E.2

Isolated restricted diffusion at admission predicts survival in patients of glioblastoma (IRD-GB) – a prospective pilot study

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Background: Glioblastoma (GB) is the most malignant primary brain tumor. Isolated restricted diffusion (IRD) is restricted diffusion outside the confines of enhancing tumor with no corresponding enhancement on post contrast study. The aim of our study was to prospectively assess the incidence of IRD in GB patients, determine how often these foci proceed to contrast enhancement on follow up, and analyze the survival pattern. Methods: In a prospective pilot cohort study, consecutive adult patients with GB on initial MRI of brain, were included and screened for IRD. All images were independently analyzed by two experienced radiologists. The survival pattern of patients with IRD was assessed with Cox-regression and Kaplan-Meier curve analysis. Results: Of the 52 patients (median age- 63 years; male-63.5%), 21% (11 of 52) exhibited IRD. Inter-rater agreement on the diagnosis of IRD foci was fair (kappa=0.29). Seven (64%) showed enhancement in the IRD focus. The Kaplan Meier analysis revealed a significant decrease (p=0.035) in the survival was observed among patients with IRD focus. Conclusions: IRD focus was seen in 21% of patients with GB, with 64% of these demonstrating enhancement at the IRD focus on follow up imaging. A shorter survival was associated with IRD foci.

E.3

Behind the brain's veil: unraveling the neuroimaging mysteries of CNS Balamuthia mandrillaris

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Background: Balamuthia mandrillaris is a rare protozoan pathogen that causes severe central nervous system (CNS) infections in humans. Given the complexity and rarity of these infections, understanding the radiological features is key for early diagnosis and management. This case series aims to elucidate the spectrum of imaging findings in microbiologically confirmed Balamuthia CNS infection cases. Methods: A retrospective study analyzing imaging findings of 20 patients with confirmed Balamuthia CNS infections collected from the hospital's archives, all of whom had positive CSF cultures and underwent gadolinium-enhanced MRI scans. Results: Patients presented with non-specific symptoms including headaches and seizures. Imaging revealed multiple intra-axial enhancing lesions with surrounding vasogenic edema, some demonstrating ring enhancement and typical imaging features of intracranial abscesses. Cerebritis, hemorrhagic infarcts and necrosis were also noted. Conclusions: CNS infections have a diverse group of causative organisms, including amoebic ones like Balamuthia, and often present with overlapping symptoms, complicating diagnosis. Accurate and timely imaging recognition, combined with CSF analysis, is essential for diagnosing and managing patients promptly, improving overall patients outcome in Balamuthia mandrillaris CNS infections.

E.4

Safety and outcomes of middle meningeal artery embolization for pseudoaneurysms and aneurysms: a systematic review

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Background: Middle meningeal artery embolization (MMAE) is increasingly used to treat chronic subdural hematomas, arteriovenous fistulas and meningiomas. Less commonly, MMAE is performed for pseudoaneurysms and aneurysms. While procedural safety and efficacy in the context of the former diseases is well-documented, data for MMA aneurysm/pseudoaneurysm treatment are scarce. Methods: We conducted a systematic review using PubMed/Medline and GoogleScholar, targeting studies published in English since 1994. Original research studies and case reports involving adult patients (≥18 years) with aneurysms or pseudo-aneurysms treated with MMAE were included. Data on complications, outcomes, procedural techniques, and embolization materials were analyzed using descriptive statistics. Results: Of 1,690 identified studies, 600 underwent full-text review, and 27 studies/case reports focusing on MMAE for pseudoaneurysms and aneurysms were included in the final analysis. In most cases, the treatment was successful, with complete (pseudo-)aneurysm occlusion in all patients and symptom improvement in 24 of 28 patients (85.7%). Complications were rare, occurring in <5%, and mild, such as transient headaches (n=1) which resolved spontaneously. Conclusions: MMAE appears to be a safe and effective treatment for pseudoaneurysms and aneurysms, with minimal complications and high success rates. However, available data are scarce and from case reports only, limiting generalizability. Confirmation in larger, multicenter studies is needed.

