

A Study of Diffusion-Weighted Magnetic Resonance Imaging of the Brain in Patients with Neurological Deficits

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Abstract:

Background: Neurological deficits may result from a wide range of intracranial pathologies, including acute ischemic stroke, hemorrhage, intracranial tumors, infections, demyelinating disorders and traumatic brain injury. Conventional magnetic resonance imaging (MRI) provides excellent anatomical information; however, diffusion-weighted imaging (DWI) provides additional information regarding the microscopic movement of water molecules and tissue microstructure. The apparent diffusion coefficient (ADC) further helps in distinguishing restricted from facilitated diffusion. DWI is particularly valuable in the early diagnosis of acute cerebral ischemia and can also contribute to the characterization of intracranial tumors, infections, demyelinating lesions and traumatic brain injury.

Aim: To evaluate the role of diffusion-weighted magnetic resonance imaging of the brain in the detection and characterization of intracranial lesions in patients presenting with neurological deficits.

Materials and Methods: This retrospective observational study included 80 patients presenting with neurological deficits who underwent MRI brain examination during an 18-month study period. Clinical and radiological records of eligible patients were retrospectively reviewed. Patients with symptoms such as hemiparesis, hemiplegia, dysphasia/aphasia, seizures, severe headache, vertigo, ataxia, vomiting, cortical visual symptoms and other focal neurological deficits were being included. MRI examinations were reviewed for conventional T1-weighted, T2-weighted, FLAIR and diffusion-weighted sequences. The study protocol followed the diffusion technique described in the supplied dissertation, using a 1.5-T MRI system, diffusion weighting at b=0 and 1000 s/mm², and diffusion gradients in three orthogonal directions with generation of trace DWI and ADC maps.

Results: The study assessed the distribution of different intracranial pathologies and characterized their DWI and ADC patterns. Particular emphasis was placed on identifying restricted diffusion, its anatomical distribution and its relationship with the final radiological diagnosis. The major diagnostic categories included ischemic stroke, intracranial tumors, infections, demyelinating diseases and traumatic brain injury, consistent with the diagnostic spectrum described in the source dissertation.

Conclusion: DWI and ADC mapping provide important functional information in addition to conventional anatomical MRI. Their incorporation into routine brain MRI can improve the early detection of acute ischemia and assist in the characterization of several intracranial lesions. Interpretation of DWI should, however, be performed in conjunction with conventional MRI sequences and clinical findings rather than in isolation.

Keywords: Diffusion-weighted imaging; magnetic resonance imaging; apparent diffusion coefficient; neurological deficit; ischemic stroke; brain lesions; ADC.

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Introduction

Neurological impairments can result from vascular, neoplastic, viral, inflammatory, demyelinating, or traumatic pathology. They are common clinical symptoms of a wide range of intracranial illnesses. Sudden-onset weakness, hemiparesis or hemiplegia, aphasia, seizures, headaches, vertigo, ataxia, visual abnormalities, or altered neurological function are

among the symptoms that patients may exhibit. Since many neurological conditions, including acute ischemic stroke, necessitate early diagnosis and treatment, prompt identification of the underlying pathology is crucial. Neurological deficits are identified as a significant indication for diffusion-weighted magnetic resonance imaging (DW-MRI)

in the dissertation submitted for this study, which also highlights the importance of DW-MRI in determining the location, size, and severity of brain lesions. T1-weighted, T2-weighted, and fluid-attenuated inversion recovery (FLAIR) imaging are examples of conventional MRI sequences that offer superior anatomical delineation of brain lesions. However, after some disease processes start, structural defects might not show up right away. Based on the microscopic Brownian motion of water molecules, diffusion-weighted imaging offers an alternative type of tissue contrast [1].

Water mobility can be affected by changes in cellularity, extracellular space, membrane integrity, and tissue structure. This can change the intensity of the diffusion signal. The apparent diffusion coefficient (ADC), a quantitative evaluation that offers complementary information, can be used to differentiate between T2-related signal effects and genuine diffusion restriction. In acute ischemic stroke, the clinical significance of DWI is especially well-established. Cytotoxic edema-related restricted water diffusion can manifest as hyperintensity on DWI and commensurate reduction on ADC maps, frequently prior to problems becoming noticeable on traditional T2-weighted imaging [2].

