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ORIGINAL ARTICLE/ORİJİNAL MAKALE

Survival Analysis of Geriatric Women Undergoing Surgery for Gynecologic Malignancies Using POSSUM and P-POSSUM Scores: A Retrospective Single-Center Study

Jinekolojik Malignite Nedeniyle Cerrahi Uygulanan Geriatrik Kadınlarda POSSUM ve P-POSSUM Skorlarını Kullanarak Sağkalım Analizi: Retrospektif Tek Merkezli Çalışma

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ABSTRACT

Objectives: The incidence of gynecologic malignancies increases with age, yet evidence on surgical outcomes in very elderly women is limited. This study evaluated the prognostic performance of POSSUM and P-POSSUM scoring systems in women aged 75–89 years undergoing surgery for gynecologic cancers and compared survival outcomes with those aged ≥90 years.

Methods: A retrospective single-center study was conducted at Başakşehir Çam and Sakura City Hospital, Türkiye, including 178 patients (153 aged 75–89 years; 25 aged ≥90 years) who underwent surgery between June 2020 and April 2025. Clinical, laboratory, and operative data were collected to calculate POSSUM and P-POSSUM scores. Primary outcome was overall survival (OS); secondary outcomes were progression-free survival (PFS), 30-day complications, and 30-day mortality. Statistical analyses were performed using jamovi 2.5.0. Group comparisons employed the Mann–Whitney U and chi-square tests, while survival was analyzed with Kaplan–Meier curves and log-rank tests

Results: Median BMI, hemoglobin, and CRP did not differ between elderly and senior groups. POSSUM physiological scores and predicted morbidity/mortality were significantly higher in seniors ($p < 0.001$), whereas operative scores were similar. One-, three-, and five-year survival rates were 77%, 68%, and 51% for elderly patients, and 93%, 76%, and 69% for seniors, respectively, with no significant difference ($p = 0.496$). Survival varied by tumor site ($p = 0.002$) and histopathological subtype ($p = 0.008$), with poorer outcomes in ovarian and serous carcinomas.

Conclusion: POSSUM and P-POSSUM models overestimated perioperative risks in very elderly women, while observed outcomes were comparable to younger elderly patients. Chronological age alone should not contraindicate surgery; carefully selected women ≥90 years may achieve meaningful survival outcomes.

Keywords: gynecologic oncology, elderly, POSSUM, P-POSSUM, perioperative risk, survival

ÖZET

Amaç: Jinekolojik malignitelerin insidansı yaşla birlikte artmaktadır; ancak çok ileri yaşlı kadınlarda cerrahi sonuçlara ilişkin kanıtlar sınırlıdır. Bu çalışma, 75–89 yaş aralığındaki kadınlarda jinekolojik kanser cerrahisi sonrası POSSUM ve P-POSSUM skorlama sistemlerinin prognostik performansını değerlendirmeyi ve ≥90 yaşındaki hastalarla sağkalım sonuçlarını karşılaştırmayı amaçladı.

Gereç ve Yöntemler: Haziran 2020 ile Nisan 2025 tarihleri arasında Türkiye, Başakşehir Çam ve Sakura Şehir Hastanesi'nde cerrahi uygulanan toplam 178 hasta (153'ü 75–89 yaş, 25'i ≥90 yaş) retrospektif olarak incelendi. POSSUM ve P-POSSUM skorlarını hesaplamak amacıyla klinik, laboratuvar ve operatif veriler toplandı. Birincil sonuç ölçütü genel sağkalım (OS); ikincil sonuç ölçütleri progresyonsuz sağkalım (PFS), 30 günlük komplikasyon oranı ve 30 günlük mortaliteydi. İstatistiksel analizler jamovi 2.5.0 programı ile yapıldı. Gruplar Mann–Whitney U ve ki-kare testleriyle karşılaştırıldı; sağkalım analizleri Kaplan–Meier eğrileri ve log-rank testleri ile değerlendirildi.

