AIM OF THE WORK

The aim of this work was to assess intratumoral and peritumoral lymphatic microvascular density (LMVD) in endometrial carcinomas and to investigate their association with classical pathological factors, risk of lymph node (LN) metastasis and their relation to other prognostic parameters.

PATIENTS

The present study included 60 patients histopathologically proven to have endometrial carcinoma recruited from The Oncology Outpatient Clinic at El-Shatby Maternity University Hospital, after signing a written consent.

Inclusion criteria

Patients diagnosed with endometrial carcinoma including different histotypes and grades based on endometrial sampling by fractional curettage.

Exclusion criteria

Patients with high operative risk (e.g. History of prior radiotherapy or chemotherapy as well as patients with contraindications for laparotomy) were excluded from this study.

METHODS

Study design:

The current study is a prospective study that included 60 patients histopathologically proven to suffer endometrial carcinoma, recruited from The Oncology Outpatient Clinic at El-Shatby Maternity University Hospital in the period from January 2011 through May 2014.

All cases included in this study were subjected to:

A- Comprehensive history taking and gynecological examination with emphasis on :

1. Full history taking.
2. General physical examination.
3. Pelvic examination for assessment of the size of the uterus, cervix, and presence of parametrial affection, vaginal or vulval metastasis.
4. Transvaginal ultrasound for assessment of uterine size, endometrial thickness and myometrial invasion. Myometrial invasion was suspected when the myometrial–endometrial interface was ill-defined. The depth of infiltration was estimated according to the method of Weber and co-workers [187], when the relationship between the endometrial thickness and anterio-posterior uterine size attained 50% or more infiltration was judged to have extended to the outer half of the myometrium. In cases where this ratio was less than 50%, tumor involvement was considered to be confined to the inner half of the myometrium. Lack of distinct sonographic boundary between the hyperechoic endometrium and the cervix was taken to be an indicator of possible cervical involvement. [187, 188]
5. Multi-slice CT scanning of the abdomen and pelvis for assessment of myometrial invasion (whether there was well defined myometrial–endometrial interface or not), pelvic extension, nodal involvement and distant metastases.
6. Serum CA125 evaluation.

B- Surgical staging :

All enrolled endometrial carcinoma patients were subjected to: Total abdominal hysterectomy with bilateral salpingo-oophrectomy, peritoneal washings were taken from the subdiaphragmatic area, paracolic gutters, and pelvis (Figure 3) [189]. Exploration of the abdomen and pelvis was performed, noting particularly the diaphragm, liver, omentum, and pelvic as well as aortic lymph nodes. With the retroperitoneum displayed, the pelvic lymph nodes can be visualized and palpated, and any enlarged nodes can be removed. Intraoperative assessment of the tumor size, depth of myometrial invasion, and cervical extension were assessed. This information, along with the surgical findings and knowledge of the preoperative histology, influenced whether pelvic and aortic lymph node dissection was indicated (Figure 4) [189].

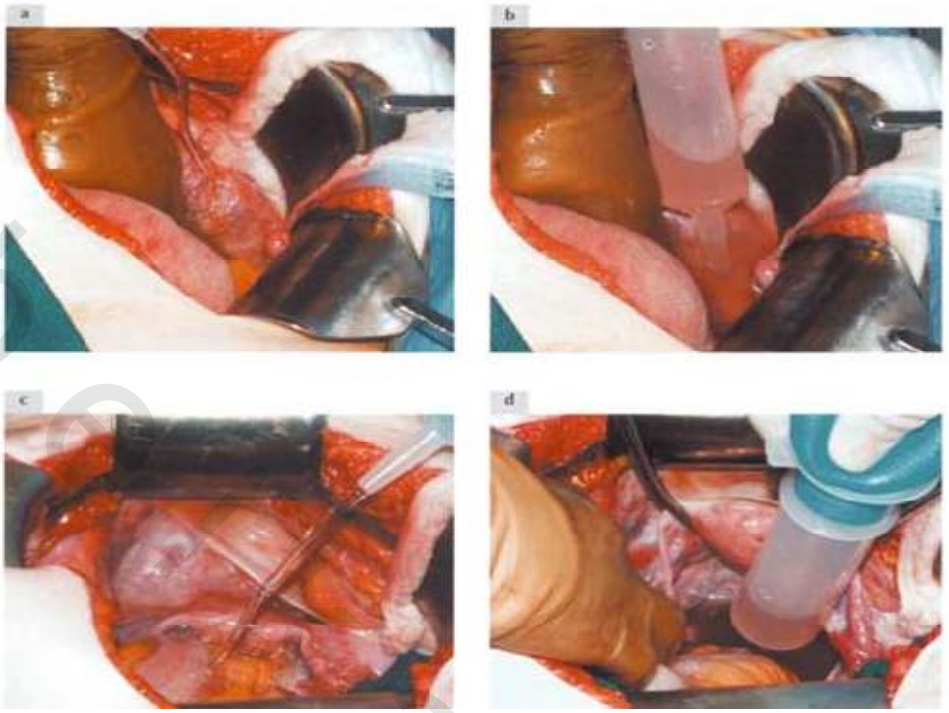

Figure (3): Peritoneal washings. Right paracolic gutter washings (a and b) and pelvic washings (c and d). (189)

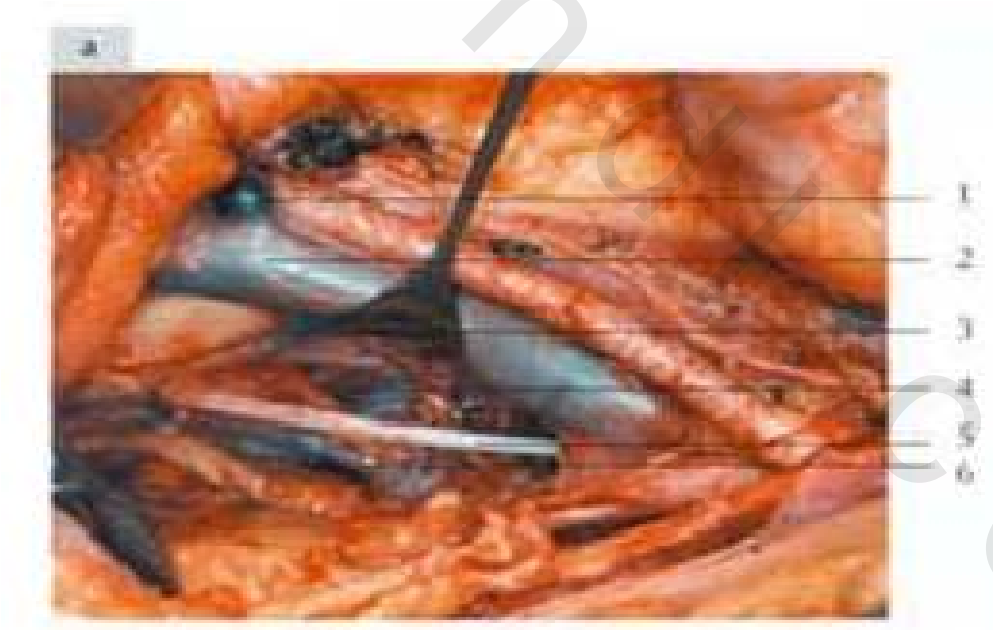

Figure (4): Pelvic LN dissection; 1.Right deep circumflex iliac vein, 2.Right external iliac vein, 3.Right anastomotic pelvic vein, 4.Right obturator internus muscle, 5.Right obturator nerve, 6.Right obturator vein. (189)

C- Histopathological examination:

1. Thorough macroscopic description of the resected uterus and lymph nodes was performed.
2. Sampling of both tumorous as well as non-tumorous endometrium took place in addition to sampling the myometrium (for depth of invasion), the uterine cervix and both adnexa. Preparation of conventionally processed, H&E stained sections was performed.
3. H&E stained smears were prepared from procured peritoneal wash fluid, and then cytological examination was performed.
4. Tumor histotype, degree of differentiation (grade) and depth of tumor invasion were studied and special emphasis was laid on the degree of intratumoral and peritumoral lymphovascular space invasion.
5. Tumors were staged according to the International Federation of Gynecology and Obstetrics 2009 (FIGO) staging system.

D- Immunohistochemistry:

a. Tissue sections (3 μm) from paraffin blocks were quenched with 3% hydrogen peroxide solution in phosphate-buffered saline (PBS; Sigma, St. Louis, MO) for 20 minutes to block endogenous peroxidase activity. After several washes in PBS, sections were heated in a microwave (Electrolux, 900 W) for 15 minutes in 0.01 M citrate buffer, pH 6.0 for antigen retrieval and then cooled at room temperature for 20 minutes. Sections were then incubated overnight with a 1:40 dilution of monoclonal antibody against human podoplanin (D2-40), Biocare Medical, with Cat #: CM 266A,B,C to highlight lymphatic vessels.[165]

b. Stained histologic sections were analyzed using standard light microscopy. Under low magnification (X100), the most vascularized intratumoral and peritumoral areas were identified (hot spots). Intratumoral lymphatic vessels were defined as those located within the tumor mass. Peritumoral lymphatic vessels were those located outside the tumor mass. The number of immunostained lymphatic vessels detected in 10 hot spot areas at 400X magnification was counted and the average was calculated. Only vessels exhibiting typical morphology (lumen) and without muscle layer or red blood cells in their lumen were considered lymphatic microvessels. Intratumoral and peritumoral LMVD for each case was expressed in terms of the mean value (total number of vessels in 10 hot spot microscopic fields/ 10). The median value of all the mean LMVD was the cutoff to divide tumors into high and low LMVD.[190]

E- Follow up:

1. All patients were sorted out postoperatively according to the stage of the tumor and hence the eligibility for adjuvant treatment (As described in table 5). [191]
2. All the patients were scheduled for follow up visits three, six, and twelve months postoperatively looking for vaginal vault and pelvic recurrence byphysical and gynecological examination. Multi-slice CT scanning of the abdomen and pelvis was done at six and twelve month intervals.

Table (V): Adjuvant treatment. [191]

	IA G1-G2	Observation
Stage I	IA G3	Observation or vaginal BT If negative prognostic factor: Pelvic RT (brachytherapy and external beam) and /or adjuvant chemotherapy could be considered.
	IB G1-G2	Observation or vaginal BT If negative prognostic factor: Pelvic RT (brachytherapy and external beam) and /or adjuvant chemotherapy could be considered.
	IB G3	Pelvic RT If negative prognostic factor: combination of radiation and chemotherapy could be considered
Stage II		Pelvic RT - If grade 1- 2 tumors, myometrial invasion<50%, negative LVSI and complete surgical staging: pelvic radiotherapy alone. - If negative prognostic factor: chemotherapy ± radiation
Stage III–IV		Chemotherapy with or without sequential radiotherapy - If metastatic disease: Chemotherapy- RT for palliative treatment.

F- Statistical analysis of the data

Sample size calculation:

The sample size was calculated using NCSS 2004 and PASS 2000 program. A sample size of 34 and 34; total (68) achieves 80% power to detect a difference of (30%) between high LMVD (87%) and low LMVD (57%). The target significance level is 0.05 using two-sided Chi square test.

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. Qualitative data were described using number and percent. Quantitative data were described using Range (minimum and maximum), mean, standard deviation and median. Comparison between different groups regarding categorical variables was tested using Chi-square test. A p-value less than 0.05 was considered significant. When more than 20% of the cells have expected count less than 5, correction for chi-square was conducted using Fisher's Exact test or Monte Carlo correction. The distributions of quantitative variables were tested for normality using Kolmogorov-Smirnov test, Shapiro-Wilk test and D'Agstino test, also Histogram and QQ plot were used for vision test. If it reveals normal data distribution, parametric tests was applied. If the data were abnormally distributed, non-parametric tests were used. For abnormally distributed data, comparison between two independent population were done using Mann Whitney test while Kruskal Wallis test was used to compare between different groups and pair wise comparison was assessed using Mann-Whitney test. Correlations between two quantitative variables were assessed using Spearman coefficient. Agreement of the different predictives with the outcome was used and was expressed in sensitivity, specificity, positive predictive value, negative predictive value and accuracy. Significance of the obtained results was judged at the 5% level. [192, 193]

RESULTS

This study included 60 patients diagnosed with endometrial carcinoma based on endometrial sampling by fractional curettage. Surgical management including total abdominal hysterectomy with bilateral salpingoopherectomy and pelvic lymph node sampling was performed for all the cases. Histopathological examination of the resected uterus and lymph nodes was conducted then all the patients were scheduled for follow up visits during which vaginal vault or pelvic recurrence was verified.

- **Age:**

Patients' ages ranged between 35 and 75 years, with a mean of 60.07 ± 9.75. Eight patients (13.3%) aged younger than 50 years, while 52 patients (86.7%) were equal to or older than 50 years. (Table VI, Figure 5)

- **Parity:**

Twelve (20%) patients had 0-2 live births and 48 patients had more than 2 live births (80%). (Table VI, Figure 6)

Table (VI): Distribution of the studied cases according to age and parity

	No.	%
Age		
<50	8	13.3
≥50	52	86.7
Min. – Max.	35.0 – 75.0	
Mean ± SD.	60.07 ± 9.75	
Median	63.0	
Parity		
0 – 2	12	20.0
>2	48	80.0

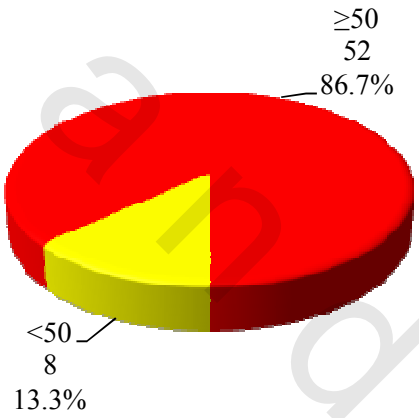

Figure (5): Distribution of the studied cases according to age

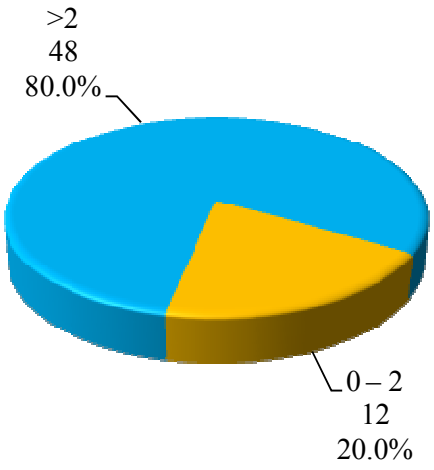

Figure (6): Distribution of the studied cases according to parity

• Obesity:

Eight (13.3%) patients recorded normal body weights (Body mass index=18.5 to 25kg/m^2), while 16 (26.7%) patients were overweight (BMI = 25 to 30kg/m^2) and 36 (60%) were obese (BMI above 30kg/m^2).

• Medical disorders:

Diabetes mellitus was present in 36 cases (60%) and hypertension in 40 cases (66.7%). Both diabetes mellitus and hypertension were present in 32 cases (53.3%). (Table VII)

Table (VII): Distribution of the studied cases according to medical disorders

	No.	%
Diabetes mellitus		
-ve	26	40
+ve	36	60
Hypertension		
-ve	20	33.3
+ve	40	66.7
Diabetes mellitus & Hypertension		
-ve	28	46.7
+ve	32	53.3

- **Contraceptive history:**

Forty four patients used a contraceptive method, (intrauterine device; IUD "32 cases" and pills "12 cases"). Sixteen patients (26.7%) did not use any contraceptive method. The duration of exposure to IUD ranged between 7 and 12 years, with a mean of 9.88 ± 1.64 years and a median of 10.50 years. The duration of exposure to combined oral contraceptive pills ranged between 4.0 – 7.0 years, with a mean of 5.33 ± 1.30 years and a median of 5.0 years. (Table VIII)

Table (VIII): Distribution of the studied cases according to contraceptive history

	No.	**%**
Contraception		
No contraception	16	26.7
contraception in the form of IUD	32	53.3
contraception in the forms of COC pills	12	20.0
Duration of use of IUD in years		
Min. – Max.	7.0 – 12.0	
Mean ± SD	9.88 ± 1.64	
Median	10.50	
Duration of COC pill use in years		
Min. – Max.	4.0 – 7.0	
Mean ± SD	5.33 ± 1.30	
Median	5.0	
Duration of extraction of IUD in years		
Min. – Max.	0.0 – 17.0	
Mean ± SD	11.50 ± 5.95	
Median	13.50	
Duration of COC pill discontinuation in years		
Min. – Max.	4.0 – 17.0	
Mean ± SD	9.0 ± 5.97	
Median	6.0	

• Radiological diagnosis of myometrial invasion:

Ultrasound findings:

Twenty eight patients proved to have invasion of less than half the myometrial thickness (46.7%), while 32 patients recorded infiltration of more than half the myometrial thickness (53.3%)

CT findings:

Thirty two patients proved to have invasion of less than half the myometrial thickness (53.3%), while 28 patients recorded infiltration of more than half the myometrial thickness (46.7%).

Sensitivity, specificity and accuracy of both US and CT in relation to histopathology in diagnosis of myometrial invasion:

Ultrasound:

Sensitivity of US in relation to histopathology was 70%, specificity 80% and accuracy 73.33%. (Table IX)

CT:

Sensitivity of CT in relation to histopathology was 50%, specificity 60% and accuracy 53.33%. (Table IX)

Table (IX): Sensitivity, specificity and accuracy of both US and CT in relation to histopathology in diagnosis of myometrial invasion

	Pathological		Sensitivity	Specificity	PPV	NPV	Accuracy
	<1/2	>1/2					
US							
<1/2	16	12	70.0	80.0	87.50	57.14	73.33
>1/2	4	28					
CT							
<1/2	12	20	50.0	60.0	71.43	37.50	53.33
>1/2	8	20					

• Radiological assessment of Lymph nodes status:

By computerized tomography, 24 patients showed lymph nodes positive for metastatic involvement, while 36 did not show lymph node metastasis.

Sensitivity, specificity and accuracy of CT in relation to histopathology in assessment of lymph nodes status:

Sensitivity of CT in relation to histopathology was 66.67%, specificity 66.7% and accuracy 66.67%. (Table X)

Table (X): Sensitivity, specificity and accuracy of CT in relation to histopathology in lymph node detection

	Pathological		Sensitivity	Specificity	PPV	NPV	Accuracy
	Negative	Positive					
CT							
Negative	32	4	66.67	66.7	33.33	88.89	66.67
Positive	16	8					

• Preoperative CA125:

Preoperative values of CA125 were ranged between 4.80 – 48.0 U/ml with a mean of 26.99 ± 15.38. (Table XI)

Table (XI): Distribution of the studied cases according to preoperative CA125

	No.	%
Preoperative CA125		
Min. – Max.	4.80 – 48.0	
Mean ± SD.	26.99 ± 15.38	
Median	25.0	

- **Cytology of peritoneal fluid aspirate:**

Positive peritoneal cytology for malignant cells was detected in eight patients (13.3%). (Table XII, Figure 7)

Table (XII): Distribution of cases according to cytology of peritoneal fluid aspirate

	No.	%
Cytology of peritoneal fluid aspirate		
Negative	52	86.7
Positive	8	13.3

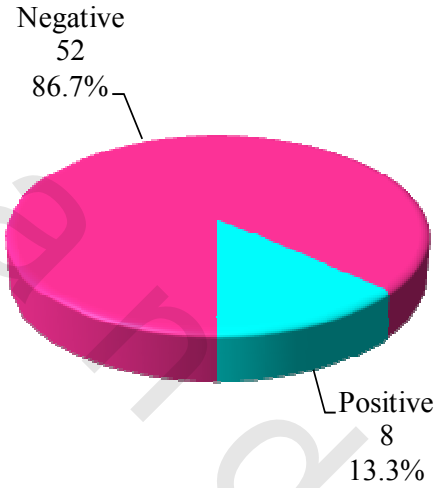

Figure (7): Distribution of cases according to cytology of peritoneal fluid aspirate

• Histopathological parameters:

Tumor histotype:

Tumors were of the endometroid type in 44 cases (73.3%) and non endometroid (serous) in 16 cases (26.7%). (Table XIII, Figure 8)

Tumor grade:

The studied tumors were of grade I in 12 cases (20%), grade II in 20 cases (33.3%) and grade III in 28 cases (46.7%). (Table XIII, Figure 9)

Myometrial invasion:

Invasion of less than half the myometrial thickness was noted in 20 cases (33.3%) and invasion of equal to or more than half the myometrial thickness in 40 cases (66.7%). (Table XIII, Figure 10)

Adnexal infiltration:

Adnexal infiltration was confirmed in 8 cases (13.3%). (Table XIII 13, Figure 11)

Lymphovascular space invasion:

The studied cases were positive for lymphovascular space invasion (LVSI) in 24 cases (40%). (Table XIII, Figure 11)

Lymph node status:

The surgically sampled lymph nodes were histopathologically proven to host metastatic tumor deposits in 12 cases (20%) and were negative for tumorous involvement in 48 cases (80%). (Table XIII, Figure 11)

Tumor stage:

The studied cases were assigned stage I in 36 cases (60%), stage II in 4 cases (6.7%) and stage III in 20 cases (33.3%). (Table XIII, Figure 12)

Table (XIII): Distribution of the studied cases according to histopathological parameters