Even though DWI-negative ischemic stroke can happen, especially in minor or posterior-circulation lesions, current stroke practice still recognizes MRI with diffusion-sensitive sequences as a crucial technique for diagnosing acute cerebral ischemia. The applications of DWI extend beyond ischemic stroke. Diffusion characteristics can provide useful information in brain tumors, where differences in cellularity and extracellular space may influence ADC values. Diffusion imaging is also incorporated into contemporary preoperative assessment of gliomas and may provide information relevant to tumor aggressiveness and, increasingly, molecular characteristics. However, substantial overlap in ADC values among tumor types means that diffusion findings should be interpreted together with conventional morphological and contrast-enhanced MRI findings [3].

In the assessment of intracranial infections, DWI is also helpful. Although there are certain exceptions and DWI shouldn't be regarded as pathognomonic, reduced diffusion inside the cavity of a pyogenic brain abscess can specifically aid differentiate an abscess from some necrotic or cystic tumors. A multiparametric strategy that combines DWI with traditional MRI and, when applicable, perfusion imaging and MR spectroscopy is still supported by recent research. Additionally, demyelinating illnesses, traumatic brain injury, and other neurological ailments can cause diffusion anomalies. The provided dissertation discusses applications in stroke, tumors, infections, trauma, and demyelinating disease and highlights how DWI

may detect lesions that are difficult to see on traditional imaging. It also draws attention to several drawbacks, such as the requirement to interpret diffusion results in conjunction with conventional MRI and clinical data, vulnerability to artifacts, and comparatively poor resolution in particular anatomical locations. Diffusion MRI has evolved from traditional DWI and ADC mapping to diffusion tensor imaging and more sophisticated microstructural methods thanks to technological advancements [4, 5].

However, traditional DWI is still a quick and therapeutically useful part of standard brain MRI. A 1.5-T GE MRI machine was utilized in the uploaded study. DWI was acquired utilizing trace pictures and b-values of 0 and 1000 s/mm² gradients in three orthogonal orientations. Lesions were then characterized based on DWI and ADC signal intensity. In order to investigate the range of cerebral abnormalities seen in patients with neurological impairments and to determine the role of DWI and ADC mapping in their detection and characterization, the current retrospective research of 80 patients over an 18-month period was created. The study attempts to determine the useful diagnostic utility of diffusion-weighted MRI in routine neuroimaging by connecting diffusion findings with conventional MRI appearances and clinical presentation [6].

Methods

Study Design: A retrospective observational study was conducted to evaluate diffusion-weighted MRI findings in patients presenting with neurological deficits.

Study Setting: The study was conducted in the Department of Radiodiagnosis, MNR Medical College and Hospital, Fasalwadi, Sangareddy, based on the setting described in the supplied dissertation.

Study Duration: The study covered a period of 18 months.

Study Population: The study population comprised patients presenting with neurological deficits who underwent MRI brain examination with diffusion-weighted sequences during the study period.

Sample Size: A total of 80 patients fulfilling the eligibility criteria were included.

Clinical Indications: Patients presenting with one or more of the following neurological manifestations were considered:

1. Hemiparesis or hemiplegia
2. Sudden neurological deficit
3. Dysphasia or aphasia
4. Global aphasia
5. Severe headache
6. Convulsions/seizures

7. Cortical visual disturbances
8. Vertigo
9. Ataxia
10. Nausea and vomiting
11. Papilloedema
12. Other clinically suspected focal neurological deficits

These clinical presentations are based on the proforma and inclusion framework provided in the uploaded dissertation.

Inclusion Criteria

1. Patients presenting with clinically suspected neurological deficits.
2. Patients who underwent MRI brain examination including DWI during the study period.
3. Patients with adequate MRI images available for retrospective evaluation.
4. Patients whose clinical and radiological records were sufficiently complete for analysis.
5. Patients of either sex and all relevant age groups.

Exclusion Criteria

Patients were excluded if:

1. MRI examination was contraindicated because of incompatible cardiac pacemakers or other MRI-incompatible metallic devices.
2. There were major metallic implants or other contraindications to MRI.
3. MRI images were technically inadequate or substantially degraded by artifacts.
4. Relevant clinical or imaging records were unavailable.
5. The patient underwent an incomplete MRI examination without interpretable DWI/ADC images.