Bulgular: Medyan BKİ, hemoglobin ve CRP düzeyleri yaşlı ve ileri yaşlı gruplar arasında anlamlı farklılık göstermedi. POSSUM fizyolojik skorları ile öngörülen morbidite/mortalite oranları ileri yaşlı grupta anlamlı derecede daha yüksekti ($p < 0.001$), ancak operatif skorlar benzerdir. Birinci, üçüncü ve beşinci yıl sağkalım oranları sırasıyla yaşlı hastalarda %77, %68 ve %51; ileri yaşlı hastalarda %93, %76 ve %69 olarak bulundu ($p = 0.496$). Sağkalım, tümör lokalizasyonuna ($p = 0.002$) ve histopatolojik alt tipe ($p = 0.008$) göre farklılık göstermekte olup, over ve seröz karsinomlarda daha kötü sonuçlar izlendi.

Sonuç: POSSUM ve P-POSSUM modelleri, çok ileri yaşlı kadınlarda perioperatif riski olduğundan yüksek tahmin etmiştir. Ancak gözlenen sonuçlar daha genç yaşlı hastalarla karşılaştırılabilir bulunmuştur. Kronolojik yaş tek başına cerrahi için kontrendikasyon olarak değerlendirilmemelidir; dikkatle seçilen ≥90 yaş hastalarda anlamlı sağkalım elde edilebilir.

Anahtar Kelimeler: Jinekolojik onkoloji, geriatrik, POSSUM, P-POSSUM, Perioperatif risk, sağkalım

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INTRODUCTION

With the global increase in life expectancy, the burden of cancer in older adults is rising rapidly. Between 2010 and 2030, the incidence of cancer among adults aged ≥65 years is projected to increase by 67%, compared to only 11% in younger adults (1). Gynecologic cancers, particularly ovarian cancer, show a strong association with advancing age. Nearly 43% of new ovarian cancer cases occur in women aged ≥65 years, and about half of these are diagnosed in women older than 75 years (2). According to the World Health Organization (WHO), the population aged 75–89 years is categorized as "elderly-old," representing a group with distinct physiological and health-related challenges (3).

Older patients often present with comorbidities, polypharmacy, and reduced functional reserve, complicating treatment decisions in gynecologic oncology (4,5). Comprehensive geriatric assessment has been recommended to evaluate physical, cognitive, nutritional, and psychosocial domains (5). Nevertheless, practical risk stratification tools remain essential in surgical oncology. The Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM), introduced by Copeland et al. in 1991, and its modified Portsmouth version (P-POSSUM), proposed in 1998, have been widely applied in general and oncologic surgery . These models combine physiological and operative parameters to predict morbidity and mortality and have been validated in various surgical populations, including gastrointestinal and head and neck cancers (6,7).

In gynecologic oncology, however, the prognostic performance of POSSUM and P-POSSUM in geriatric patients remains poorly studied. Prior reports suggest that age alone should not be a contraindication to surgery in gynecologic malignancies, and that survival outcomes may be comparable to younger cohorts if patients can tolerate cytoreductive procedures . Yet, there is no consensus regarding perioperative risk assessment in this population, and clinical decision-making is often complicated by the heterogeneity of elderly patients (8,9).

Objective: The present study aimed to evaluate survival outcomes of women aged 75–89 years undergoing surgery for gynecologic malignancies, using POSSUM and P-POSSUM scores as predictive tools for morbidity and mortality.

MATERIALS AND METHODS

Study Design and Setting: A retrospective single-center study was conducted at the Department of Gynecologic Oncology Surgery, Başakşehir Çam and Sakura City Hospital, Istanbul, Türkiye. The study included consecutive women undergoing surgery between June 2020 and April 2025. This study was approved by the Başakşehir Çam and Sakura City Hospital Scientific Research Ethics Committee (Approval No: KAEK/28.05.2025.134, Approval Date: 28 May 2025). Patient consent was waived due to retrospective design, as approved by the Ethics Committee. This study was conducted in accordance with the Declaration of Helsinki.

Eligibility Criteria:

- **Inclusion:** Female patients aged 75–89 years who underwent surgery for gynecologic malignancies.
- **Exclusion:** Patients with non-gynecologic primary malignancies, age <75 or >89 years, and inoperable cases treated without surgery.

Data Collection: Clinical and laboratory parameters were retrieved from the hospital

electronic database. Variables included: age, body mass index (BMI), hemoglobin, leukocyte count, C-reactive protein (CRP), tumor site, histology, FIGO stage, type of procedure, blood loss, contamination level, urgency, and POSSUM/P-POSSUM scores.