	No.	%
Tumor histotype		
Endometroid	44	73.3
Non endometroid	16	26.7
Grade		
I	12	20.0
II	20	33.3
III	28	46.7
Myometrial Invasion		
< 1/2	20	33.3
≥1/2	40	66.7
Adnexal infiltration		
Negative	52	86.7
Positive	8	13.3
Lymphovascular space invasion		
Negative	36	60.0
Positive	24	40.0
Lymph nodes by pathological examination		
Negative	48	80.0
Positive	12	20.0
Min. – Max.	2.0 – 34.0	
Mean ± SD.	10.47 ± 8.15	
Median	9.0	
FIGO stage		
I	36	60.0
II	4	6.7
III	20	33.3
IV	0	0.0

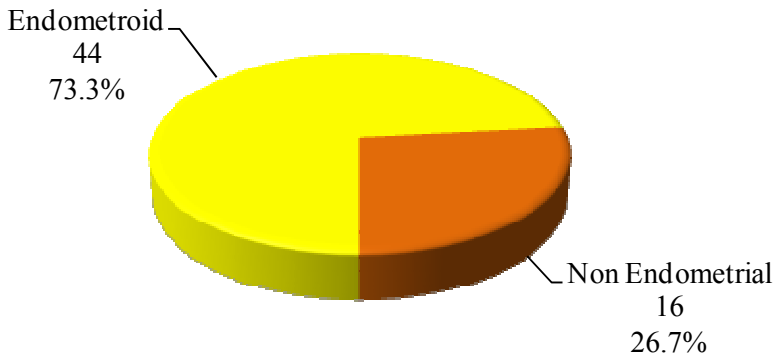

Figure (8): Distribution of the studied cases according to tumor histotype

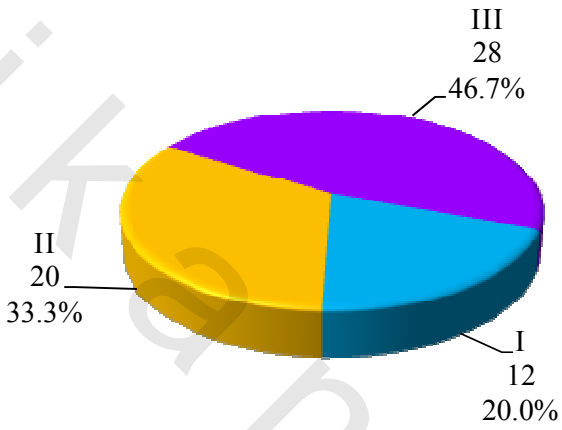

Figure (9): Distribution of the studied cases according to tumor grade

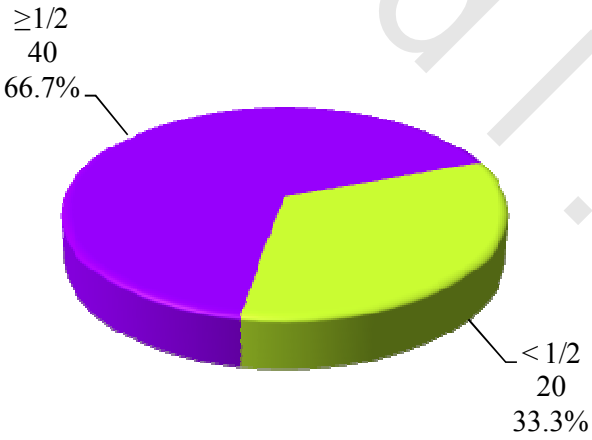

Figure (10): Distribution of the studied cases according to myometrial invasion

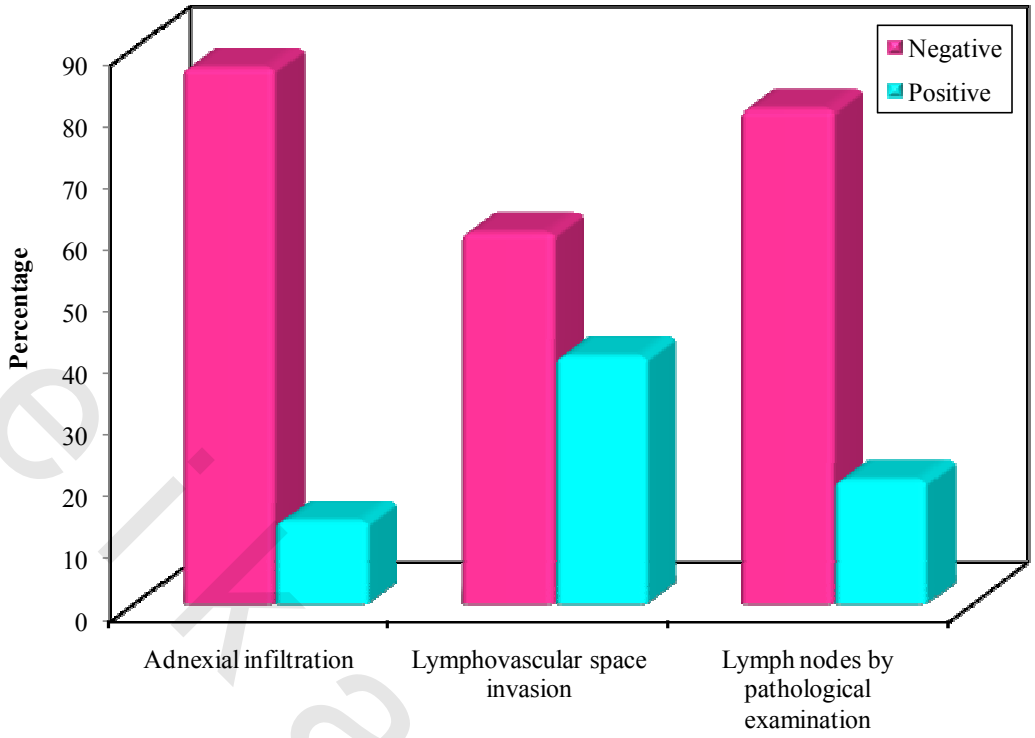

Figure (11): Distribution of the studied cases according to adnexal infiltration, LVSI, lymph node status

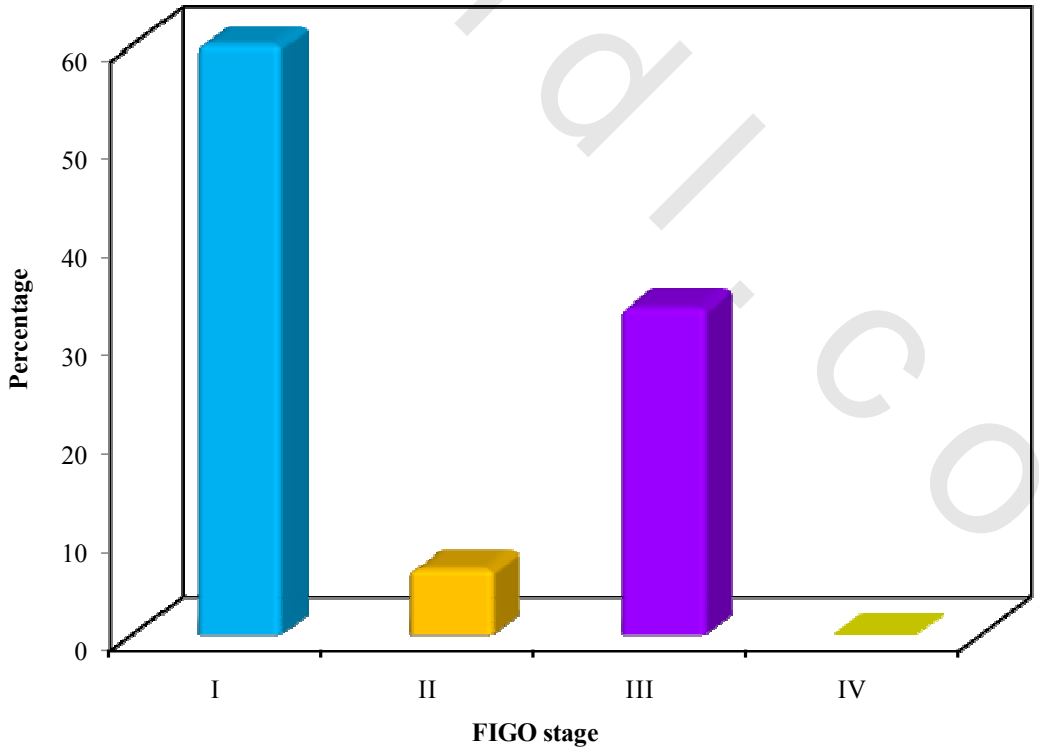

Figure (12): Distribution of the studied cases according to FIGO stage

- **Peritumoral lymphatic microvessel density (LMVD):**

Peritumoral lymphatic vessels were those located outside of the tumor mass. The mean number of peritumoral lymphatic vessels ranged between 1.60 and 5.40. The median value was 3.2. The median value was the cutoff point below which readings were considered of low peritumoral LMVD and above which or equal readings were considered of high peritumoral LMVD respectively.[190] Low peritumoral LMVD values were found in 28 (46.7%) patients, and high peritumoral LMVD values were found in 32 (53.3%) patients. (Table XIV), (Figure 13, 16 and 17)

Table (XIV): Distribution of the studied cases according to peritumoral lymphatic microvessel density

	No.	%
Peritumoral LMVD		
<3.2 (Low)	28	46.7
≥3.2 (High)	32	53.3
Min. – Max.	1.60 – 5.40	
Mean ± SD.	3.44 ± 0.99	
Median	3.20	

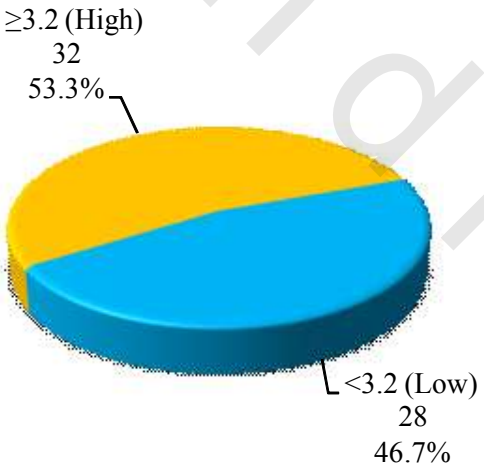

Figure (13): Distribution of the studied cases according to peritumoral lymphatic microvessel density

- **Intratumoral lymphatic microvessel density (LMVD):**

Intratumoral lymphatic vessels were defined as those located within the tumor mass. The mean number of intratumoral lymphatic vessels ranged between 0.0 and 3. The median value was 1. The median value was the cutoff point below which readings were considered of low intratumoral LMVD and above which or equal readings were considered of high intratumoral LMVD respectively. [190] Intratumoral lymphatics were not found in 20 (33.3%) patients and those were considered the group of low intratumoral LMVD. high intratumoral LMVD values were found in 40 (66.7%) patients. (Table XV, Figure 14, 18 and19)

The mean number of peritumoral lymphatic vessels ranged between 1.60 and 5.40. The median value was 3.2. While, The mean number of intratumoral lymphatic vessels ranged between 0 and 3. The median value was 1. So there was statistical significant difference between intratumoral lymphatics and peritumoral lymphatics ($p<0.001$); Intratumoral lymphatics were rare, less in no than peritumoral lymphatic, smaller than peritumoral lymphatics and flattened with a close lumen, contrasting the widely opened lymphatics in the peritumoral regions. (Table XVI), (Figure 15)

Table (XV): Distribution of the studied cases according to intratumoral LMVD

	No.	%
Intratumoral LMVD		
< 1 (Low)	20	33.3
≥ 1 (High)	40	66.7
Min. – Max.	0.0 – 3.0	
Mean ± SD.	1.07 ± 0.94	
Median	1.0	

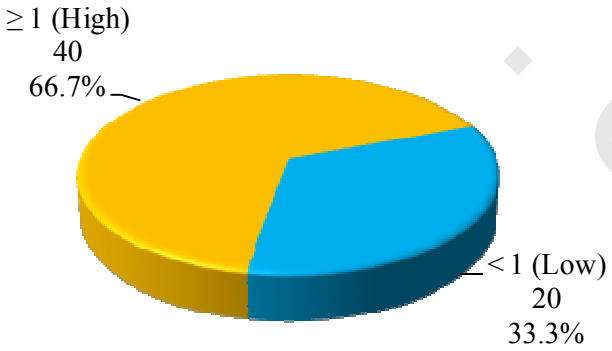

Figure (14): Distribution of the studied cases according to intratumoral LMVD

Table (XVI): Comparison between Peritumoral LMVD and Intratumoral LMVD

	Peritumoral LMVD	Intratumoral LMVD	Z	p
Min. – Max.	1.60 – 5.40	0.0 – 3.0		
Mean ± SD	3.44 ± 0.99	1.07 ± 0.94	6.742*	<0.001*
Median	3.20	1.0		

Z: Z for Wilcoxon signed ranks test

*: Statistically significant at $p \leq 0.05$

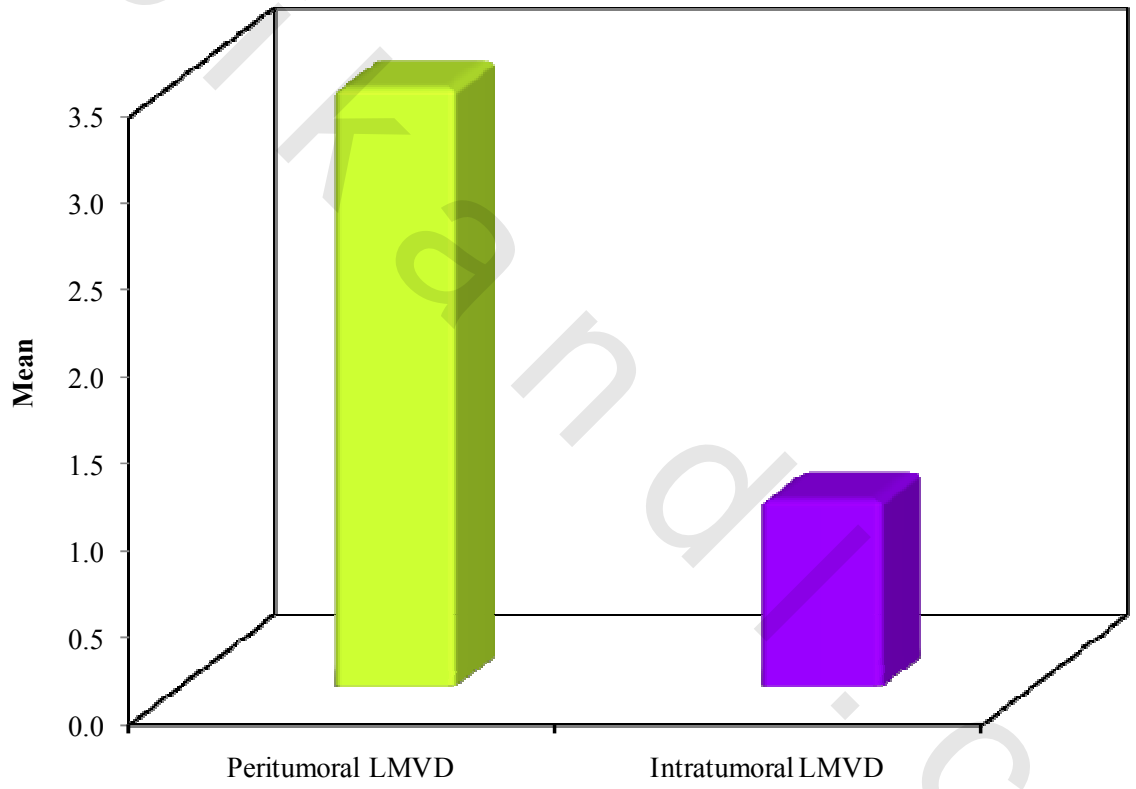

Figure (15): Comparison between peritumoral LMVD and intratumoral LMVD

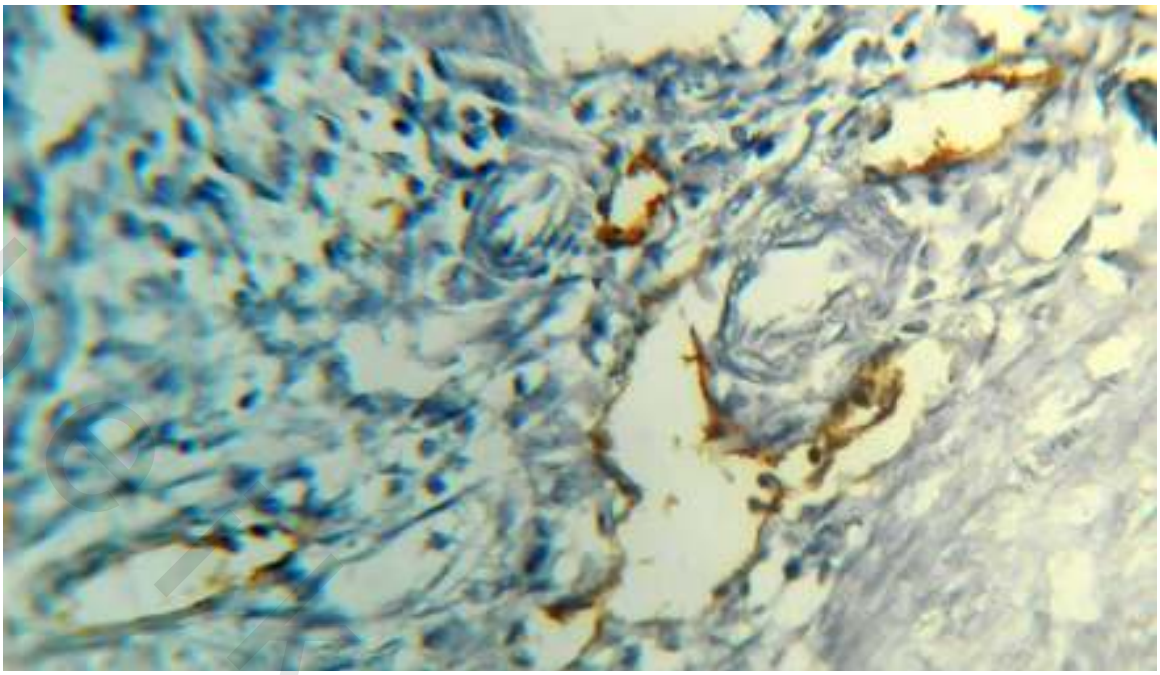

Figure (16): Peritumoral lymphatics highlighted by brownish lining (D2-40, x400)

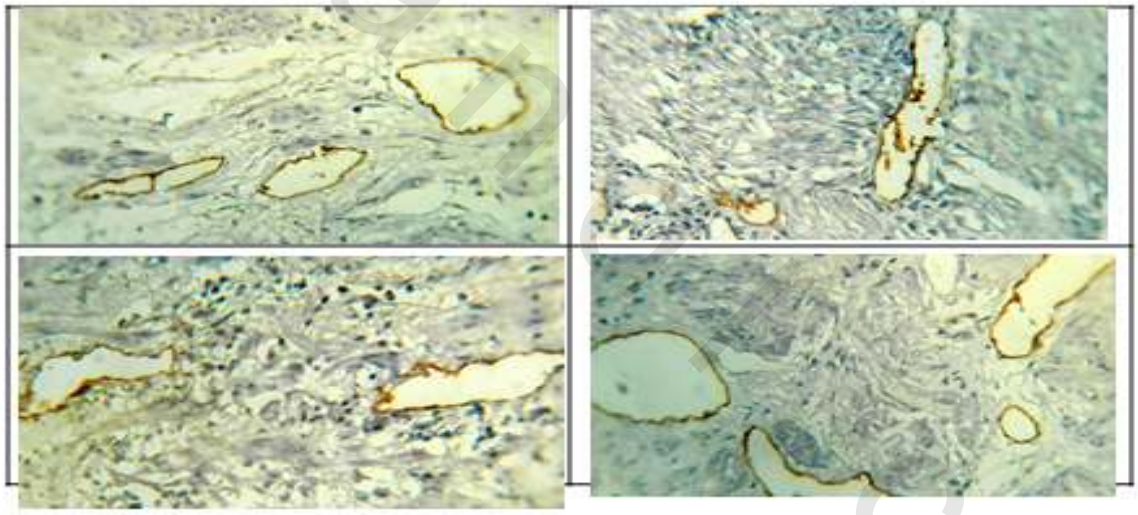

Figure (17): Peritumoral lymphatic channels showing a brownish lining (D2-40, x400)

