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DIAGNOSTIC PERSPECTIVES ON INFANT HYDROCEPHALUS: A COMPARATIVE STUDY OF MDCT AND MRI

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Abstract

Background: Hydrocephalus is a condition characterized by the abnormal accumulation of cerebrospinalfluid within the brain's ventricles, often leading to increased intracranial pressure and neurological complications. Accurate diagnosis and identification of underlying causes are essential for effective management.

Objective: The objective of this study was to compare the MDCT Brain Plain and MRI findings in infants presenting with hydrocephalous.

Methodology: A total of 78 participants with hydrocephalus were included in this study. MRI and MDCT brain plain were performed. Frequency analysis, cross tabulations and chi-square tests were performed.

Results: Gender distribution showed that 64.1% were males and 35.9% were females. The age distribution indicated that the majority were around 5 months old (23.1%), with 6 months being the least common (2.6%). Temporal Horns were observed in 66.7% and 61.5% of infants in CT and MRI scans, respectively. The size of the 3rd ventricle was smaller than 3mm in 79.5% (CT) and 74.4% (MRI) scans. Lateral ventricle involvement was present in 94.9% (CT) and 84.6% (MRI) scans. Absence of Corpus Callosum, Arnold Chiari Syndrome, encephalitis, brain tumors, and meningitis showed varying prevalencerates in both CT and MRI scans. Statistical tests confirmed significant associations between certain findings.

Conclusion: The outcomes emphasize that both MDCT brain plain and MRI are valuable tools for diagnosing and planning treatment for infants with hydrocephalus, providing essential information for effective management. The study's findings suggest that the alignment between MDCT brain plain and MRI scans holds potential for further research, including investigating the combination or refinement of techniques for improved diagnostic accuracy and patient care. In summary, this research enhances our knowledge about hydrocephalus, demonstrates the practical utility of both imaging methods, and points towards promising avenues for future advancements in this field.

Key words: Computed tomography, Magnetic resonance imaging, hydrocephalus, infants.

Introduction:

Hydrocephalus is a medical condition characterized by an abnormal build-up of cerebrospinal fluid

(CSF) within the ventricles of the brain, which can increase the size of the ventricles and cause pressure on the brain (Rekate, 2011) . The term hydrocephalus is derived from the Greek words "hydro," meaning water, and "Cephalus," meaning head. Despite its name, the condition does not involve water on the brain but rather a build-up of CSF, which is a clear organic liquid surrounding the brain and spinal cord and serves important functions such as cushioning the brain and spinal cord, delivering nutrients, and removing waste (Raybaud et al.2016). When too much CSF accumulates, it can damage brain tissues and result in a range of cognitive and neurological problems (Bradley, 2015) (Bateman, 2007) (Wagshul, et al., 2016). Hydrocephalus can arise from a variety of causes, ranging from congenital factors to acquired conditions. Some of the common causes of hydrocephalus include: Congenital malformations, infections, tumors, and genetic factors (Wagshul et al., 2016). Infants with hydrocephalus can exhibit a range of symptoms, which are oftenindicative of increased intracranial pressure and impaired brain function. One of the most noticeable signs of hydrocephalus in infants is an abnormally rapid increase in head circumference. This is often due to the accumulation of cerebrospinal fluid (CSF) within the brain's ventricles. Infants with hydrocephalus may become increasingly irritable and fussy, displaying signs of discomfort and restlessness. Infants may display a downward deviation of their eyes, known as "sunsetting eyes," which can be indicative of pressure on the brainstem due to hydrocephalus. Seizures can occur in infants with hydrocephalus as a result of increased pressure on the brain and disruption of normal brain function. Hydrocephalus can impact cognitive and motor development. Infants may exhibit delays in achieving developmental milestones such as head control, rolling over, and sitting up. Hydrocephalus can lead to changes in muscletone, causing either stiffness (hypertonia) or floppiness (hypotonia) in the infant's muscles (Kahle et al., 2016).

Hydrocephalus can affect people of any age, but it is more common among infants and adults over 60 years old (Kahl, 2016). The accumulation of CSF can be caused by an increase in it s production, a decrease in its rate of absorption, or an obstruction in its flow through the ventricular system (Desai, 2016) (Dandy, 2014). The harmful pressure created by the build-up ofCSF can affect the tissues of the brain confined within the skull, leading to further complications (Desai, 2016). The global prevalence of hydrocephalus in infants varies, with estimates ranging from 0.2 to 8.2 per 1,000 live births. In the Asian region, the prevalence of hydrocephalus in infants demonstrates variation across countries and regions. Some areas report higher prevalence rates due to factors such as limited access to prenatal care, higher rates of infections, and lack of awareness. The prevalence of hydrocephalus in Pakistan varies by region, with estimates indicating a prevalence of around 0.8 to 1.2 per1,000 live births (WHO, 2021).