POSSUM and P-POSSUM Variables

For each patient, the Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM) and the Portsmouth modification (P-POSSUM) were calculated according to the original descriptions of Copeland et al. and Prytherch et al. (6,7). The POSSUM scoring system consists of two components: a 12-item physiological score and a 6-item operative score. The physiological score included preoperative variables such as age, cardiac status, respiratory status, systolic blood pressure, heart rate, Glasgow Coma Scale, hemoglobin level, white blood cell count, serum urea, serum sodium, serum potassium, and electrocardiographic findings. The operative score incorporated intraoperative variables including the severity of the procedure (minor, moderate, major, or major+), number of procedures performed, estimated intraoperative blood loss, degree of peritoneal contamination, presence of malignancy, and urgency of surgery (elective vs. emergency).

Each variable was categorized into four predetermined levels and assigned a weight of 1, 2, 4, or 8 points following the original POSSUM definitions. Total physiological and operative scores were obtained by summing individual item scores. In cases where a single parameter was unavailable, the nearest "normal" category was selected to avoid artificial inflation of predicted risk estimates. Predicted morbidity according to the POSSUM model was calculated using the equation:

$$\ln [Rm / (1 – Rm)] = –5.91 + (0.16 \times \text{physiological score}) + (0.19 \times \text{operative score}),$$

where Rm represents the estimated postoperative morbidity risk.

Predicted mortality using the P-POSSUM equation was calculated as follows:

$$\ln [R / (1 – R)] = –9.065 + (0.1692 \times \text{physiological score}) + (0.1550 \times \text{operative score}),$$

where R denotes the predicted probability of postoperative mortality

Risk Score Calculation: POSSUM scores were calculated using 12 physiological and 6 operative parameters. P-POSSUM mortality was estimated with the standard equation (7).

Outcomes:

- Primary: Overall survival (OS).
- Secondary: Progression-free survival (PFS), 30-day complications, and 30-day mortality.

Statistical Analysis

Data were analyzed using jamovi version 2.5.0 (The jamovi project, Sydney, Australia). Continuous variables were presented as median (minimum–maximum) values due to non-normal distribution, which was assessed with the Shapiro–Wilk test. Comparisons between elderly (75–89 years) and senior (≥90 years) patients were performed using the Mann–Whitney U test for continuous. POSSUM and P-POSSUM morbidity and mortality predictions were calculated according to standard scoring systems. Survival outcomes were estimated using the Kaplan–Meier method, and survival rates at 1, 3, and 5 years were reported with 95% confidence intervals. Differences in survival

curves between groups (age, primary tumor site, histopathological subtype, and FIGO stage) were evaluated with the log-rank test. P-value <0.05 was considered statistically significant.

RESULTS

Patient Characteristics and Group Comparisons

A total of 178 patients were included, comprising 153 elderly patients (75–89 years) and 25 senior patients (≥90 years). Descriptive statistics are presented in **Table 1.** Median BMI was 30.10 kg/m² in the elderly group and 28.55 kg/m² in the senior group (p = 0.285). Median hemoglobin levels were 12.10 g/dL and 12.20 g/dL in the elderly and senior groups, respectively (p = 0.644). Median CRP levels were 4.55 mg/L in elderly patients and 2.50 mg/L in senior patients (p = 0.163). Physiologic Score, Estimated Morbidity (POSSUM), Estimated Mortality (POSSUM), and Estimated Mortality (PPOSSUM) differed significantly between the groups (all p < 0.001). Median Operative Scores were 8 in both groups (p = 0.701).

Table 1. Descriptive Statistics and Group Comparisons Between Elderly and Senior Patients

Variable	Elderly (75–89 years)	Senior (≥90 years)	P value
BMI (kg/m²) (E:151, S:24)	30.10 (13.7–71.33)	28.55 (22.22–38.06)	0.285
Hemoglobin (g/dL) (E:153, S:25)	12.10 (1.8–15.6)	12.20 (8.8–15.7)	0.644
CRP (mg/L) (E:146, S:19)	4.55 (0.3–386.0)	2.50 (0.8–41.3)	0.163
Physiologic Score (E:153, S:25)	19 (8–27)	23 (16–27)	<0.001
Operative Score (E:153, S:25)	8 (3–12)	8 (5–12)	0.701
Estimated Morbidity (POSSUM) (E:153, S:25)	0.15 (0.02–0.50)	0.28 (0.07–0.46)	<0.001
Estimated Mortality (POSSUM) (E:153, S:25)	0.03 (0.00–0.10)	0.05 (0.01–0.09)	<0.001
Estimated Mortality (PPOSSUM) (E:153, S:25)	0.00 (0.00–0.01)	0.00 (0.00–0.01)	<0.001

