Results

RESULTS

Laparoscopic, operative and pathologic findings revealed a total of 71 pelvic lesions (table 10). Adnexal lesions were diagnosed in 25 cases. Vaginal carcinoma was diagnosed in 2 cases and cancer vulva in 2 cases. Masses of extragenital origin were diagnosed in 2 cases, omental inflammatory mass in one case, omental metastatic deposit in one case and pelvic inflammatory mass in one case.

Among the adnexal lesions, 24 were of ovarian origin. The ovarian masses included 11 benign lesions and 13 malignant disorders. For patients with uterine lesions 12 had cervical carcinoma, 12 had uterine lieomyoma, 10 had endometrial carcinoma, 3 had lieomyosarcoma and two patients had choriocarcinoma .

Table (I): Pathologic diagnosis of the examined pelvic lesions.

	Diagnosis	No. of patients
1- Uterine		
Benign	Leiomyoma	12
Malignant	Leiomyosarcoma	3
	Endometrial carcinoma	10
	Choriocarcinoma	2
	Cervical carcinoma	12
II- Vaginal & Vulvar	Vaginal carcinoma	2
	Cancer Vulva	2
III-Adnexal		
Benign:	Functional cysts	2
	Cystadenomas	2
	Teratomas	3
	Endometriomas	2
	Hemorrhagic ovarian cyst	1
	Hematosalpinx	1
	Fibroma	1
Malignant :	Papillary serous cyst adenocarcinoma	5

	Mucinous cyst adenocarcinoma	5
	Clear cell carcinoma	1
	Non hodgkin's lymphoma, infiltrating ovary	1
	Krukenberg tumor	1
IV-Extragential lesions		
	Omental inflammatory mass	1
	Omental metastatic deposits	1
	Pelvic inflammatory disease	1
Total No.		71

Uterine leiomyomas were correctly diagnosed by MR in all 12 cases (total). Intramural location of the tumor was correctly demonstrated in 10 cases, subserous location in 5 cases and submucous leiomyoma in 1 case. MR demonstrated leiomyoma as a well defined low signal intensity mass in T_2- weighted images in 12 lesions. Spickled high signal intensity areas among the low signal intensity mass in T_2-weighted images were seen in 4 lesions. Well defined hyperintense masses were demonstrated in 1 lesion.

Table (II): MR appearance of leiomyomas.

MR signal	Location of Uterine Leiomyoma (N = 17)			
	Intramural	Submucous	Subserus	Cervical
Well defined hypointense mass in T_2-WI	7	1	3	1
Well defined hypointense mass with multiple spickled high S.I. areas-in T_2-WI	2	-	2	-
Well defined hyperintense mass in T_2-WI	1	-	-	-
	10	1	5	1

N.B.: Total no of leiomyomas (17 lesions) exceeds the total no of cases (12 patients) due to multiplicity of the lesions.

Three cases of leiomyosarcoma was diagnosed by MRI table (12). All of these case, shows illdefined margin and two of them had heterogenous signal intensity and showed evidence of extrauterine extension.

Table (III): Imaging features of the three cases of leiomyosarcoma.

Case no	Signal intensity		Margin	Extrauterine extension	Pelvic LN	Acsites
	T_1WI	T_2WI				
(1)	Low	Heterogenous	Illedfined	+	-	-
(2)	Medium	High	Illdefined	-	-	-
(3)	Medium	Heterogenous	Illdefined	+	-	-

In the evaluation of endometrial masses, diagnosis of endometrial carcinoma based on T_2-weighted images and contrast enhanced MR images were correct in all cases.

MR staging of all cases was compared with histology staging (Table13).

In 2 of 10 case, histological examination proved the presence of tumor limited to the endometrium (stage IA). Of these 2 cases, one was correctly staged by MR images. The second case was overestimated by MRI.

Hisologic analysis showed superficial myometrial invasion (stage IB disease) in 2 of 10 cases. of these 2 cases, 1 case was correctly assessed with MRI.

Histologic examination documented the presence of deep myometrial invasion (stage IC disease) in 1 case which was correctly assessed with MRI.

In 2 of 10 cases, histologic examination revealed deep cervical extension of the tumor (stage IIB) which was accurately detected with MRI in all cases.

