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ORIGINAL RESEARCH

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Primary *vs.* interval cytoreduction for high-grade serous ovarian cancer: oncological outcomes from a retrospective study at a single tertiary referral center

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Abstract

High-grade serous carcinomas are the most prevalent subtype of ovarian cancer. While primary debulking surgery (PDS) remains as standard approach, neoadjuvant chemotherapy (NACT) followed by interval debulking surgery (IDS) is an alternative for certain patients. Our study aims to compare the oncological outcomes of these strategies in our clinic. Our retrospective study involves the patients diagnosed with advanced stage high-grade serous ovarian cancer (HGSOC) at Hacettepe University Gynecologic Oncology Clinic from January 2014 to May 2021. Patients were categorized into two groups: PDS group and NACT/IDS group. We conducted a comparison between these groups, analyzing patient characteristics, staging and subsequent oncological follow-up outcomes. A total of 151 patients were enrolled in study population, with the PDS group consisting of 77 patients whereas the NACT/IDS group 74. The median follow-up period of our study was determined as 45 months. The median overall survival (OS) of the study population was determined to be 54 months, and the median progression-free survival (PFS) was 11 months. Accordingly, our study involved an attempt to identify independent variables that may have an impact on OS and PFS. Multivariate analysis confirmed that achieving "no residual tumor after surgery" directly influences OS rates (Hazard Ratio (HR): 0.57 (95% Confidence Interval (CI) 0.34–0.96); $p = 0.034$). Regarding overall survival (HR: 0.74 (95% CI 0.45–1.22); log rank $p = 0.234$) and progression-free survival (HR: 0.728 (95% CI 0.50–1.06); log rank $p = 0.083$), it was demonstrated that both strategies yield comparable oncological outcomes. Furthermore, the impact of pandemic on the preference of treatment strategy has also been evaluated. NACT/IDS and PDS strategies have comparable oncological outcomes, in terms of surgical complications, recurrence and survival rates. However, if it is envisaged that no residual disease after surgery with appropriate patient selection, PDS strategy can be considered as leading option.

Keywords

Ovarian cancer; Neoadjuvant therapy; Gynecologic surgical procedures

1. Introduction

Ovarian cancer, which ranks 9th in frequency among cancers seen in women, is notably significant type of cancer with an incidence of 3.4% and a mortality rate of 4.7% [1]. Since it does not cause any symptoms in the early stages and it has no screening method, ovarian cancer frequently diagnosed in advanced stages, resulting in higher mortality rates [2]. In particular, this situation notably complicates both the surgical and medical management of the disease.

The standard approach for advanced-stage ovarian cancer involves PDS followed by a combined adjuvant chemotherapy (ACT) regimen containing platinum and paclitaxel. Additionally, relatively new therapeutic agents begin to be used in first-line and recurrent treatment settings. Especially, recent studies emphasize the impact of Poly (ADP-ribose) polymerase inhibitors (PARP inhibitors) in maintenance therapy, particularly on PFS [3].

Interval debulking surgery, after neoadjuvant chemotherapy, is one of the most prominent option among these alternative management strategies [4]. However, there are several areas of contention, like determining the superiority of strategy between these and the appropriate patient selection for each. In this regard, prospective randomized clinical trials have been undertaken, leading to the conclusion that the IDS strategy following NACT might be comparably acceptable to the PDS approach [5–8].

The first prospective randomized clinical trial in this do-

main, the European Organization for Research and Treatment of Cancer (EORTC) 55971 trial, revealed nearly double the optimal surgery rate in the NACT/IDS group (80.6%) versus the PDS group (41.6%). The study assessed that median PFS (12 months) and OS (29–30 months) were comparable between groups, indicating that NACT/IDS could be non-inferior to PDS [6]. The subsequent trial following the EORTC 55971 trial was the Medical Research Council Chemotherapy or Upfront Surgery (CHORUS) study trial in 2015. It was noted that the macroscopic tumor-free surgical rate after NACT/IDS treatment (39%) increased almost 2.5 times in comparison to PDS (17%) [7]. In another study that collectively examined both trials, similar median PFS and median OS were found between both treatment strategies [8]. Unlike the results in those trials, the Japan Clinical Oncology Group (JCOG) 0602 trial, concluded in 2019, could not confirm the non-inferiority of NACT/IDS strategy, also suggested that NACT/IDS strategy might not always be a substitute for PDS. However, it was emphasized that the results obtained in previous trials cannot be rejected due to the smaller sample size of the trial [9]. According to the Surgical Complications Related to Primary or Interval debulking in Ovarian Neoplasm (SCORPION) trial concluded in 2020, both treatment strategies demonstrated comparable outcomes in terms of PFS and OS rates. However, results highlighted different toxicity profiles between the NACT/IDS and PDS strategies concerning surgical complexity, operation time and post-operative complications, making it the first trial to suggest a potential superiority for the NACT/IDS strategy in this context [5]. In a 2021 Cochrane meta-analysis incorporating the aforementioned studies, it was found that both treatment strategies showed similar PFS and OS rates. Additionally, patients in the NACT/IDS arm experienced fewer complications, suggesting potential advantages in this aspect [2]. Other summarized aspects within the meta-analysis study include:

• The combination of surgery and chemotherapy is recommended for Stage IIIC/IV epithelial ovarian cancer. The sequence in which these are administered seems to have minimal impact on survival outcomes.

• NACT might enhance the chance of complete macroscopic cytoreduction, yet it does not necessarily improve OS rates.

• PDS is more preferable when complete macroscopic cytoreduction is achievable, in stage IIIC/IV epithelial ovarian cancer.

• NACT may be a more suitable or preferable alternative for patients in Stage IV or those with poor performance status or co-morbidities.

• The decision between PDS and NACT strategy can be determined using the Leuven criteria.

The main objective of our study is to assess and compare the oncological outcomes resulting from the implementation of these strategies in our clinic.

2. Materials and methods

2.1 Study design and participants

In our study, we included 276 patients diagnosed with HGSOC, Stage III or IV according to the International Federation of Gynecology and Obstetrics (FIGO) 2014 staging and received their treatment at Hacettepe University Faculty of Medicine, Department of Gynecology and Obstetrics, Division of Gynecologic Oncology, between January 2014 and May 2021. Patients with early-stage HGSOC (FIGO Stage I and II) were excluded from the study population, along with individuals with other epithelial cancers (low-grade serous, mucinous, endometrioid, clear cell carcinoma), non-epithelial cancers, and ovarian metastases from different primary origins. The study completion date is determined as April 2022. This study is derived from medical residency thesis of corresponding author.

2.2 Data collection and patient grouping

The data for this study were gathered retrospectively from hospital information management system records and Gynecologic Oncology Council records, incorporating all eligible patients with their medical information. All patients in our study underwent evaluation for treatment strategies by the multidisciplinary Gynecologic Oncology Council, which included specialists in Gynecologic Oncology Surgery, Medical Oncology, Radiation Oncology, and Medical Pathology, prior to their treatment.

In our clinic, the stages of patients are determined clinically and surgically according to the FIGO 2014 Ovarian Cancer staging, and the selection of patients for NACT/IDS or PDS strategies based on the patient selection criteria outlined in the European Society for Medical Oncology (ESMO)-European Society of Gynaecological Oncology (ESGO) 2019 guideline. Establishment of study subgroups and data preparation for statistical analysis is depicted in Fig. 1.

