

# FACTORS AFFECTING TREATMENT FOR BENIGN OVARIAN CYSTS IN GENERAL SURGERY VS. GYNECOLOGICAL SURGERY DEPARTMENTS

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## Abstract

*Objective: The purpose of the study is to compare surgical techniques applied in gynecology and general surgery, and also the level of ovarian tissue preservation.*

*Materials and methods: A retrospective comparative study was conducted during January 2014 and December 2017 in the 1<sup>st</sup> Department of Obstetrics and Gynecology and the 2<sup>nd</sup> Department of General Surgery, Târgu Mures Emergency Clinical County Hospital, including 262 patients diagnosed with ovarian cysts. Patients were structured in 2 groups, Gynecology Group (GG) including 204 patients and Surgery Group (SG) including 58 patients, all patients being observed from the preoperative, intraoperative and postoperative perspective.*

*Results: Clinical and demographical analysis showed no important differences between the study groups, except for a wider abdominal pain localization in SG ( $P < 0.0001$ ). Laparoscopy was performed more frequently in GG ( $P < 0.0001$ ), in which we also observed the performance of more conservative surgical procedures on the ovarian parenchyma ( $P = 0.0287$ ) in a timely manner ( $P < 0.0001$ ), in comparison to SG. Postoperative assessment showed similar administered medical treatment between the study groups, hospitalization costs were not statistically significant, but the length of hospital admission was notable shorter in gynecological patients ( $P < 0.0001$ ).*

*Conclusion: Surgical treatment of ovarian cysts should be reserved to gynecologic surgeons trained to perform delicate procedures on ovaries, especially in young women.*

## Rezumat

*Obiectiv: Determinarea potentialelor diferite privind tehnicile chirurgicale utilizate in ginecologie si chirurgie generală in tratamentul chirurgical al chisturilor ovariene.*

*Material si metodă: A fost desfășurat un studiu retrospectiv în perioada Ianuarie 2014 – Decembrie 2017 în Clinica Obstetrică-Ginecologie I si Clinica Chirurgie II din Spitalul Clinic Judesean de Urgență Târgu Mures incluzând 262 de paciente diagnosticate cu chisturi ovariene. Pacientele au fost structurate in 2 grupuri, Gynecology Group (GG) incluzând 204 cazuri, respectiv Surgery Group (SG) unde au fost regăsite 58 de cazuri, acestea fiind analizate din perspectivă preoperatorie, intraoperatorie si postoperatorie.*

*Rezultate: Analiza clinico-demografică nu a prezentat diferente importante între grupurile de studiu, cu exceptia unei localizări mai extinse a durerii abdominale în SG ( $P < 0,0001$ ). Laparoscopia a fost decisă mai frecvent în GG ( $P < 0,0001$ ), si de asemenea au fost practicate proceduri chirurgicale mai conservative asupra parenchimului ovarian ( $P = 0,0287$ ) durata interveniei chirurgicale fiind mai redusă față de SG ( $P < 0,0001$ ). În urma evaluării postoperatorii s-a constatat o similaritate privind tratamentele administrate, diferentele între costurile de spitalizare în cele două grupuri fiind nesemnificative statistic, însă durata spitalizării s-a dovedit a fi mai redusă la pacientele din serviciul ginecologie ( $P < 0,0001$ ).*

*Concluzie: Tratamentul chirurgical al chisturilor ovariene ar trebui să fie rezervat specialistilor ginecologi antrenati în efectuarea unor proceduri delicate asupra ovarelor.*

**Cuvinte cheie:** ovar, chist, laparoscopie, prezervare, sutura

## **Introduction**

Ovarian cyst is one of the most frequent medical conditions of the reproductive system, prevalence in women at childbearing ages being around 7%, being also observed a high prevalence in postmenopausal patients, approximately 14-18%, the symptoms being not specific, most cases being associated with a slight discomfort or lower abdominal pain [1,2]. By their etiology, can be distinguished functional ovarian cysts, observed more often and solved spontaneously in most cases, and organic cysts with different histologic origins: serous and mucinous cystadenomas arising from the epithelial layer of the ovary, endometriomas which follow pelvic endometriosis, and dermoid cysts formed from the ovarian germinal cells [3].

