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Intracranial-intracranial bypass strategies for the treatment of complex intracranial aneurysms

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Background: This study aimed to describe the technical characteristics and clinical efficacy of intracranial-to-intracranial (IC-IC) bypass for the treatment of complex intracranial aneurysms. Methods: We retrospectively reviewed all patients with aneurysms who underwent a preplanned combination of surgical or endovascular treatment and IC-IC bypass at our institution between January 2006 and September 2023. IC-IC bypass techniques included four strategies: type A (end-to-end reanastomosis), type B (end-to-side reimplantation), type C (in situ side-to-side anastomosis), and type D (IC-IC bypass with a graft vessel). Results: We performed the type A strategy on five patients (50.0%), type B on one (10.0%), type C on one (10.0%), and type D on three (30.0%). During a mean period of 68.3 months, good clinical outcomes (modified Rankin Scale score, 0-2) were observed in all patients. Follow-up angiography demonstrated complete aneurysmal obliteration in all patients and good bypass patency in nine of ten patients (90.0%). Conclusions: The treatment of complex aneurysms remains a challenge with conventional surgical or endovascular treatments. IC-IC bypass surgery is a useful technique, associated with favorable clinical outcomes, for treating complex aneurysms.

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Anesthetic strategies for mechanical thrombectomy: a single-center retrospective review

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Background: Ischemic stroke is a major cause of morbidity and mortality in Canada. Since 2015, mechanical thrombectomy has been the standard of care for eligible large vessel occlusions (LVOs), though anesthetic strategies remain variable. Methods: We conducted a single-center retrospective review of patients undergoing mechanical thrombectomy for anterior circulation LVOs between 2021 and 2023. Patients were categorized by anesthetic strategy (general anesthesia vs. conscious sedation), and outcomes, including time to recanalization, angiographic results (mTICI), and 90-day functional status (mRS), were compared. Statistical analyses included Student's t-test, Mann-Whitney U-test, and Fisher's exact test. Results: Among 226 patients, 177 (78%) received general anesthesia and 49 (22%) underwent conscious sedation. Baseline characteristics including sex, age, NIHSS, ASPECTS, collaterals, and laterality were similar between groups. Conscious sedation was associated with a statistically significant shorter time from arrival to the angiography suite to groin puncture (p=0.007), but no differences in time to recanalization (p=0.893), angiographic outcomes (p=0.987), or 90-day functional status (p=0.795) were observed. Conclusions: Conscious sedation led to faster procedural initiation, though no difference in clinical or radiographic outcome was observed. Anesthetic choice should be individualized based on patient and physician factors in acute mechanical thrombectomy.

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Synthetic neurosurgical data generation using large language models

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Background: Use of neurosurgical data for research and machine learning model development is often constrained by privacy regulations, small sample sizes, and resource-intensive data preprocessing. We explored the feasibility of using the large language model (LLM) GPT-4o to generate synthetic neurosurgical data. Methods: A plain-language prompt instructed GPT-4o to generate synthetic data based on univariate and bivariate statistical properties of 12 perioperative parameters from a real-world open-access neurosurgical dataset ($n = 139$). The prompt was input over independent trials to generate 10 datasets matching the reference size ($n = 139$), followed by an additional dataset representing a ten-fold amplification ($n = 1390$). Fidelity was assessed using t-tests, two-sample proportion tests, Jensen-Shannon divergence, two-sample Kolmogorov-Smirnov, and Pearson's product-moment correlation. Results: Generated data preserved distributional characteristics and relationships between desired parameters. In all generations, at least 11/12 (91.67%) parameters showed no statistically significant differences in means and proportions from real data, including the amplified dataset. Five of the synthetic datasets showed no significant differences in all 12 parameters. Conclusions: The findings demonstrate that a zero-shot prompting approach can generate synthetic neurosurgical data and amplify sample sizes with consistent high fidelity compared to real-world data. This underscores LLMs' potential in addressing data availability challenges for neurosurgical research.