Hisologic analysis of 2 cases demonstrated transmural invasion (stage III A) 1 case was correctly diagnosed by MRI while the other case was overestimated.

In one of 10 cases, operative findings and histologic examination, revealed upper vaginal extension of the tumor (stage III B). This was correctly assessed with MRI.

Table (IV): Comparison of MR and histologic staging of endometrial carcinoma.

Hisologic staging	No	MR Staging									
		I			II		III			IV	
		A	B	C	A	B	A	B	C	A	B
I											
A	2	1	1	-	-	-	-	-	-	-	-
B	2	-	1	1	-	-	-	-	-	-	-
C	1	-	-	1	-	-	-	-	-	-	-
II											
A	-	-	-	-	-	-	-	-	-	-	-
B	2	-	-	-	-	2	-	-	-	-	-
III											
A	2	-	-	-	-	-	1	-	-	1	-
B	1	-	-	-	-	-	-	1	-	-	-
C	-	-	-	-	-	-	-	-	-	-	-
IV											
A	-	-	-	-	-	-	-	-	-	-	-
B	-	-	-	-	-	-	-	-	-	-	-
Total	10	1	2	2	-	2	1	1	-	1	-

Two cases of choriocarcinoma were included in our series. They showed abnormal mixed signal intensity uterine mass. Table (14). demonstrated the degree of invasion of this malignant lesion in those patients.

Table (V): Imaging features in the two patients with choriocarcinoma

Case No	Uterine			Extrauterine	
	Disuption of the zonal anatomy	Myometrial signal intensity	Peri tumoral signal voids	Signal voids of increased vascularity	Mass (parametrial or vaginal)
(1)	Partial	+	-	-	-
(2)	Complete	+	+	+	-

The surgical staging of all cases of cervical carcinoma (12 patients) were compared with MR findings (table15). Three cases were diagnosed by MRI as stage IB. 2 of these cases were falsely staged clinically. MR stage II A disease were diagnosed in one case. This case was underestimated clinically. Parametrial invasion (stage IIB) were diagnosed by MRI in four patients. One of these cases were only correctly assessed while the rest of cases were underestimated clinically. MR stage III B disease was diagnosed in one case was correctly assessed clinically. Three cases diagnosed as stage IV A (bladder or rectal wall invasion). All these cases were underestimated clinically.

Table (VI): Comparison between MR and clinical staging of cases of cervical carcinoma (no = 12 patients).

MR Staging	Total No.	Clinical staging							
		I_A	I_B	II_A	II_B	III_A	III_B	IV_A	IV_B
I_A	-								
I_B	3	1	1	1					
II_A	1		1						
II_B	4		1	2	1				
III_A	-								
III_B	1						1		
IV_A	3			1	1	1			
IV_B	-				-				
Total	12	1	3	4	2	1	1		

Primary vaginal carcinoma was encountered in our study in 2 cases. Both cases show a vaginal mass of high signal intensity in T_2 WI with heterogamous enhancement and varying degrees of extension. Table (16) shows MR staging of this lesion in two patients.

Table (VII): MR staging of the two cases of primary vaginal carcinoma.

Case No.	MR staging			
	Stage I (limited to vaginal wall)	Stage II (perivaginal tissue)	Stage III (pelvic side wall)	Stage IV (Outside pelvic wall)
(1)	-	+	-	-
(2)	+	-	-	-

Two cases of vulvar carcinoma were included in our study. A vlulvar mass of high T2 signal intensity was seen in all cases. Table (18) shows the staging criteria of this tumor in those patients.

Table (VIII): MR staging of the two cases of vulvar carcinoma.

Case No.	MR staging			
	Stage I (mass <2 cm)	Stage II (mass >2 cm)	Stage III (mass with [illegible] vaginal or elevator muscle extension or lymph [illegible])	Stage IV (bladder or rectal invasion or upper urethral involvement)
(1)	-	-	+	-
(2)	-	+	-	-

With MRI, adnexal origin of the pelvic masses in 28 patients were diagnosed. This was correct in 25 cases. The remaining three cases were proved to be, omental inflammatory mass (one case), omental metastatic deposits (one case), pelvic inflammatory disease (one case). Those three cases were diagnosed by MRI as malignant ovarian masses.