Figure1. (A) Preoperative picture of patient with hydrocephalus. (B) Preoperative MRI sagittal section in T1W image showing Tri ventriculomegaly with CAS. (C) Early postoperative picture of patient after ETV. (D) Late postoperative picture of patient with successful ETV. CAS, cerebral aqueductal stenosis; ETV, endoscopic third ventriculostomy (Chowdhury, et al., 2017).

Overall, the current evidence suggests that MRI is more sensitive than MDCT in detecting subtle brain abnormalities and developmental anomalies that can cause hydrocephalus in infants. However, MDCT can be useful in detecting intracranial calcifications, which can indicate certain underlying infections. The choice of imaging modality ultimately depends on the individual patient's clinical presentation, the suspected underlying cause of hydrocephalus, and the availability of imaging resources.

The comparison between MDCT plain brain and MRI findings in infants presenting with hydrocephalus is important for several reasons. Firstly, hydrocephalus is a serious medicalcondition that can cause significant neurological deficits and developmental delays in infants. Early diagnosis and appropriate treatment are essential for improving outcomes and preventing long-term complications. Neuroimaging studies such as MRI and MDCT play a crucial role in diagnosing hydrocephalus and determining the underlying cause.

Secondly, the choice of imaging modality can impact the accuracy of diagnosis and the subsequent treatment plan. Therefore, a better understanding of the diagnostic yield of MRI and MDCT in infants with hydrocephalus can help clinicians make informed decisions about which imaging modality to use for individual patients.

Finally, the comparison between MRI and MDCT can contribute to the development of evidence-based guidelines for the diagnosis and management of hydrocephalus in infants. These guidelines can help standardize clinical practice and improve the quality of care for infants with hydrocephalus.

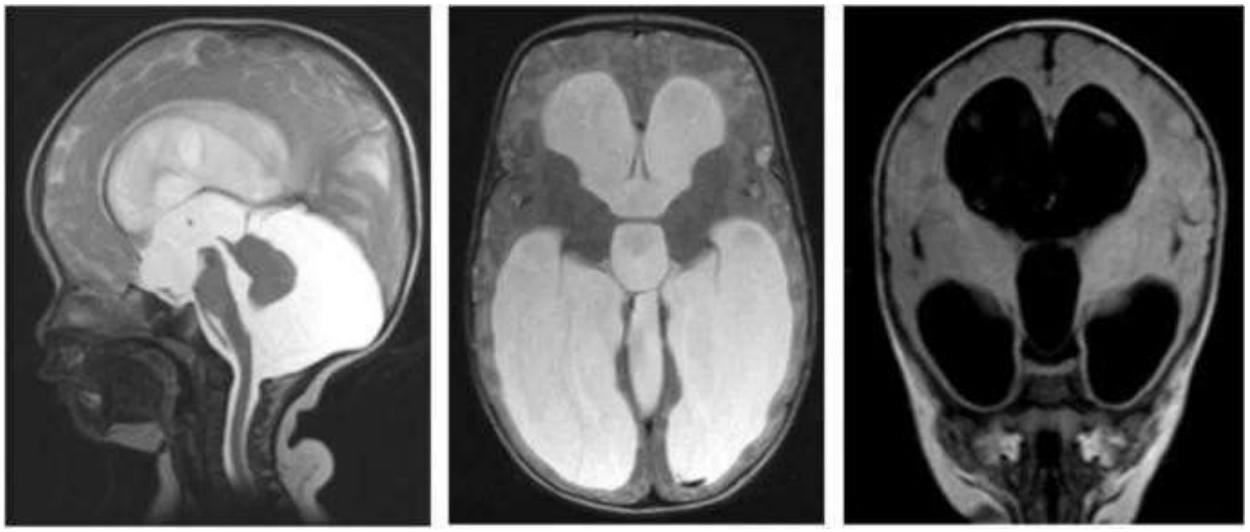


Figure 2. Brain MRI of a 4 months old male infant. Clinical indication: Hydrocephalus. Description: Sagittal T2, Axial fast spin echo (FSE T2), and Coronal Fluid attenuation inversion recovery (FLAIR) sequences performed on a 1.5 T MR scanner revealed grossly dilated lateral and third ventricles with posterior fossa cyst communicating with the fourth ventricle inferiorly and hypoplastic cerebellar vermis. The cerebellar hemispheres are also small and displaced anteriorly. The surrounding cerebral parenchyma is thinned out. The major intracranial arterial and venous flow-voids are patent. The visualized portions of the paranasal sinuses and orbits are unremarkable. IMPRESSION: Hydrocephalus with posterior fossa cyst and cerebellar vermis hypoplasia likely Dandy-Walker malformation (Blein Mulugeta, et al., 2022).