2.3 Procedure

Out of the 276 patients in our cohort, 125 were excluded from statistical analysis due to limitations in retrospective data screening as detailed in Fig. 1. Out of the remaining 151 patients, 74 were assigned to the NACT/IDS group and 77 to the PDS group, maintaining a 1:1 proportion.

The histopathological diagnoses and grades of the patients in the NACT/IDS group were confirmed by reviewing pathology reports within the hospital information management system prior to treatment. Patients in this group received an average of 3 cycles of platinum-based NACT. Chemotherapy responses of the patients were assessed radiologically using imaging studies conducted before and after NACT, following the "Response Evaluation Criteria in Solid Tumors—RECIST 1.1" scoring system [10] (**Supplementary Table 1**). Additionally, serological evaluations were conducted based on "Gynecologic Cancer Intergroup—GCIG" scoring using Cancer Antigen (CA)125 levels measured before and after NACT [11] (**Supplementary Table 2**).

Prior to treatment, patients in both groups had their largest pathological tumor sizes and clinical stages determined through an assessment of imaging methods (Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and Positron Emission Tomography (PET)-CT). These details were obtained from radiology reports recorded in the hospital information management system. At the same time, the

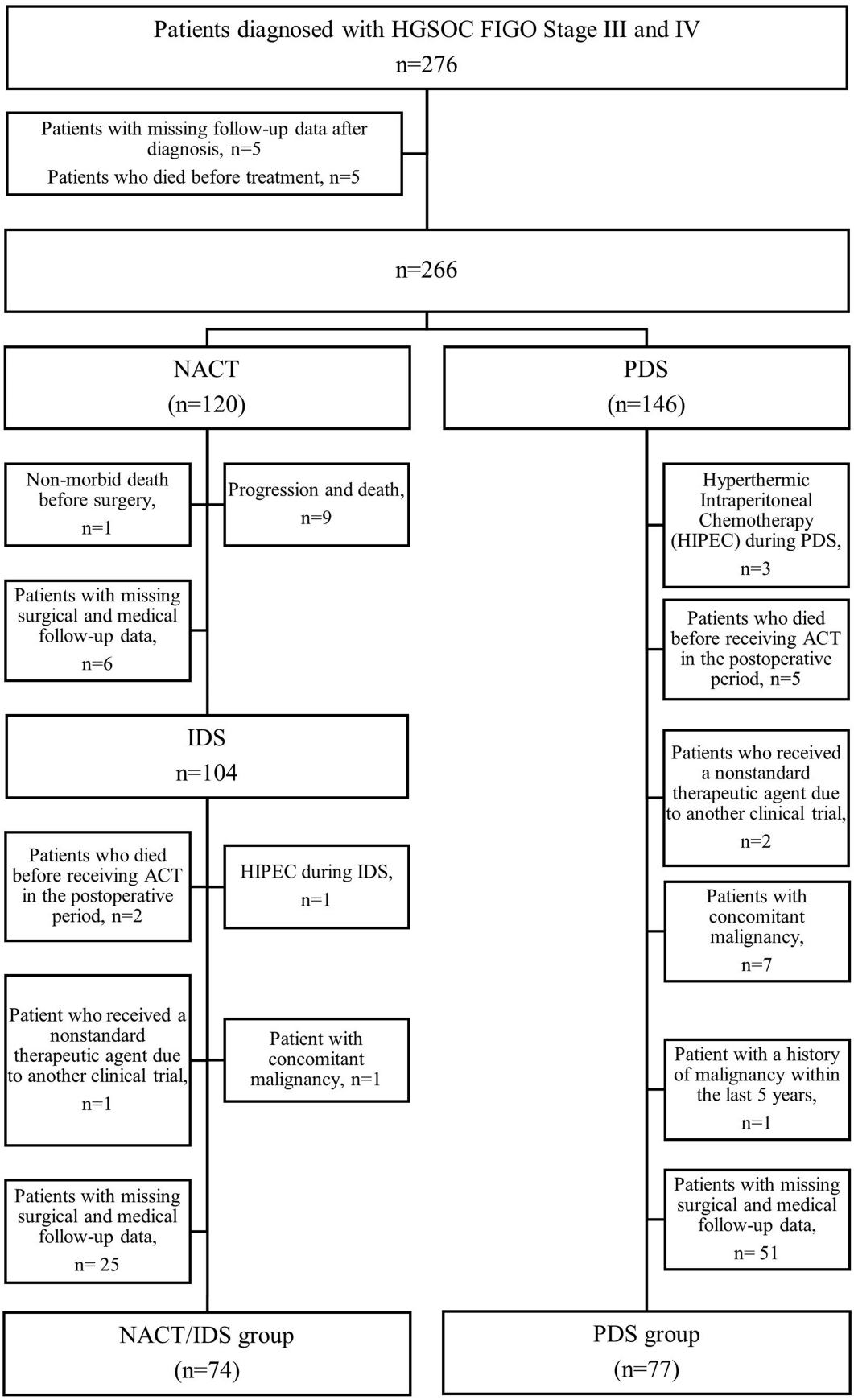

FIGURE 1. Study subgroups. HGSOC: high-grade serous ovarian cancer; FIGO: International Federation of Gynecology and Obstetrics; NACT: neoadjuvant chemotherapy; PDS: primary debulking surgery; ACT: adjuvant chemotherapy; IDS: interval debulking surgery.

performance status of these patients were evaluated according to the "Eastern Cooperative Oncology Group—ECOG" scores before treatment (**Supplementary Table 3**).

The surgical procedures involved abdominal hysterectomy, bilateral salpingo-oophorectomy (BSO), omentectomy, pelvic and para-aortic lymphadenectomy, appendectomy, pelvic and abdominal peritonectomy, rectosigmoidectomy, end-to-end anastomosis, small bowel resection, colon resection, diaphragmatic stripping, splenectomy and liver resections. Surgical characteristics of the groups were evaluated by using "Surgical Complexity Score (SCS)" which was defined by Aletti *et al*. [12] (**Supplementary Table 4**). The post-surgical cytoreduction degrees of both groups were determined by evaluating operation reports recorded in the hospital information management system, also cross-verified with pathology reports. Furthermore, postoperative pathology reports were reviewed to confirm surgical staging, histopathological diagnosis, grade and chemotherapy response following NACT. Pathology reports also provided data, including the number of surgically removed lymph nodes and the number of metastatic lymph nodes.

The assessed data encompassed postoperative complications experienced by the patients. The complications observed in the medical records were classified into early (0–1 month) and late (1–6 months) categories. Assessment was conducted following the "Memorial Sloan Kettering Cancer Center Surgical Secondary Events Grading System" [13] (**Supplementary Table 5**).

In the first-line treatment setting, patients in the NACT/IDS group received an average of 3 cycles of ACT, whereas patients in the PDS group received an average of 6 cycles of ACT after surgery. ACT regimens were composed of carboplatin, paclitaxel, bevacizumab and liposomal doxorubicin. However, regimens did not include PARP inhibitors which can be implemented in first-line therapy as a current approach [14]. Following the completion of ACT cycles, imaging study reports and serum CA125 results of patients in both groups were assessed to determine ACT responses by using the RECIST and GCIG scoring systems.

