ORIGINAL RESEARCH ARTICLE

Efficacy of bevacizumab maintenance therapy in advanced ovarian cancer

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Abstract

This study aimed to evaluate the efficacy of bevacizumab maintenance therapy in advanced ovarian cancer and its impact on the Janus kinase 2 (JAK2)/signal transducer and activator of transcription 3 (STAT3)/vascular endothelial growth factor A (VEGFA) pathway. A total of 126 patients were enrolled, divided into two groups: control (n=62) and study (n=64). The control group received neoadjuvant chemotherapy, tumor debulking surgery, and postoperative adjuvant chemotherapy. The research group received postoperative bevacizumab maintenance therapy in addition to standard treatment. Results showed that the research group had significantly improved disease control rates (43.75% vs. 24.19%, P=0.0206), objective response rates (76.56% vs. 48.39%, P=0.0011), overall survival (30.45±7.69 months vs. 22.92±7.26 months, P<0.0001) and progression-free survival (16.08±2.46 months vs. 12.08±2.25 months) compared to controls. Bevacizumab also led to lower levels of Janus kinase 2 (JAK2), signal transducer and activator of transcription 3 (STAT3) and vascular endothelial growth factor A (VEGFA) expression. This therapy demonstrated safety and efficacy, significantly prolonging progression-free survival and overall survival. *(Afr J Reprod Health 2025; 29 [7]: 107-116)*

Keywords: Neoadjuvant chemotherapy; Bevacizumab; Advanced ovarian cancer; Clinical efficacy; JAK2/STAT3/VEGFA axis

Résumé

Cette étude visait à évaluer l'efficacité du traitement d'entretien par bévacizumab chez des patientes atteintes d'un cancer de l'ovaire avancé, ainsi que son impact sur la voie Janus kinase 2 (JAK2)/transducteur du signal et activateur de la transcription 3 (STAT3)/facteur de croissance endothélial vasculaire A (VEGFA). Un total de 126 patientes ont été incluses et réparties en deux groupes : un groupe témoin (n=62) et un groupe d'étude (n=64). Le groupe témoin a reçu une chimiothérapie néoadjuvante, une chirurgie de cytoréduction tumorale et une chimiothérapie adjuvante postopératoire. Le groupe d'étude a, en plus, bénéficié d'un traitement d'entretien au bévacizumab après les soins standards. Les résultats ont montré que le groupe d'étude présentait des taux de contrôle de la maladie significativement améliorés (43,75 % contre 24,19 %, P=0,0206), des taux de réponse objective plus élevés (76,56 % contre 48,39 %, P=0,0011), une survie globale prolongée (30,45 ± 7,69 mois contre 22,92 ± 7,26 mois, P<0,0001) et une survie sans progression plus longue (16,08 ± 2,46 mois contre 12,08 ± 2,25 mois) par rapport au groupe témoin. Le bévacizumab a également réduit les niveaux d'expression de JAK2, STAT3 et VEGFA. Ce traitement s'est révélé sûr et efficace, prolongeant de manière significative la survie sans progression et la survie globale. *(Afr J Reprod Health 2025; 29 [7]: 107-116).*

Mots-clés: Chimiothérapie néoadjuvante; Bévacizumab; Cancer de l'ovaire avancé; Efficacité clinique ; Axe JAK2/STAT3/VEGFA

Introduction

Ovarian cancer (OC) mostly originates from ovarian epithelial cells and is the eighth most prevalent and fifth most deadly malignant tumor in women worldwide.[1] Statistics indicate that over 300,000 women are diagnosed with OC annually, with approximately 152,000 deaths , posing a major threat to health and survival.[2] Early-stage OC usually refers to stage I and II as defined by the International Federation of Obstetrics and Gynecology (FIGO), where the tumor is confined to one or both ovaries or has limited pelvic dilation. In contrast, advanced OC usually includes FIGO stage III and IV, characterized by peritoneal dissemination, lymph node involvement or distant metastasis. The overall survival (OS) rate for early-stage OC can reach 92% over a five-year period.[3]