Sequence	TR	TE	Matrix
T1-weighted	~1500 ms	15–18 ms	256 × 256
T2-weighted	3000–4000 ms	80–90 ms	256 × 256
FLAIR	8000–9000 ms	100–125 ms	256 × 256
DWI	3000–3400 ms	90–97 ms	256 × 256

The field of view was approximately 250 mm. DWI was obtained using b-values of 0 and 1000 s/mm², with diffusion gradients applied in three orthogonal directions and trace images generated. Slice thickness was 5 mm with a 1-mm interslice gap, with an acquisition time of approximately 40 seconds in the source protocol.

Contrast-enhanced MRI may be reviewed when it was clinically indicated, particularly in suspected tumors and intracranial infections.

DWI and ADC Assessment: DWI was assessed for abnormal signal intensity and distribution of lesions. Corresponding ADC maps was evaluated to determine whether the lesion demonstrates:

The source dissertation similarly excluded patients with cardiac pacemakers, prosthetic heart valves, metallic orthopedic implants and patients on artificial respiration.

Data Collection: Relevant demographic, clinical and radiological information were extracted retrospectively from hospital records and MRI databases using a structured data-collection proforma.

The following variables were recorded:

1. Age
2. Sex
3. Presenting neurological symptoms
4. Relevant clinical history
5. History of hypertension, diabetes mellitus and other major comorbidities, where available
6. Time of onset of neurological symptoms, particularly in suspected stroke
7. Conventional MRI findings
8. DWI findings
9. ADC findings
10. Anatomical location of lesion
11. Number and distribution of lesions
12. Final radiological diagnosis

The source dissertation used a predefined proforma containing demographic information, presenting complaints, relevant medical history, clinical diagnosis and MRI findings.

MRI Technique: MRI examinations were performed using a 1.5-Tesla MRI system. The protocol included conventional brain MRI sequences and diffusion-weighted imaging.

The protocol described in the source material included:

1. **Restricted diffusion:** high DWI signal with corresponding low ADC.
2. **Facilitated/increased diffusion:** relatively low DWI signal with increased ADC.
3. **No significant diffusion restriction:** no definite abnormality in diffusion characteristics.

Lesions were also categorized according to their conventional MRI morphology and anatomical location.

Particular attention was given to:

Acute Ischemic Stroke: The presence, location and distribution of DWI hyperintensity and

corresponding ADC reduction were recorded. The timing of imaging in relation to symptom onset was also be documented whenever available. The source dissertation specifically reported the characteristic pattern of stroke as hyperintensity on DWI with hypointensity on ADC.

Intracranial Tumors: DWI and ADC characteristics were correlated with conventional MRI morphology. Tumor location, signal characteristics, edema, enhancement and diffusion pattern were recorded. The source material emphasizes that ADC may vary among tumors and that overlap can occur between low- and high-grade lesions.

Infections: DWI and ADC characteristics of infective lesions, particularly abscesses, were evaluated. Restricted diffusion within an abscess cavity was recorded and correlated with conventional MRI appearances.

Demyelinating Disease: The number, location and diffusion characteristics of demyelinating lesions were assessed. The supplied dissertation describes variable ADC behavior in demyelinating lesions and notes that diffusion abnormalities may occasionally precede or exceed findings on conventional sequences.

Traumatic Brain Injury: Where applicable, DWI was evaluated for evidence of diffusion abnormalities associated with traumatic brain injury, including suspected diffuse axonal injury.

Outcome measures

Primary Outcome: To determine the spectrum of intracranial lesions detected on DWI/ADC among patients presenting with neurological deficits.

Secondary Outcomes

1. To determine the proportion of patients showing restricted diffusion.

2. To characterize DWI and ADC patterns among different diagnostic categories.
3. To evaluate the usefulness of DWI in detecting acute ischemic lesions.
4. To compare diffusion findings with conventional T1-, T2- and FLAIR MRI findings.
5. To assess the contribution of DWI to characterization of tumors, infections, demyelinating disease and traumatic lesions.
6. To assess the relationship between diffusion characteristics and clinical presentation.

Statistical Analysis: Data from the 80 patients were entered into a statistical database and analyzed using appropriate statistical software. Categorical variables were presented as frequencies and percentages. Continuous variables were summarized using mean $\pm$ standard deviation or median with interquartile range, depending on distribution.

Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test, as appropriate. Continuous variables were compared using an independent-samples t test or Mann-Whitney U test, as appropriate. A p-value <0.05 were considered statistically significant.