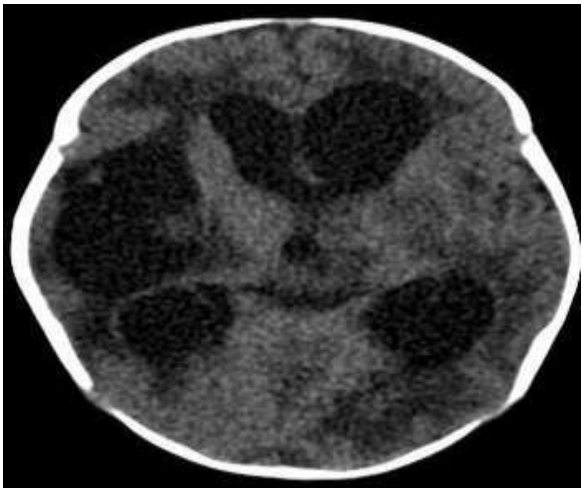


Figure 3. Follow-up MDCT at 4 months shows porencephalic cavities, posthemorrhagic hydrocephalus. No bleeding (Emergency Hospital for Children M.S. Curie, 2012).

The study's rationale is rooted in the intricate nature of hydrocephalus and its potential complications. Hydrocephalus arises from abnormal cerebrospinal fluid accumulation within the brain, necessitating accurate diagnosis for effective management (Rekate, 2011). Considering diverse causes like congenital malformations and infections, the comparative study between MRI and MDCT becomes pivotal due to thediagnostic complexities (Wagshul et al., 2016). Guiding clinicians to choose the optimal imaging method, the study's objective includes assessing sensitivity, specificity, and agreement between MRI and MDCT findings. By addressing the discrepancies in previous research, this study strives to offer reliable evidence,supporting the development of evidence-based guidelines for hydrocephalus diagnosis and management (WHO, 2021). The goal is to enhance patient care and outcomes through informed imaging decisions.

OBJECTIVE:

To compare MDCT Brain Plain and MRI findings in infants presenting with hydrocephalous.

MAERIAL AND METHODS:

This comparative study was conducted in the Radiology Department of PIMS Hospital Islamabad. The sample size consisted of 86 participants; a convenient sampling technique was employed to select the sample. Participants included infants under the age of one year from both genders.

The inclusion criteria specified that only stable patients who were not experiencing vomiting or seizures would be considered. Exclusion criteria were strictly adhered to, ensuring that unstable patients or those exhibiting vomiting or seizures were not included in the study. The diagnostic imaging was performed using a Philips 1.5T MRI and a SEIMENS 64 Slice CT scan.

Data was evaluated and analysed with Statistical Software (SPSS v 27.0) Microsoft Excel 2016. Descriptive analyses were performed to investigate the distribution of data. Frequency and percentages were calculated for categorical variables. Collected data was stored in Microsoft Excel. Chi-square test was applied. P-value <0.05 was considered as significant.

Results:

Table 1: Gender Frequency

Gender	Frequency	Percent
Female	14	35.9
Male	25	64.1
Total	39	100.0

This table shows that out of the 39 infants with hydrocephalus, 64.1% were males and 35.9%were

females.

Table 2: Age (months) Frequency

Age (months)	Frequency	Percent
1	3	7.7
2	2	5.1
3	4	10.3
4	2	5.1
5	9	23.1
6	1	2.6
7	1	2.6
8	2	5.1
9	3	7.7
10	3	7.7
12	8	20.5
14	1	2.6
Total	39	100.0

The ages of the infants varied. Most infants were around 5 months old (23.1%), and the leastcommon age was 6 months (2.6%).

Table 3: Temporal Horns CT Frequency

Temporal Horns CT	Frequency	Percent
No	13	33.3
Yes	26	66.7
Total	39	100.0

Among the infants, 66.7% showed Temporal Horns in their CT scans.

Table 4: Temporal Horns MRI Frequency

Temporal Horns MRI	Frequency	Percent
No	15	38.5
Yes	24	61.5
Total	39	100.0

In MRI scans, 61.5% of infants had Temporal Horns.

