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Research Paper

Reliability of magnetic resonance imaging in the detection of congenital anomalies of iraqi women

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ABSTRACT

Background: Prior to birth, fetal anomalies must be identified using antenatal imaging so that during utero interventions may be planned and the baby's postpartum care can be chosen. Aim: This paper aims to study the reliability of magnetic resonance imaging in the detection of congenital anomalies of Iraqi women. Patients and methods: This study was a cross-sectional study in the analysis of the reliability of magnetic resonance imaging in the detection of congenital anomalies of Iraqi women in the Baghdad-Iraq from 17th August 2021 to 24th May 2022. The collected data of the MRI technique for using with congenital anomalies of Iraqi women was analysed into 90 patients by the SPSS program. Results and Discussion: 26 participants (28.89%) in our study had hydrocephalus. As a result, MRI can be used in addition to ultrasonography to diagnose embryonic genitourinary abnormalities, particularly in cases of oligohydramnios. In one instance of the diaphragm eventration, MRI was helpful in making the diagnosis. In 70 cases, MRI was successful; in the other 20, it was not. Our findings indicated that CNS received helpful information with 66% and without useful information with 34%, Gut received useful information with 77% and without useful information with 33%, and Multiple received useful information with 57% and without useful information with 43%. Conclusion: According to the findings, MRI showed the highest scored for detecting ventriculomegaly and the worst score for detecting cerebral haemorrhage and cortical abnormalities. Additionally, our study discovered that prenatal MRI has become a more potent tool for detecting fetal defects when ultrasound results are insufficient or equivocal.

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1. INTRODUCTION

Prior to birth, fetal anomalies must be identified using antenatal imaging so that during utero interventions may be planned and the baby's postpartum care can be chosen. Due to its relative safety [1], lack of ionizing radiation, accessibility, and equipment simplicity, ultrasonography is the most popular imaging modality available. Since a fetus is not exposed to ionizing radiation, magnetic resonance imaging (MRI) represents the next sensible option for advanced imaging [2], [3].

Due to the lengthy acquisition durations of the traditional spin-echo method, fetal mobility in the past restricted the applicability of MR imaging for fetal imaging. Fetal MRI is evolving into a non-invasive technique that complements ultrasonography in the diagnosis of fetal defects, which is valuable in developing prognoses and perinatal care [4], [5], [6], [7]. Motion artifact is considerably reduced using a single-shot rapid spin-echo process. This method allows for the acquisition of T2-weighted pictures of the fetus in each segment within less than one second without image deterioration [8], [9], [10].

Due in part to the rising popularity of fetal surgery as well as fetal medicine, fetal MRI is being utilized more often in clinical settings. Because it is non-invasive, does not utilize ionizing radiation, and is unaffected by maternal weight or fetal position, MRI is regarded as an appropriate prenatal imaging tool [11], [12], [13]. With further improvements in MRI methods, fetal MRI also holds the prospect of improving our knowledge of both normal and pathological fetal development. The sophisticated equipment needed, the need for skilled workers, and the fact that it is only available at major referral centers limit its utilization. The purpose of the current investigation was to determine the significance of magnetic resonance imaging for prenatal abnormality identification [14], [15], [16], [17]. This paper aims to study the reliability of magnetic resonance imaging in the detection of congenital anomalies of Iraqi women.

2. METHODOLOGY

This study was a cross-sectional study in the analysis of the reliability of magnetic resonance imaging in the detection of congenital anomalies of Iraqi women in the Baghdad-Iraq from 17th August 2021 to 24th May 2022. The collected data of the MRI technique for using with congenital anomalies of Iraqi women was analysed into 90 patients by the SPSS program. To follow-up of methodology, this paper was conducted of detections of anomalies among Iraqi women by MRI through Chest, CNS, GIT, Gut, Miscellaneous, Multiple, and Normal these factors can be defined in Table 1. Furthermore, the examination of data had distributions of fetal central nervous system abnormalities for utero by magnetic resonance imaging into, where it included cortical developmental abnormalities, destructive lesions, midline developmental abnormalities, posterior fossa malformations, Vascular malformations, and Ventriculomegaly which can be determined into Table 2. To further of outcomes, this study was identified of cerebral pathologies on fetal MRI Hydrocephalus, Ventriculomegaly, aqueductal stenosis, Missing septum pellucidum, Cysts, haemorrhage, Ventricular asymmetry, Encephalocele, Holoprosencephaly, and nencephaly where these parameters can be shown in Figure 1 Also, this study was diagnosed with MRI into congenital anomalies of women patients, which include with successful and unsuccessful, where it can be seen in Figure 2. Moreover, this paper was assessed with the role of MRI efficiency in the detections of fetal anomalies which defined with useful and without useful which get on Cortical developmental abnormalities, Midline developmental abnormalities, Chest, CNS, GIT, Gut, Multiple, and Normal where these outcomes were shown in Table 3.