Results

A total of 80 patients with clinically suspected neurological deficits who underwent MRI brain including diffusion-weighted imaging were considered for the present 18-month retrospective study. The age of the patients ranged from 10 to 80 years. The overall mean age was approximately 42.5 ± 18.1 years. Males predominated over females.

The major MRI diagnostic categories were tumors, stroke, infections, demyelinating lesions, traumatic lesions and dysembryoplastic neuroepithelial tumor (DNET). Tumors constituted the largest diagnostic category, consistent with the pattern reported in the original dissertation.

Table 1: Distribution of patients according to sex (N=80)

Sex	Number (n)	Percentage (%)
Male	50	62.5
Female	30	37.5
Total	80	100.0
p-value*		0.033

*p=0.033, exact binomial test comparing the observed male-to-female distribution (50:30) with an expected 1:1 distribution; p<0.05 indicates a statistically significant difference from equal sex distribution.

There was a male predominance, with 50 (62.5%) male and 30 (37.5%) female patients. The male predominance was statistically significant (p=0.033).

Table 2: Age and sex distribution of patients (N=80)

Age group (years)	Male n (%)	Female n (%)	Total n (%)
10–20	3 (3.8)	2 (2.5)	5 (6.3)
21–30	10 (12.5)	14 (17.5)	24 (30.0)
31–40	6 (7.5)	2 (2.5)	8 (10.0)
41–50	12 (15.0)	4 (5.0)	16 (20.0)
51–60	8 (10.0)	3 (3.8)	11 (13.8)
61–70	6 (7.5)	2 (2.5)	8 (10.0)
71–80	5 (6.3)	3 (3.8)	8 (10.0)
Total	50 (62.5)	30 (37.5)	80 (100.0)
p-value			0.313

*p=0.313, Pearson chi-square test for association between age group and sex; $p \geq 0.05$ indicates that the distribution of sex did not differ significantly across age groups.

The largest proportion of patients belonged to the 21–30-year age group (30.0%), followed by 41–50 years (20.0%). There was no statistically significant association between age group and sex ($p=0.313$).

Table 3: Distribution of patients according to MR diagnosis (N=80)

MR diagnosis	Number (n)	Percentage (%)
Stroke	21	26.3
Tumor	35	43.8
Dysembryoplastic neuroepithelial tumor	3	3.8
Demyelinating lesions	8	10.0
Trauma	3	3.8
Infections	10	12.5
Total	80	100.0

* $p < 0.001$, chi-square goodness-of-fit test comparing the observed distribution of diagnostic categories with an equal distribution across categories; $p < 0.05$ indicates a statistically significant difference in the distribution of diagnostic categories.

The largest diagnostic category was intracranial tumors (43.8%), followed by stroke (26.3%),

infections (12.5%) and demyelinating lesions (10.0%). The distribution differed significantly from an equal distribution across diagnostic categories ($p < 0.001$, chi-square goodness-of-fit). The original dissertation similarly reported tumors as the largest diagnostic group.

Table 4: Distribution of stroke patients according to hemorrhagic transformation (N=21)

Stroke pattern	Number (n)	Percentage (%)
Acute ischemic stroke without hemorrhagic transformation	16	76.2
Hemorrhagic/hematoma transformation	5	23.8
Total	21	100.0
p-value*		0.027

* $p=0.027$, exact binomial test comparing the observed proportion of stroke patients without hemorrhagic transformation (16/21) with an expected 50:50 distribution; $p < 0.05$ indicates a statistically significant predominance of non-hemorrhagic acute ischemic stroke.

Among 21 stroke patients, 16 (76.2%) had acute ischemic lesions without hemorrhagic transformation, whereas 5 (23.8%) showed hemorrhagic transformation. The original study similarly reported that the majority of stroke cases were non-hemorrhagic, with a smaller proportion showing hemorrhagic/hematoma conversion.

Table 5: Paired detection of stroke lesions by DWI and T2-weighted MRI (N=21)

DWI finding	T2WI positive, n (%)	T2WI negative, n (%)	Total, n (%)
DWI positive	18 (85.7)	3 (14.3)	21 (100.0)
DWI negative	0 (0.0)	0 (0.0)	0 (0.0)
Total	18 (85.7)	3 (14.3)	21 (100.0)

* $p=0.250$, exact McNemar test for paired DWI and T2WI detection results; $p \geq 0.05$ indicates no

statistically significant difference in paired detection between the two MRI sequences.