Patients who complete first-line therapy in our clinic are scheduled for follow-up appointments every 3 months for a period of 2 years, followed by appointments every 6 months for the subsequent 3 years, and then annually. The period from the date of the initial diagnosis to the date of death for patients, whose follow-up details were obtained from the hospital information management system, was calculated as the overall survival (OS). For the patients who remained alive during the follow-up period OS was calculated based on the endpoint of our study. Consequently, the follow-up period of our study was also determined by using the reverse Kaplan-Meier method.

The follow-up data and chemotherapy responses of patients in both study groups were collectively assessed, and the duration from the endpoint of the first-line treatment to the initial recurrence was calculated as the progression-free survival (PFS). Recurrence was defined as the status of patients who, following completion of ACT, initially had normal imaging study reports and CA125 results but later experienced a relapse, as well as the status of patients whose imaging study reports and serum CA125 results initially remained stable after ACT but later progressed.

In addition to these assessments, the number of recorded recurrences during the follow-up period and the initial treatments after the first recurrence were identified and incorporated into the data. The ultimate status of patients' follow-up was categorized into "cure during follow-up, remission during follow-up, stable disease during follow-up, progression during follow-up, and progressive disease—death". Furthermore, an attempt was made to statistically determine the factors influencing the survival of patient groups.

2.4 Statistical analysis

Statistical analysis was performed by using the SPSS® (Statistical Package for Social Sciences 22 for Windows IBM SPSS Inc., Chicago, IL, USA) program. Normality analysis for the distributions of the variables was evaluated using the Kolmogorov-Smirnov test and histogram graphs. Among the numerical variables, those with normal distribution are expressed as mean ± standard deviation, and those without normal distribution are expressed as median (min–max). Categorical variables are stated as numbers and percentages. *t*-test analysis was used for statistical analysis in normally distributed numerical variables, and Mann-Whitney U test was used for statistical analysis in non-normally distributed or ordinal numerical variables. Non-parametric Wilcoxon signed-rank test was used in dependent groups that did not have normal distribution. Statistical analysis was performed using Pearson Chi-Square test and Fisher's Exact test to compare categorical variables. The Kaplan-Meier method was used for survival analysis and comparisons were made with the log-rank test. Treatment strategies that were thought to have an impact on PFS and OS, age, ECOG score, tumor size at diagnosis, CA125 values and degrees of cytoreduction were tested with the Cox proportional hazard regression model. p value < 0.05 was considered statistically significant.

3. Results

The study population was comprised of 74 patients in the NACT/IDS group and 77 patients in the PDS group, as indicated in the retrospective evaluation depicted in Fig. 1.

3.1 Patient characteristics

The age span of study population ranged from 39 to 85 years, with a mean age of 59 (59 ± 9.54). 25 (16.6%) patients were in the premenopausal period and 126 (83.4%) patients were in the postmenopausal period. It was detected that 90 (59.6%) patients were alive, and 61 (40.4%) patients died within the study period.

Patients in both groups underwent serum CA125 measurements before receiving treatment. The median serum CA125 value for the study population was 970.5 (22.6–16,168). A significant difference in CA125 values at the time of initial diagnosis was observed between the groups ($p = 0.015$).

According to imaging study results obtained at the time of diagnosis for patients in both groups, the median tumor

size was 7 cm (1.2–29.0 cm). Ascites status of patients at the initial diagnosis was assessed based on imaging studies, revealing the presence of ascites in 129 (85.4%) patients. Among the 58 (45%) patients with ascites who underwent cytological examination, 56 (37.1%) patients tested positive. Additionally, an evaluation of the pleural effusion revealed that 41 (27.2%) patients presented with pleural effusion. Among the patients with pleural effusion, cytological examination was performed in 10 (24.4%) patients and cytological positivity was detected in 6 of them (14.6%). If it does not affect the clinical status of patient, pleural cytological evaluation is not routinely performed in our clinic. For this reason, the pleural cytological evaluation results for certain patients could not be obtained, resulting in insufficient data for comprehensive statistical analysis.

The performance status of the patients was assessed through the examination of ECOG scores. In our study, the median ECOG score among the patients was determined to be 1, and a statistically significant difference between the groups was observed ($p = 0.003$). The characteristics of the patients according to groups are summarized in Table 1.

In our study, another feature evaluated within the study population was the clinical staging, determined through pre-treatment imaging and pathological examinations of the patients. Every patient in our study population underwent clinical staging prior to treatment. The median clinical stage of the patient population in both groups was ascertained to be FIGO Stage IIIC. A significant difference was found between the groups in terms of clinical staging ($p = 0.001$). The clinical stages of the patients according to groups are summarized in Table 2.

3.2 Surgical and medical outcomes

The median number of chemotherapy cycles of 74 patients who received NACT after the initial diagnosis was assessed to be 3 cycles (3–6 cycles). 71 of these patients (95.9%) received the combination of carboplatin and paclitaxel regimen. Among 71 patients, the median number of cycles was assessed to be 3 (3–6 cycles). 58 (78.4%) patients received 3 cycles of carboplatin and paclitaxel regimen, 4 (5.4%) patients received 4 cycles of same regimen, 1 (1.4%) patient received 5 cycles, and 8 (10.8%) patients received 6 cycles of carboplatin and paclitaxel regimen. Among the remaining 3 patients (4.1%), 1 patient (1.4%) received 6 cycles of carboplatin, paclitaxel, bevacizumab and liposomal doxorubicin; another patient (1.4%) was administered 3 cycles of carboplatin and liposomal doxorubicin, and the last patient (1.4%) received 3 cycles of carboplatin and irinotecan regimens. The chemotherapy responses of the patients were verified with RECIST 1.1 and GCIG scoring systems and are summarized in Table 3.

Furthermore, tumor sizes, clinical stages and surgical stages of patients before and after NACT were individually compared based on their chemotherapy responses. As per the non-parametric Wilcoxon signed-rank test applied to the dependent groups, a significant difference was identified among these variables in patients responding to chemotherapy, as indicated by RECIST and GCIG scores (Tumor size; $p = 0.044$, Stage; $p < 0.001$). Yet, in the group showing no response to chemotherapy, there was no significant difference found between the variables (Tumor size; $p = 0.463$, Stage; $p = 0.317$).

Within our study population, the median surgical complexity score was determined to be 2 (moderate), irrespective of the groups. Specifically, 29 patients (19.2%) underwent high-difficulty debulking surgery (SCS-3), 100 patients (66.2%) underwent moderate-difficulty debulking surgery (SCS-2), and 22 patients (14.6%) underwent low-difficulty debulking surgery (SCS-1). Additionally, 87 (57.6%) patients who underwent completed (maximal) cytoreduction (residual tumor size = 0 cm) without leaving residual macroscopic tumor were identified. Apart from this, 38 (25.2%) patients with optimal cytoreduction (residual tumor size $\leq$1 cm) and 26 (17.2%) with suboptimal cytoreduction (residual tumor size $>$1 cm) were identified. In the context of advanced surgery, rectosigmoidectomy was performed in 20 (13.2%) patients, colon resection was performed in 8 (5.3%) patients, small bowel resection was performed in 5 (3.3%) patients, pelvic peritonectomy was performed in 74 (49%) patients, abdominal peritonectomy was performed in 62 (41%) patients, diaphragmatic stripping was performed in 30 (19.9%) patients, splenectomy was performed in 17 (11.3%) patients, and liver resection was performed in 4 (2.6%) patients. The median number of removed lymph nodes was 34 (1–165) and the median number of metastatic lymph nodes was 2 (0–51). The surgical characteristics of the patients according to groups are summarized in Table 4.