3. RESULTS AND DISCUSSION

Table 1. Detections of Anomalies of Iraqi Women by MRI

		F,90	P (%)	VP (%)	CP (%)
V	Chest	8	8.9	8.9	8.9
	CNS	31	34.4	34.4	43.3
	GIT	14	15.6	15.6	58.9
	Gut	7	7.8	7.8	66.7
	Miscellaneous	7	7.8	7.8	74.4
	Multiple	19	21.1	21.1	95.6
	Normal	4	4.4	4.4	100.0
	T	90	100.0	100.0	

Table 2. Distributions of Fetal Central Nervous System Abnormalities for Utero by Magnetic Resonance Imaging

		F,90	P (%)	VP (%)	CP (%)
V	Cortical developmental abnormalities	13	14.4	14.4	14.4
	Destructive lesions	1	1.1	1.1	15.6
	Midline developmental abnormalities	18	20.0	20.0	35.6
	Posterior fossa malformations	11	12.2	12.2	47.8
	Vascular malformations	14	15.6	15.6	63.3
	Ventriculomegaly	33	36.7	36.7	100.0
	T	90	100.0	100.0	

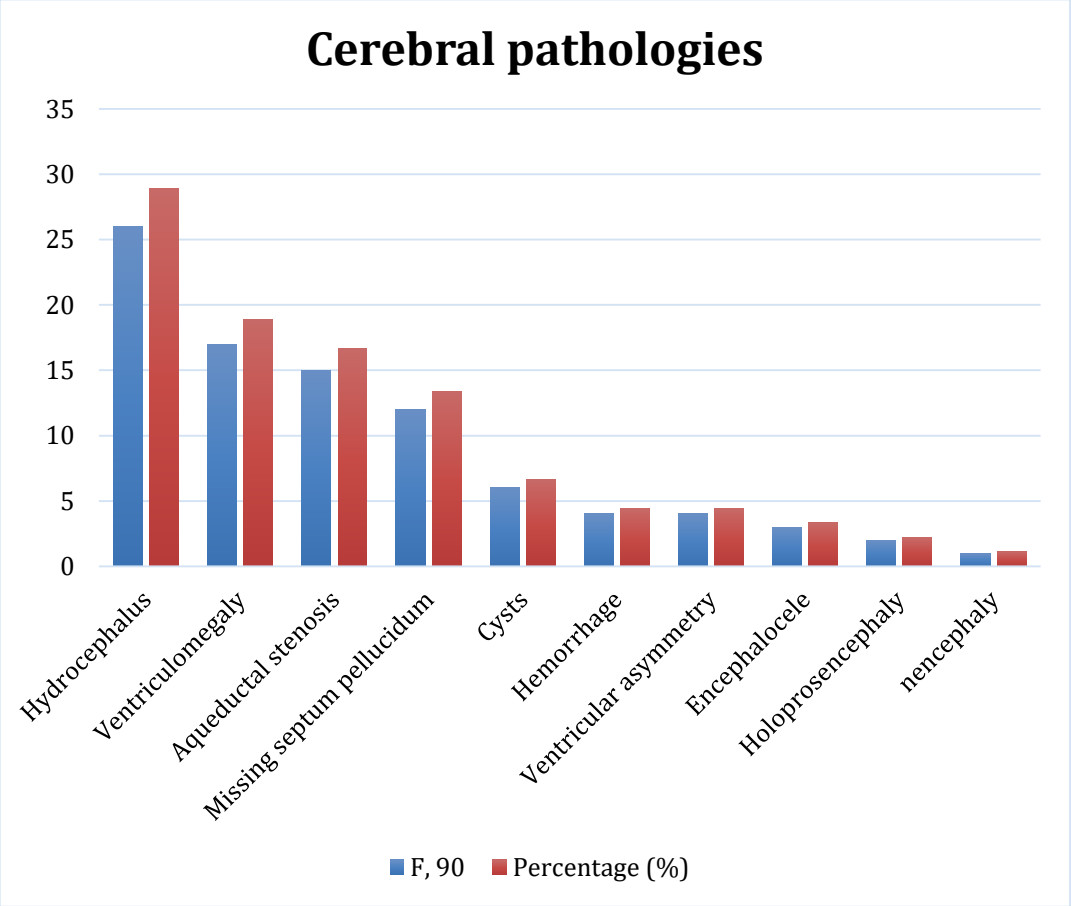

Figure 1. Identification of Cerebral Pathologies on Fetal MRI

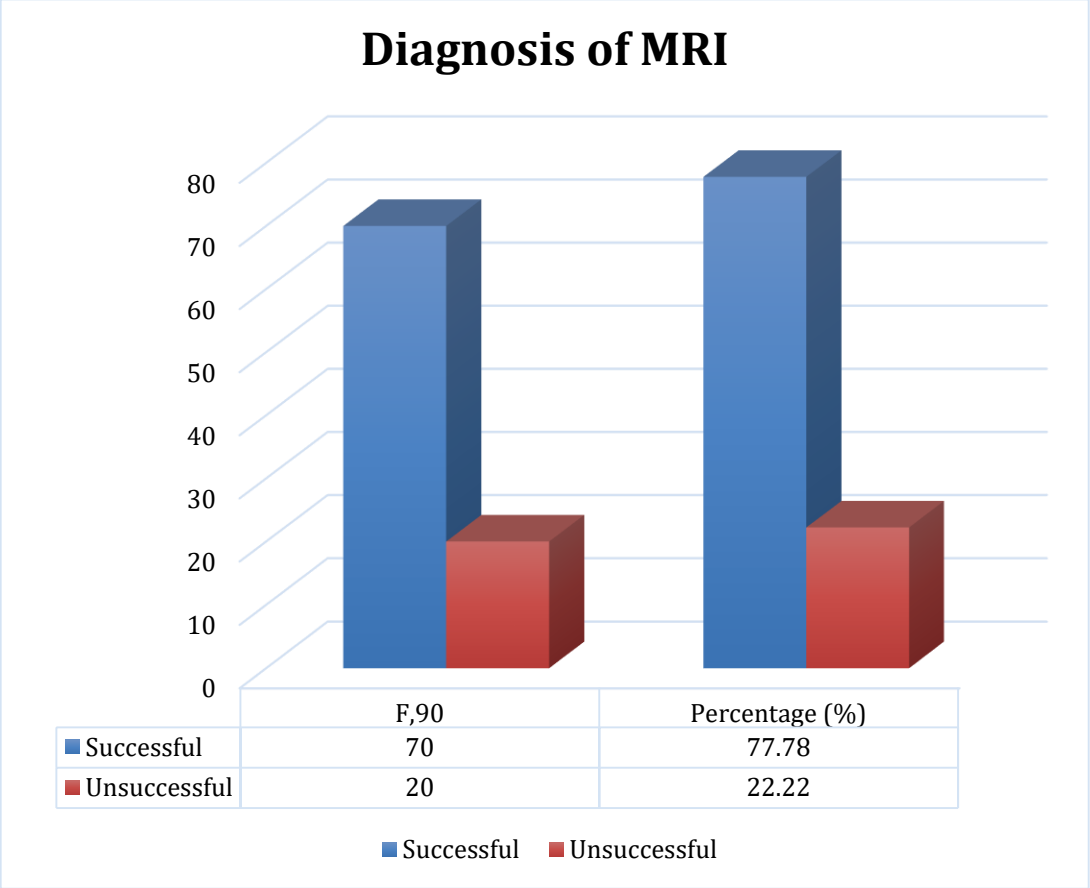

Figure 2. Diagnosis of MRI into Congenital Anomalies of Women Patients

Table 3. Role of MRI Efficiency in Detections of Fetal Anomalies

Detections of MRI Quality	Useful	Without Useful
Cortical developmental abnormalities	75%	25%
Midline developmental abnormalities	80%	20%
Chest	42%	58%
CNS	66%	34%
GIT	70%	30%
Gut	77%	33%
Multiple	57%	43%
Normal	95%	5%