Literature reports regarding the surgical management of ovarian cysts are in favor of laparoscopy, considered gold standard, due to many important advantages: adhesion prevention, less operative pain, cosmetic better results [4,5]. In addition, studies also pleaded for a conservative surgical procedure, cystectomy being preferred over ovariectomy, fertility conservation being the major concern [6]. In our country, both gynecologists and general surgeons perform surgical interventions for ovarian cysts, the purpose of the study being to compare surgical techniques applied in the two fields, and the level of preservation of the ovarian tissue, in order to emphasize the important role of the gynecologists in the management of ovarian pathologies.

## **Materials and Methods**

A retrospective comparative study was conducted during January 2014 and December 2017 in the 1<sup>st</sup> Department of Obstetrics and Gynecology and the 2<sup>nd</sup> Department of General Surgery, Târgu Mureș Emergency Clinical County Hospital, Romania. The study included 262 patients who underwent surgical interventions for ovarian cyst diagnosis, being excluded from the study patients diagnosed with ovarian endometriomas and pelvic endometriosis, this gynecological pathology being a different entity with

a more complex management. Included patients were structured in two groups based on their provenience from the two mentioned clinics, Gynecology Group (GG) including 204 patients and Surgery Group (SG) including 58 patients. For all patients were assessed preoperative variables including demographical and clinical characteristics: age, residence, type of pathology, pain localization and laboratory tests, intraoperative variables regarding the surgical management of the ovarian cysts: approach, conversion, type of incision, performed procedure, drainage, cutaneous suture, operating time and blood loss. Were analyzed the existing links between the major surgical steps and the age of patients, in order to observe the performance of minimal invasive techniques, aesthetic incisions, preservation of the ovarian tissue, and skin suture in younger woman. Also, were evaluated the postoperative variables, such as, complications incidence, blood transfusion, hospitalization costs and duration. Collected data was structures using Microsoft Excel and the subsequent database was analyzed using GraphPad InStat software, performing quantitative analysis shown by mean and median, also qualitative investigations presented by numbers and percents, applying parametric and non-parametric statistical tests. For determining a potential association between the age of patients and the performed surgical procedures was applied linear regression. P value < 0.05 was considered statistically significant for a 95% confidence interval.

## **Results**

### *Preoperative assessment*

This section of the study followed demographic and clinical characteristics of patients presented in Table 1. Was observed that the majority of patients from Gynecology Group (GG) was aged between 20-39 years old with an average of 40.92, while in the Surgery Group (SG) the maximum incidence was between 40-59 years old with calculated average value of 43.16, but the existing differences were not statistically significant. Residence of patients was predominantly urban in both groups, with no statistically relevant differences.

**Table 1.** Demographic and pre-surgical data among the studied groups

Variable	Gynecology Group (GG) n = 204 (%)	Surgery Group (SG) n = 58 (%)	P value
<b>Age (years):</b>			
< 20	12 (5.88)	7 (12.07)	NS
20 - 39	95 (46.57)	17 (29.31)	
40 - 59	65 (31.86)	22 (37.93)	
≥ 60	32 (15.69)	12 (20.69)	
Average	40.92	43.16	
<b>Residence:</b>			
Urban	126 (61.76)	31 (53.45)	NS
Rural	78 (38.23)	27 (46.55)	
<b>Type of treatment:</b>			
Chronic	167 (81.86)	45 (77.59)	NS
Emergency	37 (18.14)	13 (22.41)	
<b>Pain localisation:</b>			
Right iliac fossa	93 (45.59)	24 (41.38)	GG Mean : 1.89 SG Mean: 2.86  < 0.0001
Left iliac fossa	90 (44.12)	8 (13.79)	
Hypogastric region	3 (1.47)	3 (5.17)	
Diffuse abdominal pain	5 (2.45)	17 (29.31)	
Acute abdomen	13 (6.37)	6 (10.35)	
<b>Hemoglobin levels:</b>			
Normal	160 (78.43)	50 (86.21)	< 0.0001
< 12 g/dl	44 (21.57)	8 (13.79)	
<b>Leukocytes values:</b>			
Normal	172 (84.31)	49 (84.48)	NS
> 10 *1000/μl	32 (15.69)	9 (15.52)	

NS = not statistically significant P value

Type of treatment showed no important differences between GG and SG, most patients presenting with chronic affections of the ovaries. Regarding the localization of pain, were observed different situations in the 2 study groups. Pain in the left and right iliac fossa were observed in close percentages in GG, while in SG prevailed right iliac fossa pain, followed by the presence of a diffuse abdominal pain. Patients with acute abdominal pain were observed in a higher fraction in SG compared to GG. For a better assessment of the pain, we scored the pain depending on its extension as the following: iliac fossa = 1, hypogastric region = 2, diffuse abdominal pain = 3, acute abdomen = 4, observing a higher mean value for SG (2.86) in relation to GG (1.89), differences being statistically valid ( $P < 0.0001$ ). Laboratory exams suggested notable lower hemoglobin values for GG ( $P < 0.0001$ ), while leukocytes levels were almost similar in the 2 study groups.