Based on the surgical staging, the median stage within the study population was determined to be FIGO Stage IIIC. Cumulatively, following clinical and surgical staging, 5 patients (3.3%) were identified in Stage IIIA1ii, 6 patients (4%) in Stage IIIB, 114 patients (75.5%) in Stage IIIC, 4 patients (2.6%) in Stage IVA, and 22 patients (14.6%) were classified as Stage IVB. 2 patients (1.3%) exhibited a complete response to the NACT regimen, with no tumoral tissue detected upon pathological examination. There was no statistically significant difference between the surgical stages of the groups ($p = 0.193$). In the PDS group, the stage of 3 (3.9%) patients were identified to be lower than their clinical stage, the stage of 11 (14.3%) patients was identified to be higher than their clinical stage, and the stage of 63 (81.8%) patients was consistent with their clinical stage. A significant difference was assessed between the clinical and surgical stages of the patients in the PDS group ($p = 0.005$). The postoperative stages of the patients according to groups are summarized in Table 5.

During the early postoperative period (0–1 month), complications were observed in 27 (17.9%) patients. Complication grades were assessed using the Memorial Sloan Kettering Cancer Center—Surgical Secondary Events Grading System, revealing grade 3 and 4 major complications in 23 (15.2%) patients. The data regarding early postoperative complications among the patients, categorized by groups, is outlined in Table 6.

During the late postoperative period (1–6 months) complications were observed in 18 (11.9%) patients. Complication grades were assessed using the Memorial Sloan Kettering Cancer Center—Surgical Secondary Events Grading System, revealing grade 3 and higher major complications in 11 (7.3%) patients. The data regarding late postoperative period compli-

TABLE 1. Patient characteristics according to groups.

Variable	PDS Group N. (%)	NACT/IDS Group N. (%)	*p* value
All patients	77	74	
Mean age (±SD)	58.8 (±9.6)	59.3 (±9.5)	0.760
Menopausal status			
Premenopausal	16 (20.8)	9 (12.2)	0.154
Postmenopausal	61 (79.2)	65 (87.8)	
ECOG Score			
0	39 (50.6)	22 (29.7)	
1	35 (45.5)	41 (55.4)	0.003
2	3 (3.9)	11 (14.9)	
Median serum CA125 level at initial diagnosis (IU/mL (range))	743.2 (25.3–11,007)	1257.0 (22.6–16,168)	0.015
Presence of ascites at initial diagnosis			
No	15 (19.5)	7 (9.5)	0.081
Yes	62 (80.5)	67 (90.5)	
Ascites cytology			
Negative	0	2 (3.9)	n/a
Positive	7 (100)	49 (96.1)	
Presence of pleural effusion at initial diagnosis			
No	61 (79.2)	49 (66.2)	0.072
Yes	16 (20.8)	25 (33.8)	
Pleural cytology			
Negative	2 (66.7)	2 (28.6)	n/a
Positive	1 (33.3)	5 (71.4)	
Median tumor size (cm) at initial diagnosis (range)	7.00 (1.2–24.0)	6.75 (1.2–29.0)	0.781

n/a: Not applicable; SD: Standard deviation; PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery; ECOG: Eastern Cooperative Oncology Group.

TABLE 2. Clinical stages of patients according to groups.

Clinical Stage	PDS Group N. (%)	NACT/IDS Group N. (%)	*p* value
IIIA1ii	4 (5.2)	1 (1.4)	
IIIB	6 (7.8)	0	
IIIC	63 (81.8)	60 (81.1)	0.001
IVA	0	4 (5.4)	
IVB	4 (5.2)	9 (12.2)	

PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery.

TABLE 3. Response scores to neoadjuvant chemotherapy in the NACT/IDS group.

Scoring	Number of patients (%)
RECIST 1.1	
No change/Progression	7 (9.5)*
Complete/Partial response	67 (90.5)
GCIG	
No change/Progression	7 (9.5)*
Complete/Partial response	67 (90.5)

**Of the 7 patients, 1 patient received 4 cycles of carboplatin/paclitaxel and the other 6 patients received 3 cycles of carboplatin/paclitaxel. Although there was no change or progression, IDS was applied to the patients.*
RECIST: Response Evaluation Criteria in Solid Tumors; GCIG: Gynecologic Cancer Intergroup.

TABLE 4. Surgical characteristics of patients according to groups.

Variable	PDS Group N. (%)	NACT/IDS Group N. (%)	*p* value
All patients	77	74	
Hysterectomy + BSO	77 (100.0)	71 (95.9)*	0.115
Omentectomy	76 (98.7)**	73 (98.6)***	1.000
Pelvic Lymphadenectomy	57 (74.0)	60 (81.1)	0.299
Para-aortic Lymphadenectomy	52 (67.5)	57 (77.0)	0.193
Median number of lymph nodes removed (range)	36 (1–104)	33 (2–165)	0.936
Median number of metastatic lymph nodes (range)	2 (0–51)	2 (0–38)	0.219
Appendectomy	51 (66.2)	53 (71.6)	0.475
Pelvic Peritonectomy	45 (58.4)	29 (39.2)	0.018
Abdominal Peritonectomy	35 (45.5)	27 (36.5)	0.263
Rectosigmoidectomy and End-to-end Anastomosis	15 (19.5)	5 (6.8)	0.021
Colon Resection	5 (6.5)	3 (4.1)	0.720
Diaphragm Stripping	19 (24.7)	11 (14.9)	0.131
Splenectomy	10 (13.0)	7 (9.5)	0.493
Liver Resection	3 (3.9)	1 (1.4)	0.620
Small bowel Resection	5 (6.5)	0	0.059
Cytoreduction Degree			
Suboptimal	16 (20.8)	10 (13.5)	
Optimal	22 (28.6)	16 (21.6)	0.201
Maximal	39 (50.6)	48 (64.9)	
Surgical Complexity Score			
Low (1)	15 (19.5)	7 (9.5)	
Moderate (2)	39 (50.6)	61 (82.4)	0.183
High (3)	23 (29.9)	6 (8.1)	

**In two patients, the diagnosis was made after hysterectomy. A patient is hysterectomized at diagnosis.*
***In one patient in the PDS group, the tumor was in the form of a mass and the omentum was not observed separately.*
****Diagnostic omentectomy was performed in one patient before IDS.*
PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery; BSO: bilateral salpingo-oophorectomy.

TABLE 5. Stages of patients according to groups.