Discussion

Prenatal sonography does not have the same contrast resolution as fetal MR imaging, which makes it more difficult to distinguish between normal and diseased tissue. Prenatal sonography may miss structural anomalies, including brain malformations and destructive lesions, but fetal MR imaging can pick them up. Furthermore, prenatal MR imaging is immune to most sonography's drawbacks. Additionally, MR methods like parallel imaging and diffusion-weighted imaging continue to progress. Fetal MR imaging holds up the possibility of advancing our knowledge of both typical and aberrant brain development. To follow that of results, birth malformations are a standard risk in every pregnancy [18]. The development of imaging methods for prenatal diagnosis has been quite quick. Ultrasonography, which is a real-time imaging technique that is thought to be safe and cost-effective, is the modality that is most frequently employed for evaluating pregnancies. A comparison of magnetic resonance imaging and ultrasonography was done by Whitby [19]. In 100 singleton pregnancies with possible brain abnormalities. They discovered that, in 52 cases, magnetic resonance and ultrasound produced outcomes that were similar and that, in another 12, magnetic resonance supplied additional information that was

thought not to have directly affected care. In 35 instances, MRI either altered the diagnosis or provided additional information that would have influenced the course of treatment [20]. Magnetic resonance altered the diagnosis in 11 of the 30 cases when brain abnormalities were detected on USG because the brain was reported as normal. Twenty-six participants (28.89%) in our study had hydrocephalus. As a result, MRI can be used in addition to ultrasonography to diagnose embryonic genitourinary abnormalities, particularly in cases of oligohydramnios. In one instance of the diaphragm eventration, MRI was helpful in making the diagnosis. In 70 cases, MRI was successful; in the other 20, it was not. Our findings indicated that CNS received helpful information with 66% and without useful information with 34%, Gut received useful information with 77% and without useful information with 33%, and Multiple received useful information with 57% and without useful information with 43%.

4. CONCLUSION

According to the findings, MRI showed the highest scored for detecting ventriculomegaly and the worst score for detecting cerebral haemorrhage and cortical abnormalities. Additionally, our study discovered that prenatal MRI has become a more potent tool for detecting fetal defects when ultrasound results are insufficient or equivocal.

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Authors Contributions Statement

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Dr. Qasim Chyad Oudah		✓	✓		✓	✓		✓	✓	✓	✓		✓	✓
Dr. Muna Zamil Mohammed	✓			✓			✓			✓		✓	✓	
Dr. Ali Qais Abdulkafi	✓	✓		✓			✓		✓	✓		✓	✓	

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

Ethical Approval

The study was conducted in compliance with the ethical principles outlined in the Declaration of Helsinki and approved by the relevant institutional authorities.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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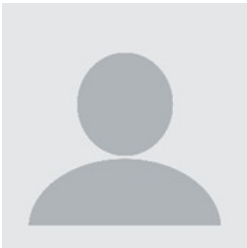
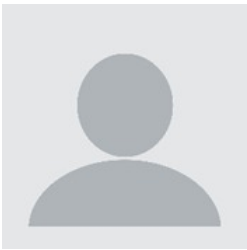
	**Dr. Muna Zamil Mohammed,** earned her M.B.Ch.B. and Higher Diploma in Diagnostic Radiology (D.M.R.D.). She is currently affiliated with the Al-Diwaniah Teaching Hospital, Department of Radiology, Iraqi Ministry of Health. Her expertise is in radiodiagnosis, with a focus on fetal imaging, congenital anomalies, and MRI applications. She has been actively involved in both clinical practice and academic research in radiology. Email: muna7zm@gmail.com
	**Dr. Ali Qais Abdulkafi,** holds an M.B.Ch.B. and a Diploma in Child Health (D.C.H.). He is affiliated with the Kirkuk Teaching Hospital under the Iraqi Ministry of Health. His research interests include pediatric health, neonatal disorders, and the role of advanced imaging in early diagnosis. He has clinical and academic experience in child health and has contributed to multidisciplinary studies on congenital anomalies. Email: Newiraqhospital@yahoo.co.uk