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Diagnosis of Head and Neck Cancer using Artificial Intelligence

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Abstract

Surgery is now an acceptable, and in many cases the only, treatment option for carefully selected infants and children with intractable severe epilepsy, including infantile spasms (ISS) (Engel, 1996; Mathern et al., 1999; Peacock et al., 1996; Sisodiya, 2000; Wyllie et al., 1996). The specimens obtained from such procedures have provided neuropathologists with novel brain tissues that may provide clues to the pathogenesis of ISS as well as epileptic syndromes.

Keywords: Specimens • Epilepsy • Syndromes • Sisodiya

Introduction

Pediatric epilepsy surgery is typically performed at tertiary medical centres, where the ancillary preoperative investigations required to determine an optimal operative strategy and outcome are available. The resulting corticectomy specimen must be handled in order to maximise its research value while also providing an accurate neuropathologic diagnosis (Farrell et al., 1992; Vinters et al., 1992; Mischel et al., 1995). At our facility, a fragment of cortex is usually delivered directly from the operating room to the neurophysiology laboratory (Mathern et al., 2000). Depending on the size of the remaining tissue, it is usually subdivided so that representative fragments are snap frozen (for subsequent neurochemical/molecular studies, if indicated or of interest), while others are fixed in paraformaldehyde and processed.

The significance of major cerebral cortical malformations as a cause of intractable ISS was suspected as early as the "presurgical era," when studies of the morphologic substrates of ISS or West syndrome were almost entirely performed on autopsy tissue. These series, almost by definition, focused on extremely severe brain lesions that were fatal to ISS patients. In a review of his own autopsy experience of 50 cases and a review of 214 confirmed examples in the literature, Jellinger found that early infantile epilepsy was associated with a wide range of neuropathologic abnormalities, ranging from severe malformations (agyria, pachygyria, micrencephaly, tuberous sclerosis, and cortical microdysplasias) to metabolic disorders (leukodystrophies, Leigh [1].

Description

Surgery is generally the standard of care for patients with early-stage and resectable advanced-stage oral cancer. The primary goal is to obtain adequate resection margins, because inadequate margins are linked to a higher risk of recurrence and a worse prognosis.

The studies were divided into five categories based on the technology used for intra-operative margin evaluation: 'Frozen Section Analysis,' 'Fluorescence,' 'Optical Imaging,' 'Conventional Imaging Techniques,' and 'Cytological Assessment.' The following data were extracted from the included studies: Margin assessment technology, whether margins were assessed on the remaining defect after tumour removal, at the resection surface of the specimen, or if the tumour was evaluated in situ, verification method, definition of positive margin, sample size, tumour site, technology accuracy, or sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV), or a different outcome measure, acquisition time, and sampling [2].

The surgeon and pathologist work together to provide a rapid intraoperative evaluation of the surgical margin using frozen section analysis (FSA). Tissue is transported to the pathology department, frozen in a cryostat machine, thinly sliced with a razor, affixed to a glass slide, and dipped into fixatives and tissue stains for immediate interpretation [3,4]. A systematic review on intraoperative margin assessment was recently published, emphasising the need for more research to improve the accuracy of techniques to reduce positive margins. However, no distinction was made between mucosal and deep margins. Technologies for intraoperative margin assessment must distinguish between healthy and tumour tissue. Healthy mucosal tissue differs from healthy tissue found at the deep margin, necessitating a different approach. The deep margin should be the focus of intra-operative margin assessment for two reasons: Woolgar et al. discovered that the deep margin was involved in 87% of the tissues with inadequate margins, and Weijers et al. discovered that there was no significant difference in recurrence rate between close and clear mucosal margins, implying that the deep margin is involved in 87% of the tissues with inadequate margins [5].

Conclusion

Stenosis, occlusion, aneurysm, dissection, bleeding, thrombosis, embolism, ischaemia, inflammation, and oedema can all result from vascular wall lesions. Angiography and Doppler ultrasound can detect stenosis, occlusions, aneurysms, thrombosis, and bleedings. X-rays, computed tomography, and magnetic resonance imaging can be used to show bleeding, lesions, complications, and the extent of the disease. If no suitable biopsies can be used or found, angiography can be used to demonstrate stenosis and post-stenotic dilations, aortic aneurysms, dissection, and microaneurysms. Internal organ microaneurysms are suggestive but not diagnostic of polyarteritis nodosa, as they can be found in other diseases affecting slightly smaller arteries, such as Wegener's granulomatosis and Churg-Strauss syndrome, as well as non-vasculitic conditions such as atrial myxoma and infective endocarditis. The diagnostic workup for primary angiitis of the central nervous system usually begins with magnetic resonance imaging of the brain, which is usually abnormal, followed by an examination of the cerebrospinal fluid, which usually demonstrates inflammatory changes in the granulomatous disease.

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The benign form of the disease is diagnosed through angiography, and the granulomatous form is diagnosed through biopsy and associated inflammatory changes in the cerebrospinal fluid.

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Conflict of Interest

There are no conflicts of interest by author.

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