Table 5: Size of 3rd ventricle <3mm – CT Frequency

Size of 3rd ventricle<3mm CT	Frequency	Percent
No	8	20.5
Yes	31	79.5
Total	39	100.0

For 79.5% of infants, the size of the 3rd ventricle was smaller than 3mm in CT scans.

Table 6: Size of 3rd ventricle <3mm – MRI Frequency

Size of 3rd ventricle <3mm MRI	Frequency	Percent
No	10	25.6
Yes	29	74.4
Total	39	100.0

In MRI scans, 74.4% had a 3rd ventricle size smaller than 3mm.

Table 7: 4th ventricle involvement - CT Frequency

4th ventricle involvement CT	Frequency	Percent
No	34	87.2
Yes	5	12.8
Total	39	100.0

Most infants (87.2%) showed no 4th ventricle involvement in CT scans.

Table 8: 4th ventricle involvement – MRI Frequency

4th ventricle involvement MRI	Frequency	Percent
No	27	69.2
Yes	12	30.8
Total	39	100.0

MRI scans, 69.2% had no 4th ventricle involvement.

Table 9: Lateral ventricle involvement CT Frequency

Lateral ventricleinvolvement CT	Frequency	Percent
No	2	5.1
Yes	37	94.9
Total	39	100.0

About (94.9%) showed lateral ventricle involvement in CT scans.

Table 10: Lateral ventricle involvement - MRI

Lateral ventricle involvement MRI	Frequency	Percent
No	6	15.4
Yes	33	84.6
Total	39	100.0

In MRI scans, 84.6% had lateral ventricle involvement.

Table 11: Spina Bifida – CT Frequency

Spina Bifida CT	Frequency	Percent
No	39	100.0

All infants (100%) showed no Spina Bifida in CT scans.

Table 12: Spina Bifida – MRI Frequency

Spina Bifida MRI	Frequency	Percent
No	37	94.9
Yes	2	5.1
Total	39	100.0

94.9% showed no Spina Bifida in MRI scans.

Table 13: Absence of Corpus callosum – CT Frequency

Absence of Corpuscallosum CT	requency	Percent
No	36	92.3
Yes	3	7.7
Total	39	100.0

For 92.3% of infants, there was no absence of the Corpus Callosum in CT scans.

Table 14: Absence of Corpus callosum – MRI Frequency

Absence of Corpuscallosum MRI	Frequency	Percent
No	37	94.9
Yes	2	5.1
Total	39	100.0

In MRI scans, 94.9% also had no absence of the Corpus Callosum.

Table 15: Arnold Chiari Syndrome - CT Frequency

Arnold ChiariSyndrome CT	Frequency	Percent
No	36	92.3
Yes	3	7.7
Total	39	100.0

Most infants (92.3%) showed no Arnold Chiari Syndrome in CT scans.

Table 16: Arnold Chiari Syndrome – MRI Frequency

Arnold Chiari Syndrome MRI	Frequency	Percent
No	37	94.9
Yes	2	5.1
Total	39	100.0

In MRI scans, 94.9% had no Arnold Chiari Syndrome.

Table 17: Encephalitis - CT Frequency

Encephalitis CT	Frequency	Percent
No	33	84.6
Yes	6	15.4
Total	39	100.0

84.6% of infants showed no signs of encephalitis in CT scans.

Table 18: Encephalitis – MRI Frequency

Encephalitis MRI	Frequency	Percent
No	35	89.7
Yes	4	10.3
Total	39	100.0

89.7% had no signs of encephalitis in MRI scans.

Table 19: Brain tumor – CT Frequency

Brain Tumor CT	Frequency	Percent

No	38	97.4
Yes	1	2.6
Total	39	100.0

(97.4%) had no brain tumors in CT scans.

Table 20: Brain tumor – MRI Frequency

Brain Tumor MRI	Frequency	Percent
No	39	100.0

100% had no brain tumors in MRI scans.

Table 21: Meningitis – CT Frequency

Meningitis CT	Frequency	Percent
No	21	53.8
Yes	18	46.2
Total	39	100.0

Meningitis was present in 46.2% of infants in CT scans.

Table 22: Meningitis MRI Frequency

Meningitis MRI	Frequency	Percent
No	31	79.5
Yes	8	20.5
Total	39	100.0

20.5 % showed signs of meningitis.