#### *Intraoperative assessment*

Analyzing gathered data regarding the surgical approach resulted that for GG the highest fraction of the interventions (69.61%) were performed laparoscopically, while in SG were performed through a laparotomy (70.69%), the differences between the two groups being statistically significant ( $P < 0.0001$ ). Conversion rate from laparoscopy to laparotomy in the studied groups presented no statistical differences.

For the statistical evaluation of the surgical incision type, were assigned values for each type of incision as it follows: 3 trocars incision = 1, 4 trocars incision = 2, Pfannenstiel incision = 3, median incision = 4, observing that GG had the most frequently 3 trocar incisions (58.82%), while for SG was preferred a median incision (53.45%), existing important statistical dissimilarities between the study groups ( $P < 0.0001$ ). Type of surgical procedure was also mathematically assessed, scoring the performed

procedures from the most conservative to the most invasive: hemostasis = 1, ovarian cyst fenestration = 2, ovarian cystectomy = 3, partial ovariectomy = 4, ovariectomy = 5, adnexectomy = 6, hysterectomy with bilateral adnexectomy = 7. Comparing the two groups we observed significant differences in favor of GG, with  $P = 0.0287$ . We also observed that peritoneal drainage were performed in higher percents in SG than in GG, being inserted one tube in 56.89% of the patients, and two tubes in 10.34% of cases, differences being statistically significant ( $P < 0.0001$ ). Cutaneous suture was also evaluated for the two groups, observing a significantly higher tendency for aesthetic skin sutures in GG ( $P < 0.0001$ ). Regarding the duration of surgery resulted an average operating time

of 1.10 hours for GG and 1.34 hours for SG, differences being extremely significant from the statistical perspective ( $P = 0.0022$ ). Also, was observed a reduced blood loss in GG with an average of 181.37 ml, while for SG the average was 252.29 ml ( $P < 0.0001$ ).

Using the same scoring scheme, were analyzed the potential connections between the age of women and the chosen procedures, observing a weak direct correlation ( $R = 0.3359$ ), statistically significant ( $P < 0.0001$ ), between the surgical approach and the age of patients, while in SG the link between the two variables was absent ( $R = 0.0703$ ). Type of preferred surgical incision also presented a weak association with the age of patients ( $R = 0.3935$ ,

**Table 2.** Surgical management of ovarian cysts from gynecology versus general surgery perspective

Variable	Gynecology Group (GG) n = 204 (%)	Surgery Group (SG) n = 58 (%)	P value
<b>Surgical approach:</b>			
Laparoscopy	142 (69.61)	17 (29.31)	< 0.0001
Laparotomy	62 (30.39)	41 (70.69)	
<b>Conversion from laparoscopy to laparotomy:</b>			
Yes	5 (2.45)	1 (1.72)	NS
No	199 (97.55)	57 (98.28)	
<b>Surgical incisions:</b>			
3 trocars	120 (58.82)	17 (29.31)	< 0.0001
4 trocars	22 (10.78)	0 (0)	
Pfannenstiel	25 (12.25)	10 (17.24)	
Median	37 (18.15)	31 (53.45)	
<b>Surgical procedure</b>			
Hemostasis	4 (1.96)	3 (5.17)	0.0287
Ovarian cyst fenestration	8 (3.92)	1 (1.72)	
Ovarian cystectomy	101 (49.51)	16 (27.59)	
Partial ovariectomy	13 (6.37)	3 (5.17)	
Ovariectomy	9 (4.41)	6 (10.35)	
Adnexectomy	54 (26.47)	24 (41.38)	
Hysterectomy with bilateral adnexectomy	15 (7.35)	5 (8.62)	
<b>Douglas pouch drainage</b>			
1 tube	65 (31.86)	33 (56.89)	< 0.0001
2 tubes	1 (0.49)	6 (10.34)	
<b>Cutaneous suture</b>			
Laparoscopic incisions suture	120 (58.82)	17 (29.31)	< 0.0001
Subdermal interrupted suture	22 (10.78)	0 (0)	
Intradermal suture	25 (12.25)	10 (17.24)	
Nonabsorbable interrupted suture	37 (18.15)	31 (53.45)	
<b>Duration of surgery (hours)</b>			
	GG Mean	SG Mean	P value
	1.10	1.34	0.0022
<b>Intraoperative blood loss (ml)</b>			
	GG Mean	SG Mean	P value
	181.37	252.59	< 0.0001

