Chronic subdural hematoma magnetic resonance imaging

The Magnetic Resonance Imaging (MRI) examination better shows the location of the chronic subdural hematoma and evidences its dimensions much clearer together with the mass effect of the adjacent structures ¹⁾.

Chronic subdural hematoma is demonstrated by MRI in almost 100% of the cases. The intensity of the collection, in T1 and T2 sequences, depends on the age of the hematoma $^{2)}$.

Moreover, it is more useful in cases of bilateral chronic subdural hematoma and isodense chronic subdural hematomas. The MRI examination is superior to the CT examination as far as the membranes dimensions of the chronic subdural haematoma and the presence of the septa inside the haematoma are concerned, and in determining the size and internal structures of chronic subdural hematomas ³⁾.

In these conditions the surgical approach could be modified ⁴⁾.

Even though MRI has advantages, CT remains the procedure of choice in the acute setting because of shorter examination time, which is important in acutely ill patients, reliability in identifying other lesions ⁵⁾.

Classification

Based on MRI, CSDHs can be classified into five types on both T(1)- and T(2)-weighted images: low, high, and mixed intensity, isointensity, and layered.

Usually, CSDHs are hyperintense on both T1- and T2-weighted MRI (the T1 values of CSDHs are significantly shorter than gray matter values and significantly longer than white matter values and the T2 values are significantly longer than both gray matter and white matter values) ⁶⁾.



Axial T1-weighted magnetic resonance imaging demonstrates bilateral subacute subdural hematomas

with increased signal intensity. Areas of intermediate intensity represent more acute hemorrhage into the subacute collections.

In the series of Hosoda et al. in many ways, MRI was superior to CT for demonstrating the hematomas. In general, chronic subdural hematomas were hyperintense on both T1- and T2-weighted MRI. The T1 values of chronic subdural hematomas were significantly shorter than gray matter values and significantly longer than white matter values. The T2 values were significantly longer than both gray matter and white matter values. These findings were consistent with previous reports. However, six hematomas (30%) were iso- or hypointense on T1-weighted images. Possible mechanisms responsible for the difference in intensity of chronic subdural hematoma on MRI are discussed, and the important role of methemoglobin formation is emphasized ⁷⁾.

In a study, magnetic resonance imaging (MRI) results were used to assign 115 primary CSDH patients to four MRI types.

The four MRI types are described as follows:

type 1 (T1-weighted low, T2-weighted low)

type 2 (T1-weighted high, T2-weighted low)

type 3 (T1-weighted mixed, T2-weighted mixed)

type 4 (T1-weighted low/high, T2-weighted high).

The four MRI types were then correlated with CSDH stage and patient hematoma fluid and serum VEGH concentrations that were measured using an enzyme-linked immunosorbent assay (ELISA). Neurological status was assessed by Markwalder scoring at admission and six-month follow-up.

The mean VEGF concentration was significantly higher in CDSH hematoma fluid samples than in patient sera (p<0.01). In unilateral CSDH hematoma fluid samples, VEGF concentration was highest in type 1 (21,613.5 \pm 1473.3pg/ml), next highest in type 2 (18,071.8 \pm 1737.1pg/ml), lower in type 3, and lowest in type 4 patients (13,153.7 \pm 3854.4pg/ml, 7265.7 \pm 726.2pg/ml, respectively). High VEGF concentrations strongly correlated with MRI type (unilateral CSDH group r=0.838, bilateral CSDH group r=0.851, p<0.01). Moreover, higher hematoma fluid VEGF concentrations correlated with markedly higher recurrence in type 1 (3/19, 15.8%) vs. type 4 unilateral CSDH patients (1/27, 3.7%).

The present study reports a significant correlation between CSDH hematoma fluid VEGF concentration and MRI results. Therefore, MRI results could be used to predict hematoma fluid VEGF concentrations in CSDH patients⁸.

Case series

2017

Ninety-three patients with bilateral CSDH who underwent unilateral bur hole surgery at Aizu Chuo Hospital were included in a retrospective analysis. Findings on preoperative MRI, preoperative thickness of the drained hematoma, and the influence of antiplatelet or anticoagulant drugs were considered and evaluated in univariate and multivariate analyses.

The overall growth rate was 19% (18 of 93 hematomas), and a significantly greater percentage of the hematomas that were iso- or hypointense on preoperative T1-weighted imaging showed growth compared with other hematomas (35.4% vs 2.3%, p < 0.001). Multivariate logistic regression analysis showed that findings on preoperative T1-weighted MRI were the sole significant predictor of hematoma growth, and other factors such as antiplatelet or anticoagulant drug use, patient age, patient sex, thickness of the treated hematoma, and T2-weighted MRI findings were not significantly related to hematoma growth. The adjusted odds ratio for hematoma growth in the T1 isointense/hypointense group relative to the T1 hyperintense group was 25.12 (95% CI 3.89-51.58, p < 0.01).

The findings of preoperative MRI, namely T1-weighted sequences, may be useful in predicting the growth of hematomas that did not undergo bur hole surgery in patients with bilateral CSDH ⁹.