However, most cases of OC are detected at an advanced stage because of its ambiguous initial symptoms. This leads to missed opportunities for optimal surgical intervention and consequently lower survival rates. Neoadjuvant chemotherapy (NACT) refers to chemotherapy administered prior

to surgery, providing surgical opportunities for patients with locally advanced or unresectable disease and improving prognosis. Recently, NACT has become a new exploration direction for advanced OC. The standard treatment regimen for NACT includes paclitaxel plus platinum-based drugs, but many patients experience recurrence due to platinum resistance during treatment,[4] adversely affecting therapeutic outcomes. In such cases, bevacizumab may serve as a potential treatment modality to delay disease recurrence and improve clinical outcomes.

Bevacizumab is an anti-angiogenic drug that suppresses angiogenesis by targeting and inhibiting vascular endothelial growth factor (VEGF), effectively restricting tumor growth.[5] It has been widely used in maintenance therapy for OC. Previous studies have reported that the addition of bevacizumab during the NACT phase and the continuation of bevacizumab in dose-dense adjuvant chemotherapy is feasible, demonstrating reasonable toxicity and achieved PFS and OS outcomes relative to studies that used bevacizumab during the NACT phase or across the entire dose-dense regimen.[6] However, reports on the use of bevacizumab maintenance therapy after NACT are still limited. The JAK2/STAT3 pathway is recognized as a significant axis involved in tumorigenesis and angiogenesis, with VEGFA playing a pivotal role in tumor angiogenesis.

According to pertinent research, bevacizumab may bind to VEGFA, prevent angiogenesis, and indirectly influence the JAK2/STAT3 pathway's activation, as shown in hepatocellular carcinoma, to provide its anti-tumor activity[7] and cervical cancer.[8] However, the impact of bevacizumab on the JAK2/STAT3/VEGFA signaling pathway in OC has yet to be clarified.

In this study, the clinical outcomes of bevacizumab maintenance therapy were analyzed in patients with advanced OC, together with its effects on the JAK2/STAT3/VEGFA axis, providing reference information for clinical decision-making and assisting in the development of personalized treatment strategies.

Methods

Study subjects

Patients diagnosed with advanced OC who underwent treatment at the Nantong Tumor Hospital from January 2018 to December 2021 were enrolled in the study. The inclusion criteria were: (1) pathological confirmation of primary OC;[9] (2) FIGO stage III to IV; and (3) the availability of complete clinical data. The exclusion criteria were: (1) women with history of radiotherapy, chemotherapy, or surgical treatment for OC; (2) presence of other malignancies, hematological diseases, or infectious diseases; (3) impaired cardiac, hepatic, or renal function; (4) pregnancy or lactation.

A total of 126 OC cases were enrolled in the study. Based on the treatment approaches, they were allocated to the control (n=62) and the study (n=64) groups. Control patients received NACT combined with tumor debulking surgery and postoperative chemotherapy, while the research group received NACT together with tumor debulking surgery and postoperative bevacizumab maintenance therapy. The baseline characteristics of both groups were comparable, with no statistically significant differences observed (P>0.05) (Table 1).

Treatment protocol for the control group

The control group was treated with NACT, followed by tumor debulking surgery and postoperative adjuvant chemotherapy. The NACT regimen (TC regimen) consisted of the following: Carboplatin (dosed based on AUC=5), administered via intravenous infusion every three weeks. Paclitaxel (175 mg/m²), also administered via intravenous infusion every three weeks. A total of 2-3 cycles of treatment were conducted. After completion of the treatment, patients underwent preoperative assessment to determine the extent and approach for surgery. Depending on the patient's tolerance, tumor debulking surgery was conducted, which involved total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, appendectomy, and resection of all visible lesions.

