E-070

TRENDS IN PEDIATRIC NEUROINTERVENTIONAL RADIOLOGY: A SURVEY OF A 23-YEAR EXPERIENCE IN INFANTS LESS THAN ONE YEAR OF AGE

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Background and Purpose Pediatric neurointerventional radiology is an evolving subspecialty with growing indications and technological advancement such as miniaturization of devices. The ability to perform these procedures is continuously balanced with necessity given the inherently higher risks of radiation^{1,2} and cerebrovascular injury in infants. Endovascular treatment of arteriovenous shunting lesions including vein of Galen malformations (VOGM), arteriovenous malformations (AVM) and arteriovenous fistulas (AVF) has been well established in pediatric patients including those of a very young age.^{3–5} More recently, intra-arterial chemotherapy (IAC) for the treatment of retinoblastoma has been used in this age group. The purpose of this study is to review our institution's neurointerventional experience in infants less than 1 year of age in order to elucidate trends in this delicate patient population.

Methods We retrospectively identified 123 patients from a neurointerventional database spanning 23 years (January 1997–October 2020) who underwent 209 procedures. Treatment type, indication, and location as well as patient demographics were extracted from the medical record. We excluded 7 patients with an age of greater than one year at the time of procedure as well as those with procedure requests without completion.

Results Neurointerventional procedures were performed as early as day of life 0 in a patient with an AVM resulting in hydrops fetalis. Average age of intervention in the first year of life is 5.8 months, and 37 of 209 procedures were completed in neonates (less than one month of age). IAC for the treatment of retinoblastoma comprised 33% of neurointerventional procedures completed in infants less than one year of age followed by lymphatic malformations (19%), VOGM (13%), and dural AVF (10%). Less frequent indications include non-Galenic pial AVF (4%) and tumor embolization (2%). Only 4 of 209 angiograms were negative. The total number of interventions has increased which is likely secondary to the onset of retinoblastoma treatment in 2010 at our institution.

Conclusion The introduction of IAC for the treatment of retinoblastoma in the last decade is the primary driver for the increased trend in neurointerventional procedures completed in patients less than one year of age from 1997 to 2020.

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E-071

NEUTROPENIA AFTER INTRA-ARTERIAL CHEMOTHERAPY FOR THE TREATMENT OF RETINOBLASTOMA

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Background and Purpose Intra-arterial chemotherapy (IAC) infusion for the treatment of intraocular retinoblastoma is an effective and relatively safe therapeutic option.^{1–3} However, one of the well described systemic complications following IAC is neutropenia.⁴ The purpose of this retrospective study is to examine the incidence of neutropenia over the course of treatment for each patient, and to further analyze if the incidence is affected by systemic chemotherapy or number of chemotherapeutic agents used for IAC.

Methods We retrospectively identified 76 patients from a neurointerventional database spanning 10 years (March 2010 – August 2020) who underwent 214 cycles of IAC. Patient demographics, treatment course, angiographic technique as well as pre and post procedural complete blood counts were extracted from the medical record. Neutropenia, including all grades I–IV, is defined by an absolute neutrophil count (ANC) equal to or less than $1.5 \times 10^9/L$. Eleven patients who did not obtain a post-procedural complete blood count during their treatment course were excluded. The presence of postprocedural neutropenia was further subdivided based on whether systemic intravenous chemotherapy was administered as well as according to the number of intra-arterial chemotherapeutic agents.

Results The overall incidence of neutropenia was 62% in our total patient cohort. There was no statistically significant difference between the incidence of neutropenia in patients who did and did not receive systemic chemotherapy. The majority of patients received two chemotherapeutic agents (melphalan and topotecan), of which 58% and 54% of patients experienced neutropenia with and without systemic chemotherapy, respectively. The highest incidence of neutropenia was 100%, in five patients who received systemic chemotherapy and a three agent intra-arterial regimen (melphalan, topotecan, carboplatin).

Conclusion Neutropenia is a systemic toxicity in more than half of patients who receive IAC infusion for intraocular retinoblastoma, and does not significantly differ in patients who do and do not receive systemic chemotherapy.