NS = not statistically significant P value;

$P < 0.0001$ ), in contrast to SG ( $R = 0.0995$ ). We observed that the number of inserted trocars was not substantially correlated with age ( $R = 0.1781$ ), but was present a moderate positive correlation between the laparotomy incisions and age of patients in GG ( $R = 0.4141$ ,  $P = 0.0008$ ) this association being not significant for SG. The performed surgical procedure for ovarian cysts was strongly and positively correlated with the age of patients in GG ( $R = 0.7308$ ), extremely valuable from the statistical perspective ( $P < 0.0001$ ). For SG was also observed a positive association ( $R = 0.5486$ ), much weaker in comparison to GG, but statistically significant ( $P < 0.0001$ ). Skin suturing was also performed in relation to age of patients in GG, but the calculated correlation factor ( $R = 0.3653$ ) suggested a weak but significant association ( $P < 0.0001$ ), while in SG was not found a link between the mentioned variables.

**Table 3.** Age of patients in relation to surgical techniques and outcomes

Variable	Gynecology Group (GG) n = 204 (%)		Surgery Group (SG) n = 58 (%)	
	R value	P value	R value	P value
Surgical approach	0.3359	< 0.0001	0.0703	NS
Type of incision	0.3935	< 0.0001	0.0995	NS
Laparoscopy	0.1781	0.0340	-	-
Laparotomy	0.4141	0.0008	0.1273	NS
Surgical procedure	0.7308	< 0.0001	0.5486	< 0.0001
Cutaneous suture	0.3653	< 0.0001	0.1383	NS

NS = not statistically significant P value.

**Table 4.** Postoperative care assessment in the studied groups

Variable	Gynecology Group (GG) n = 204 (%)	Surgery Group (SG) n = 58 (%)	P value
Postoperative complications			
Hemoperitoneum	3 (5.88)	0 (12.07)	NA
No complications	201 (46.57)	58 (29.31)	
Blood transfusion:			
	11 (5.39)	3 (5.17)	NS
Postoperative treatment:			
Analgesic	204 (100)	58 (100)	-
Anti-inflammatory	204 (100)	58 (100)	
Antibiotic	192 (94.12)	54 (93.10)	
Anticoagulant	170 (83.33)	40 (68.97)	
Admission costs (RON):			
	GG Mean	SG Mean	P value
	2283.64	2299.84	NS
Length of hospital stay (days):			
	GG Mean	SG Mean	P value
	4.09	6.03	< 0.0001

NA = not available P value; NS = not statistically significant P value.

### *Postoperative assessment*

The only postoperative complication was hemoperitoneum found only in GG (5.88%), a P value being not attributable due to the lack of complications in SG. Blood transfusions were needed in close fractions in the two study groups, differences being not statistically relevant. All patients included in the study benefited from analgesic and anti-inflammatory postoperative treatment, antibiotics were administrated in similar percentages, but anticoagulants were prescribed in a smaller number of cases in SG (68.97%) in relation to GG (83.33%). Hospitalization costs were slightly lower in GG (2283.64 RON) in comparison to SG (2299.84 RON), existing dissimilarities being statistically irrelevant. The only notable difference regarding the postoperative care between the two groups was related to the length of hospital admission, resulting an average of 4.09 days in GG and 6.03 in SG ( $P < 0.0001$ ).