Table 1: General Features of Patients in the Two Groups [n (%)]

General Characteristics		Research group (n=64)	Control group (n=62)	χ^2	P
Age (years)	<50	5 (7.81)	10 (16.13)	2.077	0.1495
	≥ 50	59 (92.19)	52 (83.87)		
FIGO Stage	Stage III	36 (56.25)	25 (40.32)	3.199	0.0737
	Stage IV	28 (43.75)	37 (59.68)		
Pathological Type	Endometrioid Adenocarcinoma	10 (15.62)	12 (19.35)	0.8128	0.6661
	Mucinous Adenocarcinoma	19 (29.69)	21 (33.87)		
	Serous Cystadenocarcinoma	35 (54.69)	29 (46.78)		
Menopausal Status	No	19 (29.69)	20 (32.26)	0.09737	0.7550
	Yes	45 (70.31)	42 (67.74)		
Ascites	No	22 (34.37)	25 (40.32)	0.4763	0.4901
	Yes	42 (65.63)	37 (59.68)		
Family History of Malignant Tumors	No	54 (84.38)	50 (80.65)	0.3040	0.5814
	Yes	10 (15.62)	12 (19.35)		
Malignant Pleural Effusion	No	52 (81.25)	47 (75.81)	0.5543	0.4566
	Yes	12 (18.75)	15 (24.19)		
Vascular Metastasis	No	14 (21.88)	16 (25.81)	0.2683	0.6045
	Yes	50 (78.13)	46 (74.19)		
Maximum Diameter of Primary Tumor	<10cm	19 (29.69)	15 (24.19)	0.4824	0.4873
	≥ 10 cm	45 (70.31)	47 (75.81)		
Histological Grade	Low Grade	33 (51.56)	37 (59.68)	0.6903	0.7081
	Intermediate Grade	22 (34.38)	19 (30.65)		
	High Grade	9 (14.06)	6 (9.67)		
Omental Cake	No	26 (40.62)	29 (46.77)	0.4841	0.4866
	Yes	38 (59.38)	33 (53.23)		
Lymph Node Metastasis	No	25 (39.06)	26 (41.94)	0.1079	0.7426
	Yes	39 (60.94)	36 (58.06)		
Initial CA125 (U/ml)	<500	29 (45.31)	35 (56.45)	1.563	0.2112
	≥ 500	35 (54.69)	27 (43.55)		

Patients with enlarged pelvic or abdominal lymph nodes (short diameter >1 cm) on preoperative imaging or intraoperative exploration were subjected to pelvic and abdominal lymphadenectomy. Partial resections of the liver, spleen, or intestine were performed if necessary. Postoperatively, patients continued with TC chemotherapy for an additional 3-6 cycles.

Treatment protocol for the research group

The research group received the same treatment as the control group, namely NACT, tumor volume reduction surgery and postoperative adjuvant chemotherapy. Then, after 3 cycles of postoperative chemotherapy, bevacizumab (7.5 mg/kg) was used for additional maintenance treatment, which lasted for a total of 16 cycles.

Measurement of JAK2, STAT3, and VEGFA Levels via ELISA

Serum levels of JAK2, STAT3, and VEGFA were assessed before and after treatment. For this purpose, 5 mL of morning fasting venous blood samples were collected from the patients, placed in centrifuge

tubes, and centrifuged at 3000 rpm for 15 minutes to isolate serum for analysis. JAK2, STAT3, and VEGFA levels were detected using respective ELISA kits, with all procedures performed according to the kit instructions.

Observed indicators

(1) Clinical efficacy evaluation: The clinical efficacy of both groups post-treatment was compared using the following criteria: Complete Response (CR): Disappearance of all lesions for more than 3 weeks. Partial Response (PR): Reduction of lesions maintained for more than 3 weeks. Stable Disease (SD): No significant change in lesion size for more than 3 weeks. Progressive Disease (PD): Lesions did not decrease and may have metastasized. The objective response rate (ORR) was determined using the formula: ORR = [(CR + PR cases) / total cases] × 100%. Similarly, the disease control rate (DCR) was calculated as: DCR = [(CR + PR + SD cases) / total cases] × 100%.