Variable	PDS Group N. (%)	NACT/IDS Group N. (%)	*p* value
All patients	77	74	
FIGO Stage			
Stage III	64 (83.1)	61 (82.5)	
IIIA1ii	4 (5.2)	1 (1.4)	
IIIB	6 (7.8)	0	
IIIC	54 (70.1)	60 (81.1)	0.193
Stage IV	13 (16.9)	13 (17.6)	
IVA	0	4 (5.4)	
IVB	13	9 (12.2)	

PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery; FIGO: International Federation of Gynecology and Obstetrics.

TABLE 6. Early postoperative period (0–1 month) complications.

Variable	PDS Group N. (%)	NACT/IDS Group N. (%)	*p* value
All patients	77	74	
Patients with early postoperative complications	18 (23.4)	9 (12.2)	0.072
Early major complications (Grade 3 and 4)	16 (20.8)	7 (9.5)	0.053
Grade 3	15 (19.5)	7 (9.5)	
Pleural effusion	1 (1.3)	1 (1.4)	
Pneumothorax	1 (1.3)	0	
PTE	2 (1.6)	0	
Ascites	1 (1.3)	0	0.081
Bowel complications*	4 (5.2)	1 (1.4)	
Urinary system injury**	2 (2.6)	2 (2.7)	
Intra-abdominal bleeding	3 (3.9)	2 (2.7)	
Wound dehiscence and revision	2 (2.6)	1 (1.4)	

**Anastomotic leak, perforation; **Bladder perforation, ureter injury.*
PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery.

cations among the patients, categorized by groups, is outlined in Table 7.

Every patient in our study population received adjuvant chemotherapy regimens following their surgery. Within the PDS group, 75 patients were administered carboplatin/paclitaxel, while 1 patient received bevacizumab/liposomal doxorubicin, and another patient received the combination of carboplatin/paclitaxel/liposomal doxorubicin/topotecan regimen. Within the NACT/IDS group, 61 patients were administered carboplatin/paclitaxel, while 2 patients received carboplatin/paclitaxel/bevacizumab regimens. Furthermore, 3 patients underwent treatment with the carboplatin/liposomal doxorubicin/bevacizumab combination, 4 patients received liposomal doxorubicin/bevacizumab, 3 patients were administered carboplatin/liposomal doxorubicin, and 1 patient was treated solely with the liposomal doxorubicin regimen. Regardless of the groups, the median number of chemotherapy (including NACT and ACT) cycles was determined to be 6 (3–16) cycles. The median number of total chemotherapy cycles was determined as 7 (6–16) cycles for the NACT/IDS group and 6 (3–9) cycles for the PDS group ($p < 0.001$). Additionally, within the NACT/IDS group, the median number of ACT cycles was 3 (3–13) cycles, while in the PDS group, it was determined to be 6 (6–9) cycles. The ACT responses of the patients were verified with RECIST 1.1 and GCIG scoring systems and are summarized in Table 8.

3.3 Survival analysis

A total of 112 patients (74.2%) experienced a recurrence after first-line treatment. No recurrence was detected in 33 patients (21.9%). 6 (4%) patients died due to progressive disease. The median number of recurrences among patients who experienced recurrence was determined as 1 (ranging from 1 to 4). Among the patients with recurrence, 86 (57%) patients received only chemotherapy regimen as recurrence treatment, and 26 (17.2%) patients underwent surgery and received chemotherapy for recurrence treatment. Recurrence information of the patients according to groups is summarized in Table 9.

The median follow-up period of our study population was calculated as 45 months (5–91 months; 95% CI 35–55) by using reverse Kaplan Meier method. During this period, 61 (40.4%) patients died, and 90 (59.6%) patients were identified as being alive. The median OS of the study population was determined to be 54 months, which was 67 months for PDS group and 51 months for NACT/IDS group, respectively (HR 0.74 (95% CI 0.45–1.22); log rank $p = 0.234$). The median PFS of the study population was determined to be 11 months. The median PFS of PDS group was 12 months, whereas in the NACT/IDS group, it was 9 months (HR 0.728 (95% CI 0.50–1.06); log rank $p = 0.083$). Moreover, in our study, the 3-year survival rate was determined as 73% in the PDS group and 63% in the NACT/IDS group. The survival analysis of patients based on groups is depicted in Fig. 2.

In our study, we examined independent variables potentially influencing survival rates. Through multivariate Cox regression analysis, it was determined that achieving the principle of "no residual tumor after surgery" had a significant impact on OS ($p = 0.034$) (Table 10).

The final status of patients at the end of the study were also examined and subsequently incorporated into the data for statistical analysis. At the end of the study period, 47 (31.1%) patients were observed to be followed up as cured, 13 (8.6%) patients were in remission, 12 (7.9%) patients were observed to be in a stable disease status during follow-up, while 21 (13.9%) patients were in a period of progression, and death occurred in 58 (38.4%) patients due to progressive disease. Two of the 61 (40.4%) patients who died due to causes unrelated to the disease were initially observed to be cured during follow-up. One patient died due to septic shock while observed in a stable disease status. The follow-up outcomes of the patients

TABLE 7. Late postoperative period (1–6 months) complications.

Variable	PDS Group N. (%)	NACT/IDS Group N. (%)	*p* value
All patients	77	74	
Patients with late postoperative complications	9 (11.7)	9 (12.2)	0.928
Late-term major complications (Grade 3–5)	6 (7.8)	5 (6.8)	0.807
Grade 3	5 (6.5)	5 (6.8)	
Pleural effusion	0	2 (2.7)	
Abdominopelvic abscess	2 (2.6)	3 (4.1)	0.948
Lymphocele	2 (2.6)	0	
Incisional hernia	1 (1.3)	0	
Grade 4	0	0	
Grade 5 (Death)	1*	0	1.000

**The patient has completed the ACT regimen.*
PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery.

TABLE 8. Response scores of patients to adjuvant chemotherapy by groups.

Scoring	PDS Group N. (%)	NACT/IDS Group N. (%)	*p* value
All patients	77	74	
RECIST 1.1			
No change/Progression	6 (7.8)	19 (25.7)	0.003
Complete/Partial response	71 (92.2)	55 (74.3)	
GCIG			
No change/Progression	6 (7.8)	19 (25.7)	0.003
Complete/Partial response	71 (92.2)	55 (74.3)	

PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery; RECIST: Response Evaluation Criteria in Solid Tumors; GCIG: Gynecologic Cancer Intergroup.

categorized by groups are presented in Table 11.

3.4 Impact of COVID-19 on strategy selection

Irrespective of these results, in our study we also investigated the impact of the Coronavirus Disease (COVID-19) pandemic, which coincided with our study period in our country, on the preference of treatment strategies. Strategy preference before and after the pandemic did not exhibit a statistically significant difference (Table 12).

4. Discussion

The standard approach for primary treatment in advanced-stage ovarian cancer involves primary debulking surgery (PDS) aiming for no residual macroscopic disease, followed by platinum-based adjuvant chemotherapy (ACT) regimens [15]. However, some patients are not suitable candidates for primary surgery due to conditions such as age, performance status, co-morbidities and the spread of the disease that impeding optimal cytoreduction. As a result of these restrictive conditions, IDS treatment after NACT appears as an alternative management strategy [15, 16]. Certain studies in the literature have especially focused on the suitable patient selection for these strategies [15, 17] and the oncological outcomes [18].