BMI = Body Mass Index, CRP = C-reactive proteinE = Elderly, S = Senior, POSSUM = Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity, PPOSSUM = Portsmouth-POSSUM. Data are presented as **median (min–max),** comparisons were performed using **Mann–Whitney U test**.

Survival Analysis by Age Group

Survival outcomes by age group are summarized in **Table 2.** Elderly patients (n = 153) had 34 observed events, while senior patients (n = 25) had 6 observed events. One-year survival was 77% (95% CI: 68–87) for elderly and 93% (95% CI: 87–100) for senior patients. Three-year survival was 68% (95% CI: 57–81) and 76% (95% CI: 62–92), and five-year survival was 51% (95% CI: 38–70) and 69% (95% CI: 53–90), respectively. The log-rank test comparing the groups was not significant (χ^2 = 0.46, df = 1, p = 0.496).

Survival Analysis by Primary Tumor Site

Survival by tumor site is presented in **Table 3.** Median survival was reached for ovarian cancer (875 days, 95% CI: 569–1272) but not for cervical or endometrial cancers. Overall log-rank test showed significant differences

Table 2. Survival Analysis by Age Group

Age Group	N	Observed Events	Expected Events	1-year Survival (%)	3-year Survival (%)	5-year Survival (%)
Elderly (75–89 years)	153	34	35.37	77 (68–87)	68 (57–81)	51 (38–70)
Senior (≥90 years)	25	6	4.63	93 (87–100)	76 (62–92)	69 (53–90)

N = Number of patients Survival estimates are Kaplan–Meier percentages with 95% confidence intervals in parentheses. Log-rank test comparing the two groups: p = 0.496. Age cut-off (≥65 years) was determined based on survival outcome using continuous variable analysis (ClinicoPath tool).

Table 3. Survival Analysis by Primary Tumor Site

Tumor Site	N	Observed Events	Expected Events	Median Survival (days) [95% CI]	1-year Survival (%)	3-year Survival (%)	5-year Survival (%)
Ovary	44	20	10.14	875 (569–1272)	82 (70–94)	65 (52–80)	50 (36–69)
Cervix	9	1	2.20	NA	89 (68–100)	78 (50–100)	78 (50–100)
Endometrium	125	19	27.66	NA	91 (86–97)	85 (76–95)	75 (63–89)

NA = Not available (median survival not reached due to censoring). Survival estimates are Kaplan–Meier percentages with 95% confidence intervals in parentheses. Overall log-rank test comparing the three tumor sites: p = 0.002. Pairwise log-rank comparisons: Ovary vs Cervix: p = 0.107, Ovary vs Endometrium: p < 0.001, Cervix vs Endometrium: p = 0.689

among tumor sites (χ^2 = 12.99, df = 2, p = 0.002). Pairwise comparisons: Ovary vs Cervix (p = 0.107), Ovary vs Endometrium (p < 0.001), Cervix vs Endometrium (p = 0.689).

Survival Analysis by Histopathological Subtype

Survival by subtype is presented in **Table 4**. Median survival was reached in serous (921 days, 95% CI: 717–NA) and Others (1006 days, 95% CI: 607–NA) subtypes, and not reached in endometrioid and squamous subtypes. Overall log-rank test was significant (χ^2 = 11.89, df = 3, p = 0.008). Pairwise comparisons: Serous vs Endometrioid (p = 0.007), Serous vs Squamous (p = 0.028), Serous vs Others (p = 0.912), Endometrioid vs Squamous (p = 0.173), Endometrioid vs Others (p = 0.053), Squamous vs Others (p = 0.034).