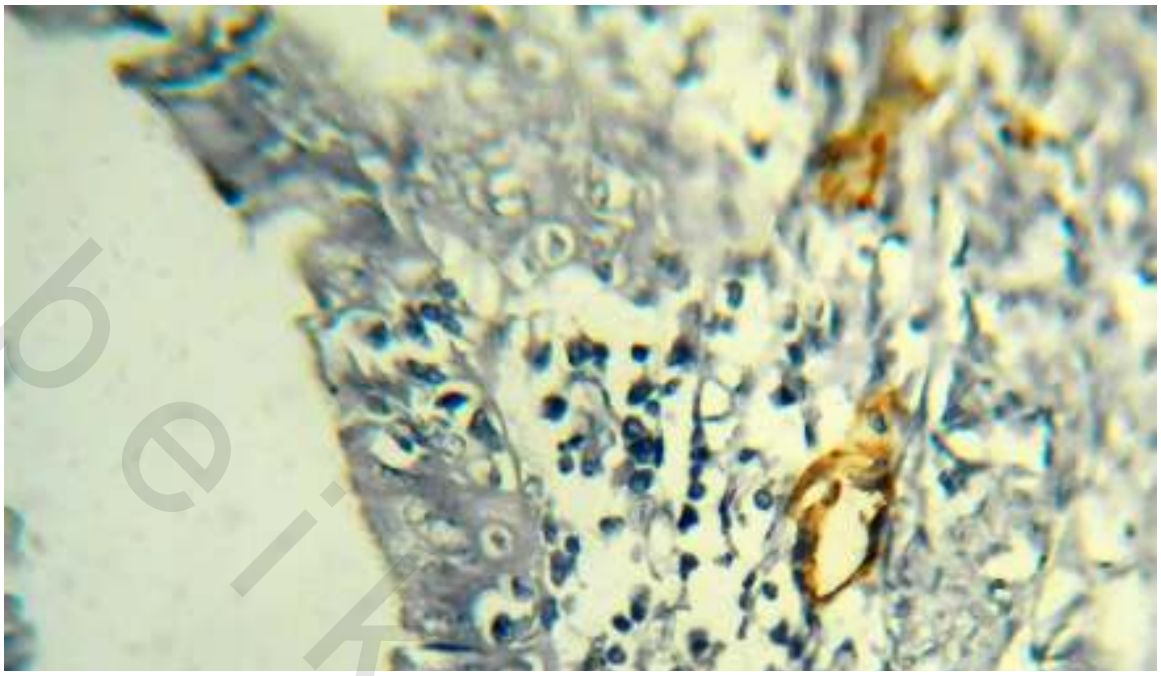

Figure (18): Intratumoral lymphatics highlighted by (D2-40, X400)

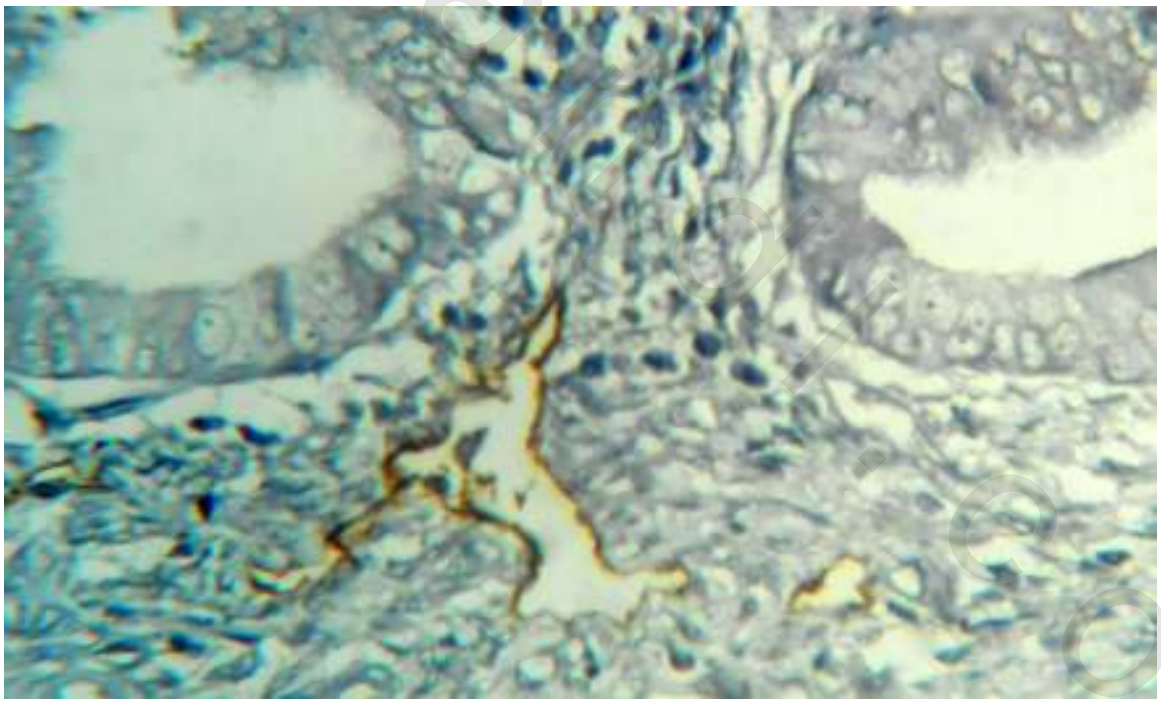

Figure (19): Another example of intratumoral lymphatics with brownish lining (D2-40, X400)

- **Eligibility for postoperative adjuvant radiotherapy :**

All patients were sorted out postoperatively according to the stage of the tumor and hence the eligibility for adjuvant treatment according to European Society of Medical Oncology (ESMO) Clinical Practice Guidelines 2013. (As described in table 5). [191]

Forty four patients proved to be eligible for postoperative adjuvant radiotherapy (73.3%), while 16 patients did not receive such therapy (26.7%). (Table XVII)

Table (XVII): Distribution of the studied cases according to eligibility for postoperative adjuvant radiotherapy

	No.	%
Radiotherapy		
No	16	26.7
Yes	44	73.3

- **Vaginal vault recurrence: (Table XVIII)**

No cases had vaginal vault recurrence after 3 months postoperatively, while 4 cases recorded such recurrence after 6 months postoperatively (6.7%); all recurred four cases were associated with invasion of more than half the myometrial thickness, positive peritoneal cytology, positive adnexal infiltration, positive lymphovascular space invasion and positive lymph nodes. Also they were of non endometroid type tumors, of grade III tumors, stage III tumors and with decreased intra and peritumoral LMVD.

All recurred four cases were obese of BMI above 30kg/m2, three of them suffered massive loss of blood intraoperatively that needed blood transfusion.

These cases were symptomatic in three cases in the form of vaginal bleeding and had vaginal vault mass detected by vaginal examination, while one case was asymptomatic and discovered by detection of vaginal vault mass by vaginal examination. All recurred four cases were subjected to relaparotomy for excision of the mass and received postoperative radiotherapy and chemotherapy.

Of all the sixty endometrial cancer cases, fifty six patients came to follow up visits after 12 months postoperatively and four cases declined that follow up visit (dropped out). Of those 56 cases who came to 12 months follow up visits; 12 cases recorded vaginal vault recurrence (20%).

Regarding these recurred 12 cases and their association with other prognostic parameters; of forty patients with recorded invasion of more than half the myometrial thickness, 8 cases recorded vaginal vault recurrence after 12 months postoperatively (represented 20% of cases of deep myometrial invasion and 40% of all recurred cases)

Four patients with positive peritoneal cytology came to follow up visits after 12 months postoperatively (the other 4 cases were dropped out) and all of them recorded vaginal vault recurrence. On the other hand, in fifty two patients with negative peritoneal cytology, 8 cases recorded vaginal vault recurrence after 12 months postoperatively (15.4%) while the remaining 44 cases did not record such recurrence (84.6%).

Four patients with positive adnexal infiltration came to follow up visits after 12 months postoperatively (the other 4 cases were dropped out) and all of them recorded vaginal vault recurrence. On the other hand, in fifty two patients with negative adnexal infiltration, 8 cases recorded vaginal vault recurrence after 12 months postoperatively (15.4%) while the remaining 44 cases did not record such recurrence (84.6%).

Of twelve patients of non endometroid type tumors who came to follow up visits after 12 months postoperatively (the other 4 cases were dropped out), 4 cases recorded vaginal vault recurrence (25%) while 8 cases did not record such recurrence (50%). On the other hand of forty four cases of endometroid type tumors, 8 cases recorded vaginal vault recurrence after 12 months postoperatively (18.2%) while 36 cases did not record such recurrence (81.8%).

Of twenty patients of positive lymphovascular space invasion who came to follow up visits after 12 months postoperatively (the other 4 cases were dropped out), 4 cases recorded vaginal vault recurrence after 12 months postoperatively (16.7%) while 16 cases

did not record such recurrence (66.7%). On the other hand of thirty six cases of negative lymphovascular space invasion, 8 cases recorded vaginal vault recurrence after 6 months postoperatively (22.2%) while 28 cases did not record such recurrence (77.8%).

All twelve cases of grade I tumors did not record vaginal vault recurrence after 12 months postoperatively (100%). Of twenty cases with grade II tumors, 8 cases recorded vaginal vault recurrence after 12 months postoperatively (40%) while 12 cases did not record such recurrence (60%). Of 24 cases with grade III who came to follow up visits after 12 month postoperatively (the other 4 cases were dropped out), 4 cases recorded vaginal vault recurrence (14.3%) while 20 cases did not record such recurrence (71.4%).

Of twelve recurred cases, 4 cases were of stage IA G3 indicated for vaginal brachytherapy but they did not receive such therapy due to unavailability of it during most of the period of the current study, 8 cases were of stage III needed postoperative adjuvant chemo and radiotherapy but they also did not receive the adjuvant brachytherapy.

Of forty eight cases with negative lymph nodes, 8 cases recorded vaginal vault recurrence after 12 months postoperatively (16.7%) while 40 cases did not record such recurrence (83.3%). On the other hand, of eight cases with positive lymph nodes who came to follow up visits after 12 months postoperatively (the other 4 cases were dropped out), 4 cases recorded vaginal vault recurrence (33.3%) while the remaining 4 cases did not record such recurrence (33.3%).

Of 28 patients with decreased peritumoral LMVD; 8 patients had vaginal vault recurrence after 12 months postoperatively (28.6%) while, of 32 patients with increased LMVD; only 4 (12.5%) had such recurrence.

Of 16 patients with decreased intratumoral LMVD who came to follow up visits after 12 months postoperatively (the other 4 cases were dropped out) ; 8 patients had vaginal vault recurrence after 12 months postoperatively (40%) and the remaining 8 cases did not record such recurrence (40%) while, of 40 patients with increased intratumoral LMVD; only 4 cases (10%) had such recurrence.

All of these recurred cases were obese of BMI above 30kg/m2.

All of these recurred cases complained of vaginal bleeding and had vaginal vault mass by vaginal examination. Of these recurred 12 cases, 8 cases received adjuvant chemotherapy and pelvic radiotherapy before and subjected to reoperation for vaginal vaultectomy, while the remaining 4 cases did not receive adjuvant radiotherapy before and subjected to relaparotomy for vaginal vaultectomy and postoperative radiotherapy.

Table (XVIII): Distribution of the studied cases according to vaginal vault recurrence

	Vaginal vault recurrence					
	After 3 months		After 6 months		After 12 months	
	No.	%	No.	%	No.	%
Negative	60	100.0	56	93.3	44	73.3
Positive	0	0.0	4	6.7	12	20.0
Drop out	0	0.0	0	0.0	4	6.7

- **Pelvic recurrence:**

All the sixty patients came to follow up visits after 3 and 6 months and did not record pelvic recurrence; no one had pelvic pain or recorded recurred pelvic mass by physical examination or CT examination. Similarly all the fifty six patients who came to postoperative follow up visits after 12 months did not record pelvic recurrence (the remaining 4 cases declined that follow up visit). (Table XIX)

Table (XIX): Distribution of the studied cases according to pelvic recurrence

	Pelvic recurrence					
	After 3 months		After 6 months		After 12 months	
	No.	%	No.	%	No.	%
Negative	60	100.0	60	100.0	56	93.3
Positive	0	0.0	0	0.0	0	0.0
Drop out	0	0.0	0	0.0	4	6.7

- **CT recurrence:**

Four cases recorded CT recurrence 6 months postoperatively in the form of vaginal vault mass (6.7%), while 12 cases recorded CT recurrence in the form of vaginal vault mass after 12 months postoperatively (20%). (Table XX)

Table (XX): Distribution of the studied cases according to CT recurrence

	CT			
	After 6 months		After 12 months	
	No.	%	No.	%
Negative	56	93.3	44	73.3
Positive	4	6.7	12	20.0
Drop out	0	0.0	4	6.7

Relation between transvaginal U.S endometrial thickness with grade and FIGO stage:

Tranvaginal U.S endometrial thickness ranged between 3.0 and 20.0 mm with a mean of 12.57 ± .13 mm. (Table XXI)

The range of endometrial thickness in grade I tumors was between 3.0 and 10.0 mm with a mean of 5.67 ± 3.23 mm, while in grade II tumors the range was between 4.0 and 20.0 mm with a mean of 15.95 ± 3.09 mm and in grade III tumors the range of endometrial thickness was between 6.0 and 20.0 mm with a mean of 13.11 ± 4.07 mm .The relation between increased endometrial thickness by Transvaginal US and higher tumor grade was strongly statistically different (P<0.001). (Table XXII)

The range of endometrial thickness in stage I tumors was between 3.0 and 17.0 mm with a mean of 11.0 ± 4.88 mm, while in stage II tumors the range was between 6.0 and 19.0 mm with a mean of 12.25 ± 6.24 mm and in stage III tumors the range of endometrial thickness was between 4.0 –and 20.0 mm with a mean of 15.45 ± 4.27 mm. The relation between increased endometrial thickness by Transvaginal US and higher tumor grade was statistically significant (P=0.007). (Table XXII)

Table (XXI): Tranvaginal U.S endometrial thickness

No	%
Transvaginal us endometrial thickness	
Min. – Max.	3.0 – 20.0
Mean ± SD.	12.57 ± .13
Median	13.0

Table (XXII): Relation between transvaginal U.S endometrial thickness with grade and FIGO stage

	N	Transvaginal us endometrial thickness			$^{KW}\chi^2$	p
		Min. – Max	Mean ± SD.	Median		
Grade						
I	**12**	3.0 – 10.0	5.67 ± 3.23	4.0		
II	**20**	4.0 – 20.0	15.95 ± 3.09	16.0	27.691*	<0.001*
III	**28**	6.0 – 20.0	13.11 ± 4.07	13.0		
r_s(p)		0.260* (0.045*)				
FIGO stage						
I	**36**	3.0 – 17.0	11.0 ± 4.88	11.0		
II	**4**	6.0 – 19.0	12.25 ± 6.24	12.0	9.844*	0.007*
III	**20**	4.0 – 20.0	15.45 ± 4.27	15.50		
r_s(p)		0.401* (0.001*)				

$^{KW}\chi^2$: Chi square for Kruskal Wallis test
r_s: Spearman coefficient
*: Statistically significant at $p \leq 0.05$

Peritumoral lymphatic microvessel density (LMVD) in relation to other prognostic factors

Low peritumoral LMVD was associated with ***poorer*** prognostic factors.

- **Peritumoral LMVD in relation to age:**

The association between decreased peritumoral LMVD and patients' age was statistically insignificant (P = 1.000). (Table XXIII, Figure 20)

Table (XXIII): Relation between peritumoral LMVD with age

	Peritumoral LMVD				χ^2	^{FE}p
	Decrease (n = 28)		Increase (n = 32)			
	No.	%	No.	%		
Age						
<50	4	14.3	4	12.5	0.041	1.000
≥50	24	85.7	28	87.5		

χ^2: Value for chi square
FE: Fisher Exact test

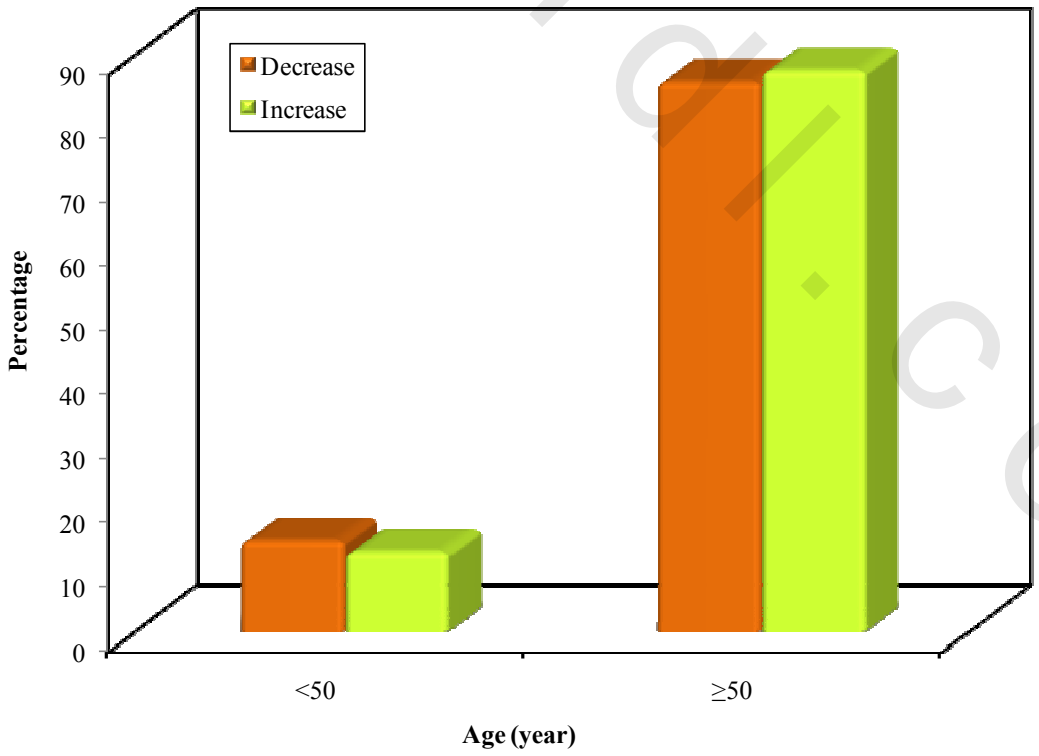

Figure (20): Relation between peritumoral LMVD with age

- **Relation between peritumoral LMVD and cytology of peritoneal fluid aspirate:**

The association between decreased peritumoral LMVD and positivity of peritoneal fluid aspirate for malignant cells was statistically significant (P= 0.001). (Table XXIV, Figure 21)

Table (XXIV): Relation between peritumoral LMVD and cytology of peritoneal fluid aspirate

	Peritumoral LMVD				Test of sig.	p
	Decrease (n = 28)		Increase (n = 32)			
	No.	%	No.	%		
cytology of peritoneal fluid aspirate:						
Negative	20	71.4	32	100.0	χ^2 = 10.549*	$^{FE}p = 0.001^*$
Positive	8	28.6	0	0.0		

χ^2: Value for chi square
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

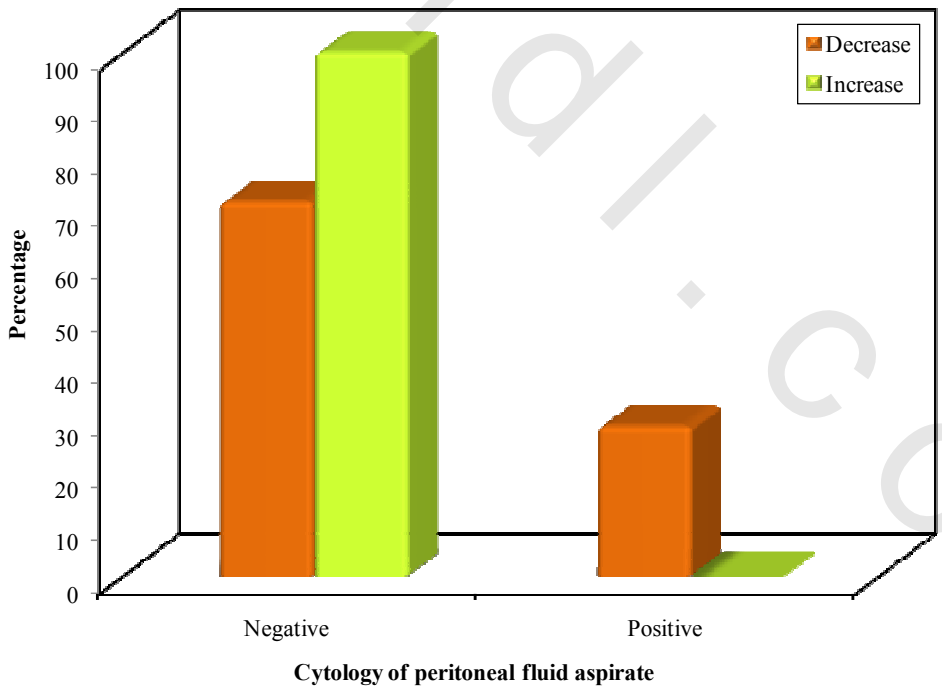

Figure (21): Relation between peritumoral LMVD and cytology of peritoneal fluid aspirate

- **Relation between peritumoral LMVD with histopathological parameters :**

Relation between peritumoral LMVD and tumor histotype:

The association between decreased peritumoral LMVD and non endometroid type tumors was strongly statistically significant (P = 0.008). (Table XXV, Figure 22)

Relation between peritumoral LMVD and tumor grade:

The relation between decreased peritumoral LMVD and higher tumor grade was strongly statistically significant (P < 0.001). (Table XXV, Figure 23)

Relation between peritumoral LMVD and myometrial invasion:

The relation between decreased peritumoral LMVD and deeper myometrial invasion was strongly statistically significant (P<0.001). (Table XXV, Figure 24)

Relation between peritumoral LMVD and adnexal infiltration:

The relation between decreased peritumoral LMVD and adnexal infiltration was strongly statistically significant (P=0.001). (Table XXV, Figure 25)

Relation between peritumoral LMVD and lymphovascular space invasion:

Interestingly, the relation between decreased peritumoral LMVD and lymphovascular space invasion detected histopathologically was statistically insignificant (P = 0.673). (Table XXV, Figure 26)

Relation between peritumoral LMVD and lymph node status:

The relation between decreased peritumoral LMVD and lymph node positivity did not reach statistical significance (P=0.121). (Table XXV, Figure 26)

Relation between peritumoral LMVD and tumor stage:

The relation between decreased peritumoral LMVD and higher tumor stage was statistically significant (P = 0.014). (Table XXV, Figure 27)

