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MRI Evaluation of Acute Abdominal and Pelvic Pain in Pregnant Patients

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Abstract **Original Research Article**

MRI evaluation of acute abdominal and pelvic pain in pregnant patients, the data of this study were collected from Prince Sultan Military hospital; Data of the MRI procedures for fetus was taken during Aug 2020 – Dec 2020, using two Magnetic Resonance Machines GE Medical System 3.0T and SIMENS Medical System 1.5T. A total of 139 pregnant patients with different examinations were referred to MRI studies because of suspected fetus abnormities or congenital. The results shows that the descriptive statistics for mother and fetus age were the values presented as mean, standard deviation, minimum and maximum. For mother age the mean ± standard deviation was 31.67 ± 7.28 years and for fetus age was 23.85 ± 6.09 week. correlation between the finding against the request, were the requests divided to four type Brain Anomalies, Kidney, an hydramnios and Accrete precreta were the numbers of this request was 48, 32, 30 and 29 respectively. And the finding was 9 categories and the number of patients here was almost same between 13 and 20 patients for the findings. Also, correlation between the optimal and request, for optimal the option was only yes and no, where the patients with NO was 56 patients and the patients with yes 83.for Brain Anomalies found in 26 patients, kidney in 18 patients, an hydramnios with 21 patients while the Accrete precreta with 18 patients. The relation between the request with comments, were the comments found with three categories motion artifact, T1,T2 and Multiplanar protocol with number of patients 24,28 and 17 patients respectively. While the numbers of patients with no comments was 70. analysis of variance between the Fetus age with other variables, were the p.value show there is no significant difference between the fetus age with request (p.value = 0.846), finding (0.958), optimal (0.450) and comments (0.912).

Keywords: MRI, Pregnant patients, Pelvic Pain, Acute Abdominal pain.

INTRODUCTION

A wide variety of diseases may appear with pain during pregnancy. The causes of pelvic pain in pregnancy can be classified in gynaecological causes and non-gynaecological causes. Diagnosis of pelvic pain in pregnant women is confounded by several factors found in a normal pregnancy, such as nonspecific leuko-cytosis, displacement of abdominal and pelvic structures from their normal locations by the gravid uterus, a difficult abdominal examination, and nonspecific nausea and vomiting [1-3]. Therefore, a prompt and accurate diagnosis and treatment are essential for the well-being of the mother and the foetus, and imaging is commonly requested to clarify the clinical picture and expedite diagnosis.

Diagnosis of abdominal pain in pregnant women is confounded by several factors found in a normal pregnancy. Such confounding factors include nonspecific leuko-cytosis, displacement of abdominal and pelvic structures from their normal locations by the gravid uterus, a difficult abdominal examination, and nonspecific nausea and vomiting [4, 5]. Yet, accurate and efficient diagnosis of the source of abdominal pain is important, as a delay in diagnosis can be detrimental to the condition of both the mother and fetus [6]. Often, when a pregnant patient presents with abdominal pain, the diagnosis of appendicitis must be considered, as it is the most common illness necessitating emergency surgery in pregnant patients [7]. Given the established risks to the foetus from radiation exposure, ultrasound (US) and magnetic resonance imaging (MRI) are the preferred imaging investigations [8-10].

Magnetic Resonance Imaging

MRI provides a good overall topographic display and high intrinsic soft-tissue contrast. MRI also benefits from lack of ionizing radiation [11, 12], making it safe to use in pregnant patients.

And it provides excellent soft-tissue resolution and anatomic detail. Furthermore, its efficacy in evaluating acute abdominal pain can match CT in identifying certain causes of abdominal pain. MRI has 50% to 100% sensitivity, 93% to 100% specificity, 94% to 100% negative predictive value (NPV), and 82% to 100% positive predictive value (PPV) with regard to the diagnosis acute appendicitis.7 to date, there are no known harmful effects to the fetus at 1.5 Tesla imaging. Potential safety issues include heating effects and acoustic noise, but recent studies have not confirmed these concerns. In fact, the American College of Radiology (ACR) recommends MRI over CT in pregnant patients when US is nondiagnostic. The imaging protocol for MRI evaluation includes T1- and T2-weighted sequences using 1.5 T magnets and a phased array coil. Informed consent should be obtained. Oral contrast is administered at some institutions with iron-oxide-based oral preparations, resulting in a T2* blooming artifact that aids in identifying the normal appendix.

METHODOLOGY

The data of this study were collected from Prince Sultan Military hospital; Data of the MRI procedures for fetus was taken during Aug 2020 – Dec 2020, using two Magnetic Resonance Machines GE Medical System 3.0T HDX TIWN SPEED1 and SIMENS Medical System 1.5T MAGNETOM AEA. All quality control tests were performed to the machine prior any data collection. All data were within acceptable ranges.

Patient data: A total of 139 pregnant patients with different examinations were referred to MRI studies because of suspected fetus abnormities or congenital. The mean patient age was 31 years. Before any other image, each patient underwent fetal sonographic examination. All MRI studies were performed for clinical indications, so approval was obtained for case review. Patient must be NPO for 6H and Empty bladder before exam.

Imaging techniques: All MR examinations were performed using a set protocol including three planner localizers Coronal-sagittal and axial every plane take 1 to 2 min, T2-weighted HASTE images (TR/effective TE, infinite/90; 2–3 acquisitions). Section thickness was 3.03 mm, and the matrix size was 256/244 (phase × frequency encoding) for all sequences. The overall scan time is 10 min depending on the fetus motion the average scan time is increase to 30 min.