(2) Comparison of JAK2, STAT3, and VEGFA Levels: The levels of JAK2, STAT3, and VEGFA were assessed, comparing the values between the groups following surgery and after the completing postoperative adjuvant chemotherapy.

(3) Adverse reactions: The occurrence of adverse reactions post-treatment was analyzed in the groups.

(4) Long-term Outcomes: All cases were followed up until recurrence, death, or the end of follow-up, which concluded in June 2024. Long-term outcomes, specifically OS and progression-free survival (PFS), were determined and compared between the groups.

(5) Independent Prognostic Factors: Data from both groups were first analyzed using univariate Cox regression analysis to identify significant factors, followed by multivariate Cox regression analysis.

Statistical methods

Data analysis were analyzed with SPSS 26.0, and graphs were generated using GraphPad Prism 6.0. For continuous variables with normal distribution, t-tests were applied, with results reported as mean ± standard deviation (x±SD). Categorical data were compared using the χ^2 test, expressed as count and rate [n(%)]. Kaplan-Meier curves were employed to assess survival outcomes. Univariate and multivariate Cox regression identified potential factors affecting prognosis in patients with advanced OC. Statistical significance was recognized at $p < 0.05$.

Ethical consideration

All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Ethics Committee of Nantong Tumor Hospital (NO. 2023-049) and informed consent was taken from all the patients.

Results

Short-term efficacy evaluation

Following treatment, the research group exhibited markedly higher ORR and DCR compared to the controls (43.75% vs. 24.19%, χ^2=5.358, P=0.0206; 76.56% vs. 48.39%, χ^2=10.69, P=0.0011). (Table 2)

Comparison of JAK2, STAT3, and VEGFA Levels Between Groups

After surgical treatment, no significant changes were observed in the levels of JAK2, STAT3, and VEGFA between the groups (P>0.05). However, following the completion of postoperative adjuvant chemotherapy, the levels decreased markedly in both groups (P<0.05), with the lower levels seen in the research group relative to the controls (P<0.05). (Table 3)

Adverse reactions

The occurrence of adverse reactions in the research group did not differ significantly from that seen in the controls (P > 0.05). (Table 4)

Evaluation of long-term efficacy

As of June 2024, the follow-up period concluded with a 100% follow-up rate, as no patients were lost. The median OS was 22.92±7.26 months in the control group and 30.45±7.69 months in the research group, indicating markedly prolonged OS in these participants (P<0.0001).

Table 2: Analysis of Short-term Efficacy [n (%)]

Group	CR	PR	SD	PD	ORR	DCR
Research group (n=64)	11 (17.19)	17 (26.56)	21 (32.81)	15 (23.44)	28 (43.75)	49 (76.56)
Control group (n=62)	6 (9.68)	9 (14.52)	15 (24.19)	32 (51.61)	15 (24.19)	30 (48.39)
χ^2	-	-	-	-	5.358	10.69
P	-	-	-		0.0206	0.0011

Table 3: JAK2, STAT3, and VEGFA Expression Levels in the Groups (χ±s)

Group	JAK2		STAT3		VEGFA	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Research group (n=64)	55.72±1.77	45.65±1.94 ****	62.19±2.00	54.26±1.77 ****	290.34±58.44	182.53±36.67 ****
Control group (n=62)	55.20±1.58	48.79±2.00 ****	61.56±2.24	58.00±2.01 ****	277.80±52.35	213.27±37.84 ****
t	-1.768	8.9597	-1.665	11.12	-1.267	4.632
P	0.0794	<0.0001	0.0984	<0.0001	0.2074	<0.0001

Note: Relative to pre-treatment levels within the same group, ****P < 0.0001.