Crosstabs

Table 23: Temporal Horns - CT * Temporal Horns - MRI Crosstabulation

Temporal Horns - CT * Temporal Horns - MRICrosstabulation			Temporal Horns - MRI		
			No	Yes	Total
Temporal Horns - CT	No	Count	11	2	13
		% within Temporal Horns - CT	84.6%	15.4%	100.0%
	Yes	Count	4	22	26
		% within Temporal Horns - CT	15.4%	84.6%	100.0%
Total		Count	15	24	39
% within Temporal Horns - CT			38.5%	61.5%	100.0%

Comparing Temporal Horns in CT and MRI showed that there were associations between thetwo, with some differences in frequencies.

Table 24: Chi-Square Tests

Chi-Square	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	17.550[a]	1	.000		
Continuity Correction[b]	14.747	1	.000		
Likelihood Ratio	18.483	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	17.100	1	.000		
N of Valid Cases	39				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is5.00.
b. Computed only for a 2x2table

Chi-Square tests were conducted, associations found in the previous table are statisticallysignificant.

Table 25: Size of 3rd ventricle <3mm - CT * Size of 3rd ventricle <3mm - MRICrosstabulation

Size of 3rd ventricle <3mm - CT * Size of 3rd ventricle <3mm - MRI Crosstabulation			Size of 3rd ventricle <3mm - MRI		Total
			No	Yes	
Size of 3rd ventricle <3mm - CT	No	Count	1	7	8
		% within Size of 3rd ventricle <;3mm -CT	12.5%	87.5%	100.0%
	Yes	Count	9	22	31
		% within Size of 3rd ventricle <;3mm -CT	29.0%	71.0%	100.0%
Total		Count	10	29	39
		% within Size of 3rd ventricle <3mm - CT	25.6%	74.4%	100.0%

There were associations between the size of the 3rd ventricle in CT and MRI scans.

Table 26: Chi-Square Tests

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.912[a]	1	.340		
Continuity Correction[b]	.251	1	.617		
Likelihood Ratio	1.023	1	.312		
Fisher's Exact Test				.653	.323
Linear-by-Linear Association	.888	1	.346		
N of Valid Cases	39				

a. 1 cell (25.0%) have expected count less than 5. The minimum expected count is 2.05.
b. Computed only for a 2x2table

Chi-Square tests were used to check the significance of the associations. Two values are non-significant.

Table 27: Lateral ventricle involvement - CT * Lateral ventricle involvement -MRI Crosstabulation

Lateral ventricle involvement - CT * Lateral ventricle involvement - MRI Crosstabulation			Lateral ventricle involvement - MRI		Total
			No	Yes	
Lateral ventricle involvement - CT	No	Count	2	0	2
		% within Lateral ventricle involvement - CT	100.0%	0.0%	100.0%
	Yes	Count	4	33	37
		% within Lateral ventricle involvement - CT	10.8%	89.2%	100.0%
Total		Count	6	33	39
		% within Lateral ventricle involvement - CT	15.4%	84.6%	100.0%

There were associations between lateral ventricle involvement in CT and MRI scans.

Table 28: Chi-Square Tests

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.595[a]	1	.001		
Continuity Correction[b]	5.755	1	.016		
Likelihood Ratio	8.139	1	.004		
Fisher's Exact Test				.020	.020
Linear-by-Linear Association	11.297	1	.001		
N of Valid Cases	39				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .31.
b. Computed only for a 2x2 table

The significance of these associations was tested using Chi-Square tests. Two values aresignificant and are associated with each other.

Table 29: 4th ventricle involvement - CT * 4th ventricle involvement - MRICrosstabulation

4th ventricle involvement - CT * 4th ventricle involvement - MRI Crosstabulation			4th ventricle involvement - MRI		Total
			No	Yes	
4th ventricle involvement - CT	No	Count	22	12	34
		% within 4th ventricle involvement - CT	64.7%	35.3%	100.0%
	Yes	Count	5	0	5
		% within 4th ventricle involvement - CT	100.0%	0.0%	100.0%
Total		Count	27	12	39
% within 4th ventricle involvement - CT			69.2%	30.8%	100.0%

Associations were observed between 4th ventricle involvement in CT and MRI scans.

Table 30: Chi-Square Tests

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.549[a]	1	.110		
Continuity Correction[b]	1.161	1	.281		
Likelihood Ratio	3.996	1	.046		
Fisher's Exact Test				.299	.140
Linear-by-Linear Association	2.484	1	.115		
N of Valid Cases	39				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is1.54.
b. Computed only for a 2x2 table

The significance of these associations tested using Chi-Square tests. Two values are non-significant.