Table (XXV): Relation between peritumoral LMVD with histopathological parameters

	Peritumoral LMVD				Test of sig.	p
	Decrease (n = 28)		Increase (n = 32)			
	No.	%	No.	%		
Tumor histotype						
Endometroid	16	57.1	28	87.5	$\chi^2 = 7.037^*$	0.008^*
Non endometroid	12	42.9	4	12.5		
Grade						
I	0	0.0	12	37.5		
II	8	28.6	12	37.5	$\chi^2 = 17.775^*$	$<0.001^*$
III	20	71.4	8	25.0		
Myometrial Invasion						
< 1/2	0	0.0	20	62.5	$\chi^2 = 26.250^*$	$<0.001^*$
≥1/2	28	100.0	12	37.5		
Pathological adnexal examination						
Negative	20	71.4	32	100.0	$\chi^2 = 10.549^*$	$^{FE}p = 0.001^*$
Positive	8	28.6	0	0.0		
Lymphovascular space invasion						
Negative	16	57.1	20	62.5	$\chi^2 = 0.179$	0.673
Positive	12	42.9	12	37.5		
Lymph nodes by pathological examination						
Negative	20	71.4	28	87.5	$\chi^2 = 2.411$	0.121
Positive	8	28.6	4	12.5		
FIGO stage						
I	12	42.9	24	75.0		
II	4	14.0	0	0.0	$\chi^2 = 8.571^*$	$^{MC}p = 0.014^*$
III	12	42.9	8	25.0		

χ^2: Value for chi square
MC: Monte Carlo test
Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

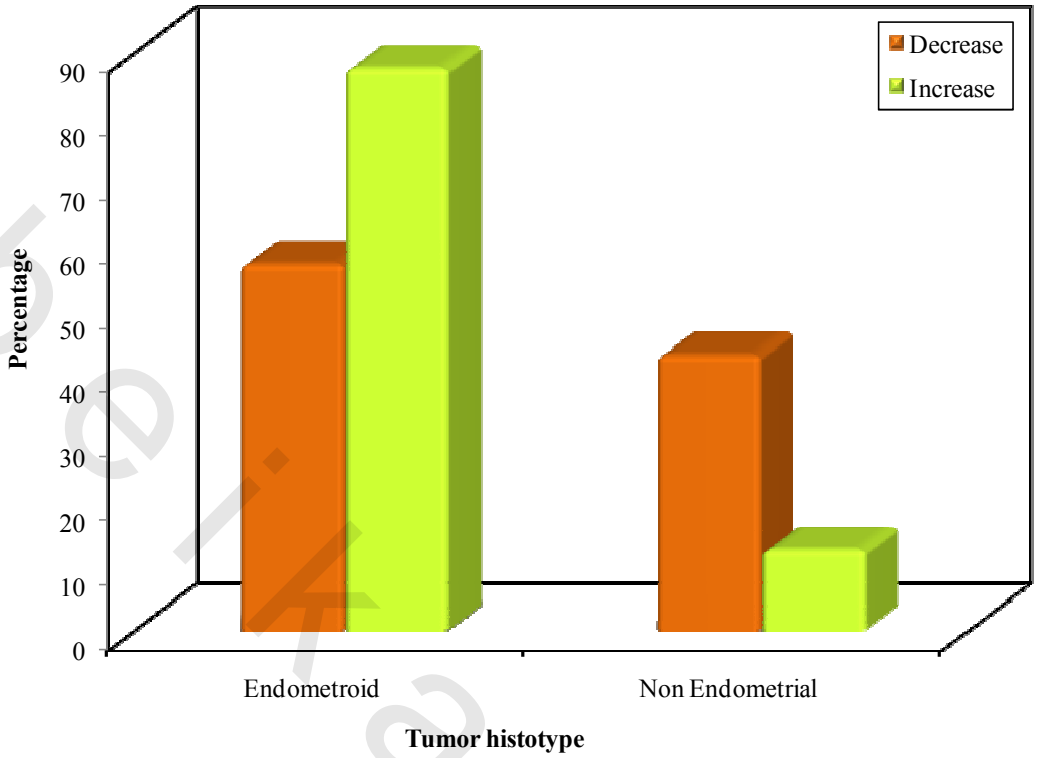

Figure (22): Relation between peritumoral LMVD with Tumor histotype

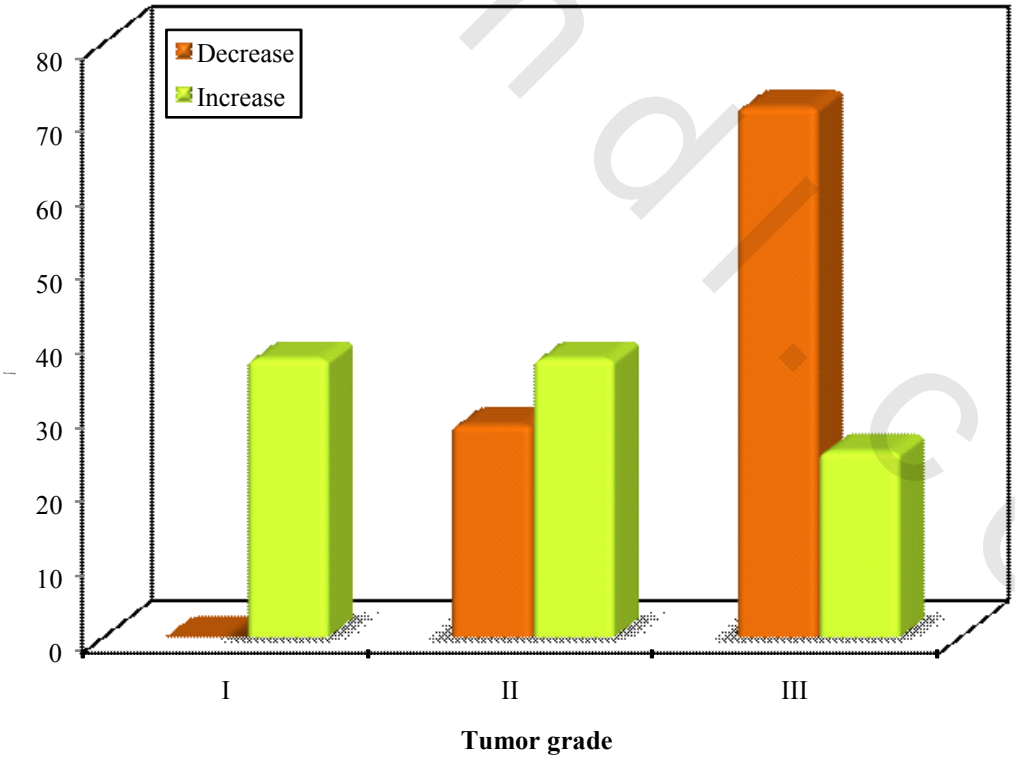

Figure (23): Relation between peritumoral LMVD with tumor grade

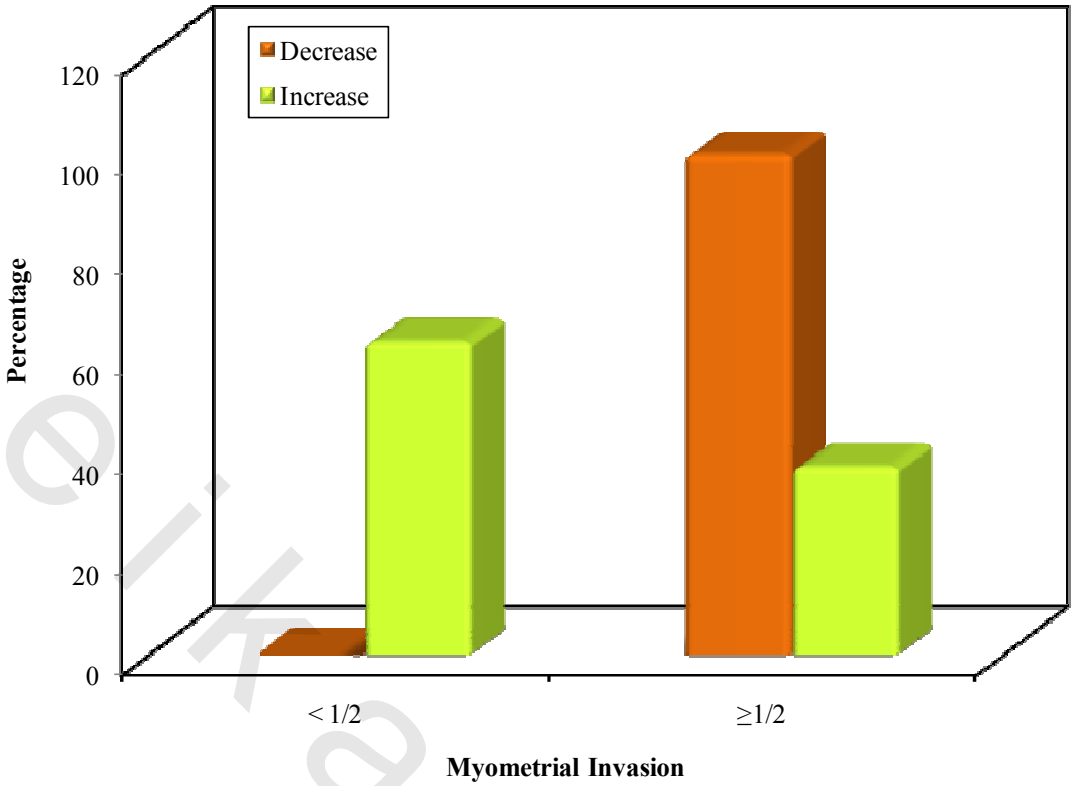

Figure (24): Relation between peritumoral LMVD with myometrial invasion

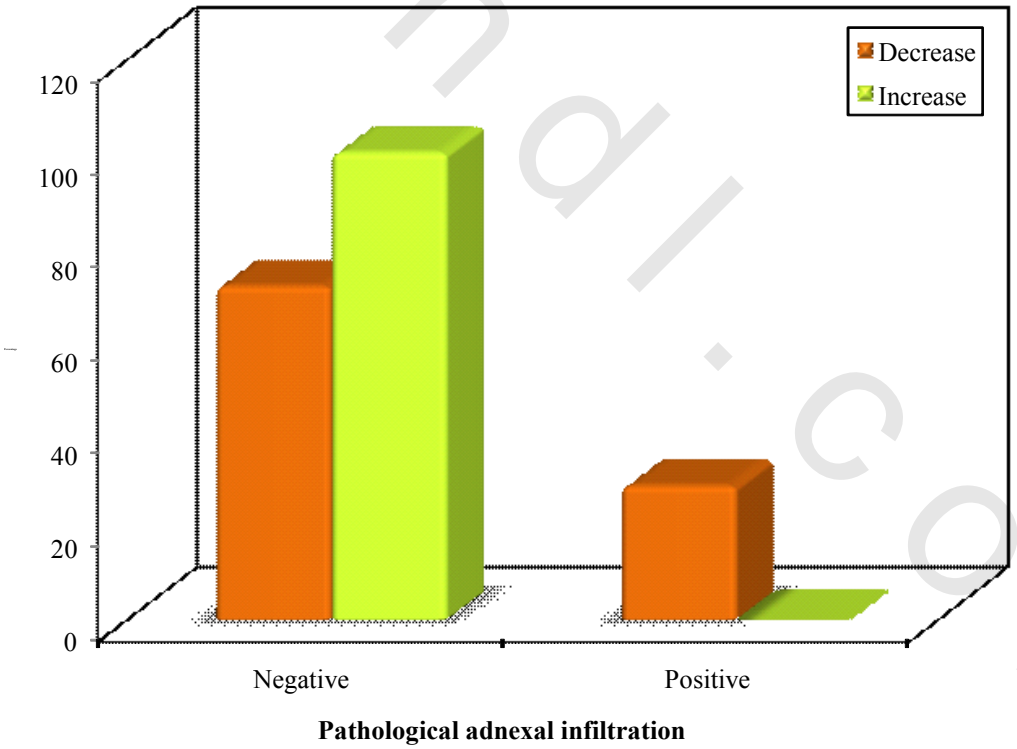

Figure (25): Relation between peritumoral LMVD with Pathological adnexal infiltration

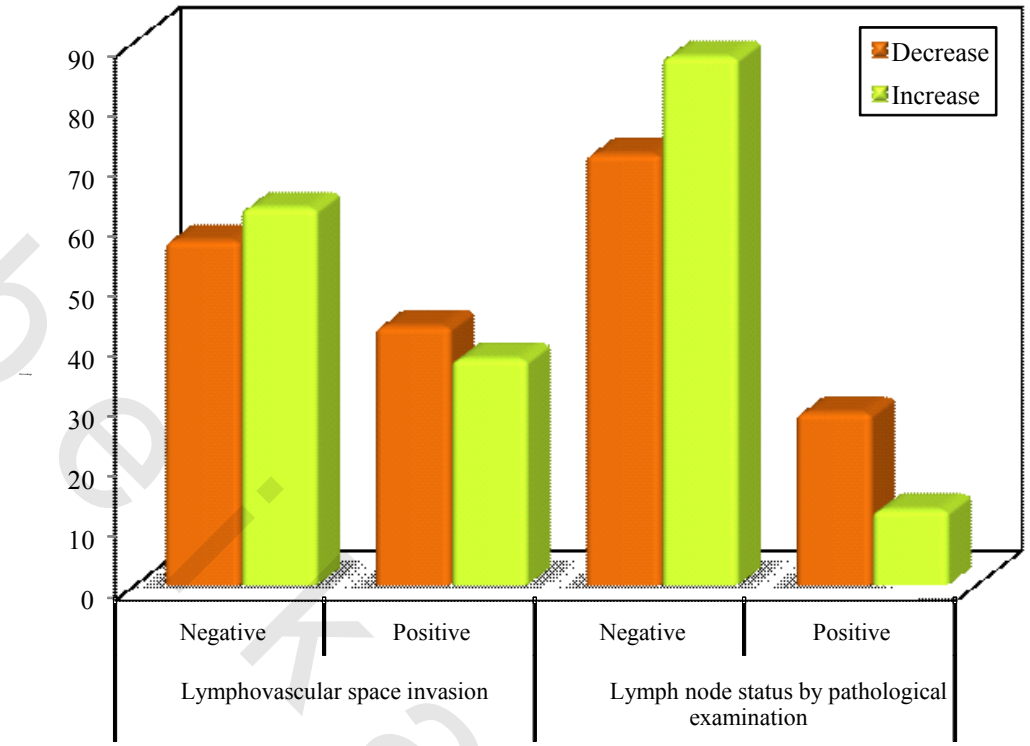

Figure (26): Relation between peritumoral LMVD with Lymphovascular space invasion and Lymph nodes status by pathological examination

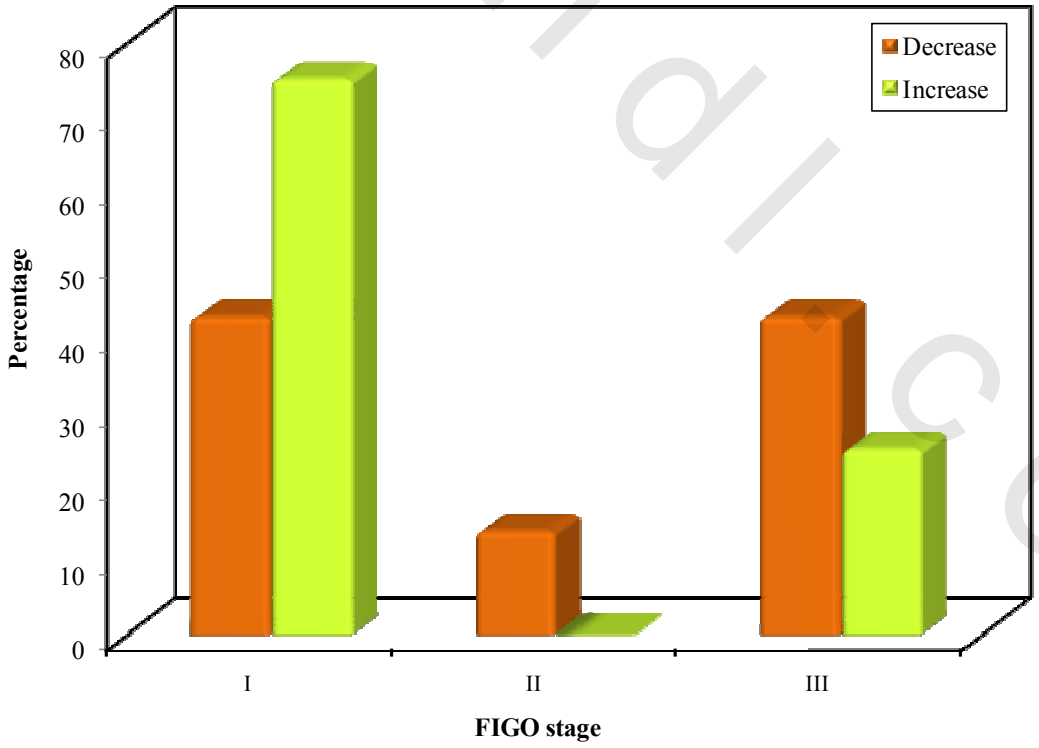

Figure (27): Relation between peritumoral LMVD with FIGO stage

- **Relation between peritumoral LMVD with the eligibility for postoperative adjuvant radiotherapy:**

The relation between decreased peritumoral LMVD and the eligibility for postoperative adjuvant radiotherapy was strongly statistically significant (P < 0.001). (Table XXVI, Figure 28)

Table (XXVI): Relation between peritumoral LMVD with the eligibility postoperative adjuvant radiotherapy

	Peritumoral LMVD				χ^2	p
	Decrease (n = 28)		Increase (n = 32)			
	No.	%	No.	%		
Radiotherapy						
No	0	0.0	16	50.0	19.091*	<0.001*
Yes	28	100.0	16	50.0		

χ^2: Chi square test
*: Statistically significant at $p \leq 0.05$

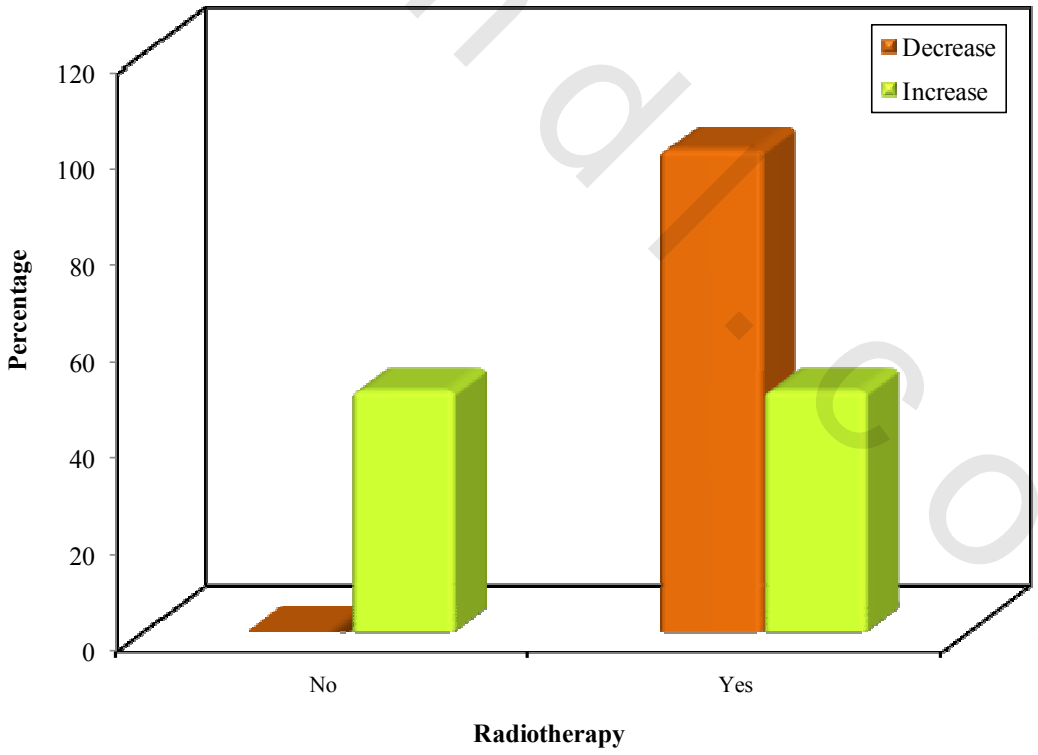

Figure (28): Relation between peritumoral LMVD with the eligibility postoperative adjuvant radiotherapy

- **Relation between peritumoral LMVD with vaginal vault recurrence:**

a) Vaginal vault recurrence after 3 months :

No cases recurred after 3 months. (Table XXVII, Figure 29)

b) Vaginal vault recurrence after 6 months:

The relation between decreased peritumoral LMVD and presence of vaginal vault recurrence after 6 months was statistically significant (P = 0.042). (Table XXVII, Figure 29)

c) Vaginal vault recurrence after 12 months:

Of 28 patients with decreased peritumoral LMVD; 8 patients had vaginal vault recurrence after 12 months postoperatively (28.6%), 16 had no vaginal vault recurrence (57.1%) and 4 case did not come to follow up visits (14.3%). While, of 32 patients with increased LMVD; only 4 (12.5%) had such recurrence.