Table 4: Analysis of Adverse Reactions [n (%)]

Group	Gastrointestinal Reactions	Bone Marrow Suppression	Liver and Kidney Function Impairment	Cardiotoxicity	Allergic Reactions	Peripheral Neuropathy	Other Adverse Reactions
Research group (n=64)	42 (65.63)	37 (57.81)	8 (12.50)	11 (17.19)	1 (1.56)	1 (1.56)	5 (7.81)
Control group (n=62)	40 (64.52)	32 (51.61)	7 (11.29)	13 (20.97)	1 (1.61)	5 (8.06)	18 (19.35)
χ^2	0.01704	0.4886	0.04394	0.2919	0.0005122	2.936	3.595
P	0.8961	0.4846	0.8340	0.5890	0.9819	0.0866	0.0580

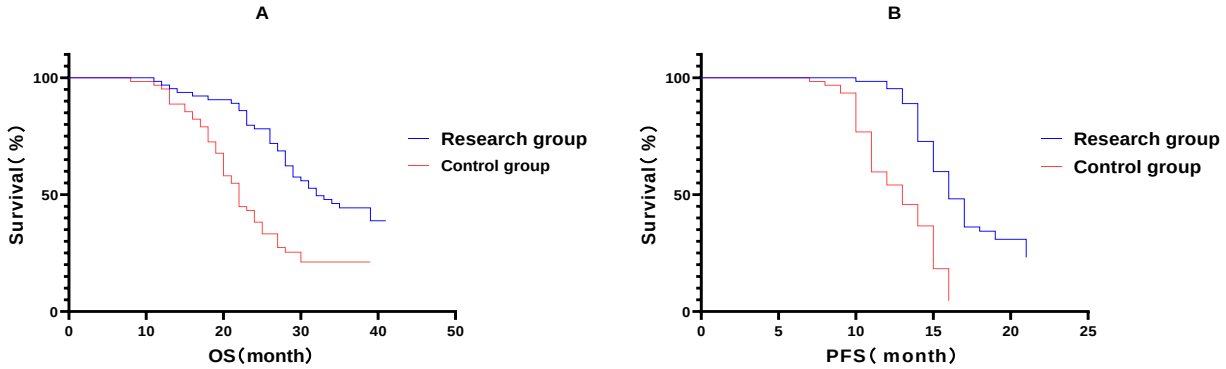

Figure 1: Analysis of Long-term Efficacy in the Two Groups. (A) the overall survival (OS) analysis for both groups. (B) The progression-free survival (PFS) analysis for the two groups.

Table 5: Univariate Cox analysis of prognostic factors

Influencing Factors		β	SE	Wald χ^2 value	P	Exp(B)	OR 95% CI
Age (years)	<50						
	≥ 50	0.0290	0.3400	0.0070	0.9320	1.0300	0.5280 ~ 2.0060
FIGO Stage	Stage III						
	Stage IV	1.9645	0.3161	38.616	0.0000	7.1316	3.8379~ 13.2520
Pathological Type	Endometrioid Adenocarcinoma						
	Mucinous Adenocarcinoma	0.0736	0.3349	0.0482	0.8262	1.0763	0.5583 ~ 2.0750
	Serous Cystadenocarcinoma	0.1489	0.3166	0.2213	0.6380	1.1606	0.6240~ 2.1587
Menopausal Status	No						
	Yes	0.3526	0.2528	1.9463	0.1630	1.4228	0.8669 ~ 2.3352
Ascites	No						
	Yes	1.5880	0.3410	21.6340	0.0000	4.8930	2.5060 ~ 9.5530
Family History of Malignant Tumors	No						
	Yes	0.4386	0.3232	1.8412	0.1748	1.5506	0.8229 ~ 2.9217
Malignant Pleural Effusion	No						
	Yes	0.8234	0.2463	11.1744	0.0008	2.2783	1.4058 ~ 3.6923
Vascular Metastasis	No						
	Yes	2.3906	0.5924	16.2833	0.0001	10.9201	3.4194~ 34.8741
Maximum Diameter of Primary Tumor	<10cm						
	≥ 10 cm	0.2958	0.2603	1.2912	0.2558	1.3442	0.8070~ 2.2391
Histological Grade	Low Grade						
	Intermediate Grade	-0.1500	0.2650	0.3200	0.5710	0.8610	0.5120 ~ 1.4470
	High Grade	0.7150	0.3760	3.6160	0.0570	2.0440	0.9780 ~ 4.2720
Omental Cake	No						
	Yes	0.1952	0.2334	0.6994	0.4030	1.2155	0.7693~ 1.9205