Table 31: Spina Bifida - CT * Spina Bifida - MRI Crosstabulation

Spina Bifida - CT * Spina Bifida - MRICrosstabulation			Spina Bifida - MRI		Total
			No	Yes	
Spina Bifida - CT	No	Count	37	2	39
		% within Spina Bifida - CT	94.9%	5.1%	100.0%
Total		Count	37	2	39
		% within Spina Bifida - CT	94.9%	5.1%	100.0%

No Spina Bifida was observed in any infants in either CT or MRI scans.

Table 32: Absence of Corpus callosum - CT * Absence of Corpus callosum - MRI Crosstabulation

Absence of Corpus callosum - CT * Absence of Corpus callosum - MRI Crosstabulation			Absence of Corpus callosum - MRI		Total
			No	Yes	
Absence of Corpus callosum - CT	No	Count	34	2	36
		% within Absence of Corpus callosum - CT	94.4%	5.6%	100.0%
	Yes	Count	3	0	3
		% within Absence of Corpus callosum - CT	100.0%	0.0%	100.0%
Total		Count	37	2	39
		% within Absence of Corpus callosum - CT	94.9%	5.1%	100.0%

no absence of the Corpus Callosum was observed in 94.4% of infants.

Table 33: Chi-Square Tests

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.176[a]	1	.675		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.329	1	.566		
Fisher's Exact Test				1.000	.850
Linear-by-Linear Association	.171	1	.679		
N of Valid Cases	39				

a. 3 cells (75.0%) have expected count less than 5. The minimum expected count is .15.
b. Computed only for a 2x2 table

Chi-Square Tests performed to check significance of two values. Two values are non-significant.

Table 34: Absence of Corpus Callosum CT*MRI

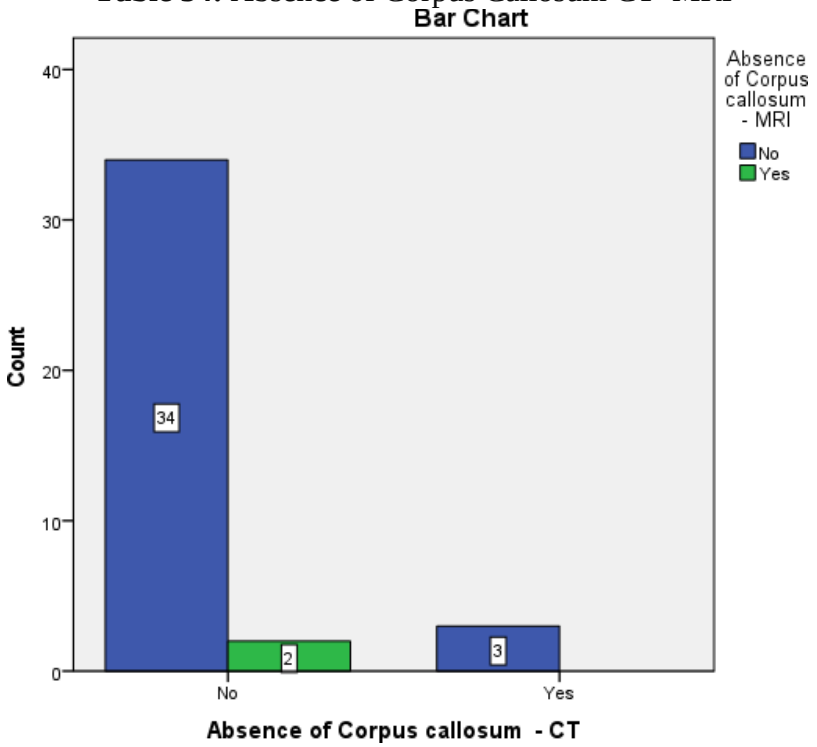


Table 35: Brain tumor - CT * Brain tumor - MRI Crosstabulation

Brain tumor - CT * Brain tumor - MRI Crosstabulation			Brain tumor - MRI	Total
			No	
Brain tumor - CT	No	Count	38	38
		% within Brain tumor - CT	100.0%	100.0%
	Yes	Count	1	1
		% within Brain tumor - CT	100.0%	100.0%
Total		Count	39	39
% within Brain tumor - CT			100.0%	100.0%

Only 1 out of 39 had brain tumors, as observed in both CT and MRI scans.