The relation between decreased peritumoral LMVD and presence of vaginal vault recurrence after 12 months postoperatively was statistically significant (P = 0.012). (Table XXVII, Figure 29)

Table (XXVII): Relation between peritumoral LMVD with vaginal vault recurrence

Vaginal vault recurrence	Peritumoral LMVD				χ^2	p
	Decrease (n = 28)		Increase (n = 32)			
	No.	%	No.	%		
After 3 months						
Negative	28	100.0	32	100.0	-	-
Positive	0	0.0	0	0.0		
After 6 months						
Negative	24	85.7	32	100.0	4.898*	$^{FE}p = 0.042^*$
Positive	4	14.3	0	0.0		
After 12 months						
Negative	16	57.1	28	87.5		
Positive	8	28.6	4	12.5	8.377*	$^{MC}p = 0.012^*$
Drop out	4	14.3	0	0.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

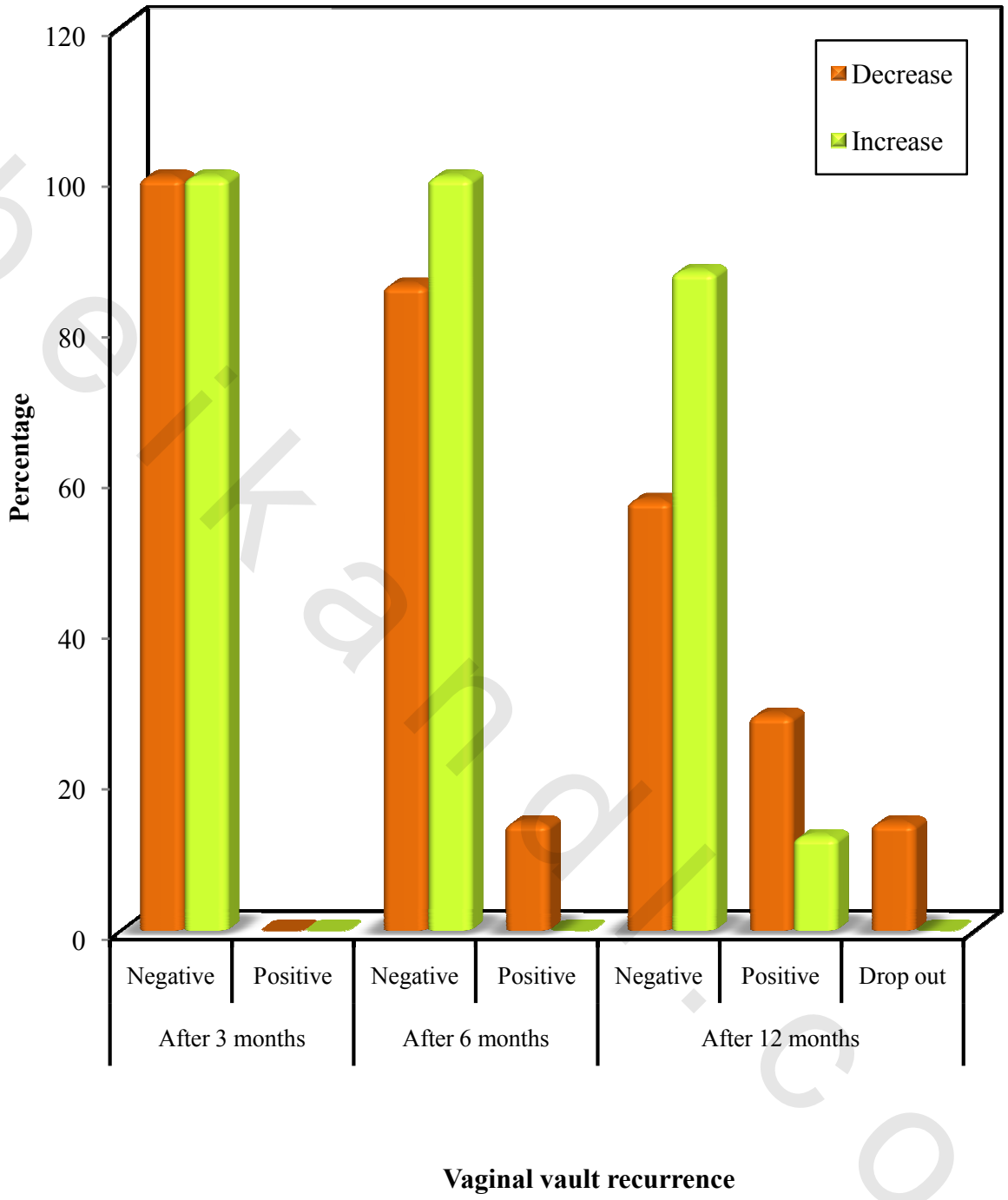

Figure (29): Relation between peritumoral LMVD with vaginal vault recurrence

Relation between peritumoral LMVD with pelvic recurrence:

a) Pelvic recurrence after 3 months and 6 months :

No patients had pelvic recurrence after 3 or 6 months postoperatively. (Table XXIII, Figure 30)

b) Pelvic recurrence after 12 months:

All the fifty six cases who came to follow up visits after 12 months postoperatively did not record pelvic recurrence (the remaining 4 cases declined that visit and were dropped out).

Twenty four of the twenty eight patients with decreased peritumoral LMVD came to follow up visits after 12 months and did not record pelvic recurrence (the other 4 cases were dropped out). Similarly all patients with increased peritumoral LMVD recorded no pelvic recurrence after 12 months postoperatively. (Table XXVIII, Figure 30)

Table (XXVIII): Relation between peritumoral LMVD with pelvic recurrence

Pelvic recurrence	Peritumoral LMVD				χ^2	^{FE}p
	Decrease (n = 28)		Increase (n = 32)			
	No.	%	No.	%		
After 3 months						
Negative	28	100.0	32	100.0	-	-
Positive	0	0.0	0	0.0		
After 6 months						
Negative	28	100.0	32	100.0	-	-
Positive	0	0.0	0	0.0		
After 12 months**						
Negative	24	100.0	32	100.0	-	-
Positive	0	0.0	0	0.0		

χ^2: Value for chi square
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$
** Four patients with decreased LMVD were dropped out as they did not come for follow up visit after 12 months

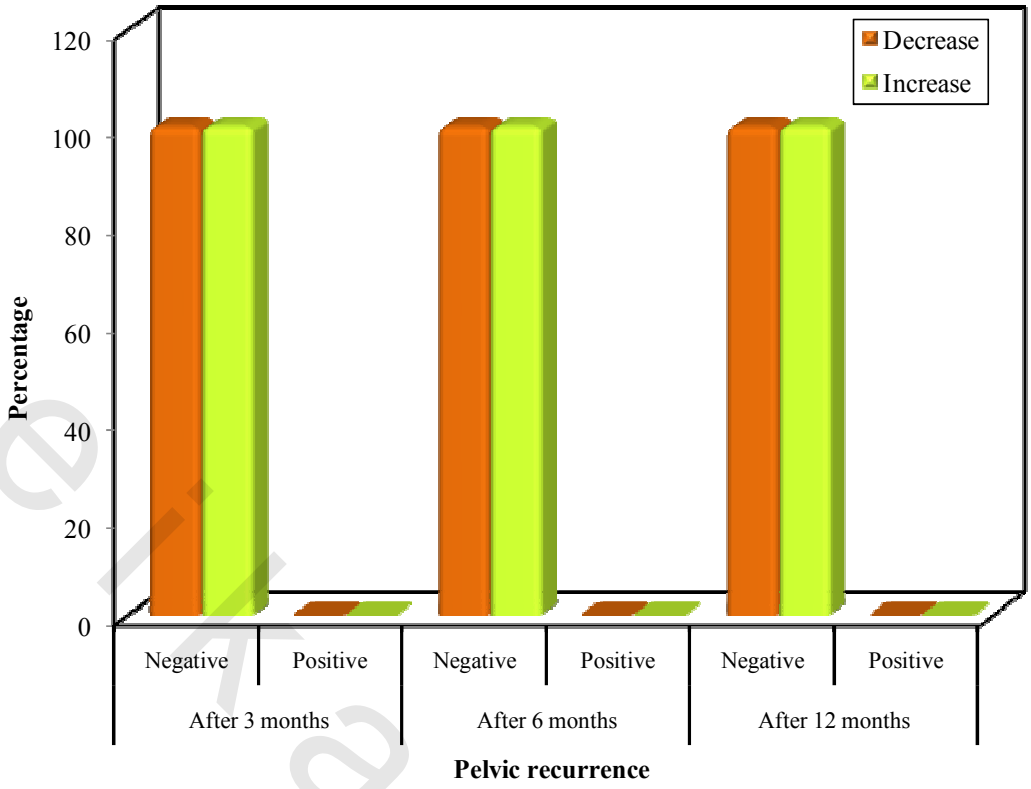

Figure (30): Relation between peritumoral LMVD with pelvic recurrence

- **Relation between peritumoral LMVD with postoperative CT recurrence:**

a) Six months CT recurrence:

The relation between decreased peritumoral LMVD and presence of CT recurrence was statistically significant (P = 0.042). (Table XXIX, Figure 31)

b) After 12 months CT recurrence :

Of 28 patients with decreased peritumoral LMVD; 16 had no recurrence by CT (57.1%), 8 patients had recurrence (28.6%) and 4 patients did not come to follow up visits (were dropped out) (14.3%).

Of 32 patients with increased peritumoral LMVD; 28 patients had no recurrence by CT (87.5%) and 4 patients had recurrence (12.5%).

The relation between decreased peritumoral LMVD and presence of CT recurrence after 12 months postoperatively was statistically significant (P = 0.013). (Table XXIX, Figure 31)

Table (XXIX): Relation between peritumoral LMVD with CT recurrence

CT recurrence	Peritumoral LMVD				χ^2	p
	Decrease (n = 28)		Increase (n = 32)			
	No.	%	No.	%		
After 6 months						
Negative	24	85.7	32	100.0	4.898*	$^{FE}p = 0.042^*$
Positive	4	14.3	0	0.0		
After 12 months						
Negative	16	57.1	28	87.5		
Positive	8	28.6	4	12.5	7.985*	$^{MC}p = 0.013^*$
Drop out	4	14.3	0	0.0		

χ^2: Value for chi square
MC: Monte Carlo test
*: Statistically significant at $p \leq 0.05$

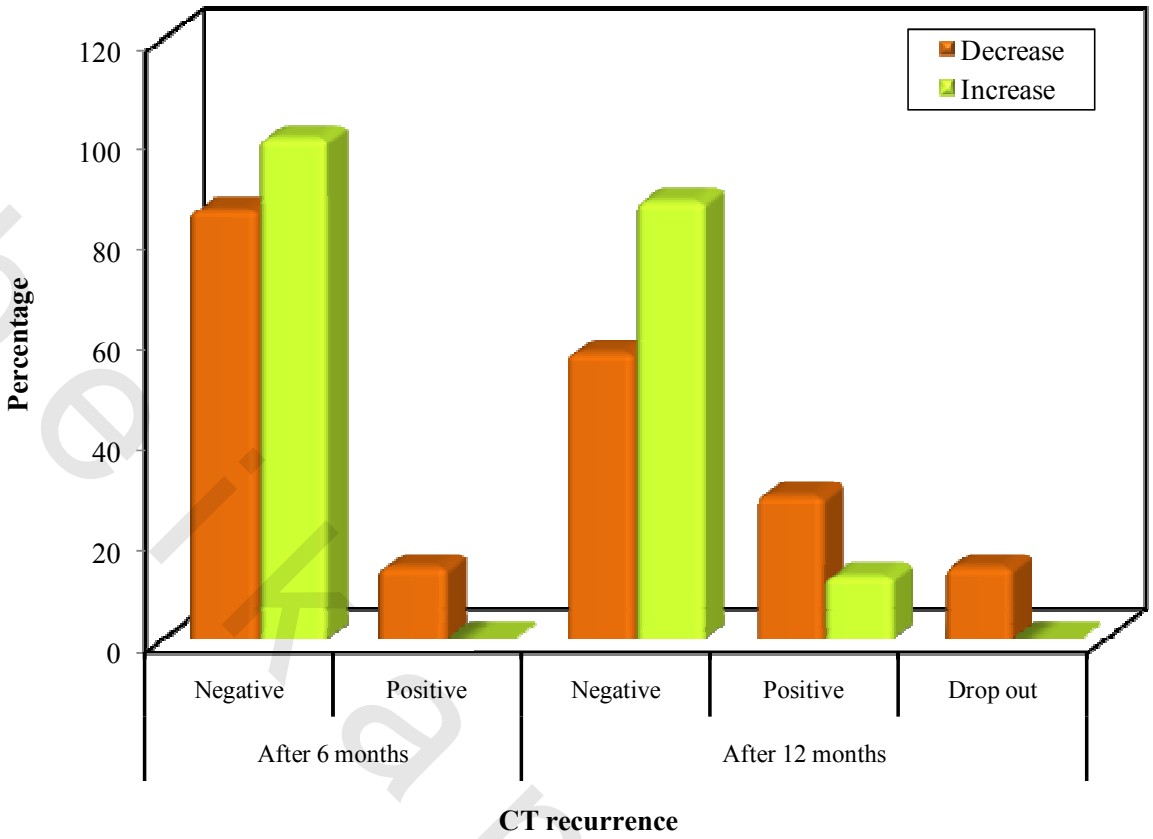

Figure (31): Relation between peritumoral LMVD with CT recurrence

Intratumoral lymphatic microvessel density (intratumoral LMVD) in relation to other prognostic factors

Low intratumoral LMVD was associated with ***poorer*** prognostic factors.

- **Intratumoral LMVD in relation to age:**

The association between decreased LMVD and patients' age was statistically insignificant (P = 0.422). (Table XXX, Figure 32)

Table (XXX): Relation between intratumoral LMVD with age

	Intratumoral LMVD				χ^2	^{FE}p
	<1 Low (n=20)		≥1 High (n=40)			
	No.	%	No.	%		
Age						
<50	4	20.0	4	10.0	1.154	0.422
≥50	16	80.0	36	90.0		

χ^2: Value for chi square
FE: Fisher Exact test

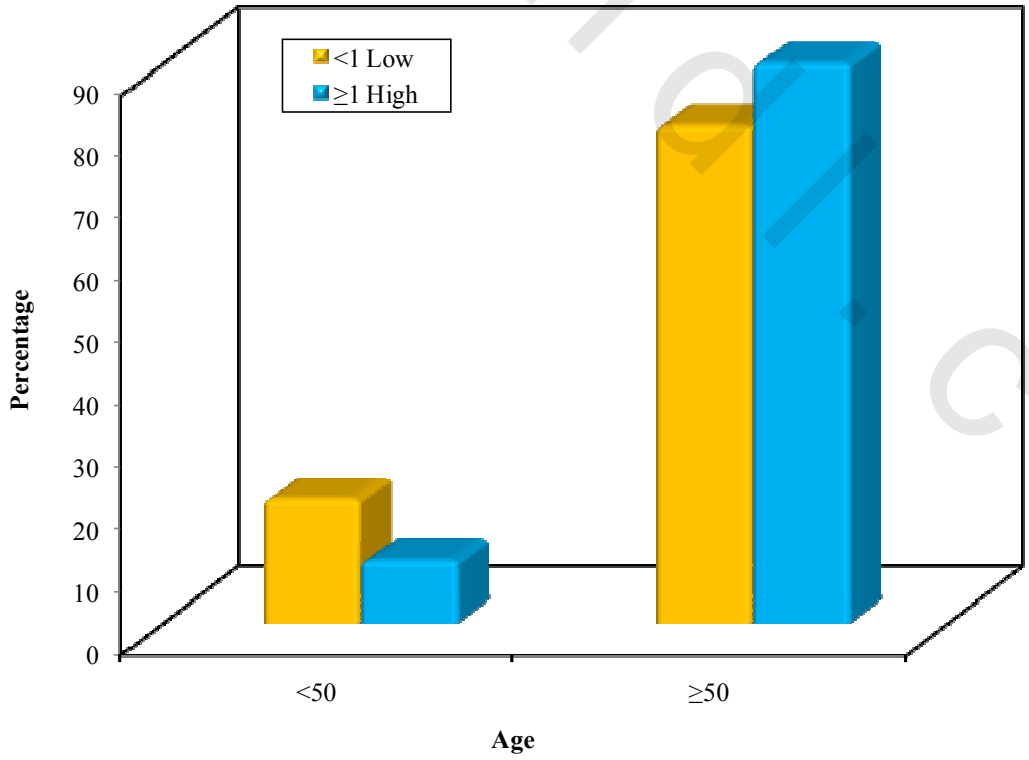

Figure (32): Relation between intratumoral LMVD with age

- **Relation between intratumoral LMVD and cytology of peritoneal fluid aspirate:**

The association between decreased intratumoral LMVD and positivity of peritoneal fluid aspirate for malignant cells was statistically significant (P< 0.001). (Table XXXI, Figure 33)

Table (XXXI): Relation between intratumoral LMVD with Peritoneal cytology

	Intratumoral LMVD				Test of sig.	p
	<1 Low (n=20)		≥1 High (n=40)			
	No.	%	No.	%		
Peritoneal cytology						
Negative	12	60.0	40	100.0	χ^2=18.462*	FEp<0.001*
Positive	8	40.0	0	0.0		

χ^2: Value for chi square
FE: Fisher Exact test
Z: Z for Mann Whitney test

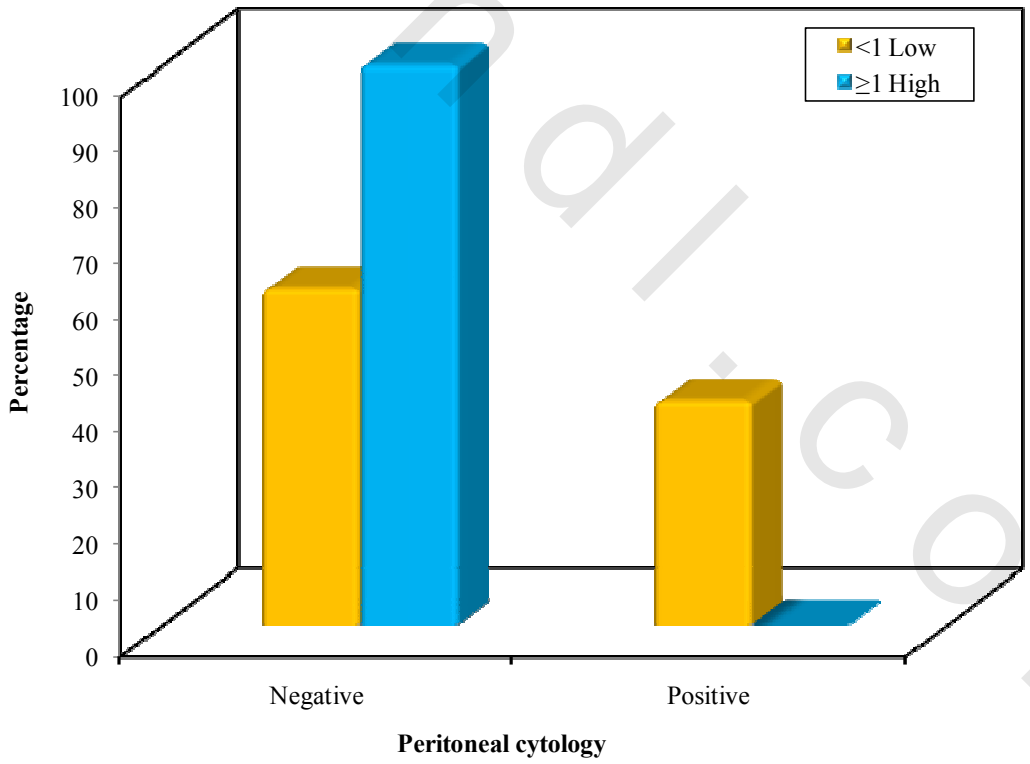

Figure (33): Relation between intratumoral LMVD with Peritoneal cytology

- **Relation between intratumoral LMVD with histopathological parameters :**

Relation between intratumoral LMVD and tumor histotype:

The association between decreased intratumoral LMVD and non endometroid type tumors was strongly statistically significant (P < 0.001). (Table XXXII, Figure 34)

Relation between intratumoral LMVD and tumor grade:

The relation between decreased intratumoral LMVD and higher tumor grade was strongly statistically significant (P =0.023). (Table XXXII, Figure 35)

Relation between intratumoral LMVD and myometrial invasion:

The relation between decreased intratumoral LMVD and deeper myometrial invasion was strongly statistically significant (P<0.001). (Table XXXII, Figure 36)

Relation between intratumoral LMVD and adnexal infiltration:

The relation between decreased intratumoral LMVD and adnexal infiltration was strongly statistically significant (P<0.001). (Table XXXII, figure 37)

Relation between intratumoral LMVD and lymphovascular space invasion:

Interestingly, the relation between decreased intratumoral LMVD and lymphovascular space invasion detected histopathologically was statistically insignificant (P = 1.000). (Table XXXII, Figure 38)

Relation between intratumoral LMVD and lymph node status:

The relation between decreased intratumoral LMVD and lymph node positivity was statistically significant (P=0.014). (Table XXXII, Figure 38)

Relation between intratumoral LMVD and tumor stage:

The relation between decreased intratumoral LMVD and higher tumor stage was statistically significant (P = 0.006). (Table XXXII, Figure 39)

Table (XXXII): Relation between intratumoral LMVD with histopathological parameters