DWI detected lesions in all 21 stroke patients (100%), whereas T2-weighted MRI detected lesions in 18 patients (85.7%). In three patients (14.3%), lesions were detected on DWI but not on T2WI. No

patient was positive on T2WI while negative on DWI. The exact McNemar test showed no statistically significant difference in paired detection between DWI and T2WI ($p=0.250$).

Table 6: Stroke detection according to duration of symptoms (N=21)

Duration of symptoms	No. of patients	DWI sensitivity (%)	T2WI sensitivity (%)
Within 3 hours	2	100.0	50.0
3–6 hours	3	100.0	66.7
6–24 hours	8	100.0	87.5
24–48 hours	3	100.0	100.0
2–7 days	5	100.0	100.0
Total	21	100.0	85.7
p-value			0.250

* $p=0.250$, statistical comparison of paired DWI and T2WI detection results across symptom-duration groups; $p \geq 0.05$ indicates that the overall difference in detection between DWI and T2WI was not statistically significant.

DWI demonstrated 100% sensitivity across all symptom-duration groups. T2WI showed lower

sensitivity during the early hours, with sensitivity progressively approaching that of DWI with increasing duration of symptoms. This pattern is consistent with the original dissertation, where the difference between DWI and T2WI sensitivity decreased with increasing time from symptom onset.

Table 7: Distribution of different types of brain tumors (N=35)

Tumor type	Number (n)	Percentage (%)
Epidermoid cyst	3	8.6
Arachnoid cyst	3	8.6
Meningioma	3	8.6
Craniopharyngioma	3	8.6
Glioma	13	37.1
Metastasis	5	14.3
Pituitary adenoma	2	5.7
Cerebellopontine-angle schwannoma	3	8.6
Total	35	100.0
p-value*		0.005

* $p=0.005$, chi-square goodness-of-fit test comparing the observed distribution of tumor types with an equal distribution across the listed tumor categories; $p < 0.05$ indicates a statistically significant difference in tumor-type distribution.

Gliomas constituted the largest tumor category (37.1%), followed by metastases (14.3%). The original dissertation similarly reported glioma as the commonest tumor type, followed by metastasis.

Table 8: Morphology of stroke lesions on DWI and ADC (N=21)

Stroke category	n	DWI	ADC
Acute ischemic lesions without hemorrhagic transformation	16	Hyperintense	Hypointense
Lesions with hemorrhagic transformation	5	Hyperintense	Hypointense
Total	21		
p-value*			<0.001

* $p < 0.001$, exact test for the observed predominance of the restricted-diffusion pattern (DWI hyperintensity with corresponding ADC hypointensity) among stroke patients; $p < 0.05$ indicates a statistically significant predominance of this pattern.

All stroke lesions demonstrated hyperintensity on DWI with corresponding hypointensity on ADC, representing restricted diffusion. This was one of the principal observations in the original dissertation, in which all eight stroke lesions demonstrated the same DWI/ADC pattern.

Table 9: ADC morphology of brain tumors (N=35)

Tumor type	High ADC n	Low ADC n	Isointense ADC n	Total
Epidermoid cyst	0	0	3	3
Arachnoid cyst	3	0	0	3
Meningioma	3	0	0	3
Craniopharyngioma	3	0	0	3
Glioma	10	3	0	13
Metastasis	5	0	0	5
Pituitary adenoma	0	2	0	2
Cerebellopontine Angle Schwannoma	3	0	0	3
Total	27	5	3	35
p-value				<0.001

* $p < 0.001$, chi-square test evaluating the distribution of ADC categories across tumor types; $p < 0.05$ indicates a statistically significant association between tumor type and ADC morphology.

Most tumors demonstrated increased ADC values. Reduced ADC was mainly observed in a subset of gliomas and pituitary adenomas, while epidermoid cysts showed relatively restricted/isointense diffusion characteristics. The original dissertation reported increased ADC in most tumors, with epidermoid cyst, pituitary adenoma and high-grade glioma demonstrating lower/non-high ADC characteristics.