Table 4. Survival Analysis by Histopathological Subtype

Subtype	N	Observed Events	Expected Events	Median Survival (days) [95% CI]	1-year Survival (%)	3-year Survival (%)	5-year Survival (%)
Serous	61	22	14.34	921 (717–NA)	85 (76–95)	70 (58–85)	55 (42–72)
Endometrioid	72	9	16.25	NA	92 (86–98)	85 (76–95)	75 (63–89)
Squamous	12	0	3.21	NA	100 (100–100)	100 (100–100)	100 (100–100)
Others	33	9	6.20	1006 (607–NA)	88 (78–99)	76 (61–92)	65 (50–84)

NA = Not available (median survival not reached due to censoring). Survival estimates are Kaplan–Meier percentages with 95% confidence intervals in parentheses. Overall log-rank test comparing the four subtypes: p = 0.008, Pairwise log-rank comparisons: Serous vs Endometrioid: p = 0.007, Serous vs Squamous: p = 0.028, Serous vs Others:, p = 0.912, Endometrioid vs Squamous: p = 0.173, Endometrioid vs Others: z = p = 0.053,Squamous vs Others: p = 0.034

Survival Analysis by FIGO Stage

Survival by stage is presented in **Table 5.** Median survival was reached in stage 3 (921 days, 95% CI: 717–NA) and stage 4 (1178 days, 95% CI: 484–NA), and not reached in stages 1 and 2. Overall log-rank test showed significant differences among stages (χ^2 = 10.67, df = 3, p = 0.014). Pairwise comparisons: 1 vs 2 (p = 0.119), 1 vs 3 (p = 0.003), 1 vs 4 (p = 0.004), 2 vs 3 (p = 0.201), 2 vs 4 (p = 0.119), 3 vs 4 (p = 0.629).

Kaplan–Meier analyses demonstrated no significant survival difference between age groups **(Figure 1)**, while primary tumor site showed clear disparities, with ovarian cancer associated with poorer outcomes **(Figure 2).** Survival also varied by histopathological subtype, with serous carcinoma showing the worst prognosis **(Figure 3)**, and by FIGO stage, where advanced stages were associated with significantly shorter survival **(Figure 4).**

Table 5. Survival Analysis by Stage (FIGO)

Stage (FIGO)	N	Observed Events	Expected Events	Median Survival (days) [95% CI]	1-year Survival (%)	3-year Survival (%)	5-year Survival (%)
1	40	3	10.63	NA	93 (85–100)	85 (73–100)	78 (62–97)
2	57	9	10.57	NA (1006)	91 (84–99)	82 (70–96)	75 (61–91)
3	64	21	14.87	921 (717–NA)	88 (79–97)	70 (58–84)	55 (42–72)
4	17	7	3.93	1178 (484–NA)	95 (82–100)	82 (64–100)	72 (52–99)

NA = Not available (median survival not reached due to censoring). Survival estimates are Kaplan–Meier percentages with 95% confidence intervals in parentheses. Overall log-rank test comparing the four groups: p = 0.014. Pairwise log-rank comparisons: 1 vs 2: p = 0.119, 1 vs 3: p = 0.003, 1 vs 4: p = 0.004, 2 vs 3: p = 0.201, 2 vs 4: p = 0.119, 3 vs 4:, p = 0.629

