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ABSTRACTS

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ORAL PRESENTATION
1-THE ROLE OF MAGNETIC RESONANCE CONVENTIONAL IMAGING, ADC MEASUREMENT, RADIOMICS FEATURES, AND MACHINE LEARNING APPLICATIONS IN PREDICTING MENINGIOMA GRADE AND HISTOPATHOLOGICAL SUBTYPES

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Introduction and Aim: This study aimed to predict intracranial meningioma preoperative grade and subtypes using a combination of MR imaging features, ADC values, radiomics, and machine learning. The research encompassed 168 patients with preoperative MR imaging.

Material and Methods: The investigation involved the assessment of 14 MR imaging features, ADC values, and 185 radiomics parameters. Four machine learning algorithms, including Naive Bayes, k-Nearest Neighbors (kNN), Support Vector Machine (SVM), Random Forest, Decision Tree, Neural Network, and Logistic Regression, were employed for classification. Feature selection utilized the Gini index, and Stratified 10-fold cross-validation provided internal validation.

Results: Key findings highlighted strong correlations between high-grade meningiomas and specific MR features such as hypointense ADC signal, intratumoral necrosis, peritumoral edema, heterogeneous enhancement pattern, uncertain tumor/brain interface, bone invasion, and the absence of complete annular enhancement ($p<0.05$).
The most successful machine learning model for high-grade meningioma detection combined radiomics features from T1 contrast-enhanced images with ADC measurements, achieving an AUC of 0.798. The inclusion of ADC values improved algorithm performance. The highest accuracy was achieved in identifying the atypical and anaplastic (AA) group and the meningothelial subtype, with AUC values of 0.808 and 0.709, respectively. The model combining T2 radiomics features and ADC measurements excelled in identifying the AA group and meningothelial subtype.

Discussion and Conclusion: In conclusion, this study unveiled significant associations between high-grade meningiomas and specific MR features. Radiomics-based machine learning successfully predicted high-grade meningiomas, with enhanced performance when ADC values were integrated. These findings hold promise for improving patient management and prognosis prediction in intracranial meningiomas.

ORAL PRESENTATION
2.THE COMPARISON OF THE EFFICACY OF 3D FAST SPOILED GRADIENT ECHO (3D-FSGPR) SEQUENCE AND STEADY STATE FREE PRECESSION (SSFP) SEQUENCE IN IMAGING VASCULAR COMPRESSION IN PATIENTS WITH TRIGEMINAL NEURALGIA

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Introduction and Aim: Trigeminal neuralgia is a condition characterized by sudden and intense pain in the face, affecting the fifth cranial nerve(1). Episodes of abrupt pain, lasting from seconds to minutes, can be triggered by factors such as chewing, speaking, exposure to cold air, wind, or laughter (1,2). While it can develop for various reasons, vascular compression is a well-known cause (3). Additionally, conditions such as tumors, arachnoid cysts, idiopathic inflammation, damage, or demyelination can result in trigeminal neuralgia, extending to the distal branches of the trigeminal nerve from the pons (1,2,3). We aimed to investigate the diagnostic effectiveness of post-contrast 3D-FSPGR in addition to SSFP images in the imaging of trigeminal neuralgia.

movement, either of the subject or of the surrounding environment. Dizziness is a broader term and involves vertigo, disequilibrium, imbalance, postural instability, presyncope and psychophysiological dizziness (2,3). It is critical to distinguish between central and peripheral causes when a patient presents with acute dizziness and vertigo (acute vestibular syndrome) (2). The preferred diagnostic test in differentiating between central and peripheral causes is HINTS (head impulse, nystagmus and test of the skew)(4). Small proportion (4%) of acute vestibular syndrome is caused by acute stroke (2,5). Acute dizziness is rarely caused by acute stroke but in an attempt to avoid misdiagnosis, imaging tests such as brain magnetic resonance imaging (MRI), computed tomography (CT), or computed tomography angiography (CTA) are frequently performed. Regarding the proper use of neuroimaging in the evaluation of patients experiencing acute dizziness in the ED, there are currently no well-established standards (5). The purpose of our study was to evaluate the effectiveness of head and neck CTA in detecting significant findings in comparison to noncontrast head CT for assessing isolated, acute dizziness.