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E-072

THE RELATIONSHIP BETWEEN CEREBRAL VASOSPASM AND HERPESVIRUS REACTIVATION AFTER ANEURYSMAL SUBARACHNOID HEMORRHAGE

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Background Aneurysmal subarachnoid hemorrhage (aSAH) is a devastating disease frequently leading to death or poor functional outcome. A major source of disability from aSAH is the development of cerebral vasospasm, which is defined as narrowing of the large and medium-sized intracranial arteries. Limited information exists regarding underlying anatomic mechanisms of vasospasm after aSAH. Based on the anatomical location of resident herpesvirus and their activation in response to adrenergic stress, we propose that herpesvirus reactivation in response to adrenergic activation of head and neck ganglia during aSAH will be temporally related to cerebral vasospasm.

Methods We developed an IRB-approved protocol for non-invasive bedside testing of viral shedding in tears and saliva in aSAH patients. The protocol was a joint effort with Infectious Disease and our virology laboratory. Viral specimens and catecholamines were obtained at admission and at days 4, 7, 10 and 14 post-aSAH. These values were compared to standard-of-care metrics including transcranial doppler, clinical examination and radiological studies. Herpesvirus serology was also obtained.

Results Our protocol successfully yielded samples for analysis in all cases. Initially, serum catecholamines were utilized but collection methodology and requirements resulted in unusable samples. Further, many patients require pressor support using parenteral catecholamines and serum results may not be valid during hospitalization. Instead, salivary alpha-amylase is being tested as a surrogate marker, with collection limited to those patients not requiring catecholamine pressor support within the previous 24 hours. In our preliminary dataset, integrity analyses demonstrated high quality yields of saliva and tears for quantitative PCR analysis. Once collection is complete, we aim to present the collection and storage protocol for dissemination and highlight the training required for specimen processing.

Conclusion We have developed a novel protocol for the analysis of viral shedding and catecholamine measurement in post-aSAH patients. The specimens are captured during the patient's hospitalization and allow us to study the relationship between reactivation of chronic herpesvirus infection and cerebral vasospasm after aSAH.

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E-073

CLOT BANK COLLABORATIVE REGISTRY PROTOCOL: NOVEL METHOD FOR EVALUATING ISCHEMIC THROMBUS

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Background Epidemiological and laboratory studies have brought renewed attention to the myriad ways in which bacteria contribute to risk of stroke and to adverse outcomes after stroke. The emergence of endovascular thrombectomy as a treatment provides a unique opportunity to advance our understanding of infection in stroke patients. Thrombus retrieved from cerebral arteries represents a new source of information providing unprecedented biological insight into the vascular microenvironment. Our aim was to develop a reproducible protocol allowing for the preservation of microbiota and their DNA/RNA during collection and transfer of thrombi and peripheral blood specimens from facilities across remote or distant geographies for future multi-omic analysis.

Methods Utilizing Materials Transfer Agreements with partners in several states, we developed an IRB-approved protocol for collection, archive and study of specimens retrieved during standard-of-care thrombectomy. The protocol was a joint effort among University of Washington stroke physicians, clinical scientists, and multiple laboratories at the J. Craig Venter Institute. Using pre-labeled sterile laboratory supplies in the angiography suite, a step-by-step protocol for specimen retrieval and processing was outlined for interventionalists and their team.

Results Our protocol successfully yielded samples for analysis in all cases. Preliminary metagenomic analysis, including negative controls, demonstrated sufficient DNA quality and quantity for evaluation. We present the tissue preservation protocol for dissemination and highlight the analytical challenges presented by low biomass, high host-contamination specimens. In addition, we discuss the benefits of room (ambient) temperature preservation media compared to others requiring refrigeration or freezing for storage and transport.

Conclusion We have developed a novel tissue banking protocol to preserve microbiota from arterial thrombi retrieved from ischemic stroke patients. While there is no consensus which class of pathogens is implicated in the susceptibility to stroke, multiple studies including our own, have shown bacterial fragments and communities in cerebral thrombi. The specimens captured during standard-of-care thrombectomy allow us to characterize and functionally define the microbiota associated with cerebral thrombi in ischemic stroke patients.

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