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Neurointerventions and Imaging: Advancements in Diagnosis and Treatment

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DESCRIPTION

Neurointerventions and imaging have revolutionized the field of neurology, providing minimally invasive techniques for diagnosing and treating various neurological disorders. The integration of advanced imaging modalities with neurointerventional procedures has significantly improved patient outcomes, offering precision, safety, and efficacy. These advancements have led to a paradigm shift in the management of conditions such as stroke, aneurysms, arteriovenous malformations, and spinal disorders. These procedures have gained prominence due to their minimally invasive nature, reducing the need for open surgeries and minimizing recovery time. By restoring blood flow rapidly, this procedure significantly reduces the risk of long-term neurological deficits and enhances functional recovery. Coiling involves the insertion of platinum coils into the aneurysm sac, promoting thrombosis and preventing rupture. Flow diverters, on the other hand, are stent-like devices that redirect blood flow away from the aneurysm, facilitating its gradual closure. These techniques, guided by high-resolution imaging, have improved the safety and efficacy of aneurysm treatment, reducing complications and recurrence rates. Similarly, embolization is a primary treatment modality for dAVFs, effectively obliterating abnormal arteriovenous connections and alleviating symptoms. Advanced imaging technologies play a crucial role in neurointerventions, enabling precise diagnosis, real-time procedural guidance, and post-procedural assessment. Digital Subtraction Angiography (DSA) remains the gold standard for visualizing cerebrovascular anatomy and assessing blood flow dynamics. Computed Tomography Angiography (CTA) and Magnetic Resonance Angiography (MRA) have also become indispensable in pre-procedural planning. CTA offers rapid, detailed visualization of blood vessels, making it ideal for assessing stroke patients and detecting aneurysms. MRA, on the other hand, provides excellent soft tissue contrast without ionizing radiation, making it suitable for long-term follow-up of vascular lesions. Additionally, perfusion imaging techniques, such as CT or MRI perfusion, help assess cerebral blood flow and identify salvageable brain tissue in stroke patients, guiding timely interventions. Robotic-assisted endovascular procedures offer enhanced precision, stability, and remote operability, minimizing human error and expanding access to specialized care. In conclusion, neurointerventions and imaging have transformed the diagnosis and treatment of neurological disorders, offering minimally invasive, highly effective solutions. Despite these advancements, challenges remain in the widespread adoption of neurointerventional techniques. High costs, limited availability of specialized centers, and the need for skilled expertise pose significant barriers. Additionally, radiation exposure during imaging procedures necessitates continued efforts to optimize dose reduction strategies and develop safer imaging alternatives. The continuous evolution of imaging technologies, coupled with innovations in artificial intelligence and robotics, holds immense promise for further improving patient outcomes. As research and technology advance, the future of neurointerventions will likely see enhanced accessibility, precision, and safety, ultimately revolutionizing the field of neurovascular medicine.

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CONFLICT OF INTEREST

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