There exist four primary prospective randomized clinical trials [5–7, 9] and one meta-analysis study [2] that assessed the oncological outcomes of both treatment strategies, considering factors such as surgical complexity, degree of cytoreduction, post-surgical complications, quality of life, chemotherapy toxicity, PFS and OS. The outcomes of these trials, with the exception of one trial [9], indicated that the oncological outcomes of the NACT/IDS strategy and the PDS strategy were comparable in terms of survival. Also it was indicated that the NACT/IDS strategy might lead to a reduction in post-surgical complications [5]. In our study, the main objective was to assess the oncological outcomes of both strategies in our clinic,

TABLE 9. Recurrence analysis of patients according to groups.

	PDS Group N. (%)	NACT/IDS Group N. (%)	*p* value
All patients	74*	71*	
Recurrence			
No	18 (24.3)	15 (21.1)	0.646
Yes	56 (75.7)	56 (78.9)	
Median number of recurrences in patients with recurrence (range)	1 (1–3)	1 (1–4)	0.218
First Recurrence Treatment			
Chemotherapy	38 (67.9)	48 (85.7)	0.025
Surgery + Chemotherapy	18 (32.1)	8 (14.3)	

**Three patients each in the PDS and NACT/IDS groups died due to progressive disease.*
PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery.

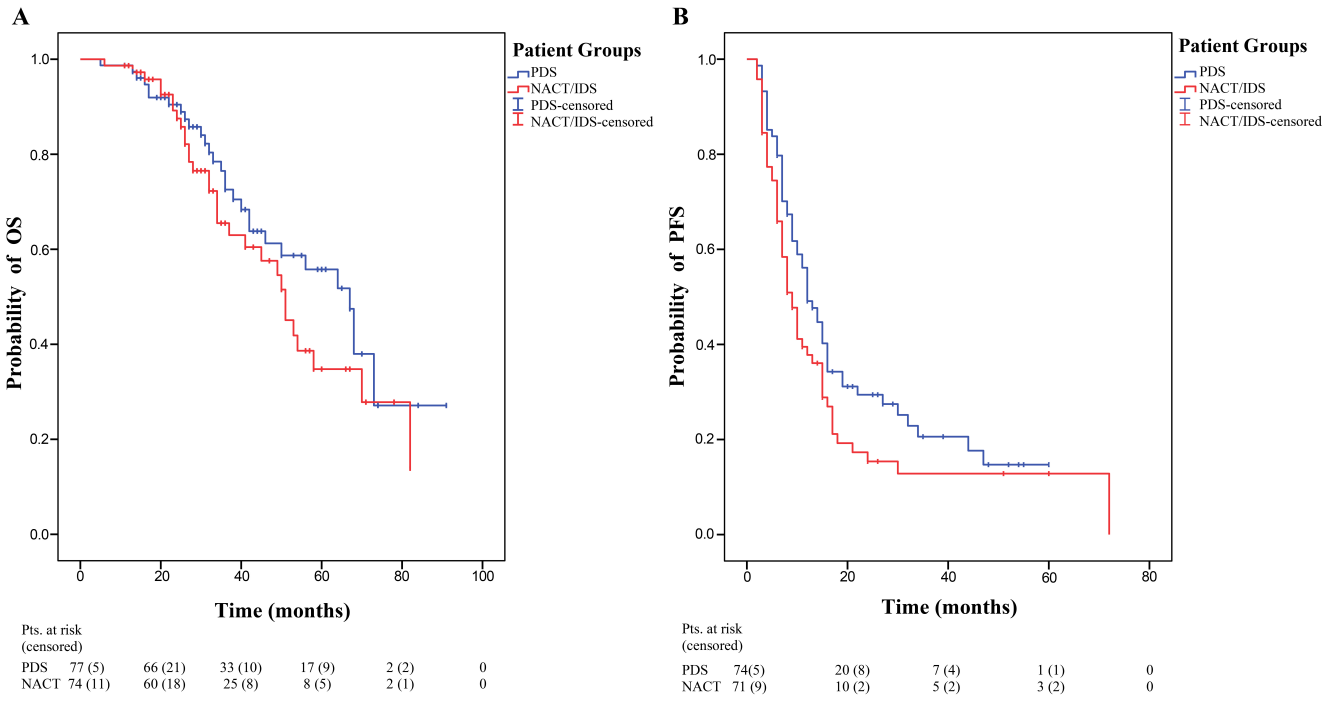

FIGURE 2. Survival analysis. According to survival analysis, no significant difference has been demonstrated between study groups in terms of Overall Survival (OS) (A) and Progression-free Survival (PFS) (B). Additionally, 3-year OS was 73% and 63% for PDS and NACT/IDS groups, respectively. PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery; CI: Confidence Interval.

taking into account the fundamental criteria from these studies, and ultimately establish a general conclusion that aligns with finding similar outcomes between the NACT/IDS and PDS strategies.

Our study population was divided into PDS (n = 77) and NACT/IDS (n = 74) groups maintaining 1:1 ratio, following a pattern similar to previous studies [5–7] (Fig. 1). Regarding patient characteristics, no significant differences were observed between the groups in terms of age (p = 0.760), menopausal status (p = 0.154), presence of ascites and pleural effusion at diagnosis (p = 0.081; p = 0.072), median tumor size (p = 0.781), and efforts were undertaken to standardize the groups. However, our study is a single-center retrospective study. In contrast to the pioneer trials used for comparison, those were prospective, multicenter and randomized clinical trials. This factor significantly diminishes the power of our study. Especially, the comparatively smaller size of our study population, which is notably less than EORTC, CHORUS and JCOG trials is a significant factor to consider. Despite of the similarity in our study population size to the SCORPION trial,

TABLE 10. Cox proportional hazard regression model.

Overall survival (OS)	Multivariate analysis		
Parameter	HR	95% CI	*p* value
Patient groups*	1.12	0.64–1.96	0.688
Age	0.99	0.95–1.03	0.573
ECOG Score	1.43	0.82–2.52	0.207
CA125 level at diagnosis	1.00	0.99–1.01	0.218
Stage	1.13	0.81–1.59	0.453
Cytoreduction grade**	0.57	0.34–0.96	0.034
Progression-free survival (PFS)	Multivariate analysis		
Parameter	HR	95% CI	*p* value
Patient groups*	1.25	0.83–1.88	0.286
Age	0.99	0.97–1.02	0.727
ECOG Score	1.18	0.76–1.82	0.453
CA125 level at diagnosis	1.00	0.99–1.01	0.055
Stage	0.99	0.82–1.22	0.984
Cytoreduction grade**	0.73	0.49–1.08	0.113

HR: Hazard ratio; CI: Confidence interval; ECOG: Eastern Cooperative Oncology Group; CA125: Cancer Antigen 125.
**PDS and NACT/IDS; **No residual tumor—R > 0.*

TABLE 11. Follow-up status of patients by groups.

	PDS Group N. (%)	NACT/IDS Group N. (%)	*p* value
All patients	77	74	
Status			
Cure	29 (37.7)*	18 (24.3)**	
Remission	10 (13.0)	3 (4.1)	
Stable disease	2 (2.6)*	10 (13.5)	0.012
Progression	8 (10.4)	13 (17.6)	
Progressive disease and death	28 (36.4)	30 (40.5)	

**In the PDS group, one patient had a cause of death other than disease and related conditions and one patient with stable disease during follow-up died due to septic shock.*
***In the NACT/IDS group, one patient had a cause of death other than disease and related conditions.*
PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery.