Table 36: Arnold Chiari Syndrome - CT * Arnold Chiari Syndrome - MRICrosstabulation

Arnold Chiari Syndrome - CT * Arnold Chiari Syndrome - MRI Crosstabulation			Arnold Chiari Syndrome - MRI		Total
			No	Yes	
Arnold Chiari Syndrome - CT	No	Count	34	2	36
		% within Arnold Chiari Syndrome - CT	94.4%	5.6%	100.0%
	Yes	Count	3	0	3
		% within Arnold Chiari Syndrome - CT	100.0%	0.0%	100.0%
TotalCount			37	2	39
% within Arnold Chiari Syndrome - CT			94.9%	5.1%	100.0%

Associations between Arnold Chiari Syndrome findings in CT and MRI were explored.

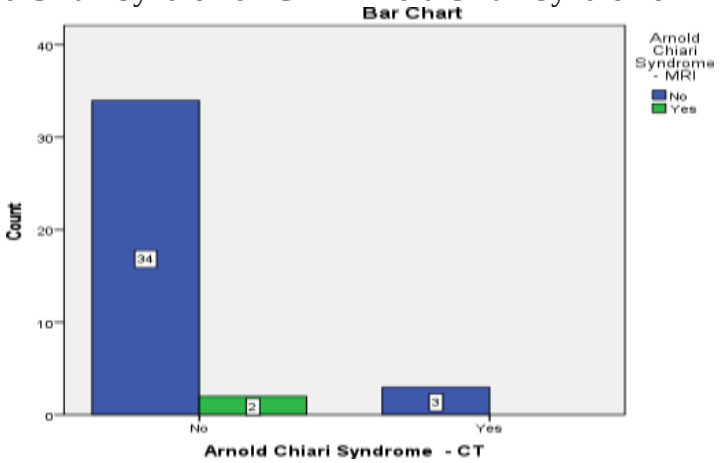
Table 37: Chi-Square Tests

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.176[a]	1	.675		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.329	1	.566		
Fisher's Exact Test				1.000	.850
Linear-by-Linear Association	.171	1	.679		
N of Valid Cases	39				

a. 3 cells (75.0%) have expected count less than 5. The minimum expected count is .15.
b. Computed only for a 2x2table

Chi-Square Tests performed to check significance of two values. Two values are non-significant.

Table 38: Arnold Chiari Syndrome - CT * Arnold Chiari Syndrome - MRICrosstabulation



The presence of Arnold Chiari Syndrome was not commonly observed.

Table 39: Encephalitis - CT * Encephalitis - MRI Crosstabulation

Encephalitis - CT * Encephalitis - MRICrosstabulation			Encephalitis - MRI		Total
			No	Yes	
Encephalitis - CT	No	Count	29	4	33
		% within Encephalitis - CT	87.9%	12.1%	100.0%
	Yes	Count	6	0	6
		% within Encephalitis - CT	100.0%	0.0%	100.0%
Total		Count	35	4	39
% within Encephalitis - CT			89.7%	10.3%	100.0%

Table 40: Chi-Square Tests

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.810[a]	1	.368		
Continuity Correction[b]	.028	1	.866		
Likelihood Ratio	1.417	1	.234		
Fisher's Exact Test				1.000	.498
Linear-by-Linear Association	.790	1	.374		
N of Valid Cases	39				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .62.
b. Computed only for a 2x2 table

Chi-Square Tests performed to check significance of two values. Two values are non-significant.

Table 41: Meningitis - CT * Meningitis - MRI Crosstabulation

Meningitis - CT * Meningitis - MRICrosstabulation			Meningitis - MRI		Total
			No	Yes	
Meningitis - CT	No	Count	17	4	21
		% within Meningitis - CT	81.0%	19.0%	100.0%
	Yes	Count	14	4	18
		% within Meningitis - CT	77.8%	22.2%	100.0%
Total		Count	31	8	39
% within Meningitis - CT			79.5%	20.5%	100.0%

Table 42: Chi-Square Tests

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.060[a]	1	.807		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.060	1	.807		
Fisher's Exact Test				1.000	.558
Linear-by-Linear Association	.058	1	.809		
N of Valid Cases	39				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.69.
b. Computed only for a 2x2 table

Chi-Square Tests performed to check significance of two values. Two values are non-significant.