Lymph Node Metastasis	No						
	Yes	1.3712	0.2842	23.2765	0.0000	3.9403	2.2573~6.8779
Initial CA125 (U/ml)	<500						
	≥ 500	0.9840	0.2510	15.3530	0.0000	2.6760	1.6350~4.3780
Treatment Method	Postoperative TC regimen adjuvant chemotherapy						
	Postoperative TC regimen combined with bevacizumab adjuvant chemotherapy	-0.6344	0.2381	7.1016	0.0077	0.5302	0.3325~0.8455

Table 6: Multivariate Cox analysis of prognostic factors

Influencing Factors	β	SE	Wald χ^2 value	P	Exp(B)	OR 95% CI
FIGO Stage	1.4240	0.3675	15.0146	0.0001	4.1537	2.0213~8.5360
Ascites	0.7156	0.4211	2.8876	0.0893	2.0454	0.8960~4.6691
Malignant Pleural Effusion	-0.2298	0.2652	0.7511	0.3861	0.7947	0.4726~1.363
Vascular Invasion	1.0984	0.6708	2.6814	0.1015	2.9995	0.8055~11.1692
Lymph Node Metastasis	0.8249	0.3083	7.1593	0.0075	2.2816	1.2469~4.1749
Initial CA125	-0.1542	0.3182	0.2348	0.6280	0.8571	0.4594~1.5992
Treatment Method	-0.6660	0.2658	6.2772	0.0122	0.5138	0.3051~0.8650

The median PFS was 12.08±2.25 months for the control group and 16.08±2.46 months for the research group, with the research group also demonstrating a significantly longer PFS (P<0.0001). (Figure 1)

Univariate and multivariate cox analysis of prognostic factors

Univariate analysis indicated that FIGO stage, ascites, lymph node metastasis, vascular invasion, maximum diameter of the primary tumor, malignant pleural effusion, initial CA125 levels, and treatment methods influenced prognosis in patients with advanced OC. In the multivariate Cox regression model, FIGO stage IV (P=0.0001) and lymph node metastasis (P=0.0075) were found to be independently predictive of prognosis, while postoperative TC regimen combined with bevacizumab as adjuvant chemotherapy was recognized as an independent protective factor for patient prognosis (P=0.0122). (Table 5 and 6)

Discussion

The standard treatment method for OC involves a combination of early surgical intervention and standardized chemotherapy[10,11]. However, advanced OC is often characterized by peritoneal dissemination, where the primary tumor extends to the surfaces of the ovaries or fallopian tubes, and tumor cells detach into the peritoneal cavity.

The peritoneal fluid circulates continuously in the abdomen, facilitating the implantation and growth of tumor cells on various surfaces such as the peritoneum, intestines, and other abdominal organs, severely invading adjacent tissues.[12-16] This greatly increases the difficulty of achieving complete surgical resection, leading to a generally poor prognosis for patients with advanced OC. NACT not only alleviates the extent of tumor deterioration and reduces tumor staging but also inhibits the metastasis and growth of tumor cells, shrinking tumor lesions to make them more manageable and

increasing the likelihood of R0 resection, especially in patients with advanced OC.[17,18]

However, there are still instances where patients experience unsatisfactory outcomes or even failures with chemotherapy, primarily due to resistance. Clinical studies have demonstrated that bevacizumab can enhance sensitivity to chemotherapy by disrupting the tumor's blood supply network, increasing hypoxic conditions in the tumor microenvironment, thereby reducing the tumor's resistance to chemotherapy. It has shown good efficacy and safety, significantly improving patient prognosis and is now widely used in cancer treatment.[19,20] The findings indicate that relative to the controls, a greater proportion of patients in the research group achieved symptom relief, along with extended OS and PFS. This demonstrates that postoperative adjuvant chemotherapy combined with bevacizumab is effective not only in alleviating the condition but also in providing good control over the disease, effectively delaying disease progression and extending patient survival time. The reason for this is that bevacizumab increases the sensitivity of tumor cells to chemotherapy, thus enhancing the cytotoxic effects of postoperative adjuvant

chemotherapy on tumor cells, ultimately improving both short-term and long-term efficacy in cases of advanced OC. Furthermore, the study results indicate that the use of bevacizumab in postoperative adjuvant chemotherapy does not increase the occurrence of adverse reactions, indicating a certain level of safety.

