

Higher Versus Conventional 11 Hz/second Stimulation Rate in Intra-operative Monitoring of Brainstem Auditory Evoked Potential

N 5

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Objective: To investigate the effect of 33.1 Hz/sec stimulation rate on brainstem auditory evoked potential (BAEP) waveform compared with the conventional rate of 11.1 Hz/sec.

Methods: This is a prospective preliminary study, in which 16 patients undergoing retromastoid craniotomy were recruited from April to August 2016. Hearing thresholds were obtained in preoperative BAEP baseline examination, and intra-operative study was performed on the ear of non-pathological side of patient. Post-induction BAEP baselines were obtained by 11.1 Hz/sec and 33.1 Hz/sec stimulation rates. The absolute amplitude and latency of waves I, III and V, as well as interpeak interval of waves I-III, III-V, and I-V were analysed by two-tailed Student's *t* test. Significant level was set at < 0.05 .

Results: No significant differences were found between two stimulation rates on BAEP waveform, in terms of absolute amplitude of waves I and V, and interpeak latency of waves I-III, III-V, and I-V. Statistically significant difference was only noted in the absolute amplitude of wave III ($P=0.02$). The study replicated the findings from Burke (1999), and the latest recommendations on warning threshold criterion emphasis mainly the changes on the amplitude and latency of wave V, as well as the interpeak interval of wave I-V. Furthermore, literature support titrating of the repetition rate to minimise the mean time with acceptable degradation of signal fidelity.

Conclusion: Higher stimulation rate of 33.1 Hz/sec can collect a fixed number of averaged trials in a shorter time, which allows for faster feedback to the surgeon.

Awake Craniotomy in Neurosurgery at Kwong Wah Hospital

N 6

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Objectives: Awake craniotomy can improve outcome of patients with maximal brain tumour removal while preserving neurological functions. It is especially important when operating lesions in close proximity to functional areas. Since 2015, our department has started performing awake craniotomy for indicated patients. This study aimed to assess our preoperative consultation, monitoring paradigm, practical difficulties, treatment outcome, and patient satisfaction for cases of awake craniotomy.

Methods: A multidisciplinary patient-centred approach was used. A multidisciplinary team including neurosurgeons, anaesthetists, nurses, and clinical psychologists was organised to reduce patients' stress and optimise patients' performance. Patients were carefully assessed and prepared with preoperative interview and counselling. During the surgery, patients were asked to carry out tailor-made tasks and encouraged to verbalise their discomfort. Besides the effort of neurosurgeons, pain control by anaesthetists, psychological support, and careful intra-operative neurophysiological monitoring by nursing staff were crucial elements to the success of the procedure. Regular follow-up was also conducted by phone contact or direct interview during the course of adjuvant chemoradiotherapy.

Results: From August 2015 to July 2016, there were seven eligible cases and all patients could proceed to awake craniotomy successfully. Most patients showed satisfied functional outcome and quality of life after the surgery.

Conclusion: Awake craniotomy is a modern safe and efficient method. Our team has close inter-professional collaboration, and provides high-quality perioperative consultation, psychological preparation, and intra-operative monitoring for our patients. Most patients showed high satisfaction. We hope to share our experience and further improve our services to provide better patient outcome in the future.

Nursing Audit Report in Seven Neurosurgical Centres of Hospital Authority on “Care of Patient with Low Vacuum Wound Drain in Neurosurgical Centres” in Hong Kong

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A nursing audit was conducted by the Neurosurgical Specialty Core Group among seven neurosurgical centres of Hospital Authority. The audit checklist was based on the “Guidelines for Specialty Nursing Services—Neurosurgical Care” in 2016. This audit aimed to evaluate the standard of nursing practice in caring of patients with low vacuum wound drain. With the cooperation of the Neurosurgical Specialty Core Group members, the objective of the nursing audit was achieved and successfully completed.

The nursing audit was conducted from June 2016 to August 2016. A total of 66 samples were recruited in this study. A total of 11 standard criteria, in whom six were defined as critical items, were examined.

In all, 99.7% compliance rate in critical items and 99.2% in other standard criteria were achieved. The strength and weakness areas in related care were identified. This audit result was encouraging and provides a good opportunity to measure and consolidate the standard of practice. Relevant and appropriate recommendations are introduced and followed up by individual neurosurgical centre.

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