TABLE 12. Impact of COVID-19 pandemic on strategy selection.

Groups	PDS Group (77) N. (%)	NACT/IDS Group (74) N. (%)	*p* value
Initial diagnosis			
Before pandemic	67 (87.0)	56 (75.7)	0.073
After pandemic	10 (13.0)	18 (24.3)	

PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery.

the absence of a conducted power analysis remains a notable drawback in our study.

In the study population, an attempt was made to determine the stage of the disease clinically before treatment. Similar to CHORUS [7] and JCOG0602 [19] trials the clinical stages of the patients were determined by imaging and cytopathological examinations. As a result of this examination, a significant difference in clinical staging was detected between the groups (p = 0.001). As per these assessments, the PDS strategy is frequently preferred for patients with Stage IIIB and below, while the NACT/IDS strategy tends to be favored for patients with Stage IIIC and higher (Table 2). However, a factor, which might notably impact this assessment, has to be taken into consider. Especially, if it does not affect the clinical status of patient, pleural cytological evaluation is not routinely performed in our clinic. As a result, pleural cytological evaluation wasn't conducted for certain patients. This suggests potential missing data for the clinical staging of patients, particularly those with Stage IVA, which could pose a drawback for the study. Also, a study indicated that the positive predictive value of clinical staging in advanced-stage ovarian cancer was 95% [20]. However, in the same study, it was emphasized that the reliability of clinical staging based on imaging, especially in Stage IIIB and below disease, is not that high and that Stage IIIA1i disease cannot be accurately detected, as in our study (Table 2).

In contrast to the SCORPION [5] and JCOG0602 [19] trials, which highlighted significant differences between the groups, particularly in upper abdomen surgery, bowel resection, and retroperitoneal lymph node dissection, our study observed a comparable surgical complexity between the two groups. Furthermore, in our study, we also used "surgical complexity scoring" system, same as the SCORPION trial [5]. In contrast to this trial, both groups yielded comparable results in our study (p = 0.183) (Table 4). The data concerning the cytoreduction degrees from the pioneer trials and our own study is detailed in Table 13. At our clinic, achieving "no residual tumor after surgery" has been predominantly accomplished for both the PDS and IDS groups. Based on these evaluations, our study did not demonstrate a discernible difference in surgical degrees between the PDS and NACT/IDS strategies. Nevertheless, a limitation of our study is the absence of surgical details, such as duration of operation, blood loss and discharge time, all of which were examined in pioneer trials but were not part of outcomes of this study. Acquiring this data would facilitate a more precise evaluation, especially in demonstrating the surgical proficiency of our clinic and understanding the surgical circumstances that adhere to the principle of complete tumor removal.

Another notable aspect concerning the surgical details is the pelvic and para-aortic lymphadenectomy. Our study noted a comparable occurrence of retroperitoneal lymph node dissection (LND) among patients in both groups (Pelvic LND; p = 0.299, Para-aortic LND; p = 0.193). In contrast to other studies, our research also presents data on the quantity of removed lymph nodes and the amount identified as metastatic (Table 4). While no significant difference was observed between the groups, the median number of removed lymph nodes for the study population was 34 (1–165), with a median number of metastatic lymph nodes was 2 (0–51). The calculated metastasis detection rate was 13.4%. Despite these numbers falling short of the Lymphadenectomy in Ovarian Neoplasms (LION) trial (median number of lymph nodes removed: 57, with a metastasis detection rate of 55.7%) [21], we believe that this situation might be a result of the impact of the LION trial on our clinical approach. Concurrently with the LION trial, we surmise that lymphadenectomy (LND) heightens postoperative complications without demonstrating a favorable impact on PFS and OS. Hence, our current preference in advanced-stage ovarian cancers is to refrain from performing LND if there is no macroscopic or radiological evidence of lymph node involvement. Nevertheless, a distinct study design might be more appropriate for this evaluation.

Another significant outcome in our study was the rates of postoperative complications. In contrast to the CHORUS [7], JCOG0602 [19] and SCORPION [5] trials, our study did not exhibit a significant difference in postoperative complications between the groups (Tables 6 and 7). In comparison with SCORPION trial [5], especially similar to our study in terms of study design, contradictory results concerning postoperative complications were observed (Table 14). Our study did not demonstrate that the NACT/IDS strategy yielded more favorable outcomes in terms of postoperative complications compared to the PDS strategy. This was presumed to be potentially due to the similarity in surgical complexity between the groups in our study (Table 4).

A notable missing data for our study was the inability to assess germline breast cancer gene (*gBRCA*) mutations within the cohorts. This limitation was due to the inability of accessing genetic test results for *gBRCA* mutations of the patients during the retrospective data analysis. This circumstance is considered as a limiting factor regarding the use of PARP inhibitors in maintenance therapy of patients with *gBRCA* mutations as a current approach and their impact on survival rates [22]. Even though it holds significance for patients with *gBRCA* mutations, studies also suggest that PARP inhibitors have an improving effect especially on survival rates in patients without this mutation [23, 24]. Especially, the PFS rates for patients with complete gross resection treated with PARP inhibitors are notably favorable [25]. However, none of the patients received PARP inhibitors as maintenance therapy or recurrence therapy within our study population. That was because the official approval for PARP inhibitors was not granted in Turkey during the study period. For this reason, we were unable to conduct an evaluation for the outcomes linked to the usage of PARP inhibitors in our study. In this context, we anticipate the results from studies conducted at the national level.

Another distinctive aspect analyzed within our study population was the recurrence characteristics observed within the groups. Through the study period, no significant difference was noted between the patient groups in terms of recurrence (p = 0.646) or the recurrence frequency (p = 0.218). This assessment supports the similarity in oncological outcomes between the two strategies, specifically regarding recurrence.

In our study, there were no significant differences detected in the OS and PFS rates of patients in both groups, consistent with the survival outcomes of pioneering trials (Fig. 2). The

TABLE 13. Cytoreduction degrees: pioneer trials and Hacettepe experiences.

Trials	PDS Groups N. (%)	NACT/IDS Groups N. (%)
EORTC 55791 [6]	N = 315	N = 295
No residual tumor	61 (19.4)	151 (51.2)
R ≤1 cm	70 (22.2)	87 (29.5)
R >1 cm	167 (53.0)	52 (17.7)
Missing data	17 (5.4)	5 (1.7)
CHORUS [7]	N = 255	N = 219
No residual tumor	39 (15.3)	79 (36.1)
R ≤1 cm	57 (22.4)	68 (31.1)
R >1 cm	137 (53.7)	54 (24.7)
Missing data	22 (8.6)	18 (8.2)
JCOG0602 [19]	N = 147	N = 150
No residual tumor	45 (30.6)	83 (55.3)
R <1 cm	47 (32.0)	24 (16.0)
R ≥1 cm	55 (37.4)	23 (15.3)
Missing data	0	20 (13.3)
SCORPION [5]	N = 84	N = 74
No residual tumor	40 (47.6)	57 (77.0)
R ≤1 cm	38 (45.2)	16 (21.6)
R >1 cm	6 (7.1)	1 (1.4)
HACETTEPE	N = 77	N = 74
No residual tumor	39 (50.6)	48 (64.9)
R ≤1 cm	22 (28.6)	16 (21.6)
R >1 cm	16 (20.8)	10 (13.5)

PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery; EORTC: European Organization for Research and Treatment of Cancer; CHORUS: Medical Research Council Chemotherapy or Upfront Surgery; JCOG: Japan Clinical Oncology Group; SCORPION: Surgical Complications Related to Primary or Interval debulking in Ovarian Neoplasm.