The JAK2/STAT3 axis plays a critical role in various solid tumors.[21] Among these, STAT3 is an oncogenic transcription factor, and its abnormal activation and overexpression are found in multiple tumor tissues and cells, promoting the upregulation of genes related to cell proliferation, apoptosis, angiogenesis, invasion, and metastasis.[22] Activated JAK2 can stimulate downstream STAT3 expression, promoting excessive tumor proliferation and metastasis.[23] The persistent activation of the JAK2/STAT3 axis is closely related to the malignant behavior of tumors. VEGFA is a downstream target gene of JAK2/STAT3 and is a key factor in inducing tumor angiogenesis. Existing evidence indicates that the activation of the JAK2/STAT3 axis can upregulate VEGFA, thus promoting tumor angiogenesis.[24] The findings of this study demonstrate that following postoperative adjuvant chemotherapy, protein levels of JAK2, STAT3, and VEGFA markedly decreased in both groups, with lower levels in the research group relative to the controls. This indicates that bevacizumab not only significantly inhibits the carcinogenicity of OC but also exerts a strong anti-angiogenic effect, potentially related to its inhibitory action on the activation of the JAK2/STAT3/VEGFA axis.

Multivariate Cox regression analysis indicated that FIGO stage IV and lymph node metastasis are independent prognostic risk factors for patients with advanced OC. Sun [25] reported that FIGO stage and lymph node metastasis are negatively predictive of OS and PFS. Cheng et al.[26] also reported that FIGO stage, histological type, and tumor grade are independently predictive of OS. Clinically, patients with FIGO stage IV and lymph node metastasis can be included in a high-risk group with poorer prognosis, necessitating close monitoring of disease progression and personalized treatment plans to improve their outcomes. Additionally, the findings show that postoperative chemotherapy combined with bevacizumab is an independent protective factor for the prognosis of patients with advanced OC, suggesting that it can achieve better outcomes in the treatment of advanced OC and has significant advantages in improving patient prognosis, warranting its promotion in clinical practice.

Study strengths and limitations: Several strengths are present in this study. First, it systematically evaluated the clinical effects and underlying molecules involved in the influence of bevacizumab treatment; and analyses of the JAK2/STAT3/VEGFA pathway offered a comprehensive explanation of bevacizumab-mediated functions in advanced ovarian cancer. In addition, the integration of OS, PFS, adverse reactions and molecular biomarkers changes makes the conclusion more credible. However, this study also has limitations. Its retrospective non-randomized design that can result in selection bias and confounding. The sample size, although appropriate, was somewhat small and from a single center, so the generalisability of the results may be somewhat limited.

Conclusion

In summary, bevacizumab exerts good anti-tumor activity by inhibiting the activation of the JAK2/STAT3/VEGFA axis. The use of bevacizumab as maintenance therapy after surgery in cases of advanced OC significantly improves both short-term and long-term efficacy, demonstrating good effectiveness and safety. Furthermore, clinical staging of IV and the occurrence of lymph node metastasis are recognized as independent risk factors influencing advanced OC prognosis, while postoperative chemotherapy combined with bevacizumab serves as an independent protective factor for prognosis.

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Competing interests

The authors have no conflicts of interest to declare.

Authors' contributions

QH. and YL. conceptualised this study. QH, AQ, H H, BX, CZ, YF, Q, and YL. worked on the literature review. BX, QH, and AQ. worked on the data analysis and interpretation of results. All authors worked on the discussion of the findings. All the authors read and approved the final manuscript.

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