	Intratumoral LMVD				Test of sig.	p
	<1 Low (n=20)		≥1 High (n=40)			
	No.	%	No.	%		
Tumor histotype						
Endometroid	8	40.0	36	90.0	χ^2= 17.045*	<0.001*
Non endometroid	12	60.0	4	10.0		
Myometrial invasion						
< 1/2	0	0.0	20	50.0	χ^2= 15.000*	<0.001*
≥1/2	20	100.0	20	50.0		
Pathological adnexal examination						
Negative	12	60.0	40	100.0	χ^2= 18.462*	^{FE}p<0.001*
Positive	8	40.0	0	0.0		
Grade						
I	0	0.0	12	30.0		
II	8	40.0	12	30.0	χ^2= 7.5431*	0.023*
III	12	60.0	16	40.0		
Lympho vascular space invasion						
Negative	12	60.0	24	60.0	χ^2= 0.0	1.000
Positive	8	40.0	16	40.0		
Lymph nodes by pathological examination						
Negative	12	60.0	36	90.0	χ^2= 7.500*	^{FE}p=0.014*
Positive	8	40.0	4	10.0		
FIGO stage						
I	8	40.0	28	70.0		
II	0	0.0	4	10.0	χ^2= 9.467*	^{MC}p= 0.006*
III	12	60.0	8	20.0		

χ^2: Value for chi square
MC: Monte Carlo test
Z: Z for Mann Whitney test
*: Statistically significant at p ≤ 0.05

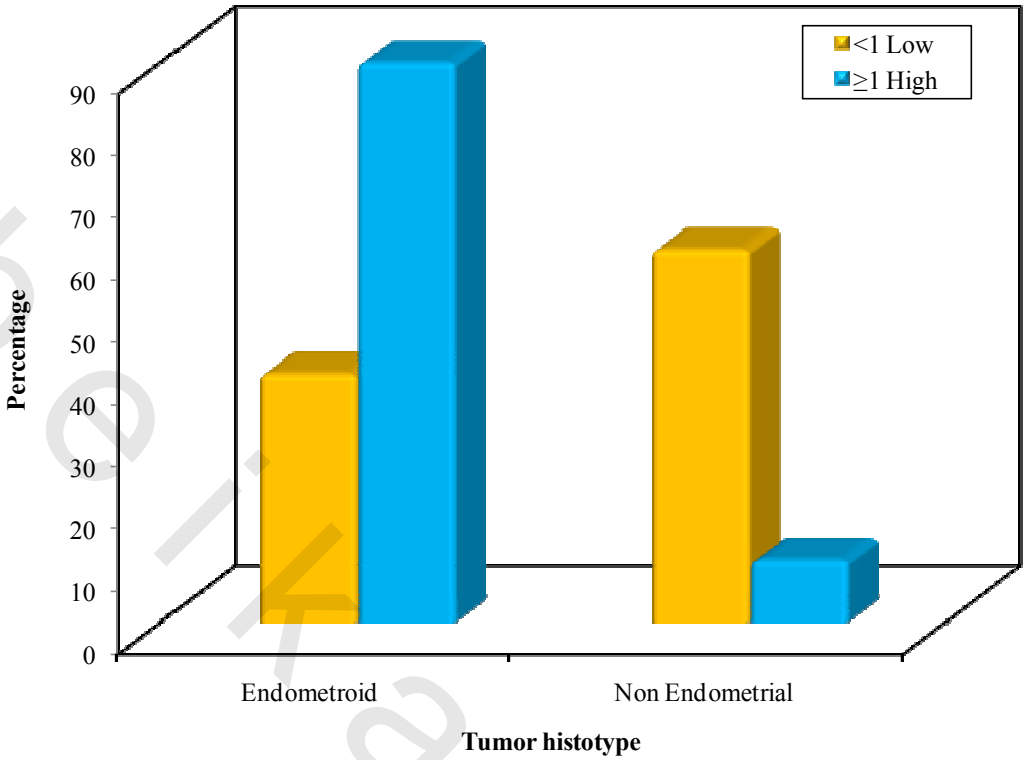

Figure (34): Relation between intratumoral LMVD with Tumor histotype

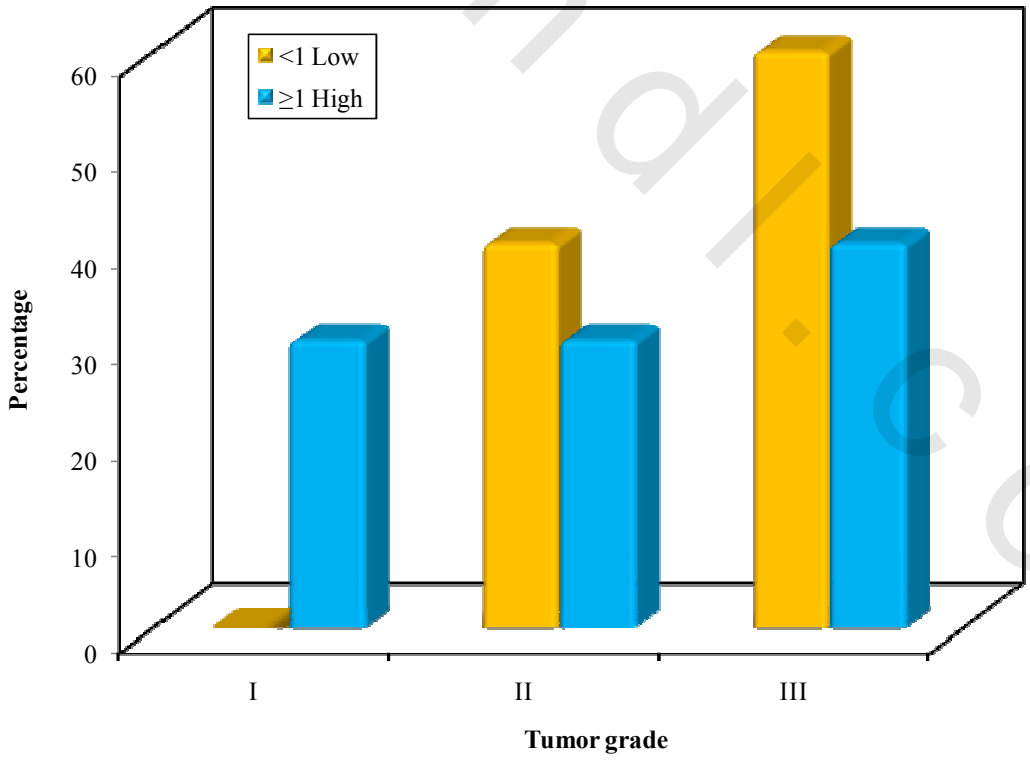

Figure (35): Relation between intratumoral LMVD with tumor grade

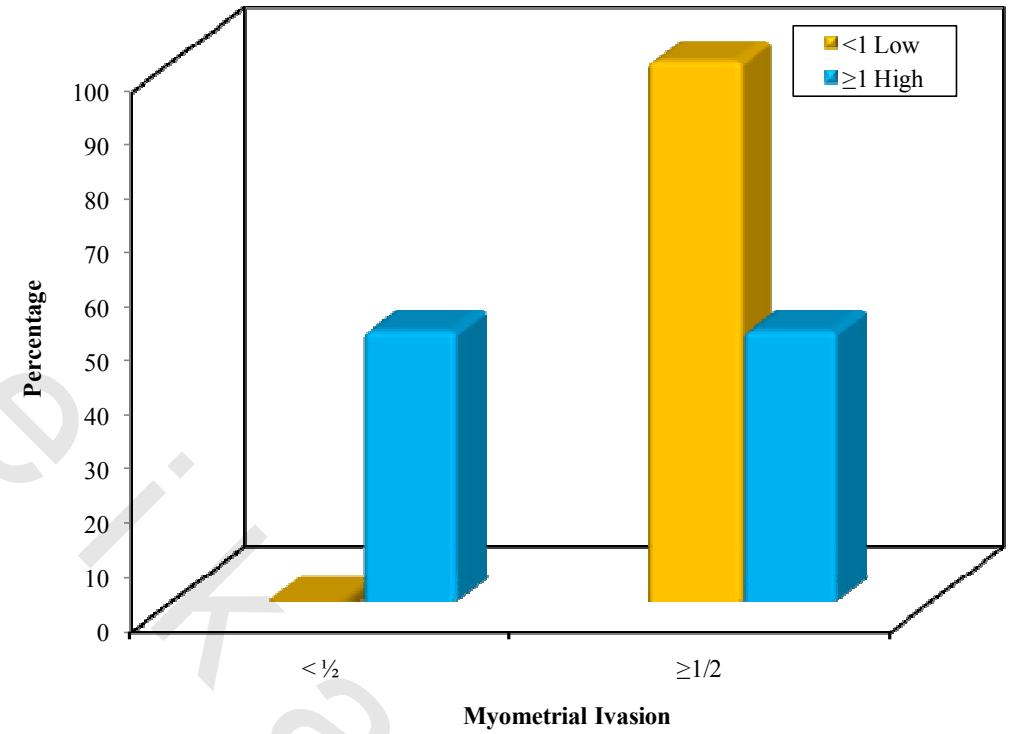

Figure (36): Relation between intratumoral LMVD with Myometrial invasion

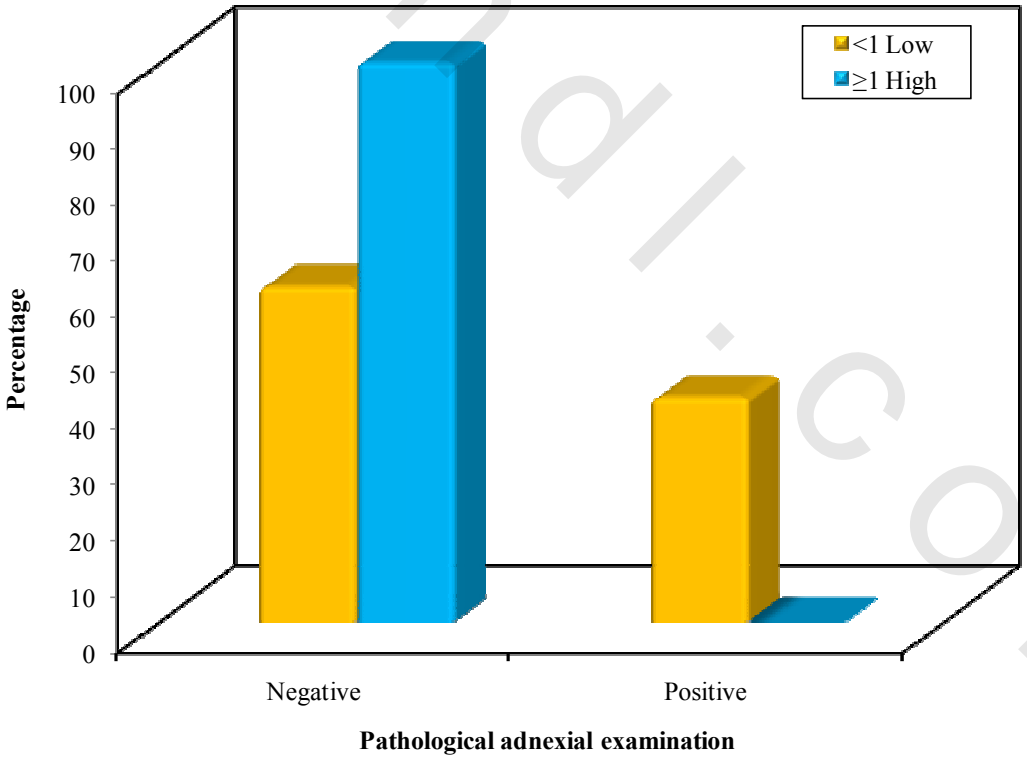

Figure (37): Relation between intratumoral LMVD with Pathological adnexal infiltration

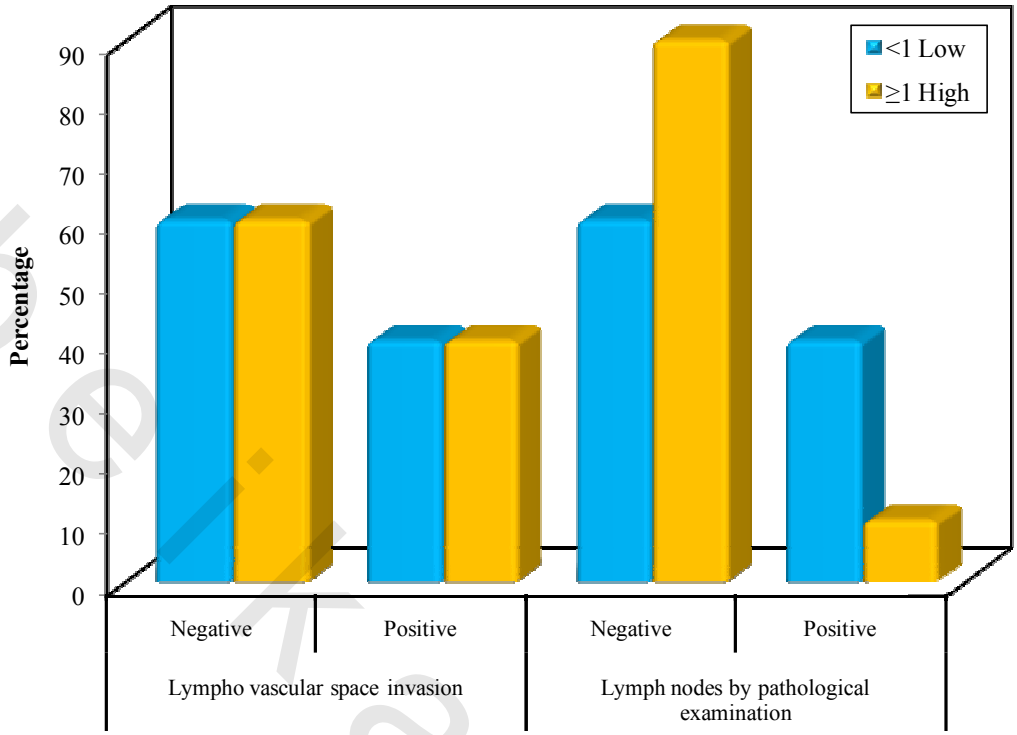

Figure (38): Relation between intratumoral LMVD with Lympho vascular space invasion and Lymph node status by pathological examination

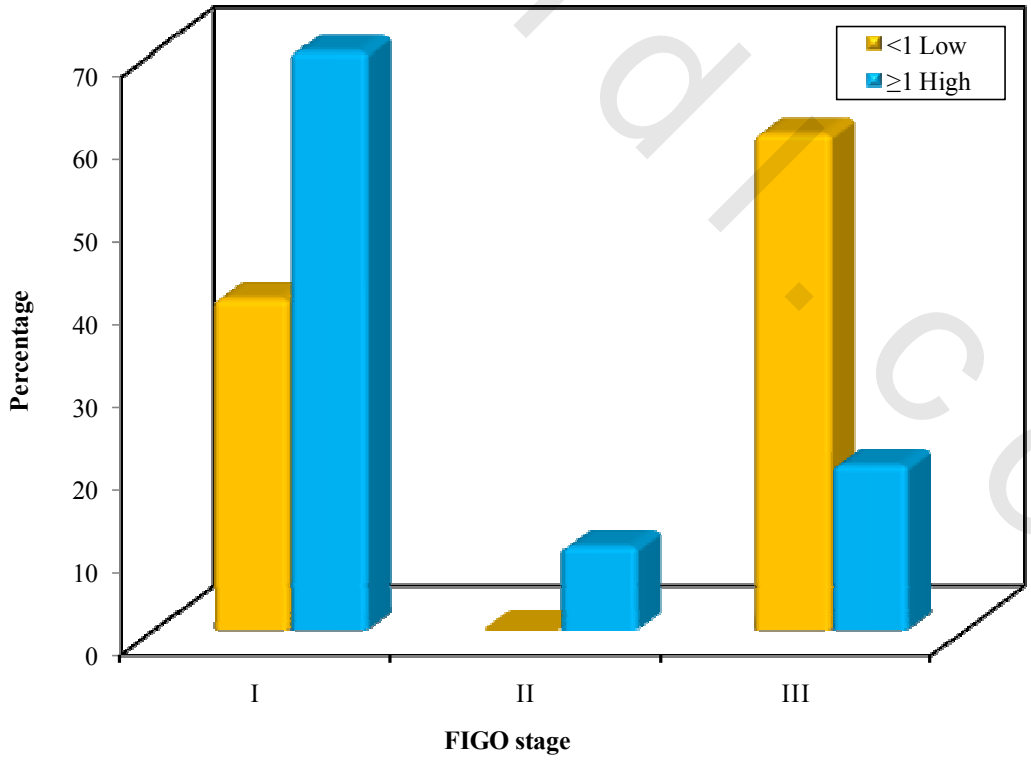

Figure (39): Relation between intratumoral LMVD with FIGO stage

Relation between intratumoral LMVD with the eligibility for postoperative adjuvant radiotherapy:

The relation between decreased intratumoral LMVD and the eligibility for postoperative adjuvant radiotherapy was strongly statistically significant (P = 0.001). (Table XXXIII, Figure 40)

Table (XXXIII): Relation between Intratumoral LMVD with eligibility for postoperative radiotherapy

	Intratumoral LMVD				χ^2	p
	<1 Low (n=20)		≥1 High (n=40)			
	No.	%	No.	%		
Radiotherapy						
No	0	0.0	16	40.0	10.909*	0.001*
Yes	20	100.0	24	60.0		

χ^2: Chi square test

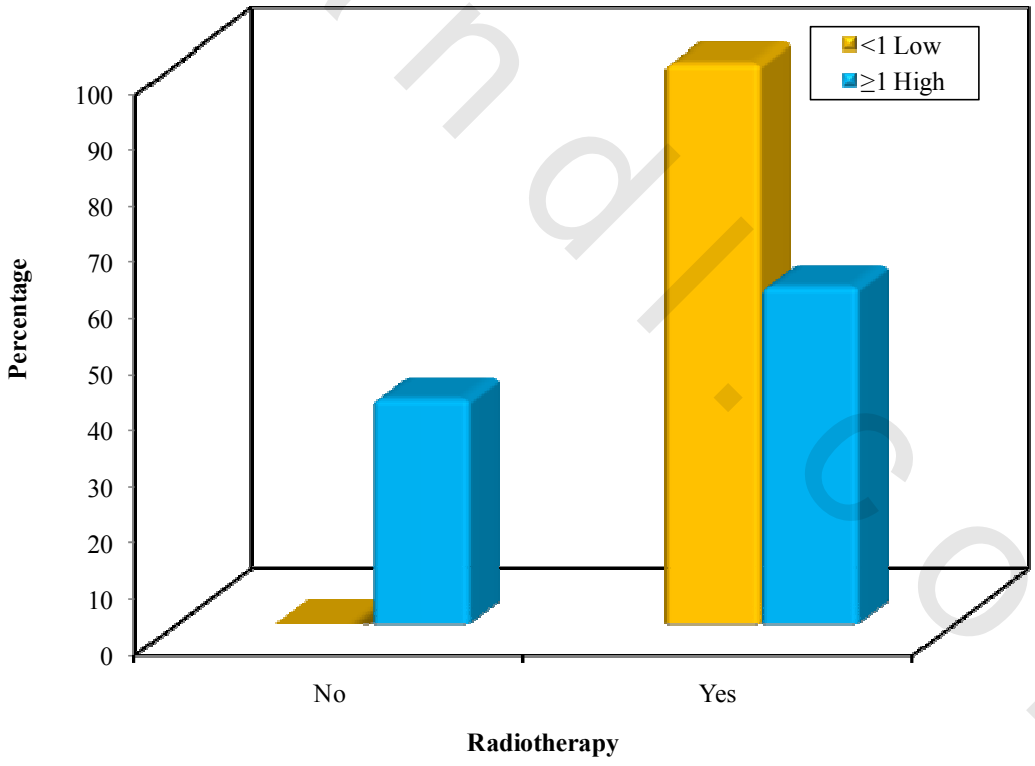

Figure (40): Relation between Intratumoral LMVD with eligibility for postoperative radiotherapy

- **Relation between intratumoral LMVD with vaginal vault recurrence:**

a) Vaginal vault recurrence after 3 months :

No cases recurred after 3 months. (Table XXXIV, Figure 41)

b) Vaginal vault recurrence after 6 months:

The relation between decreased intratumoral LMVD and presence of vaginal vault recurrence after 6 months was statistically significant (P = 0.010). (Table XXXIV, Figure 41)

c) **Vaginal vault recurrence after 12 months:**

Of 20 patients with decreased intratumoral LMVD; 8 patients had vaginal vault recurrence after 12 months postoperatively (40%), 8 cases did not record such recurrence (40%) and 4 cases were dropped out as they did not come for follow up visits (20%).

While, of 40 patients with increased intratumoral LMVD; only 4 cases (10%) had such recurrence.