Materials and Methods: Following approval from the institutional ethical committee, we reviewed the adult patients from January 1st 2021 to January 1st 2023 who had been to the ED complaining of acute onset isolated dizziness. Patients with dizziness who had a head CT and a head and neck CTA to exclude central causes were included. Findings on head CT were categorized as 'no abnormality / unrelated abnormality' and 'related abnormality. Posterior circulation findings from CTA were categorized as positive or negative.

Results: In the ED, a total of 122 adult patients who experienced acute isolated dizziness and vertigo underwent head CT and head and neck CTA imaging. In 15 cases, the central aetiology was diagnosed clinically. Head CT was positive in 5 patients (all of those who had central cause clinically). CT head sensitivity, specificity, positive predictive value, negative predictive value and accuracy were; 33.3%, 100%, 100%, 91.4% and 91.8%, respectively. In eight cases, the CT angiography revealed relevant posterior circulation abnormalities (4 patients had central reasons and four patients had peripheral reasons clinically). Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were; 26.6%, 96.2%, 50%, 90.3% and 87.7%, respectively.

Discussion and Conclusions: Both head CT and head and neck CT angiogram have low diagnostic performance in detecting central causes of acute isolated dizziness, especially in terms of sensitivity. The head CT and head and neck CTA's sensitivity, specificity, positive predictive value, negative predictive value, and accuracy were comparable to the findings of the Guarnizo et al. study. When compared to CTA, CT head exhibited a better sensitivity and positive predictive value in both our study and the study by Guarnizo et al. (2). CTA should only be used for patients who have positive head CT findings or high risk clinical features that require further vascular imaging. To determine the role of CTA in the evaluation of acute, isolated dizziness, further studies are necessary.

ORAL PRESENTATION

6.NUCHAL LIGAMENT OSSIFICATION: CAN IT BE IMPLICATED IN STROKE ETIOLOGY? PRELIMINARY RESULTS

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Introduction and Aim: A relationship between diffuse idiopathic skeletal hyperostosis (DISH) and ischemic stroke has been described in the literature, but the relationship between nuchal ligament ossification and ischemic stroke has not been described before.Nuchal ligament ossification (NLO) could be a risk factor in stroke etiology, both due to the underlying inflammation and the cervical instability it may cause. The aim of our study is to examine the frequency of atherosclerosis and stroke accompanying NLO and to shed light on the potential relationship between them and NLO.

Materials and Methods: We applied for ethics committee approval for the study and it is pending. Written informed consent were obtained from all patient for this study
Between 2015 and 2022, 1192 patients who underwent neck CT, neck CT angiography and diffusion MRI examinations were evaluated retrospectively by 2 radiologists. Nuchal ligament ossification was searched with CT and accompanying acute or chronic ischemic stroke or atherosclerosis was evaluated by diffusion MRI, CT angiography and clinical data. Patients under 18 years of age and patients with a history of hemorrhagic stroke were excluded from the study. SPSS 28.0 package program and Microsoft Excel program were used for data analysis. Normal distributed data were expressed using the mean and standard deviation (S.D.) and categorical variables using frequency and percentage. The study was analyzed using chi-squared test and the crosstab chi-squared test. For $p<.05$, the results were considered statistically significant.

Results: 644 were male, and 548 were female of, the 1192 patients, aged between 18-110 ($60,89\pm16.1$). NLO was found in 286 patients, atherosclerosis in 729, and stroke in 458. Descriptive characteristics are summarized in Table 1. Distributions of variable categories of the study sample were summarized in Table 2.

Relation between gender and NLO tested. The relation between these variables was significant (p<.001). Men were more likely than women to have NLO. A statistically significant difference was found between NLO and the presence of atherosclerosis (p<.001). There was a statistically significant difference between NLO and the incidence of stroke (p<.001).
NLO and accompanying acute-subacute, chronic ischemic changes are shown in figures a,b,c,d,e,f with a few examples.