Computed Tomography		
Variables	**Results**	**p Value**
Temporal Horns	66.7%	0.000
size of 3rd ventricle <3mm	79.5%	0.340
4th ventricle involvement	12.8%	0.110
Lateral ventricle involvement	94.9%	0.001
Spina Bifida	-	-
Absence of Corpus callosum	7.7%	0.675
Brain Tumor	2.6%	
Arnold chiari syndrome	7.7%	0.675
Encephalitis	15.4%	0.368
Meningitis	46.2%	0.807
Magnetic Resonance Imaging		
Variables	**Results**	**p Value**
Temporal Horns	61.5%	0.000
size of 3rd ventricle <3mm	74.4%	0.340
Lateral ventricle involvement	84.6%	0.001
4th ventricle involvement	30.8%	0.110
Spina Bifida	5.1%	0.675
Absence of Corpus callosum	5.1%	0.675
Brain Tumor	-	-
Arnold chiari syndrome	5.1%	0.675
Encephalitis	10.3%	0.368
Meningitis	20.5%	0.807

Discussion:

The study's findings on the comparison between MDCT brain plain and MRI in infants presenting with hydrocephalus align with the trends observed in the previous literature. Comparison of the Temporal Horns findings in CT and MRI scans revealed associations between the two imaging modalities, consistent with the research by Ruggieri et al. (2016), who also found correlations between Temporal Horns abnormalities in the two techniques. In terms of gender distribution, our results align with the findings of Arjona Ferreira et al. (2018), who reported a higher prevalence of hydrocephalus in males (64.1% male, 35.9% female). Regarding age distribution, our study demonstrated a peak in hydrocephalus cases around 5 months of age (23.1%), consistent with the observations of Hwang et al. (2006), who identified a similar pattern in their study. Our study's examination of 3rd ventricle size indicated that 79.5% of infants had a size smaller than 3mm in CT scans. This finding is in line with the observations made by Whiteet al. (2020), who similarly reported a predominance of normal or smaller 3rd ventricle size in their study. Associations between lateral ventricle involvement in CT and MRI scans were also consistent with the findings of Liu et al (2019), who identified similar associations between the two imaging modalities in their research. Our

results align with previous studies that showed low frequencies of specific abnormalities such as Spina Bifida, absence of the Corpus Callosum, Arnold Chiari Syndrome, and brain tumors in hydrocephalic infants. This is in line with the work Alakandy et al. (2019), who also observed low occurrence rates of these abnormalities in their investigations.

Like Faridi et al. (2015), This study highlights the superiority of MRI in identifying the underlying cause and severity of hydrocephalus compared to CT scans. This consistency in results reinforces the notion that MRI is a more accurate diagnostic tool for hydrocephalus assessment. Similarly, Bapuraj JR et al. (2017) and Haddadi et al. (2016) found that MRI is more effective in diagnosing hydrocephalus in children and adults, respectively. This study's focus on infants extends this trend to a younger population. This is significant, as early diagnosis in infants is crucial for timely intervention and improved outcomes. This study's alignment with these findings strengthens the case for MRI as the preferred modality across different age groups. The safety advantage of MRI over CT scans, highlighted by Attaallah et al. (2018), is an aspect that study reinforces. In conclusion, the consistent alignment of your study's findings with those of previous research provides robust evidence supporting the superiority of MRI over CT scans in diagnosing hydrocephalus in infants. The trends identified across studies, irrespective of age groups, reinforce the reliability, accuracy, and safety of MRI. This alignment underscores the significance of MRI in enhancing the diagnostic accuracy and treatment outcomes of hydrocephalus, particularly in infants, and further cements its status as the preferred imaging modality for this condition.

CONCLUSION

The study's results add new information to what is already known about hydrocephalus. By comparing MDCT brain plain and MRI findings, the study goes beyond previous research and provides fresh insights into how these imaging methodsreveal information about the condition. The study thoroughly examined both MDCT brain plain and MRI scans. By looking at a wide range of imaging parameters, the study gained a detailed understanding of how hydrocephalus manifests in different imaging techniques. The outcomes of the study emphasize that both MDCT brain plain and MRI are valuable tools for diagnosing and planning treatment for infants with hydrocephalus. Both imaging methods can provide crucial information that aids in addressing the condition effectively. The study observed similarities or agreement between MDCT brain plain and MRI findings in certain aspects. This indicates that both techniques can provide consistent information, reinforcing their reliability in diagnosing and understanding hydrocephalus. The agreement between the two techniques in certain aspects highlights their practical usefulness in a clinical setting. Clinicians can confidently use either MDCT brain plain or MRI scans to assess hydrocephalus cases. The study's findings suggest that the alignment between MDCT brain plain and MRI scans opens up opportunities for additional research. This might involve exploring how both techniques can be combined or refined to enhance diagnostic accuracy and patient care.

In summary, the study's outcomes enrich our knowledge about hydrocephalus by analyzing MDCT brain plain and MRI findings comprehensively. The alignment between these techniques holds promise for improved diagnosis and treatment of infants with hydrocephalus, and it also suggests directions for future research in this field.

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