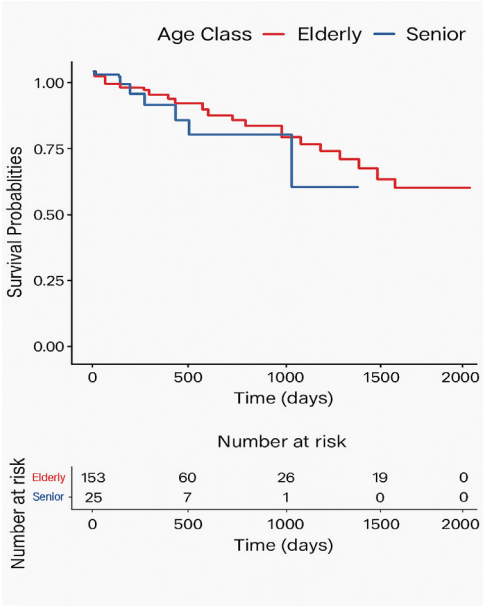

Figure 1. Kaplan–Meier Survival Curve by Age Group

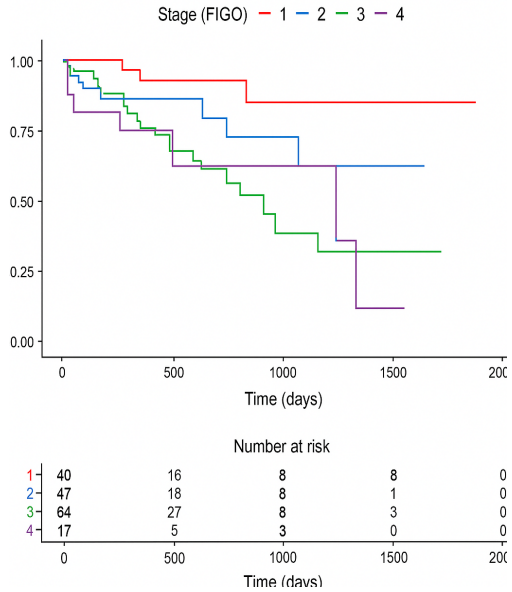

Figure 2. Kaplan–Meier Survival Curves by Primary Tumor Site

DISCUSSION

This study evaluated geriatric women undergoing surgery for gynecologic malignancies, comparing POSSUM and P-POSSUM predicted risks with observed outcomes. Although patients aged ≥90 years had higher physiological scores and predicted

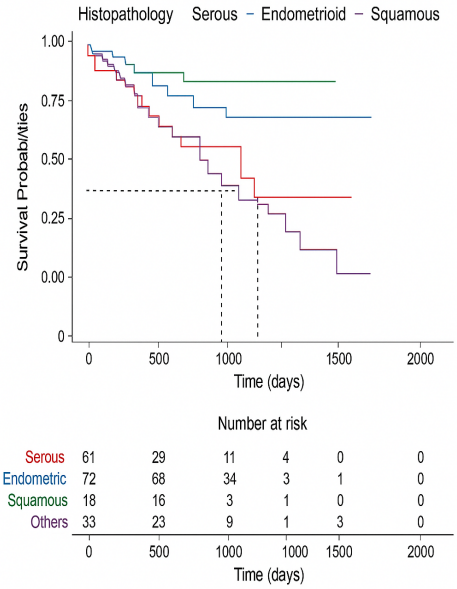

Figure 3. Kaplan–Meier Survival Curves by Histopathological Subtype

morbidity/mortality, actual survival outcomes and 30-day results did not significantly differ from those of patients aged 75–89 years. Interestingly, absolute survival rates at 1, 3, and 5 years appeared numerically higher in the senior group, but this difference was not statistically significant, confirming that advanced chronological age alone does not necessarily translate into poorer outcomes. These findings reinforce that chronological age alone should not contraindicate surgery in well-selected patients (1,3,8,9).

Our results align with prior studies questioning the calibration of POSSUM models. Teeuwen et al. showed that POSSUM overestimated mortality while P-POSSUM and CR-POSSUM underestimated it in colorectal resections, with limited discriminative ability in malignancy (10). Similarly, we observed that POSSUM overstated risks in seniors, while observed outcomes remained acceptable. Copeland's original POSSUM and Prytherch's P-POSSUM were designed primarily for surgical audit rather than individual prognostication, which may explain the overprediction (6,7).

Other studies support these observations. Brooks et al. highlighted limited accuracy of POSSUM in high-risk surgical patients (11). Horzic et al. and Tez et al. showed CR-POSSUM had somewhat improved predictions, but calibration remained suboptimal in malignancies (12,13). Ferjani et al. proposed an alternative model with superior performance in colorectal cancer (14). More recently, Eswaravaka et al. revisited POSSUM and P-POSSUM in ileal perforation cases, again confirming their predictive limitations in complex surgical populations (15). Together, these reports indicate that POSSUM retains utility for audit and benchmarking but lacks precision for individualized risk assessment in oncology.

In addition, survival outcomes in our cohort varied significantly according to tumor site and histopathological subtype. Patients with ovarian cancer, particularly those with serous carcinoma, demonstrated poorer survival compared to endometrial cancer and endometrioid subtypes, which is consistent with their known aggressive clinical behavior. These results highlight the importance of

integrating tumor biology into perioperative risk stratification alongside scoring systems such as POSSUM and P-POSSUM.