2015

Preoperative MRI and postoperative computed tomography (CT) were performed and the influence of the preoperative use of antiplatelet or anticoagulant drugs was also studied. The overall recurrence rate was 9.3% (47 of 505 hematomas). The MRI T1-iso/Hypointensity group showed a significantly higher recurrence rate (18.2%, 29 of 159) compared to the other groups (5.2%, 18 of 346; p < 0.001). Multivariate logistic regression analysis showed T1 classification was the solo significant prognostic predictor among various factors such as bilateral hematoma, antiplatelet or anticoagulant drug usage, residual hematoma on postoperative CT, and MRI classification (p < 0.001): adjusted odds ratio for the recurrence in T1-iso/Hypointensity group relative to the T1-hyperintensity group was 5.58 [95% confidence interval (CI), 2.09-14.86] (p = 0.001). Postoperative residual hematoma and antiplatelet or anticoagulant drug usage did not increase the recurrence risk. The preoperative MRI findings, especially T1WI findings, have predictive value for postoperative recurrence of CSDH and the T1-iso/Hypointensity group can be assumed to be a high recurrence risk group ¹⁰.

2010

CT and MR images of 48 chronic subdural haematomas of 34 patients were reviewed retrospectively. The thickness measurements and imaging characteristics of haematomas were compared.

Levelling was observed in 25% of haematomas, and most of them (60%) had intrahaematomal membranes. All membranes could be delineated by MR imaging, whereas only 27% were defined by CT. Mixed density (52%) and T1 hyperintensity (59%) were commonly observed in membraned haematomas, but the difference was not statistically significant. Haematomas were measured significantly thicker on MR images. All patients had been treated with burr hole craniotomy and irrigation.

MR imaging is more sensitive than CT in determining the size and internal structures of chronic subdural haematomas 11 .

1987

Magnetic resonance imaging (MRI) and computerized tomography (CT) scans of 18 patients with 20 chronic subdural hematomas were compared. In many ways, MRI was superior to CT for demonstrating the hematomas. In general, chronic subdural hematomas were hyperintense on both T1- and T2-weighted MRI. The T1 values of chronic subdural hematomas were significantly shorter than gray matter values and significantly longer than white matter values. The T2 values were significantly longer than both gray matter and white matter values. These findings were consistent with previous reports. However, six hematomas (30%) were iso- or hypointense on T1-weighted images. Possible mechanisms responsible for the difference in intensity of chronic subdural hematoma on MRI are discussed, and the important role of methemoglobin formation is emphasized ¹².

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Williams VL, Hogg JP. Magnetic resonance imaging of chronic subdural hematoma. Neurosurg Clin N Am. 2000 Jul;11(3):491-8. Review. PubMed PMID: 10918019.

Guénot M. [Chronic subdural hematoma: diagnostic imaging studies]. Neurochirurgie. 2001 Nov;47(5):473-8. French. PubMed PMID: 11915760.

Senturk S, Guzel A, Bilici A, Takmaz I, Guzel E, Aluclu MU, Ceviz A. CT and MR imaging of chronic subdural hematomas: a comparative study. Swiss Med Wkly. 2010 Jun 12;140(23-24):335-40. doi: smw-12867. PubMed PMID: 20349366.

Iliescu IA. Current diagnosis and treatment of chronic subdural haematomas. J Med Life. 2015 Jul-Sep;8(3):278-84. Review. PubMed PMID: 26351527; PubMed Central PMCID: PMC4556906.

Adhiyaman V, Asghar M, Ganeshram KN, Bhowmick BK. Chronic subdural haematoma in the elderly. Postgrad Med J. 2002;78:71–5.

Fujisawa H, Nomura S, Kajiwara K, Kato S, Fujii M, Suzuki M. Various magnetic resonance imaging patterns of chronic subdural hematomas: indicators of the pathogenesis? Neurol Med Chir (Tokyo) 2006;46:333–9.

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Hosoda K, Tamaki N, Masumura M, Matsumoto S, Maeda F. Magnetic resonance images of chronic subdural hematomas. J Neurosurg. 1987 Nov;67(5):677-83. PubMed PMID: 3668635.

Li F, Hua C, Feng Y, Yuan H, Bie L. Correlation of vascular endothelial growth factor with magnetic resonance imaging in chronic subdural hematomas. J Neurol Sci. 2017 Jun 15;377:149-154. doi: 10.1016/j.jns.2017.04.013. Epub 2017 Apr 12. PubMed PMID: 28477686.

Fujitani S, Ishikawa O, Miura K, Takeda Y, Goto H, Maeda K. Factors predicting contralateral hematoma growth after unilateral drainage of bilateral chronic subdural hematoma. J Neurosurg. 2017 Mar;126(3):755-759. doi: 10.3171/2016.1.JNS152655. PubMed PMID: 27081904.

Goto H, Ishikawa O, Nomura M, Tanaka K, Nomura S, Maeda K. Magnetic resonance imaging findings predict the recurrence of chronic subdural hematoma. Neurol Med Chir (Tokyo). 2015;55(2):173-8. doi: 10.2176/nmc.oa.2013-0390. PubMed PMID: 25746312; PubMed Central PMCID: PMC4533403.

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