Image Interpretation: All MR examinations were interpreted in a clinical setting at the time of examination by experienced radiologists with fellowship training in body MRI. Unenhanced images were reviewed first to assists in the diction of not using contrast media determine (gadolinium). Medical, surgical, and obstetric records were reviewed to determine the correctness of the clinical MR interpretations.

RESULTS

Table-1: show descriptive statistics for mother and fetus age

Variables	Mean	Std. Dev	Minimum	Maximum
Mother age / Y	31.67	7.275	18	44
Fetus age / W	23.852	6.0935	12.0	33.0

Table-2: Show correlation between the finding against the request

Findings	Request				Total
	Brain Anomalies	Kidney	An hydramnios	Accrete precreta	
The placenta appears to be fundal and posterior	7	4	4	4	19
Normal limits for the gestational age between 22-28 W	4	3	3	3	13
There is shared lower part of the thoracic cavity Small bowel is seen in the lower part of the shared abdomen	6	3	3	3	15
Single intra-uterine fetus in transverse presentation	6	4	3	3	16
Enlarged posterior fossa with a large cystic dilatation	11	3	3	3	20
Heterogeneous soft tissue mass is seen within the lower aspect of the uterine cavity	3	3	4	4	14
Lack of cerebral hemisphere sulcation consistent with lissencephaly	4	3	4	3	14
The two fetal kidneys are visualized	3	6	3	3	15
Normal fetal presentation with the head caudally	4	3	3	3	13
Total	48	32	30	29	139

Table-3: Show correlation between the optimal and request

Request * Optimal Crosstabulation				
Request		**Optimal**		**Total**
		NO	**Yes**	
	Brain Anomalies	22	26	48
	Kidney	14	18	32
	An hydramnios	9	21	30
	Accrete precreta	11	18	29
Total		56	83	139

Table-4: Show correlation between the requests with comments

Request		**Comments**				**Total**
		None	**Motion Artifact**	**T1,T2**	**Multiplanar protocol**	
	Brain Anomalies	24	10	6	8	48
	Kidney	17	5	7	3	32
	An hydramnios	20	3	6	1	30
	Accrete precreta	9	6	9	5	29
Total		70	24	28	17	139

Table-5: Show analysis of variance between the Fetus age with other variables

ANOVA						
		Sum of Squares	**df**	**Mean Square**	**F**	**p.value**
Request	Between Groups	12.630	17	.743	.573	.846
	Within Groups	11.667	9	1.296		
	Total	24.296	26			
Findings	Between Groups	72.074	17	4.240	.382	.958
	Within Groups	100.000	9	11.111		
	Total	172.074	26			
Optimal	Between Groups	3.519	17	.207	1.118	.450
	Within Groups	1.667	9	.185		
	Total	5.185	26			
Comments	Between Groups	6.852	17	.403	.473	.912
	Within Groups	7.667	9	.852		
	Total	14.519	26			

DISCUSSIONS

Table 1. show descriptive statistics for mother and fetus age were the values presented as mean, standard deviation, minimum and maximum. For mother age the mean ± standard deviation was 31.67 ± 7.28 years and for fetus age was 23.85 ± 6.09 week.

correlation between the finding against the request, were the requests divided to four type Brain Anomalies, Kidney, an hydramnios and Accrete precreta were the numbers of this request was 48, 32, 30 and 29 respectively. And the finding was 9 categories and the number of patients here was almost same between 13 and 20 patients for the findings. As shown in table 2.

Table 3. show correlation between the optimal and request, for optimal the option was only yes and no, where the patients with NO was 56 patients and the patients with yes 83.for Brain Anomalies found in 26 patients, kidney in 18 patients, an hydramnios with 21 patients while the Accrete precreta with 18 patients.

Table 4. show correlation between the request with comments, were the comments found with three categories motion artifact, T1,T2 and Multiplanar protocol with number of patients 24,28 and 17 patients respectively. While the numbers of patients with no comments was 70.

Table 5. show analysis of variance between the Fetus age with other variables, were the p.value show there is no significant difference between the fetus age with request (p.value = 0.846), finding (0.958), optimal (0.450) and comments (0.912).

CONCLUSION

MRI evaluation of acute abdominal and pelvic pain in pregnant patients, were the total of 139 pregnant patients with different examinations were referred to MRI studies because of suspected fetus abnormities or

congenital. correlation between the finding against the request, were the requests divided to four type Brain Anomalies, Kidney, an hydramnios and Accrete precreta were the numbers of this request was 48, 32, 30 and 29 respectively. And the finding was 9 categories and the number of patients here was almost same between 13 and 20 patients for the findings. Also, correlation between the optimal and request, for optimal the option was only yes and no, where the patients with NO was 56 patients and the patients with yes 83.for Brain Anomalies found in 26 patients, kidney in 18 patients, an hydramnios with 21 patients while the Accrete precreta with 18 patients. The relation between the request with comments, were the comments found with three categories motion artifact, T1,T2 and Multiplanar protocol with number of patients 24,28 and 17 patients respectively. While the numbers of patients with no comments was 70. analysis of variance between the Fetus age with other variables, were the p.value show there is no significant difference between the fetus age with request (p.value = 0.846), finding (0.958), optimal (0.450) and comments (0.912).

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