In our study, the findings that median survival was not reached for FIGO stages I and II, whereas definitive median values were observed for stages III and IV, are consistent with the results of Inoue et al. (2019), who reported high five-year survival in elderly patients with localized (early-stage) ovarian and endometrial cancers (16). Furthermore, SEER and American Cancer Society data indicate that endometrial cancer has excellent five-year survival rates in localized disease (~96%), but markedly lower rates in regional and distant stages (17). When compared with our stage I–II groups, our 1-, 3-, and 5-year survival estimates (e.g., ~93–100% for stage I) appear reasonably consistent with these population data.

For ovarian cancer, SEER statistics show that survival is excellent when diagnosed at an early stage (localized ~92%), while outcomes decline substantially with distant spread (18). This pattern supports the decrease in survival we observed in our stage III–IV patients.

Strengths and Limitations: This study's strengths include its focus on a narrowly defined geriatric cohort and use of validated scoring systems. Limitations include retrospective design, single-center scope, and small sample size in the ≥90 years group.

Implications: POSSUM and P-POSSUM can support perioperative planning but should be interpreted cautiously. Integration with comprehensive geriatric assessment is recommended for individualized risk evaluation in gynecologic oncology.

CONCLUSİON

POSSUM and P-POSSUM scoring systems predicted higher morbidity and mortality risk in very elderly patients (≥90 years); however, observed 30-day outcomes and overall survival did not significantly differ from those aged 75–89 years. These findings suggest that advanced chronological age alone should not be considered a contraindication for surgical treatment of gynecologic malignancies. Careful patient selection and optimization can result in comparable survival outcomes across geriatric subgroups. Consistent with prior evidence of superior outcomes in localized disease and poorer survival in advanced stages (16–18), our findings confirm the prognostic relevance of FIGO staging in elderly gynecologic cancers.

What is Already Known on This Topic?

- POSSUM and P-POSSUM are validated tools for predicting morbidity and mortality in general and oncologic surgeries.
- Older age is associated with increased comorbidity and decreased physiologic reserve, complicating surgical decision-making.

What Does This Study Add?

- This is one of the first studies to evaluate POSSUM and P-POSSUM in geriatric gynecologic oncology.
- Despite higher predicted risks in very elderly women (≥90 years), actual survival outcomes were similar to those of patients aged 75–89 years.
- Supports the notion that age alone should not preclude surgery in gynecologic malignancies.

ACKNOWLEDGEMENT

Ethics Committee Approval

This study was approved by the Başakşehir Çam and Sakura City Hospital Scientific

Research Ethics Committee (Approval No: KAEK/28.05.2025.134, Approval Date: 28 May 2025). Patient consent was waived due to retrospective design, as approved by the Ethics Committee. This study was conducted in accordance with the Declaration of Helsinki.

Author Contributions:

Conceptualizatio:G.G.,A.H.,İ.T.Y.; Methodology: G.G., İ.T.Y.; Data Curation: G.G.; Formal Analysis: GG, İTY; Investigation: G.G.; Visualization: G.G., İTY; Writing – Original Draft: G.G., İTY; Writing – Review & Editing: All authors

Declaration of Interests

The authors declare no competing interests.

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Data Availability

De-identified data that support the findings of this study are available from the corresponding author upon reasonable request and with permission of Basaksehir Cam and Sakura City Hospital.

AI Statement

Artificial intelligence tools (ChatGPT, OpenAI) were used to improve the English language and formatting of this manuscript. No AI tool was involved in study design, data collection, statistical analysis, or interpretation.

Clinical trial registration

Not applicable. This study is a retrospective observational study and does not involve prospective assignment of participants to health-related interventions