OTHER NEUROSURGERY

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Trends in the management of scalp aplasia cutis congenita

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Background: Aplasia Cutis Congenita is a rare congenital abnormality characterized by varying absence of skin and mesodermal tissues. Management remains controversial, with significant inconsistency across specialties and over time. This review

evaluates trends in management based on journal specialty and publication epoch. Methods: A review of pediatric scalp Aplasia Cutis Congenita management was conducted. Articles were categorized by journal type (neurosurgery, plastic surgery, dermatology, other medical, and other surgical) and management approach (surgical, conservative, or combined). Descriptive statistics were used to summarize trends in recommendations, and assess associations between journal type and treatment. Trends over time were analyzed based on publication year. Results: A total of 171 studies were included. Among surgical journals, 33.7% recommended surgical management, while medical journals favored conservative (14.1%) or combined approaches (84.5%) (p < 0.001). Recommendations for surgical management decreased from 80% in the 1970s to 30% in the 2020s. Notably, among 119 studies advocating for a combined approach, only 27 provided criteria for surgical indications, with lesion thresholds ranging from >1cm to >15 cm. Conclusions: This study highlights the lack of guidelines for ACC management and reveals specialty and time epoch of publication-dependent biases in treatment. These findings emphasize the need for multidisciplinary guidelines for consistent, patient-centered care.

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Development of benign enlargement of subarachnoid spaces growth charts

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Background: Normalized growth curves are an essential component in management of pediatric patients. Benign enlargement of subarachnoid spaces (BESS) is a common condition in infants that results in deviation from expected head growth but does not have long term implications. Differentiating BESS from pathological conditions is critical to minimize unnecessary imaging and specialist evaluations. Standardized growth charts specific to BESS do not exist, complicating monitoring and management. Methods: An analysis of head circumference (HC) data was performed for 315 children aged 0-6 years diagnosed with BESS at CHEO. Growth charts were created using Generalized Additive Models for Location, Scale, and Shape (GAMLSS). Z-scores derived from HC measurements were compared to World Health Organization (WHO) norms, stratified by sex. Results: Benign macrocephalic patients consistently tracked above the 97th percentile of WHO curves, with the 50th percentile in this cohort aligning with the 97th percentile of WHO data. HC growth accelerated in early infancy, stabilizing around ages 2-3. Growth charts demonstrated distinct patterns for BESS compared to normative data. Conclusions: This study provides novel charts for BESS, enabling improved monitoring and clinical management. These charts have the potential to reduce unnecessary imaging and specialist referrals, alleviating anxiety for caregivers and clinicians while optimizing resource use.

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Factors affecting access to neurosurgical care in diverse communities in Canada: a qualitative scoping review

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Background: Access to neurosurgical care is vital for conditions such as traumatic brain injuries and brain tumours. However, significant disparities in healthcare access persist in Canada, disproportionately affecting rural, Indigenous, and socioeconomically disadvantaged populations. This qualitative scoping review examines barriers and facilitators to neurosurgical access, addressing gaps in the literature concerning equity-deserving groups. Methods: A systematic literature search (2000–2024) was conducted within MEDLINE, EMBASE, Cochrane Library, PsycINFO, and Scopus, along with gray literature from governmental and non-governmental organizations. From 1400 identified records, eight qualitative or mixed-methods studies met the inclusion criteria. Thematic analysis was conducted to explore socioeconomic, geographic, racial, gender-based, and cultural barriers. Results: Four major themes emerged: delays in access, alternative healthcare options, policy barriers, and communication and coordination issues. Barriers such as transportation gaps, socioeconomic inequities, and systemic discrimination were particularly pronounced for rural and Indigenous populations. Facilitators like telehealth and improved inter-hospital coordination show potential but are limited by infrastructure constraints and cultural misalignments. Conclusions: Addressing barriers to neurosurgical care requires systemic reforms, including equitable resource allocation, expanded digital infrastructure, and culturally competent care. The lack of intersectional research on overlapping barriers underscores the need for future studies to prioritize tailored interventions to ensure timely, equitable neurosurgical care across Canada.

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Resident wellness and burnout in the University of Alberta Neurosurgery Residency Program – a quality improvement study

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Background: Residency training is well-known to be an arduous life event - especially in neurosurgery. The Maslach Burnout Index (MBI) is the gold standard for assessing burnout while the Perceived Stress Scale (PSS) identifies the relative importance of stressors. The purpose of this study is to quantify resident wellness using two validated instruments