E.5

Does administration of iodinated contrast for CT-imaging modalities impact renal function?

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Background: Computed tomography (CT) is common imaging modality, though its utilization of iodinated contrast media (ICM) has been historically associated with adverse effects on the

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kidneys including nephropathy. This study aims to investigate whether administration of ICM in critically ill patients is associated with reduced kidney function and acute kidney injury (AKI). Methods: Data was used from two prospective cohort studies-ACT-TBI and CANCCAP, where patients underwent a whole head CT perfusion with additional CT scans. Serum creatinine (CR) and glomerular filtration rate (eGFR) were sequentially collected for five days of their ICU stay. AKI was evaluated following the KDIGO criteria. Results: Of the 291 patients enrolled, a stratified trend analysis for eGFR could be conducted in 158 patients. No AKI was identified in any of these patients in our study. A significant upward trend in eGFR was observed in those older than 40 years (p=0.027), those with hypertension (p=0.027), diabetes (p=0.027) and history of smoking (p=0.027), The volume of ICM received was not significantly associated with patients' eGFR. Conclusions: AKI was not identified in critically ill patients who received ICM but significant upward trend of eGFR was seen in older individuals and those with diabetes, hypertension, and a history of smoking.

E.6

Return to work after aneurysmal subarachnoid hemorrhage: a systematic review of the literature and meta-analysis

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Background: Aneurysmal subarachnoid hemorrhage (aSAH) is a devastating disease process that represents a significant health shock for thousands of patients each year. Return to work outcomes and associated factors require evaluation to counsel patients and identify domains on which to focus clinical efforts. Methods: A systematic review of the literature following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 guidelines was performed using MEDLINE, EMBASE and Cochrane databases from inception to February 2024. Proportion of patients returning to work was collected from included studies. Odds ratios were pooled from studies evaluating the association between pre-rupture demographic variables, post-rupture clinical variables and return to work following aSAH. Results: Literature search yielded 3861 studies, of which 40 studies were included in the final analysis for a total of 6888 patients. On average, 55% (SD 17%) of all patients returned to work after an aSAH. Female sex (male sex OR 1.75), high grade aSAH on presentation (OR 0.30), and need for permanent CSF diversion (OR 0.50) are significantly associated with unemployment after aSAH. Conclusions: Female sex, high grade presentation, and permanent CSF diversion are associated with unemployment after aSAH. About half of all patients that experience aSAH return to work.

Neurosurgery (CNSS)

F.1

Validation and next-generation update of a DNA methylation-based recurrence predictor for meningioma: a multicenter prospective study

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Background: We previously developed a DNA methylation-based risk predictor for meningioma, which has been used locally in a prospective fashion. As a follow-up, we validate this model using a large prospective cohort and introduce a streamlined next-generation model compatible with newer methylation arrays. Methods: The performance of our next-generation predictor was compared with our original model and standard-of-care 2021 WHO grade using time-dependent receiver operating characteristic curves. A nomogram was generated by incorporating our methylation predictor with WHO grade and extent of resection. Results: A total of 1347 meningioma cases were utilized in the study, including 469 prospective cases from 3 institutions and a retrospective cohort of 100 WHO grade 2 cases for model validation. Both the original and next-generation models significantly outperformed 2021 WHO grade in predicting postoperative recurrence. Dichotomizing into grade-specific risk subgroups was predictive of outcome within both WHO grades 1 and 2 tumours (log-rank $p<0.05$). Multivariable Cox regression demonstrated benefit of adjuvant radiotherapy in high-risk cases specifically, reinforcing its informative role in clinical decision making. Conclusions: This next-generation DNA methylation-based meningioma outcome predictor significantly outperforms 2021 WHO grading in predicting time to recurrence. This will help improve prognostication and inform patient selection for RT.

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