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REFERENCES

1. Smith BD, Smith GL, Hurria A, Hortobagyi GN, Buchholz TA. Future of cancer incidence in the United States: Burdens upon an aging, changing nation. J. Clin. Oncol. 2009, 27, 2758–2765. https://doi.org/10.1200/JCO.2008.20.8983.
2. Siegel RL, Miller KD, Fuchs HE, Jemal A. Cancer statistics, 2022. CA Cancer J. Clin. 2022, 72, 7–33. https://doi.org/10.3322/caac.21708.
3. World Health Organization (WHO). Ageing and Health. 2022. Available online: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health (accessed on 10 February 2025).
4. Suh DH, Kim JW, Kim HS, Chung HH, Park NH, Song YS. Pre- and intra-operative variables associated with surgical complications in elderly patients with gynecologic cancer: The clinical value of comprehensive geriatric assessment. J. Geriatr. Oncol. 2014, 5, 315–322. https://doi.org/10.1016/j.jgo.2014.04.003.
5. Cioli Puviani F, Calogero P, Bianchi G, De Benedetti P, Boussedra S, Dondi, G, et al. Pre-operative geriatric screening and assessment as predictors of postoperative complications in older adults with gynecologic cancer: A pilot cohort study. J. Geriatr. Oncol. 2023, 14, 101419. https://doi.org/10.1016/j.jgo.2023.04.002.
6. Copeland GP, Jones D, Walters M. POSSUM: A scoring system for surgical audit. Br. J. Surg. 1991, 78, 355–360. https://doi.org/10.1002/bjs.1800780327.
7. Prytherch DR, Whiteley MS, Higgins B, Weaver PC, Prout WG, Powell SJ. POSSUM and Portsmouth POSSUM for predicting mortality. Br. J. Surg. 1998, 85, 1217–1220. https://doi.org/10.1046/j.1365-2168.1998.00840.x.
8. Chan JK, Sherman AE, Kapp DS, Zhang R, Osann K.E, Maxwell L, et al. Influence of gynecologic oncologists on the survival of patients with endometrial cancer. J. Clin. Oncol. 2011, 29, 832–838. https://doi.org/10.1200/JCO.2010.31.1316.
9. Duska L, Shahrokni A, Powell M. Treatment of older women with endometrial cancer: Improving outcomes with personalized care. Am. Soc. Clin. Oncol. Educ. Book 2016, 35, 164–174. https://doi.org/10.14694/EDBK_159008.
10. Teeuwen PHE, Bremers AJA, Groenewoud JMM, van Laarhoven CJHM, Bleichrodt RP. Predictive value of POSSUM and ACPGBI scoring in mortality and morbidity of colorectal resection: A case–control study. J. Gastrointest. Surg. 2011, 15, 294–303. https://doi.org/10.1007/s11605-010-1354-0.
11. Brooks MJ, Sutton R, Sarin S. Comparison of surgical risk score, POSSUM and P-POSSUM in higher-risk

surgical patients. Br. J. Surg. 2005, 92, 1288–1292. https://doi.org/10.1002/bjs.5058.

12. Horzic M, Kopljar M, Cupurdija K, et al. Comparison of P-POSSUM and CR-POSSUM scores in patients undergoing colorectal cancer resection. Arch. Surg. 2007, 142, 1043–1048. https://doi.org/10.1001/archsurg.142.11.1043.

13. Tez M, Yoldas O, Gocmen E, et al. Evaluation of P-POSSUM and CR-POSSUM scores in patients with colorectal cancer undergoing resection. World J. Surg. 2006, 30, 2266–2269. https://doi.org/10.1007/s00268-005-0675-8.

14. Ferjani AM, Griffin D, Stallard N, et al. A newly devised scoring system for prediction of mortality in patients with colorectal cancer: A prospective study. Lancet Oncol. 2007, 8, 317–322. https://doi.org/10.1016/S1470-2045(07)70045-1.

15. Eswaravaka S, Suhrid C, Rao B, Prabhakar S, Pandya J. Revisiting Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM) and Portsmouth-POSSUM (P-POSSUM) Scores: Are They Valid in Cases of Ileal Perforation? Cureus 2024, 16, e62104. https://doi.org/10.7759/cureus.62104.

16. Inoue Y, Kodama J, Nakamura K, Hongo A, Hiramatsu Y. Net survival of elderly patients with gynecological cancer. *J Gynecol. Oncol. 2019, 30, e94*. https://doi.org/10.3802/jgo.2019.30.e94.

17. American Cancer Society. Survival Rates for Endometrial Cancer. Available at: https://www.cancer.org/cancer/types/endometrial-cancer/detection-diagnosis-staging/survival-rates.html(accessed 15 Sept 2025).

18. American Cancer Society. Ovarian Cancer Survival Rates. Available at: https://www.cancer.org/cancer/types/ovarian-cancer/detection-diagnosis-staging/survival-rates.html (accessed 15 Sept 2025).