### **Discussion**

Demographic evaluation showed no statistical differences between the two groups, despite the slightly higher average age in SG, studies reporting for patients with ovarian cysts average ages close to ours [7]. Abdominal pain was more varied in SG, without many specific localizations, the multitude of factors and possibilities of a surgical pathology obscuring the patients' presentation [8,9]. The examination in many cases was difficult, with high chances of misdiagnosis, appendicitis being considered in many cases of right lower abdominal pain, situation observed in the present study [10]. Also, acute abdominal pain was more frequent in SG, multiple diagnoses being considered during evaluation, requiring a timely surgical intervention to decrease morbidity and mortality [11]. Laboratory findings showed more significant changes in GG than in SG, a high fraction of patients presenting with low hemoglobin values, situation that suggests an underlying process and a more complex evaluation, as previous studies affirm [12].

For GG, the higher percentage of performed laparoscopies is in accordance to existing studies in

literature, which reported that laparoscopy is the gold standard for the surgical management of ovarian cysts, but the treatment should be adapted to the type and size of the cysts [13], also the conversion rate in the two study groups was lower than other authors' reports [14]. In SG, results showed a higher preference for laparotomies, this finding can be put on the higher mean age of patients, authors reporting the indication for a surgical treatment through laparotomy in patients at more advanced ages [15]. Related to the surgical incisions, gynecologist had an important advantage due to the minimal invasive incisions performed in laparoscopy in higher percentages in comparison to general surgeons, underlining the multiple advantages in the laparoscopic management of ovarian cysts, including extremely important cosmetic considerations among women [16]. Pfannenstiel incision was preferred in GG for treatment through laparotomy and surgeons opted mostly for median incisions, previous reports emphasizing the superior esthetics and the strength of the abdominal wall in comparison to the median incision, together with no differences in postoperative pain and analgesics consumption [17,18].

According to the literature, ovarian cystectomy, ovariectomy and adnexectomy are the standard techniques for the surgical treatment of ovarian cysts, but studies reported that ovarian cystectomy is the main technique that preserves the ovarian function if performed properly, an extremely important detail in women at reproductive ages, no radical surgery should be performed without a pathological certitude [19,20,21]. Also, in peri or postmenopausal cysts, previous studies reported a high rate of performed adnexectomies [22]. In gynecological patients, the highest observed rate was for ovarian cystectomy confirming the literature findings with the predominance of women at childbearing ages, between 20-39 years old; surgical patients underwent adnexectomies in a higher percentage, but these results could be also put on the higher mean age in this study group and the majority of patients aged between 40-59 years old. Besides the frequency of the procedures, was also analyzed the association between the performed operation and the age of patients, in GG resulting a very strong

correlation between surgery and age, concluding that younger women benefited from a more conservative intervention on the ovaries in order to preserve fertility in a highly manner. For SG we also observed a correlation between the procedure and women's age, significantly lower in relation to GG, developing a moderate attempt to preserve the ovarian tissue in young women.

Skin closure also followed esthetic considerations in GG, mostly performed skin sutures were laparoscopy incision, subdermal and intradermal suture techniques, with a high potential of a good postoperative scar according to previous researches; on the other side, in SG existed a predominance of interrupted non-absorbable skin suture, usually resulting in an unfavorable appearance of the cutaneous scar [23]. Operating time was significantly shorter in gynecological patients, being also observed a lower blood loss, mostly because of the high number of performed laparoscopies in a timely manner, previous studies reporting close results [24, 25].

Related to the postoperative analysis, the only important differences between the two study groups were found in the length of hospital admission, gynecological patients presenting a significantly lower number of hospitalization days in relation to surgical patients, aspect that can also be connected to the high incidence of laparoscopic procedures in GG. An interesting aspect, but not statistically relevant, was regarding the total costs of hospitalization in the two groups, GG presenting slightly lower costs in comparison to SG.

## Conclusion

Despite the few significant differences regarding the preoperative evaluation and underlining the more extended presence of pain in patients admitted to general surgery service, the operative management of the ovarian cysts presented important particularities. The predominance of laparoscopic approach, minimal invasive surgical incisions with minimum blood loss and esthetic sutures joined the conservative procedures on the ovarian tissue, such as ovarian cystectomy, in patients treated in the gynecology department. Due to the vast experience

and knowledge regarding the ovarian morphological and physiological characteristics, the present study proved that gynecologists performed more rapid interventions with high preservation of the ovarian function and a faster recovery, also at slightly lower hospitalization costs. Surgical treatment of ovarian cysts should be reserved to gynecologic surgeons trained to perform delicate procedures on ovaries, especially in young women, in order to maintain the conceiving capacity at its highest.

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