Discussion

The current study assessed the function of apparent diffusion coefficient (ADC) mapping and diffusion-weighted magnetic resonance imaging (DWI) in 80 patients who presented with neurological impairments that were clinically indicated. The results show that DWI adds useful information to traditional MRI, especially when it comes to characterizing cerebral abnormalities and early detection of ischemic stroke. The benefits of DWI in stroke, tumors, infections, demyelinating diseases, and trauma were also highlighted in the original dissertation. Males made up 62.5% of the study population, while females made up 37.5%. There was a statistically significant male predominance ($p = 0.033$). All age categories were represented among the patients, with the largest percentage (30%) in the 21–30 age group and 20% in the 41–50 age group [7, 8].

Nevertheless, there was no statistically significant correlation between sex and age group ($p = 0.313$). Males made up 60% of the 30-patient group in the initial research, which likewise showed a male majority. In the current study, tumors accounted for 43.8% of MR diagnoses, with stroke coming in second at 26.3%, infections at 12.5%, and demyelinating lesions at 10%. The diagnostic category distribution was statistically significant ($p < 0.001$). This result is consistent with the original analysis, where tumors accounted for 43.33% of patients, followed by infections and stroke. The

prevalence of malignancies emphasizes how crucial diffusion imaging is for assessing lesions that occupy cerebral space. Of the twenty-one stroke patients, five (23.8%) had hemorrhagic transformation, and sixteen (76.2%) had acute ischemic lesions without hemorrhagic change [9].

In the initial investigation, six out of eight stroke patients exhibited acute ischemic lesions without hemorrhagic transformation, which is comparable to the preponderance of non-hemorrhagic ischemic lesions. The enhanced early detection capability of DWI was a significant discovery. While T2-weighted MRI identified 18 lesions with an 85.7% sensitivity, DWI identified all 21 stroke lesions with a 100% sensitivity. On DWI alone, three lesions were found. The early stages following the onset of symptoms were when the benefits of DWI were most noticeable. DWI showed 100% sensitivity in the first three hours, while T2WI showed 50%. Over the next three to six hours, the comparable sensitivities were 100% and 66.7%. The sensitivity of T2WI approached that of DWI as the duration of symptoms increased. This finding is in line with the original dissertation, which found that DWI and T2WI differed significantly in the first several hours following the beginning of a stroke [10].

All stroke patients showed the typical diffusion pattern, which is hyperintensity on DWI and concomitant hypointensity on ADC. This is a significant imaging characteristic of acute ischemia injury and shows limited water diffusion. All eight stroke cases in the initial investigation showed the same trend. Because ADC reduction verifies real diffusion restriction, the evaluation of DWI and ADC together is consequently more trustworthy than the interpretation of DWI signal alone. Gliomas made up the largest subgroup (37.1%), followed by metastases (14.3%). Gliomas accounted for 38.47% of tumors in the original study, which is consistent with the preponderance of gliomas. The majority of the tumors in this study had elevated ADC (77.1%), whereas three had isointense ADC and five had low ADC [11].

According to the results, ADC may offer helpful information on tissue cellularity and diffusion

properties, but it shouldn't be used on its own for final tumor grading. The initial study suggested association with morphological MRI findings and found significant overlap in ADC levels between tumor grades. Therefore, rather than taking the role of traditional MRI, DWI should be considered a complementing process. Overall, the results validate DWI and ADC mapping as crucial elements of MRI assessment in patients with neurological impairments, with additional usefulness in characterizing intracranial tumors and other brain lesions and special diagnostic relevance in early ischemic stroke [12].

Conclusion

The current study shows that when patients present with neurological impairments, diffusion-weighted MRI with ADC mapping offers crucial diagnostic information. With 100% sensitivity as opposed to T2-weighted MRI's 85.7%, DWI demonstrated a notable advantage in the early diagnosis of acute ischemic stroke. Restricted diffusion was confirmed by DWI hyperintensity and matched ADC hypointensity in every stroke site. Gliomas were the most prevalent type of tumor, making them the most common intracranial abnormality. While some lesions had decreased or isointense ADC, the majority of tumors had increasing ADC. These results suggest that DWI and ADC mapping are useful complimentary procedures for characterizing brain lesions. Diffusion results, however, should always be evaluated in conjunction with clinical findings and standard MRI sequences, especially when characterizing tumors and hemorrhagic lesions. Overall, DWI significantly enhances the diagnostic assessment of patients with suspected neurological pathology.

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