The relation between decreased intratumoral LMVD and presence of vaginal vault recurrence after 12 months postoperatively was statistically significant (P = 0.002). (Table XXXIV, Figure 41)

Table (XXXIV): Relation between Intratumoral LMVD with vaginal vault recurrence

Vaginal vault recurrence	Intratumoral LMVD				χ^2	p
	<1 Low (n=20)		≥1 High (n=40)			
	No.	%	No.	%		
After 3 months						
Negative	20	100.0	40	100.0	-	-
Positive	0	0.0	0	0.0		
After 6 months						
Negative	16	80.0	40	100.0	8.571*	$^{FE}p= 0.010^*$
Positive	4	20.0	0	0.0		
After 12 months**						
Negative	8	40.0	36	90.0	10.861*	$^{MC}p=0.002^*$
Positive	8	40.0	4	10.0		

χ^2: Chi square test
MC: Monte Carlo test
FE: Fisher Exact test
** Four patients with decreased intratumoral LMVD were dropped out as they did not come for follow up visit after 12 months

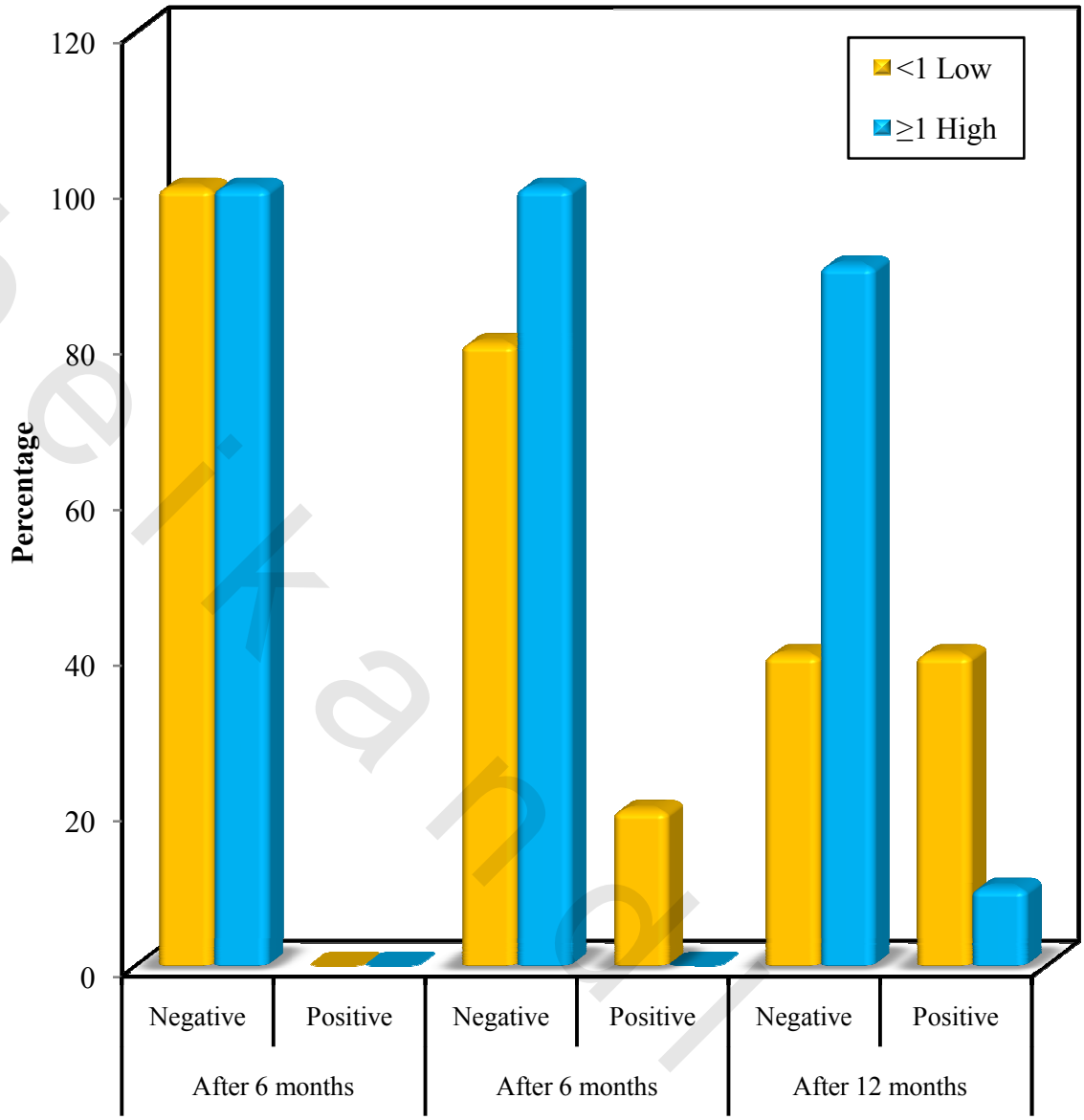

Figure (41): Relation between Intratumoral LMVD with vaginal vault recurrence

Relation between intratumoral LMVD with pelvic recurrence:

a) Pelvic recurrence after 3 months and 6 months :

No patients had pelvic recurrence after 3 or 6 months postoperatively. (Table XXXV, figure 42)

b) Pelvic recurrence after 12 months:

All the fifty six cases who came to follow up visits after 12 months postoperatively did not record pelvic recurrence (the remaining 4 cases declined that visit and were dropped out).

Sixteen of the twenty patients with decreased intratumoral LMVD came to follow up visits after 12 months and did not record pelvic recurrence. Similarly all patients with increased intratumoral LMVD recorded no pelvic recurrence after 12 months postoperatively. (Table XXXV, figure 42)

Table (XXXV): Relation between intratumoral LMVD with pelvic recurrence

Pelvic recurrence	Intratumoral LMVD			
	<1 Low (n=20)		≥1 High (n=40)	
	No.	%	No.	%
After 3 months				
Negative	20	100.0	40	100.0
Positive	0	0.0	0	0.0
After 6 months				
Negative	20	100.0	40	100.0
Positive	0	0.0	0	0.0
After 12 months**				
Negative	16	100.0	40	100.0
Positive	0	0.0	0	0.0

**Four patients with decreased intratumoral LMVD were dropped out as they did not come for follow up visit after 12 months

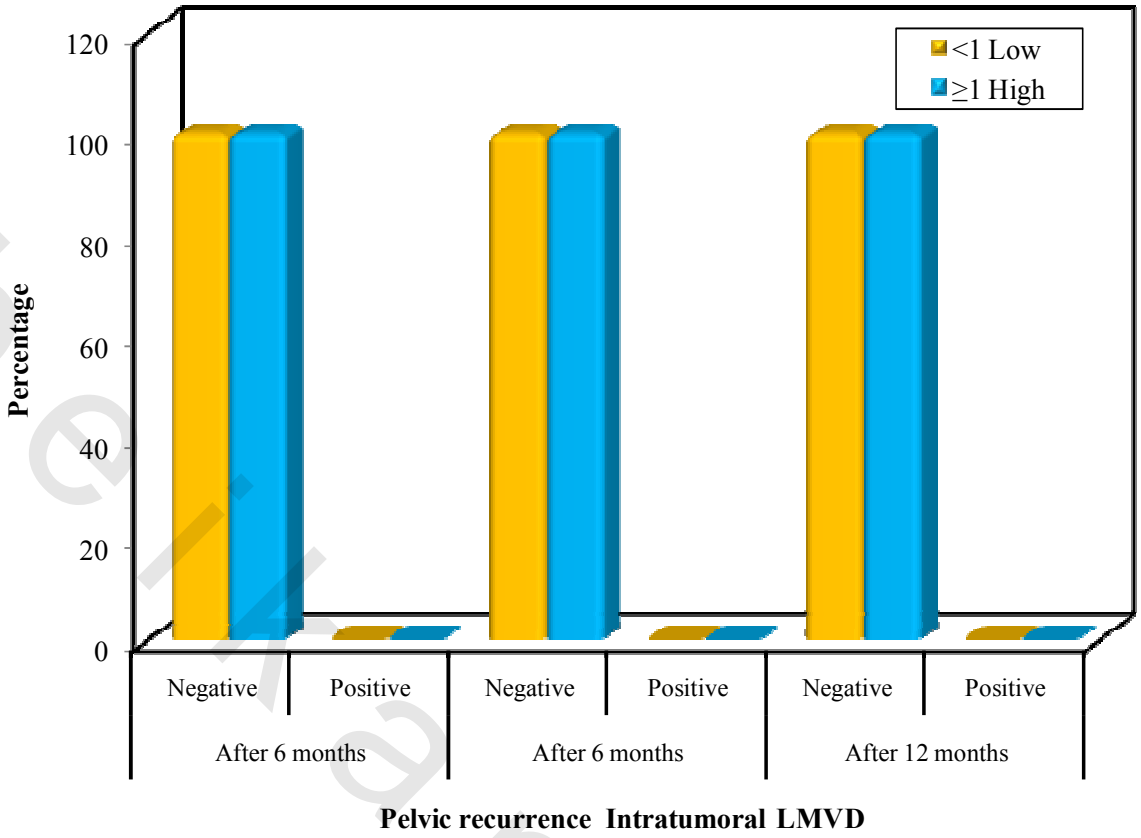

Figure (42): Relation between intratumoral LMVD with pelvic recurrence

- **Relation between intratumoral LMVD with postoperative CT recurrence:**

a) Six months CT recurrence:

The relation between decreased intratumoral LMVD and presence of CT recurrence was statistically significant (P = 0.010). (Table XXXVI, Figure 43)

b) After 12 months CT recurrence :

Of 20 patients with decreased intratumoral LMVD; 16 patients came to follow up visits; 8 had no recurrence by CT (40%) and the remaining 8 patients had recurrence (40%).

Of 40 patients with increased intratumoral LMVD; 36 patients had no recurrence by CT (90%) and 4 patients had recurrence (10%).

The relation between decreased intratumoral LMVD and presence of CT recurrence after 12 months postoperatively was statistically significant (P = 0.002). (Table XXXVI, Figure 43)

Table (XXXVI): Relation between Intratumoral LMVD with CT recurrence

CT recurrence	Intratumoral LMVD				χ^2	p
	<1 Low (n=20)		≥1 High (n=40)			
	No.	%	No.	%		
After 6 months						
Negative	16	80.0	40	100.0	8.571*	FE p=0.010*
Positive	4	20.0	0	0.0		
After 12 months**						
Negative	8	40.0	36	90.0	10.861*	MC p=0.002*
Positive	8	40.0	4	10.0		

χ^2: Chi square test
MC: Monte Carlo test
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$
** Four patients with decreased LMVD were dropped as they did not come for follow up visit after 12 months

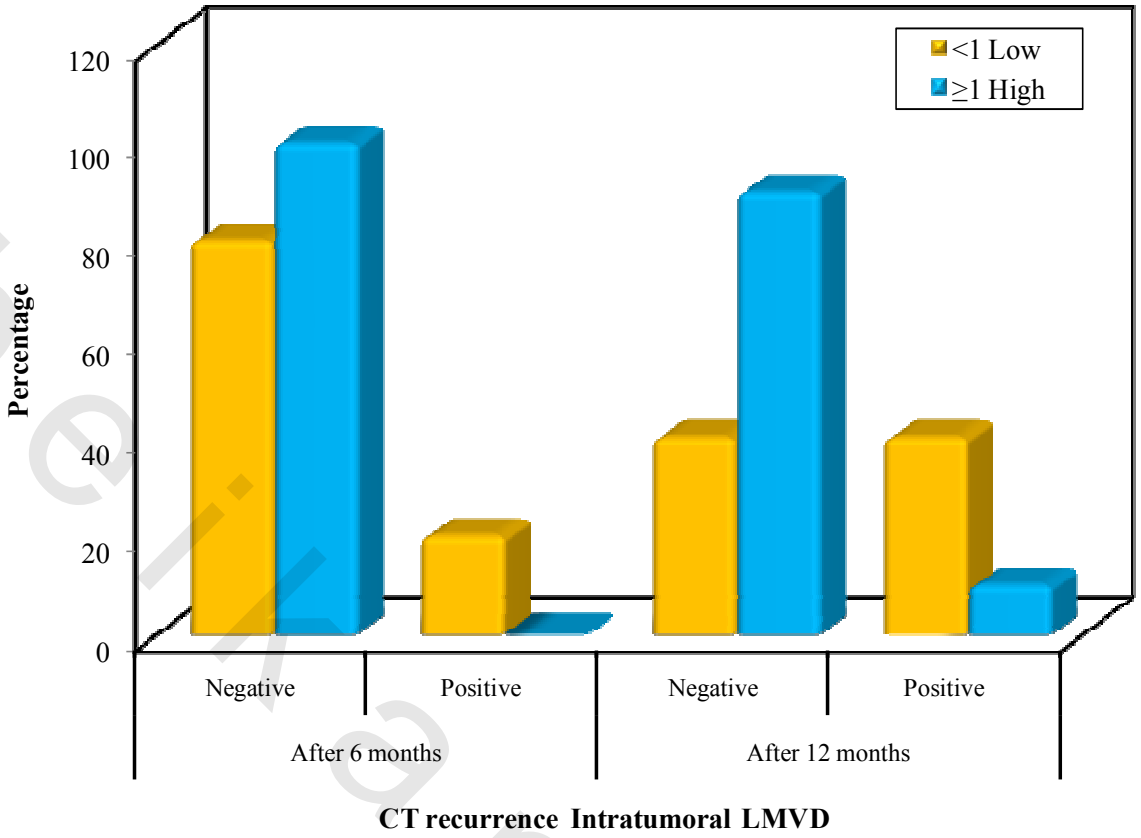

Figure (43): Relation between Intratumoral LMVD with CT recurrence

Finally the relations between intratumoral LMVD and peritumoral LMVD with all prognostic parameters were summarized in (Table XXXVII)

Table (XXXVII): Relation between intratumoral-LMVD, peritumoral-LMVD with different prognostic parameters

		Intratumoral-LMVD		p	peritumoral-LMVD		p
		Low	High		Low	High	
Age	<50	4 (20%)	4 (10%)	0.422	4 (14.3%)	4 (12.5%)	1.000
	≥50	16 (80%)	36 (90%)		24 (85.7%)	28 (87.5%)	
Peritoneal cytology	Negative	12 (60%)	40 (100%)	<0.001*	20 (71.4%)	32 (100%)	0.001*
	Positive	8 (40%)	0 (0%)		8 (28.6%)	0 (0%)	
Tumor histotype	Endometroid	8 (40%)	36 (90%)	<0.001*	16 (57.1%)	28 (87.5%)	0.008*
	Non endometroid	12 (60%)	4 (10%)		12 (42.9%)	4 (12.5%)	
Grade	I	0 (0%)	12 (30%)	0.023*	0 (0%)	12 (37.5%)	<0.001*
	II	8 (40%)	12 (30%)		8 (28.6%)	12 (37.5%)	
	III	12 (60%)	16 (40%)		20 (71.4%)	8 (25%)	
Myometrial invasion	<1/2	0 (0%)	20 (50%)	<0.001*	0 (0%)	20 (62.5%)	<0.001*
	≥1/2	20 (100%)	20 (50%)		28 (100%)	12 (37.5%)	
Pathological adnexal infiltration	Negative	12 (60%)	40 (100%)	<0.001*	20 (71.4%)	32 (100%)	0.001*
	Positive	8 (40%)	0 (0%)		8 (28.6%)	0 (0%)	
Lymph node involvement	Negative	12 (60%)	36 (90%)	0.014*	20 (71.4%)	28 (87.5%)	0.121
	Positive	8 (40%)	4 (10%)		8 (28.6%)	4 (12.5%)	
Lymphovascular space invasion	Negative	12(60%)	24(60%)	1.000	16(57.1%)	20(62.5%)	0.673
	Positive	8(40%)	16(40%)		12(42.9%)	12(37.5%)	
FIGO stage	I	8 (40%)	28 (70%)	0.006*	12 (42.9%)	24 (75%)	0.014*
	II	0 (0%)	4 (10%)		4 (14%)	0 (0%)	
	III	12 (60%)	8 (20%)		12 (42.9%)	8 (25%)	
Radiotherapy	No	0 (0%)	16 (40%)	0.001*	0 (0%)	16 (50%)	<0.001*
	Yes	20 (100%)	24 (60%)		28 (100%)	16 (50%)	
3 months vaginal vault recurrence	Negative	20 (100%)	40 (100%)	-	28 (100%)	32 (100%)	-
	Positive	0 (0%)	0 (0%)		0 (0%)	0 (0%)	
6 months vaginal vault recurrence	Negative	16 (80%)	40 (100%)	0.010*	24 (85.7%)	32 (100%)	0.042*
	Positive	4 (20%)	0 (0%)		4 (14.3%)	0 (0%)	
12 months vaginal vault recurrence	Negative	8 (40%)	36 (90%)	0.002*	16 (57.1%)	28 (87.5%)	0.060
	Positive	8 (40%)	4 (10%)		8 (28.6%)	4 (12.5%)	
3 months pelvic recurrence	Negative	20 (100%)	40 (100%)	-	28 (100%)	32 (100%)	-
	Positive	0 (0%)	0 (0%)		0 (0%)	0 (0%)	
6 months pelvic recurrence	Negative	20 (100%)	40 (100%)	-	28 (100%)	32 (100%)	-
	Positive	0 (0%)	0 (0%)		0 (0%)	0 (0%)	
12 months pelvic recurrence	Negative	20 (100%)	40 (100%)	-	24 (85.7%)	32 (100%)	-
	Positive	0 (0%)	0 (0%)		0 (0%)	0 (0%)	
6 month CT	Negative	16 (80%)	40 (100%)	0.010*	24 (85.7%)	32 (100%)	0.042*
	Positive	4 (20%)	0 (0%)		4 (14.3%)	0 (0%)	
12 months CT	Negative	8 (40%)	36 (90%)	0.002*	16 (57.1%)	28 (87.5%)	0.060
	Positive	8 (40%)	4 (10%)		8 (28.6%)	4 (12.5%)	

p: p value for Chi square test or Fisher Exact test or Monte Carlo test
*: Statistically significant at $p \leq 0.05$

Myometrial invasion in relation to other prognostic factors

The relations between deeper myometrial invasion and positivity of peritoneal fluid aspirate for malignant cell (P=0.043), non endometroid type tumors (P=0.001), higher tumor grade (P<0.001), adnexal infiltration (P=0.043), lymphovascular space invasion (P=0.025), higher tumor stage (P<0.001) and lymph node positivity (P=0.005) were statistically significant. (Table XXXVIII, XXXIX)

The relations between deeper myometrial invasion and vaginal vault recurrence after 3 and 6 months postoperatively were statistically insignificant. (P=0.291, P=0.504). The relations between deeper myometrial invasion and presence of CT recurrence after 6 and 12 months postoperatively were statistically insignificant (P=0.29, P=0.504). (Table XL, XLI)

No cases recorded pelvic recurrence after 3, 6 and 12 months postoperatively. (Table XLII)

Table (XXXVIII): Relation between myometrial invasion and cytology of peritoneal fluid aspirate

	Peritoneal cytology				Test of sig.	p
	Negative (n = 52)		Positive (n = 8)			
	No.	%	No.	%		
Myometrial invasion						
< 1/2	20	38.5	0	0.0	$\chi^2 = 4.615^*$	$^{FE}p = 0.043^*$
≥1/2	32	61.5	8	100.0		

Table (XXXIX): Relation between myometrial invasion with histopathological parameters

	Myometrial Invasion				Test of sig.	p
	< 1/2 (n = 20)		≥1/2 (n = 40)			
	No.	%	No.	%		
Tumor histotype						
Endometroid	20	100.0	24	60.0	χ^2= 10.909*	0.001*
Non endometroid	0	0.0	16	40.0		
Grade						
I	12	60.0	0	0.0		
II	4	20.0	16	40.0	χ^2= 30.171*	<0.001*
III	4	20.0	24	60.0		
Pathological adnexal examination						
Negative	20	100.0	32	80.0	χ^2= 4.615*	^{FE}p =0.043*
Positive	0	0.0	8	20.0		
Lymphovascular space invasion						
Negative	16	80.0	20	50.0	χ^2= 5.000*	0.025*
Positive	4	20.0	20	50.0		
Lymph nodes by pathological examination						
Negative	20	100.0	28	70.0	χ^2= 7.500*	^{FE}p= 0.005*
Positive	0	0.0	12	30.0		
FIGO stage						
I	20	100.0	16	40.0		
II	0	0.0	4	10.0	χ^2= 21.981*	^{MC}p<0.001*
III	0	0.0	20	50.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test
Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

Table (XL): Relation between myometrial invasion with vaginal vault recurrence

Vaginal vault recurrence	Myometrial Invasion				χ^2	p
	< 1/2 (n = 20)		≥1/2 (n = 40)			
	No.	%	No.	%		
After 3 months						
Negative	20	100.0	40	100.0	-	-
Positive	0	0.0	0	0.0		
After 6 months						
Negative	20	100.0	36	90.0	2.143	$^{FE}p= 0.291$
Positive	0	0.0	4	10.0		
After 12 months						
Negative	16	80.0	28	70.0		
Positive	4	20.0	8	20.0	1.795	$^{MC}p= 0.504$
Drop out	0	0.0	4	10.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test

Table (XLI): Relation between myometrial invasion with CT recurrence

CT recurrence	Myometrial Invasion				χ^2	p
	< 1/2 (n = 20)		≥1/2 (n = 40)			
	No.	%	No.	%		
After 6 months						
Negative	20	100.0	36	90.0	2.143	$^{FE}p= 0.291$
Positive	0	0.0	4	10.0		
After 12 months						
Negative	16	80.0	28	70.0		
Positive	4	20.0	8	20.0	1.795	$^{MC}p= 0.504$
Drop out	0	0.0	4	10.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test

Table (XLII):Relation between myometrial invasion with pelvic recurrence

Pelvic recurrence	Myometrial Invasion			
	< 1/2 (n = 20)		≥1/2 (n = 40)	
	No.	%	No.	%
After 3 months				
Negative	20	100.0	40	100.0
Positive	0	0.0	0	0.0
After 6 months				
Negative	20	100.0	40	100.0
Positive	0	0.0	0	0.0
After 12 months				
Negative	20	100.0	36	90.0
Positive	0	0.0	0	0.0
Drop out	0	0.0	4	10.0

χ^2: Value for chi square
FE: Fisher Exact test

The relation between cytology of peritoneal fluid aspirate and other prognostic factors