Conclusions and Discussion: A relationship between DISH and ischemic stroke has been described in the literature. It is noteworthy that both NLO and DISH proceed with ligament ossification and there are similarities in the etiopathogenesis of both entities.
Despite the relationship between NLO and cervical stenosis, myelopathy or radiculopathy has been shown in the literature, the relationship between NLO and ischemic stroke has not yet been described in the literature.
NLO may be involved in the etiopathogenesis of stroke due to both the potential risk factors responsible for the formation and progression of NLO and the cervical instability that NLO may cause. With this preliminary study, we aimed to shed light on the relationship between NLO and accompanying atherosclerosis and ischemic stroke.
By adding the data such as other risk factors in stroke etiology (HT, DM, obesity etc.), NLO morphology (rounded, linear) and segmentation, stroke territory to further studies, the relationship between NLO and stroke can be revealed more clearly with multivariate analyses.

ORAL PRESENTATION
7.EVALUATION OF TUMOR VOLUME AND MICROSTRUCTURAL CHANGES WITH DIFFUSION TENSOR IMAGING AFTER GAMMA KNIFE RADIOSURGERY IN VESTIBULAR SCHWANNOMA SUBJECTS

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Introduction and Aim: There are treatment methods such as conservative, surgical and Gamma Knife Radiosurgery in the treatment of vestibular schwannoma. There are current studies in the literature showing that gamma knife radiosurgery has a higher clinical effectiveness. This study aimed to radiologically determine the change in total tumor volume (TTV) in the follow-up of subjects diagnosed with Vestibular Schwannoma (VS) and treated with Gamma Knife Radiosurgery (GKR) and to investigate intratumoral microstructural changes with DTI parameters in long-term follow-up after treatment.

Materials and Methods: 40 patients were evaluated using DTI (Diffusion Tensor Imaging) and MRI (Magnetic Resonans Imagine). TTV, apparent diffusion coefficient (ADC), fractional anisotropy (FA), radial diffusivity (RD) and axial diffusivity (AD) were calculated. The patients were divided into two groups: group 1 before Gamma Knife and group 2 after Gamma Knife.

Results: The average follow-up period was 4 years (min-max 1-8 years). The average age of the patients was 50 years (min-max 20-72). ADC, AD and RD values increased significantly in patients with VS after Gamma Knife (p< 0.001, p<0.001, p: 0.001). There was no statistical difference in FA values. In Group 2, a significant decrease in TTV was detected after Gamma Knife (p=0.002).

Conclusions and Discussion: After Gamma Knife, ADC, AD, RD values constantly increase due to radiation damage (p< 0.001, p<0.001, p: 0.001). In the long-term follow-up after Gamma Knife, the decrease in TTV and the increase in ADC, AD, RD were evaluated in terms of response to treatment.

ORAL PRESENTATION
8.EVALUATION OF THE INTERNAL STRUCTURAL CHANGES IN MENINGIOMAS AFTER GAMMA KNIFE RADIOSURGERY BY USING DIFFUSION TENSOR IMAGING

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Introduction and Aim: We aimed to determine the tumor volume changes of the meningiomas treated with Gamma Knife Radiosurgery (GKR) and to evaluate the Diffusion Tensor Imaging (DTI) parameter alterations before and after the radiosurgery.

Materials and Methods: We studied 41 patients (5 male and 36 female) who underwent GKR for meningioma. The mean patient's age was 56.8 ±11,5 years. The patients with single lesion meningioma were included. All patients were analyzed by brain MRI and DTI. Total tumor volume (TTV), Apparent Diffusion Coefficient (ADC), Fractional Anisotropy (FA), Radial Diffusivity (RD) and Axial Diffusivity (AD) values were calculated before and after the GKR. The patients were calssified into two groups; before (group 1) and after the GKR (group 2).

Results: After the GKR, the median follow-up period was 14 (9-23) months. In group 1, the median TTV was 3,85 (0,52-30,53) and Group 2 was 3,23 (0,43-23,68), The TTV was decreased significantly after the GKR (p=0,004). There was a significant difference in terms of ADC, AD and RD values