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Technical evolution of pediatric neurosurgery: the evolution of intraoperative imaging

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Abstract

Imaging has always been fundamental to neurosurgery, and its evolution over the last century has made a dramatic transformation in the ability of neurosurgeons to define pathology and preserve normal tissue during their operations. In the mid-70 s, the development of computerized cross-sectional imaging with CT scan and subsequently MRI have revolutionized the practice of neurosurgery. Later, further advances in computer technology and medical engineering have allowed the combination of many modalities to bring them into the operating theater. This evolution has allowed real-time intraoperative imaging, in the hope of helping neurosurgeons achieve accuracy, maximal safe resection, and the implementation of minimally invasive techniques in brain and spine pathologies. Augmented reality and robotic technologies are also being applied as useful intraoperative techniques that will improve surgical planning and outcomes in the future. In this article, we will review imaging modalities and provide our institutional perspective on how we have integrated them into our practice.

Keywords: Brain tumor surgery; Intraoperative imaging; Pediatric neurosurgery; Pediatric spine surgery.

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