Intramedullary ependymoma outcome

Ryu et al., compiled spinal ependymoma cases diagnosed between 1973 and 2014 from the Surveillance, Epidemiology, and End Results (SEER) registry. To identify the factors influencing survival, statistical analyses were performed using the Kaplan-Meier method and Cox proportional hazards regression model. In addition, we implemented machine learning algorithms to predict the OS of spinal ependymoma patients.

In the multivariate analysis model, age ≥ 65 years, histological subtype, extraneural metastasis, multiple lesions, surgery, radiation therapy, and gross total resection (GTR) were found to be independent predictors for OS. Our ML model achieved an area under the receiver operating characteristic curve (AUC) of 0.74 (95% confidence interval [CI], 0.72-0.75) for predicting a 5-year OS of spinal ependymoma and an AUC of 0.81 (95% CI, 0.80-0.83) for predicting a 10-year OS. The stepwise logistic regression model showed poorer performance by an AUC of 0.71 (95% CI, 0.70-0.72) for predicting a 5-year OS and an AUC of 0.75 (95% CI, 0.73-0.77) for predicting a 10-year OS.

With SEER data, they reaffirmed that therapeutic factors, such as surgery and GTR, were associated with improved OS. Compared with statistical methods, machine learning (ML) algorithms techniques showed satisfactory results in predicting OS although the dataset was heterogeneous and complex with numerous missing values [1)].

The aim of a study was to illustrate the survival outcomes of patients with classic ependymoma (CE) and identify potential prognostic factors.CE is the most common category of spinal ependymomas, but few published studies have discussed predictors of the survival outcome.A Boolean search of the PubMed, Embase, and OVID databases was conducted by 2 investigators independently. The objects were intramedullary grade II ependymoma according to 2007 WHO classification. Univariate Kaplan-Meier analysis and Log-Rank tests were performed to identify variables associated with progression-free survival (PFS) or overall survival (OS). Multivariate Cox regression was performed to assess hazard ratios (HRs) with 95% confidence intervals (95% CIs). Statistical analysis was performed by SPSS version 23.0 (IBM Corp.) with statistical significance defined as $P<.05$.A total of 35 studies were identified, including 169 cases of CE. The mean follow-up time across cases was 64.2 ± 51.5 months. Univariate analysis showed that patients who had undergone total resection (TR) had better PFS and OS than those with subtotal resection (STR) and biopsy ($P=.002$, $P=.004$, respectively). Within either univariate or multivariate analysis ($P=.000$, $P=.07$, respectively), histological type was an independent prognostic factor for PFS of CE [papillary type: HR 0.002, 95% CI (0.000-0.073), $P=.001$, tanycytic type: HR 0.010, 95% CI (0.000-0.218), $P=.003$].It was the first integrative analysis of CE to elucidate the correlation between kinds of factors and prognostic outcomes. Definite histological type and safely TR were foundation of CE's management [2)].

Invasive ependymomas occurring in the spine have a much worse prognosis, while higher tumor grades do not clearly demonstrate worse rates of survival. Early diagnosis and surgery appear to be associated with improved survival and outcomes, while radiation therapy and chemotherapy has an unclear role [3)].

While resection can often achieve favorable outcomes in the treatment of spinal ependymoma, more research on the unique molecular, genetic, chromosomal and epigenetic traits must be conducted in

order to tailor treatment and intervention for those patients for whom total resection is not possible [4].

Case series

To evaluate the long-term outcome and functional recovery of intramedullary medullocervical ependymoma (IME), the clinical charts of 38 surgically treated consecutive cases of IME were reviewed. Follow-up was obtained prospectively. The mean age of the patients (19 male and 19 female) was 35.3 years (range: 11-60 years). Complete resection was achieved in 33 (86.8%) patients. Fourteen patients worsened postoperatively; five and seven of these improved to their baseline levels within 1 and 3 months, respectively. By 1 year postoperatively, 17 patients returned to work. After a mean follow-up duration of 81.5 months, 31 patients improved or stabilized, and 3 had recurrence. The means of the modified McCormick grade (mMG) scores before the operation, at discharge, 1 year after the operation, and at the most recent evaluation were 1.76, 2.13, 1.82, and 1.84, respectively. A favorable long-term outcome of the mMG was associated with a good preoperative status (mMG I) (odds ratio [OR] = 9.956, p = 0.008) and well-defined tumor boundary (OR = 7.829, p = 0.035). Improvements in the postoperative walking dysfunction and paresthesia over time were associated with the absence of preoperative walking dysfunction (p = 0.047) and paresthesia (p = 0.028), respectively. The 12-year progression/recurrence-free survival and overall survival rates were 92.0% and 93.7%, respectively. The study suggests that the goal of surgery is to stabilize the preoperative neurological function and that a favorable outcome may be achieved in patients with good preoperative statuses and well-defined tumor boundaries. Surgery should be performed as soon as possible after the diagnoses and before the neurological functions deteriorate [5].

Early diagnosis and referral for surgery to specialized centers are recommended as controllable factors in improving outcome [6].

1)
Ryu SM, Lee SH, Kim ES, Eoh W. Predicting survival of spinal ependymoma patients using machine learning algorithms with SEER database. World Neurosurg. 2018 Dec 28. pii: S1878-8750(18)32914-0. doi: 10.1016/j.wneu.2018.12.091. [Epub ahead of print] PubMed PMID: 30597279.
2)
Wang Y, Cai R, Wang R, Wang C, Chen C. Outcome predictors in the management of intramedullary classic ependymoma: An integrative survival analysis. Medicine (Baltimore). 2018 Jun;97(23):e10870. doi: 10.1097/MD.0000000000010870. PubMed PMID: 29879023.
3)
Khalid SI, Kelly R, Adogwa O, Carlton A, Woodward J, Ahmed S, Khanna R, Bagley C, Cheng J, Shah S, Mehta AI. Pediatric Spinal Ependymomas: An Epidemiological Study. World Neurosurg. 2018 Apr 6. pii: S1878-8750(18)30698-3. doi: 10.1016/j.wneu.2018.03.206. [Epub ahead of print] PubMed PMID: 29631082.
4)
Connolly ID, Ali R, Li Y, Gephart MH. Genetic and molecular distinctions in spinal ependymomas: A review. Clin Neurol Neurosurg. 2015 Dec;139:210-5. doi: 10.1016/j.clineuro.2015.10.011. Epub 2015 Oct 19. Review. PubMed PMID: 26519890.
5)
Li D, Hao SY, Wu Z, Jia GJ, Zhang LW, Zhang JT. Intramedullary medullocervical ependymoma–surgical treatment, functional recovery, and long-term outcome. Neurol Med Chir (Tokyo). 2013;53(10):663-75. Epub 2013 Sep 27. PubMed PMID: 24077278; PubMed Central PMCID:

PMC4508749.
6)
Alkhani A, Blooshi M, Hassounah M. Outcome of surgery for intramedullary spinal ependymoma. Ann Saudi Med. 2008 Mar-Apr;28(2):109-13. PubMed PMID: 18398287.