All benign adnexal lesions (12 cases) were detected by MRI. Characterization was correct in all cases of teratoma (3), all cases of

endometrioma (2), case of hemorrhagic ovarian cysts (1) and the one case of fibroma. Functional ovarian cysts were correctly diagnosed in two cases, the third case was falsely diagnosed as cystadenoma. The pathologically proved cystadenomas (2 cases) were correctly assessed with MRI. The one case of hematosalpinx was falsely diagnosed as hemorrhagic ovarian cysts by MRI.

MR findings of the predominatly cystic ovarian lesions were tabulated (table 18).

Most of the functional cysts were less than 4 cm in maximum diameter while all cystadenomas are greater than 4 cm. Also most of cystadenocarcinomas are greater than 4 cm in maximum diameter.

Wall thickness was greater than 3mm in all malignant ovarian lesions, and most of cystadenoma. Mural nodularity was absent in functional cysts and cystadenomas but found in most of cystadeno-carcinomas. Solid components were detected by MRI in 8 cases of cystadenocarcinomas (10 cases). The signal intensity of clear fluid was detected in all cases of functional cysts, cystadenomas, and 4 cases of serous cystadenocarcinoma while fluid of moderate signal intensity was detected in all cases of mucinous cystadenocarcinoma and 1 case of serous cystadenocarcinoma. Pelvic side wall invasion was detected in 2 cases of serous cystadenocarcinoma while ascites was seen in 5 cases of cystadenocarcinoma. Peritoneal depositis were seen in one case of serous cystadenocarinoma and in two cases of mucinous cystadenocarcinoma.

Table (IX): MR appearance of the predominantly cystic ovarian lesions.

MR appearance	Pathological diagnosis			
	Benign lesions		Malignant lesions	
	Functional (n=2)	Cystadenoma (n=2)	Serous cystadeno carcinoma (n=5)	Mucinous cystoden carcinoma (n = 5)
1- Lesion Size				
• Less than 4 cm	+ (1)	-	+ (1)	+ (1)
• More than 4 cm	+ (1)	+ (2)	+ (4)	+ (4)
2- Wall thickness				
• Less than 3 mm	+ (2)	+ (0)	-	-
• More than 3 mm	+ (0)	+ (2)	+ (5)	+ (5)
3- Mural nodularity	-	-	+ (5)	+ (4)
4- Signal intensity of the cystic component				
•Low signal intensity in T_1W_1 and high S.I. in T_2W_1	+ (2)	+ (2)	+ (4)	-
•Moderate signal intensity in T_1WI and high SI in T_2 WI	-	-	+ (1)	+ (5)
5- Associated solid components	-	-	+ (4)	+ (4)
6- Associated findings				
• Pelvic side wall invasion	-	-	+(2)	-
• Peritoneal, mesentric or omental deposits.	-	-	+ (1)	+ (2)
• Ascites	-	-	+ (2)	+ (3)
• Lymphadenopathy.	-	-	-	-

The different MR criteria of the predominantly solid ovarian neoplasms were tabulated (table 19). Single intensity of the malignant lesions were low in T_1WI and high T_2WI while the case of ovarian fibroma showed a characteristic low S.I. in T_2WI. As regard margin definition, it was ill-defined in clear cell carcinoma and in the case of non-Hodgkin lymphoma. Case of clear cell carcinoma demonstrated cystic components and ascites. Ascites was also seen in case of ovarian fibroma (Mieg's syndrome). Lymphadenopathy was detected in the case non-Hodgkin lymphoma and in case of clear cell carcinoma.

Table (X): MR appearance of predominantly solid ovarian neoplasms.

MR appearance	Pathological diagnosis			
	Benign lesions		Malignant lesions	
	Ovarain fibrama (n=1)	Clear cell carcinoma (n=1)	Krukenerg tumor (n=1)	Non-Hodgkin-Lymphoma (n = 1)
1- Sinal intensity				
• T_1 WI	Medium	Low	Low	Low
• T_2 WI	Low	High	High	High
2- Margin				
• Well defined	+	-	+	-
• Ill-defined	-	+	-	+
3- cystic component	-	+	-	-
4- Associated findings				
• Pelvic side wall invasion	-	+	-	+
• Peritoneal mesentric or omental deposits	-	-	-	-
• ascites.	+	+	-	-
• Lymphadenopathy.	-	+	-	+