TABLE 14. Postoperative complications: pioneer trials and Hacettepe experiences.

Trials	PDS Groups N. (%)	NACT/IDS Groups N. (%)	*p* value
EORTC 55791 [6]	N = 336	N = 334	
All postoperative major complications	n/a	n/a	n/a
CHORUS [7]	N = 276	N = 274	
All postoperative major complications	66 (24)	38 (14)	0.0007
JCOG 0602 [19]	N = 149	N = 152	
All postoperative major complications	23 (15.6)	7 (4.6)	0.0030
SCORPION [5]	N = 84	N = 74	
Early postoperative major complications	39 (46.4)	7 (9.5)	<0.0001
Late postoperative major complications	10 (11.9)	1 (1.4)	0.0090
HACETTEPE	N = 77	N = 74	
Early postoperative major complications	18 (23.4)	9 (12.2)	0.0720
Late postoperative major complications	9 (11.7)	9 (12.2)	0.9280

n/a: Not applicable. PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery; EORTC: European Organization for Research and Treatment of Cancer; CHORUS: Medical Research Council Chemotherapy or Upfront Surgery; JCOG: Japan Clinical Oncology Group; SCORPION: Surgical Complications Related to Primary or Interval debulking in Ovarian Neoplasm.

TABLE 15. Median survival rates: pioneer trials and Hacettepe experiences.

Trial	Overall Survival (OS) (months)		Progression-free Survival (PFS) (months)		Follow-up period (months)
	PDS Groups	NACT/IDS Groups	PDS Groups	NACT/IDS Groups	
EORTC55791 [6]	29.0	30.0	12.0	12.0	56.4
CHORUS [7]	22.6	24.1	10.7	12.0	52.8
JCOG0602 [19]	49.0	44.3	15.1	16.4	72.0
SCORPION [5]	41.0	43.0	15.0	14.0	59.0
HACETTEPE	67.0	51.0	12.0	9.0	45.0

PDS: primary debulking surgery; NACT: neoadjuvant chemotherapy; IDS: interval debulking surgery; EORTC: European Organization for Research and Treatment of Cancer; CHORUS: Medical Research Council Chemotherapy or Upfront Surgery; JCOG: Japan Clinical Oncology Group; SCORPION: Surgical Complications Related to Primary or Interval debulking in Ovarian Neoplasm.

median follow-up period in our study was 45 months (5–91 months, 95% CI 35–55), which was relatively shorter compared to the follow-up duration in RCTs. Despite of the shorter follow-up period, this was not reflected in the OS and PFS rates. The survival analysis revealed a higher median OS compared to other trials. Especially, it was surmised that this might be correlated with the maximal cytoreduction rates in our clinic. The median PFS was determined to be consistent with the results of pioneer trials. The OS and PFS of the pioneer trials and our study are summarized in Table 15. Accordingly, we evaluated independent variables that could impact survival rates. Consistent with the pioneer trials, the direct impact of maximal cytoreduction on OS was once again affirmed (HR: 0.57 (95% CI 0.34–0.96); $p = 0.034$). However, the direct impact of maximal cytoreduction on PFS could not be demonstrated (HR: 0.73 (95% CI 0.49–1.08); $p = 0.113$).

During our study period, our country, like many others worldwide, faced with the COVID-19 pandemic. Certain studies in the literature suggest that the pandemic might have influenced the referral of patients towards the NACT strategy [26, 27]. In this context, our study investigated which strategies patients were directed to before and after the pandemic according to their date of initial diagnosis. During this period, we observed a slightly greater inclination towards the NACT strategy in our clinical practice. Nevertheless, the investigation revealed that the pandemic did not influence patient selection within our clinic (Table 12). Additionally, this situation did not seem to affect the oncological outcomes.

Finally, as our study indicates, NACT/IDS strategy is comparable to the PDS strategy in terms of oncological outcomes. However, the primary cytoreductive surgery performed without residual macroscopic tumor behind should be the preferred approach, considering the proper patient selection, in line with the recommendations of ESMO-ESGO 2019 [28] and National Comprehensive Cancer Network (NCCN) 2023 [29] guidelines. The instances where the PDS strategy, which emphasizes surgical competence, would bring benefits for oncological outcomes should be identified. Given these aspects, it is also crucial to ascertain whether the NACT/IDS strategy will genuinely benefit operable or inoperable patients. The outcomes of the Trial of Radical Upfront Surgical Therapy in advanced ovarian cancer (TRUST) study, which is anticipated to assess these issues and hypothesize that the impact of the PDS strategy on overall survival might be superior to the NACT/IDS strategy, would provide guidance in this regard [30].

5. Conclusions

Although the standard management of HGSOC typically involves chemotherapy following PDS, it may not suit every patient. In such cases, the NACT/IDS strategy should be considered as an alternative approach, provided appropriate patient selection is made. Both strategies demonstrate similar oncological outcomes concerning surgical complexity, postoperative complications and survival rates. Irrespective of the strategy, surgery stands as the main treatment step, making the surgical competence of the clinic notably significant. The main objective of surgery should be to leave no macroscopic residual tumor behind, as this directly impacts overall survival. In this context, the PDS strategy stands out as the preferred option if complete resection is anticipated.

ABBREVIATIONS

ACT, adjuvant chemotherapy; BSO, bilateral salpingo-oophorectomy; CT, computed tomography; CA125, cancer antigen 125; ESMO, European Society of Medical Oncology; ESGO, European Society of Gynecological Oncology; FIGO, International Federation of Gynecology and Obstetrics; GCIG, Gynecological Cancer InterGroup; HGSOC, high-grade serous ovarian cancer; IDS, interval debulking surgery; MRI, magnetic resonance imaging; NACT, neoadjuvant chemotherapy; NCCN, national comprehensive cancer network; OS, overall survival; PDS, primary debulking surgery; PET, positron emission tomography; PFS, progression-free survival; RECIST, response criteria in solid tumors; SCS, surgical complexity score.

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. The request should be addressed by email at

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AUTHOR CONTRIBUTIONS

OCZ and MG—designed the research study, wrote the manuscript. OCZ—performed the research. NO, MCS, HVE and DB—provided help and advice on surgical investigation, dataset formation and literature review. OCZ and YG—analyzed the data. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

For our study with project number GO 19/93, Ethics committee approval was given by the Hacettepe University Non-Interventional Clinical Research Ethics Committee under decision number 2019/03-26. The study follows the ethical principles of the Declaration of Helsinki. Informed consent for participation was obtained from all patients.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.ejgo.net/files/article/1801495607918903296/attachment/Supplementary%20material.docx.

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