The relations between positivity of peritoneal fluid and presence of adnexal infiltration (P<0.001), lymph node positivity (P=0.043) and higher tumor stage (P=0.001) were statistically significant. (Table XLIII)

The relations between positivity of peritoneal fluid and non endometroid type tumors (P=0.192), presence of lymphovascular space invasion (P=0.702) and higher tumor grade (P=0.340) were statistically insignificant. (Table XLIII)

The relations between positivity of peritoneal cytology and the presence of vaginal vault and CT recurrence after 6 and 12 months postoperatively were strongly statistically significant (P<0.001). (Table XLIV, XLV)

No cases had pelvic recurrence after 3, 6 and 12 months postoperatively. (Table XLVI)

Table (XLIII): Relation between peritoneal cytology with histopathological parameters

	Peritoneal cytology				Test of sig.	p
	Negative (n = 52)		Positive (n = 8)			
	No.	%	No.	%		
Tumor histotype						
Endometroid	40	76.9	4	50.0	χ^2= 2.570	^{FE}p= 0.192
Non endometroid	12	23.1	4	50.0		
Grade						
I	12	23.1	0	0.0		
II	16	30.8	4	50.0	χ^2= 2.422	^{MC}p= 0.340
III	24	46.2	4	50.0		
Myometrial Invasion						
< 1/2	20	38.5	0	0.0	χ^2= 4.615*	^{FE}p= 0.043*
≥1/2	32	61.5	8	100.0		
Pathological adnexal examination						
Negative	52	100.0	0	0.0	χ^2= 60.000	^{FE}p<0.001*
Positive	0	0.0	8	100.0		
Lymphovascular space invasion						
Negative	32	61.5	4	50.0	χ^2= 0.385	^{FE}p= 0.702
Positive	20	38.5	4	50.0		
Lymph nodes by pathological examination						
Negative	44	84.6	4	50.0	χ^2= 5.192*	^{FE}p= 0.043*
Positive	8	15.4	4	50.0		
Tumor FIGO stage						
I	36	69.2	0	0.0		
II	4	7.7	0	0.0	χ^2= 16.607*	^{MC}p= 0.001*
III	12	23.1	8	100.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test
Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

Table (XLIV): Relation between peritoneal cytology with vaginal vault recurrence

Vaginal vault recurrence	Peritoneal cytology				χ^2	p
	Negative (n = 52)		Positive (n = 8)			
	No.	%	No.	%		
After 3 months						
Negative	52	100.0	8	100.0	-	-
Positive	0	0.0	0	0.0		
After 6 months						
Negative	52	100.0	4	50.0	27.857*	$^{FE}p<0.001^*$
Positive	0	0.0	4	50.0		
After 12 months						
Negative	44	84.6	0	0.0		
Positive	8	15.4	4	50.0	27.996*	$^{MC}p<0.001^*$
Drop out	0	0.0	4	50.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

Table (XLV): Relation between peritoneal cytology with CT recurrence

CT recurrence	Peritoneal cytology				χ^2	p
	Negative (n = 52)		Positive (n = 8)			
	No.	%	No.	%		
After 6 months						
Negative	52	100.0	4	50.0	27.857*	$^{FE}p<0.001^*$
Positive	0	0.0	4	50.0		
After 12 months						
Negative	44	84.6	0	0.0		
Positive	8	15.4	4	50.0	27.996*	$^{MC}p<0.001^*$
Drop out	00	.0	4	50.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

Table (XLVI): Relation between peritoneal cytology with pelvic recurrence

Pelvic recurrence	Peritoneal cytology			
	Negative (n = 52)		Positive (n = 8)	
	No.	%	No.	%
After 3 months				
Negative	52	100.0	8	100.0
Positive	0	0.0	0	0.0
After 6 months				
Negative	52	100.0	8	100.0
Positive	0	0.0	0	0.0
After 12 months				
Negative	52	100.0	4	50.0
Positive	0	0.0	0	0.0
Drop out	00	.0	4	50.0

The relation between adnexal infiltration and other prognostic factors

The relations between presence of adnexal infiltration with higher tumor stage (P<0.001) and lymph node positivity (P=0.043) were statistically significant. (Table XLVII)

The relations between presence of adnexal infiltration with non endometroid type tumors (P=0.192), lymphovascular space invasion (P=0.702) and higher tumor grade (P=0.337) were statistically insignificant. (Table XLVII)

The relations between presence of adnexal infiltration with presence of vaginal vault recurrence after 6 months postoperatively (P<0.001), presence of vaginal vault recurrence after 12 months postoperatively (P=0.001) and presence of CT recurrence after 6 and 12 months postoperatively (p<0.001, p=0.001) were statistically significant. (Table XLVIII, XLIX)

No cases recorded pelvic recurrence after 3, 6 and 12 months postoperatively. (Table L)

Table (XLVII): Relation between pathological adnexal infiltration with other histopathological parameters

	Pathological adnexal infiltration				Test of sig.	p
	Negative (n = 52)		Positive (n = 8)			
	No.	%	No.	%		
Tumor histotype						
Endometroid	40	76.9	4	50.0	χ^2= 2.750	^{FE}p=0.192
Non endometroid	12	23.1	4	50.0		
Grade						
I	12	23.1	0	0.0		
II	16	30.8	4	50.0	χ^2= 2.422	^{FE}p=0.337
III	24	46.2	4	50.0		
Lymphovascular space invasion						
Negative	32	61.5	4	50.0	χ^2= 0.385	^{FE}p=0.702
Positive	20	38.5	4	50.0		
Lymph nodes by pathological examination						
Negative	44	84.6	4	50.0	χ^2= 5.192*	^{FE}p= 0.043*
Positive	8	15.4	4	50.0		
FIGO stage						
I	36	69.2	0	0.0		
II	4	7.7	0	0.0	χ^2= 16.607*	^{MC}p<0.001*
III	12	23.1	8	100.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test
Z: Z for Mann Whitney test
*: Statistically significant at p ≤ 0.05

Table (XLVIII): Relation between pathological adnexal examination with vaginal vault recurrence

Vaginal vault recurrence	Pathological adnexal infiltration				χ^2	^{FE}p
	Negative (n = 52)		Positive (n = 8)			
	No.	%	No.	%		
After 3 months						
Negative	52	100.0	8	100.0	-	-
Positive	0	0.0	0	0.0		
After 6 months						
Negative	52	100.0	4	50.0	27.857*	<0.001*
Positive	0	0.0	4	50.0		
After 12 months						
Negative	44	84.6	0	0.0		
Positive	8	15.4	4	50.0	15.795*	0.001*
Drop out	0	0.0	4	50.0		

χ^2: Value for chi square
FE: Fisher Exact test

Table (XLIX): Relation between pathological adnexal infiltration with CT recurrence

CT recurrence	Pathological adnexal infiltration				χ^2	p
	Negative (n = 52)		Positive (n = 8)			
	No.	%	No.	%		
After 6 months						
Negative	52	100.0	4	50.0	27.857*	$^{FE}p<0.001^*$
Positive	0	0.0	4	50.0		
After 12 months						
Negative	44	84.6	0	0.0		
Positive	8	15.4	4	50.0	27.996*	$^{MC}p<0.001^*$
Drop out	0	0.0	4	50.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

Table (L): Relation between pathological adnexal infiltration with pelvic recurrence

Pelvic recurrence	Pathological adnexal infiltration			
	Negative (n = 52)		Positive (n = 8)	
	No.	%	No.	%
After 3 months				
Negative	52	100.0	8	100.0
Positive	0	0.0	0	0.0
After 6 months				
Negative	52	100.0	8	100.0
Positive	0	0.0	0	0.0
After 12 months				
Negative	52	100.0	4	50.0
Positive	0	0.0	0	0.0
Drop out	0	0.0	4	50.0

The relation between tumor histotype and other prognostic factors

The relations between the non endometroid type tumors with deeper myometrial invasion (p=0.001), higher tumor grade (P<0.001), higher tumor stage (P<0.001) and lymph node positivity (P=0.001) were statistically significant. (Table XXXIX, LI)

The relations between the non endometroid type tumors with positivity of peritoneal fluid (0.192), lymphovascular space invasion (P=0.340) and presence of adnexal infiltration (p=0.702) were statistically insignificant. (Table XLIII, XLVII, LI)

The relations between tumor histotype with presence of 6 months vaginal vault and CT recurrence postoperatively were statistically significant (P=0.004). (Table LII, LIII)

The relations between tumor histotype with presence of 12 months vaginal vault and CT recurrence postoperatively were statistically insignificant (P=0.263). (Table LII, LIII)

No cases recorded pelvic recurrence after 3, 6 and 12 months postoperatively. (Table LIV)

Table (LI): Relation between tumor histotype with histopathological parameters

	Tumor histotype				Test of sig.	p
	Endometroid (n = 44)		Non endometroid (n = 16)			
	No.	%	No.	%		
Grade						
I	12	27.3	0	0		
II	20	45.5	0	0.0	χ^2= 25.686*	^{MC}p<0.001*
III	12	27.3	16	100.0		
Lymphovascular space invasion						
Negative	28	63.6	8	50.0	χ^2= 0.909	0.340
Positive	16	36.4	8	50.0		
Lymph nodes by pathological examination						
Negative	40	90.9	8	50.0	χ^2= 12.273*	^{FE}p= 0.001*
Positive	4	9.1	8	50.0		
FIGO stage						
I	32	72.7	4	25.0		
II	4	9.1	0	0.0	χ^2= 15.540*	^{MC}p<0.001*
III	8	18.2	12	75.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test
Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

Table (LII): Relation between tumor histotype with vaginal vault recurrence

Vaginal vault recurrence	Tumor histotype				χ^2	^{FE}p
	Endometroid (n = 44)		Non endometroid (n = 16)			
	No.	%	No.	%		
After 3 months						
Negative	44	100.0	16	100.0	-	-
Positive	0	0.0	0	0.0		
After 6 months						
Negative	44	100.0	12	75.0	11.786*	0.004*
Positive	0	0.0	4	25.0		
After 12 months						
Negative	36	81.8	8	50.0		
Positive	8	18.2	4	25.0	1.286	0.263
Not done	0	0.0	4	25.0		

χ^2: Value for chi square
FE: Fisher Exact test

Table (LIII): Relation between tumor histotype with CT recurrence

CT recurrence	Tumor histotype				χ^2	^{FE}p
	Endometroid (n = 44)		Non endometroid (n = 16)			
	No.	%	No.	%		
After 6 months						
Negative	44	100.0	12	75.0	11.786*	0.004*
Positive	0	0.0	4	25.0		
After 12 months						
Negative	36	81.8	8	50.0		
Positive	8	18.2	4	25.0	1.286	0.263
Not done	0	0.0	4	25.0		

χ^2: Value for chi square
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

Table (LIV): Relation between tumor histotype with pelvic recurrence

Pelvic recurrence	Tumor histotype			
	Endometroid (n = 44)		Non endometroid (n = 16)	
	No.	%	No.	%
After 3 months				
Negative	44	100.0	16	100.0
Positive	0	0.0	0	0.0
After 6 months				
Negative	44	100.0	16	100.0
Positive	0	0.0	0	0.0
After 12 months				
Negative	44	100.0	12	75.0
Positive	0	0.0	0	0.0
Not done	0	0.0	4	25.0

The relation between lymphovascular space invasion and other prognostic factors

The relations between presence of lymphovascular space invasion with deeper myometrial invasion (p=0.025), higher tumor grade (P=0.003), higher tumor stage (P<0.001) and lymph node positivity (P<0.001) were statistically significant. (Table XXXIX, LV)

The relations between presence of lymphovascular space invasion with positivity of peritoneal fluid aspirate (p= 0.702), adnexal infiltration (p=0.702) and non endometroid tumors (p=0.340) were statistically insignificant. (Table XLIII, XLVII, LI)

The relations between presence of lymphovascular space invasion with presence of vaginal vault and CT recurrence after 6 months postoperatively were statistically significant (P=0.022). While, the relations between presence of lymphovascular space invasion with presence of vaginal vault and CT recurrence after 12 months postoperatively were statistically insignificant (P=1.000). (Table LVI, LVII)

No cases recorded pelvic recurrence after 3, 6 and 12 months postoperatively. (Table LVIII)

Table (LV): Relation between lymphovascular space invasion with tumor grade, stage and lymph node status

	Lymphovascular space invasion				Test of sig.	p
	Negative (n = 36)		Positive (n = 24)			
	No.	%	No.	%		
Grade						
I	12	33.3	0	0.0		
II	12	33.3	8	33.3	χ^2= 12.759*	0.003*
III	12	33.3	16	66.7		
Lymph nodes by pathological examination						
Negative	36	100.0	12	50.0	χ^2= 22.500	FEp<0.001*
Positive	0	0.0	12	50.0		
FIGO stage						
I	28	77.8	8	33.3		
II	0	0.0	4	16.7	χ^2= 13.616*	MCp<0.001*
III	8	22.2	12	50.0		

χ^2: Value for chi square
MC: Monte Carlo test
FE: Fisher Exact test
Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

Table (LVI): Relation between lymphovascular space invasion with vaginal vault recurrence

Vaginal vault recurrence	Lymphovascular space invasion				χ^2	^{FE}p
	Negative (n = 36)		Positive (n = 24)			
	No.	%	No.	%		
After 3 months						
Negative	36	100.0	24	100.0	-	-
Positive	0	0.0	0	0.0		
After 6 months						
Negative	36	100.0	20	83.3	6.429*	0.022*
Positive	0	0.0	4	16.7		
After 12 months						
Negative	28	77.8	16	66.7		
Positive	8	22.2	4	16.7	0.038	1.000
Drop out	0	0.0	4	16.7		

χ^2: Value for chi square
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

Table (LVII): Relation between lymphovascular space invasion with CT recurrence

CT recurrence	Lymphovascular space invasion				χ^2	^{FE}p
	Negative (n = 36)		Positive (n = 24)			
	No.	%	No.	%		
After 6 months						
Negative	36	100.0	20	83.3	6.429*	0.022*
Positive	0	0.0	4	16.7		
After 12 months						
Negative	28	77.8	16	66.7		
Positive	8	22.2	4	16.7	0.038	1.000
Drop out	0	0.0	4	16.7		

χ^2: Value for chi square
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

Table (LVIII): Relation between lymphovascular space invasion with pelvic recurrence

Pelvic recurrence	Lymphovascular space invasion			
	Negative (n = 36)		Positive (n = 24)	
	No.	%	No.	%
After 3 months				
Negative	36	100.0	24	100.0
Positive	0	0.0	0	0.0
After 6 months				
Negative	36	100.0	24	100.0
Positive	0	0.0	0	0.0
After 12 months				
Negative	36	100.0	20	83.3
Positive	0	0.0	0	0.0
Drop out	0	0.0	4	16.7

The relation between tumor grade and other prognostic factors

The relations between higher tumor grade with deeper myometrial invasion (p<0.001), non endometroid histotype tumors (p<0.001), positivity of lymphovascular space invasion (p=0.003) and tumor stage (P=0.004) were statistically significant (Table XXXIX, LI, LV, LIX)

The relations between higher tumor grade with positivity of peritoneal fluid (p=0.337), adnexal infiltration (p=0.337), lymph node positivity (P=0.123) were statistically insignificant. (Table XLIII, XLVII, LIX)

The relations between higher tumor grade with vaginal vault and CT recurrence after 6 months postoperatively were statistically insignificant (P=0.126).While, the relations between higher tumor grade with presence of vaginal vault and CT recurrence after 12 months postoperatively were statistically significant (P<0.001). (Table LX, LXI)

No cases recorded pelvic recurrence after 3, 6 and 12 months postoperatively. (Table LXII)

Table (LIX): Relation between tumor grade with lymph node status and tumor stage

	Grade						Test of sig.	p
	I (n = 12)		II (n = 20)		III (n = 28)			
	No.	%	No.	%	No.	%		
Lymph nodes by pathological examination								
Negative	12	100.0	16	80.0	20	71.4	χ^2= 4.335	^{MC}p= 0.123
Positive	0	0.0	4	20.0	8	28.6		
FIGO stage								
I	12	100.0	12	60.0	12	42.9		
II	0	0.0	0	0.0	4	14.3	χ^2= 13.674*	^{MC}p= 0.004*
III	0	0.0	8	40.0	12	42.9		

χ^2: Value for chi square
MC: Monte Carlo test
$^{KW}\chi^2$:chi square for Kruskal Wallis test
*: Statistically significant at $p \leq 0.05$

Table (LX): Relation between tumor grade with vaginal vault recurrence

Vaginal vault recurrence	Grade						χ^2	^{MC}p
	I (n = 12)		II (n = 20)		III (n = 28)			
	No.	%	No.	%	No.	%		
After 3 months								
Negative	12	100.0	20	100.0	28	100.0	-	-
Positive	0	0.0	0	0.0	0	0.0		
After 6 months								
Negative	12	100.0	20	100.0	24	85.7	3.501	0.126
Positive	0	0.0	0	0.0	4	14.3		
After 12 months								
Negative	12	100.0	12	60.0	20	71.4		
Positive	0	0.0	8	40.0	4	14.3	13.533*	<0.001*
Drop out	0	0.0	0	0.0	4	14.3		

χ^2: Value for chi square
MC: Monte Carlo test
*: Statistically significant at $p \leq 0.05$

Table (LXI): Relation between tumor grade with CT recurrence

CT recurrence	Grade						χ^2	^{MC}p
	I (n = 12)		II (n = 20)		III (n = 28)			
	No.	%	No.	%	No.	%		
After 6 months								
Negative	12	100.0	20	100.0	24	85.7	3.501	0.126
Positive	0	0.0	0	0.0	4	14.3		
After 12 months								
Negative	12	100.0	12	60.0	20	71.4		
Positive	0	0.0	8	40.0	4	14.3	13.533*	<0.001*
Drop out	0	0.0	0	0.0	4	14.3		

χ^2: Value for chi square
MC: Monte Carlo test
*: Statistically significant at $p \leq 0.05$

Table (LXII): Relation between tumor grade with pelvic recurrence

Pelvic recurrence	Grade					
	I (n = 12)		II (n = 20)		III (n = 28)	
	No.	%	No.	%	No.	%
After 3 months						
Negative	12	100.0	20	100.0	28	100.0
Positive	0	0.0	0	0.0	0	0.0
After 6 months						
Negative	12	100.0	20	100.0	28	100.0
Positive	0	0.0	0	0.0	0	0.0
After 12 months						
Negative	12	100.0	20	100.0	24	85.7
Positive	0	0.0	0	0.0	0	0.0
Drop out	0	0.0	0	0.0	4	14.3

The relation between lymph node status and other prognostic factors:

The relations between lymph node positivity and deeper myometrial invasion (p=0.005), positivity of peritoneal fluid (p=0.043), adnexal infiltration (p=0.043), non endometroid histotype tumors (p=0.005), lymphovascular space invasion (p<0.001) higher tumor stage (P<0.001) were statistically significant. (Table XXXIX, XLIII, XLVII, LI, LV, LXIII)

The relation between lymph node positivity and higher tumor grade was statistically insignificant (p=0.123). (Table LIX)

The relations between lymph node positivity with vaginal vault and CT recurrence after 6 and 12 months postoperatively were statistically significant (P=0.001, p=0.05). (Table LXIV, LXV)

No cases recorded pelvic recurrence after 3, 6 and 12 months postoperatively. (Table LXV1)

Table (LXIII): Relation between lymph node status and tumor stage

	Lymph node status				Test of sig.	p
	Negative (n = 48)		Positive (n = 12)			
	No.	%	No.	%		
FIGO stage						
I	36	75.0	0	0.0		
II	4	8.3	0	0.0	30.000*	$^{MC}p<0.001^*$
III	8	16.7	12	100.0		

χ^2: Value for chi square
MC: Monte Carlo test
Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

Table (LXIV): Relation between lymph node status and vaginal vault recurrence

Vaginal vault recurrence	Lymph node status				χ^2	^{FE}p
	Negative (n = 48)		Positive (n = 12)			
	No.	%	No.	%		
After 3 months						
Negative	48	100.0	12	100.0	-	-
Positive	0	0.0	0	0.0		
After 6 months						
Negative	48	100.0	8	66.7	17.143*	0.001*
Positive	0	0.0	4	33.3		
After 12 months						
Negative	40	83.3	4	33.3		
Positive	8	16.7	4	33.3	4.525	0.05*
Drop out	0	0.0	4	33.3		

χ^2: Value for chi square
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

Table (LXV): Relation between lymph node status with CT recurrence

CT recurrence	lymph node status				χ^2	^{FE}p
	Negative (n = 48)		Positive (n = 12)			
	No.	%	No.	%		
After 6 months						
Negative	48	100.0	8	66.7	17.143*	0.001*
Positive	0	0.0	4	33.3		
After 12 months						
Negative	40	83.3	4	33.3		
Positive	8	16.7	4	33.3	4.525	0.05*
Drop out	0	0.0	4	33.3		

χ^2: Value for chi square
FE: Fisher Exact test
*: Statistically significant at $p \leq 0.05$

Table (LXVI): Relation between lymph node status with pelvic recurrence

Pelvic recurrence	lymph node status			
	Negative (n = 48)		Positive (n = 12)	
	No.	%	No.	%
After 3 months				
Negative	48	100.0	12	100.0
Positive	0	0.0	0	0.0
After 6 months				
Negative	48	100.0	12	100.0
Positive	0	0.0	0	0.0
After 12 months				
Negative	48	100.0	8	66.7
Positive	0	0.0	0	0.0
Drop out	0	0.0	4	33.3