Pediatric posterior fossa tumor differential diagnosis

Prevalent pathologies include medulloblastoma, ependymoma, pilocytic astrocytoma, and atypical teratoid/rhabdoid tumor(AT/RT).

While the majority of tumors at this location comprise of pilocytic astrocytoma, ependymoma, and medulloblastoma, some rare examples may also arise; common differentials must be considered and prudently excluded to arrive at the diagnosis which is crucial in guiding the neurosurgeon. Both squash smears and rapid frozen section should be prepared and complement each other for rapid on-site evaluation [1].

A predesigned flowchart facilitated identification of pilocytic astrocytoma, ependymoma, and medulloblastoma sonic hedgehog tumors with high sensitivity and specificity. On the basis of the results, the flow chart was adjusted so that it would also be able to better discriminate atypical teratoid/rhabdoid tumors and medulloblastoma groups 3 or 4 (sensitivity = 75%-79%; specificity = 92%-99%). Moreover, our adjusted flow chart was useful in ruling out ependymoma, pilocytic astrocytomas, and medulloblastoma sonic hedgehog tumors.

The modified flow chart offers a structured tool to aid in the adjunct diagnosis of pediatric posterior fossa tumors. The results also establish a useful starting point for prospective clinical studies and for the development of automated algorithms, which may provide precise and adequate diagnostic tools for these tumors in clinical practice [2].

Apparent diffusion coefficient maps were produced and histogram data was extracted from tumour regions of interest. Total histograms and histogram metrics (mean, variance, skew, kurtosis and 10th, 20th and 50th quantiles) were used as data input for classifiers with accuracy determined by tenfold cross validation. Mean ADC values from the tumour regions of interest differed between tumour types, (ANOVA $P < 0.001$). A cut off value for mean ADC between Ependymomas and Medulloblastomas was found to be of $0.984 \times 10\text{-}3$ mm2 s-1 with sensitivity 80.8% and specificity 80.0%. Overall classification for the ADC histogram metrics were 85% using Naïve Bayes and 84% for Random Forest classifiers. The most commonly occurring posterior fossa paediatric brain tumours can be classified using Apparent Diffusion Coefficient histogram values to a high accuracy on a multicentre basis [3].

1)
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2)
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3)

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