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Comparison of anlotinib combined with docetaxel versus single docetaxel as second-line treatment beside radiotherapy for advanced non-small cell lung cancer: Efficacy and safety

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Abstract: This study compared the efficacy and safety of anlotinib combined with docetaxel versus docetaxel alone in patients with non-small cell lung cancer (NSCLC), assessing overall survival (OS), disease control rate (DCR), and incidence of adverse events (AE). 128 patients with advanced non-small cell lung cancer were randomly divided into ACD group (n=64) and DOC group (n=64). They were treated with ACD and Docetaxel alone, respectively. They received routine blood, urine, stool examination, fecal occult blood, blood biochemistry and tumor markers. The post-treatment CEA and VEGF levels in the ACD group were sharply lower to those in the DOC group (P<0.05). DCR in the ACD group was 79.7%, which was much higher in comparison to the 60.9% in the DOC group (P<0.05). The overall response rate (ORR) of ACD was 23.4%, slightly higher than the 17.2% of DOC. The incidence of hand-foot syndrome (HFS), hypertension, and hemoptysis in the ACD group was significantly higher than in the DOC group. Anlotinib combined with docetaxel for second-line treatment of advanced NSCLC enhanced the DCR, downregulated CEA and VEGF levels and prolonged progression-free survival (PFS) compared to docetaxel alone.

Keywords: Anlotinib; docetaxel; second-line treatment; NSCLC

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INTRODUCTION

Advanced non-small cell lung cancer (NSCLC) is a common and highly lethal malignant tumor (Wang *et al.,* 2023; Omer and Amin, 2023). Currently, the treatment of NSCLC mainly encompasses various methods such as chemotherapy, targeted therapy, and immunotherapy (Jin *et al.,* 2023; Parums, 2022; Taminya, 2023). However, monotherapy often faces issues of poor efficacy and drug resistance, necessitating the search for more effective treatment strategies. Anlotinib is a highly selective ALK inhibitor widely found in treating ALK fusion-positive NSCLC (Liu *et al.,* 2023; Han *et al.,* 2023). Mutations in the ALK fusion protein are common driver genes in NSCLC, leading to abnormal proliferation and growth of tumor cells (Hao, 2018). Anlotinib inhibits the activity of the ALK fusion protein, thereby blocking the signaling pathways of tumor cells and inhibiting the growth and spread of tumors. Anlotinib exhibits high selectivity, binding to the ALK fusion protein and inhibiting its activity, while minimally affecting normal cells (Zhai *et al.,* 2022). This makes anlotinib have good safety and tolerability treating ALK fusion-positive NSCLC. Recent clinical studies have demonstrated significant efficacy of anlotinib in both first-line and second-line treatments. Docetaxel is a microtubule inhibitor that interferes with the mitotic process of tumor cells, thereby inhibiting tumor growth (Zhou *et al.,* 2023; Li *et al.,* 2023). Although first-line treatment typically includes targeted therapy drugs or immunotherapy, docetaxel is often served as a second-line treatment choice when patients progress or can't tolerate these treatments. Several clinical studies have demonstrated the notable extension of survival in patients with advanced NSCLC through the use of docetaxel monotherapy (Yang *et al.,* 2022; Isamu *et al.,* 2020). Additionally, docetaxel has demonstrated certain anti-tumor activity, reducing tumor burden and improving the quality of life for patients.

The combined use of anlotinib and docetaxel significantly prolongs the survival of patients and adverse reactions during the treatment process are relatively minor (Markers, 2023). Especially for those with ALK fusion-positive advanced NSCLC patients, this combination therapy has shown great potential. The high selectivity of anlotinib allows it to more effectively inhibit the activity of the ALK fusion protein, thereby preventing the growth and spread of tumor cells. Docetaxel, on the other hand, further inhibits tumor growth by interfering with the mitotic process of tumor cells. Therefore, the combination of these

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two drugs can produce a synergistic effect, more effectively inhibiting the growth and spread of tumors (Ji *et al.,* 2022). In addition, the combined treatment of anlotinib and docetaxel also exhibits good tolerability. Studies show that the adverse reactions of this combination treatment are relatively mild, and patients can better tolerate the treatment process (Fang *et al.,* 2021). This is particularly important for patients with advanced NSCLC, as they may already be in a weakened physical state and require a gentler treatment approach.

Currently, there is relatively limited research on the efficacy and safety comparison of the joint effect anlotinib and docetaxel with single docetaxel as second-line treatment for advanced NSCLC. Therefore, this work evaluated the efficacy and safety of combination use of anlotinib and docetaxel compared to single-agent docetaxel as second-line treatment for advanced NSCLC through clinical trials and comprehensive analysis.

MATERIALS AND METHODS

Experimental objects

From June 2021 to June 2024, 128 patients with NSCLC who were treated in the Oncology Department of the 908th Hospital of Chinese People's Liberation Army Joint Logistic Support Force were recruited. They were randomly assigned into the ACD group and the DOC group, with 64 patients in each group, using a random number method. Patients in the ACD group underwent combined treatment with anlotinib and docetaxel, while patients in the DOC group received single docetaxel as second-line treatment. The criteria for including and excluding the patients were presented in tables 1 and 2, respectively.

Treatment schemes

In the ACD group, patients received second-line treatment with docetaxel 75 mg/m^2 combined with anlotinib 60 mg/m^2 on day 1 every 3 weeks. The therapy persisted until either disease progression or the emergence of intolerable adverse reactions. Typically, second-line chemotherapy will be stopped after 4 - 6 cycles, followed by continued treatment with apatinib. Apatinib is a targeted therapy drug that inhibits the growth and spread of tumors. In the DOC group, patients received treatment with docetaxel 75 mg/m² on day 1 every 3 weeks. The treatment will be sustained until the occurrence of disease progression, intolerable adverse reactions, or completion of 4-6 cycles of chemotherapy. Docetaxel is a commonly used chemotherapy drug that inhibits tumor growth by suppressing the division and proliferation of tumor cells. During treatment, patients received supportive care to alleviate adverse reactions and improve their quality of life. This includes administering antiemetic drugs to relieve nausea and vomiting caused by treatment, providing hydration to maintain the electrolyte balance of patients and using recombinant human granulocyte colony-stimulating factor to increase white blood cell count and prevent infections. Radiotherapy: intensity modulated radiation therapy (IMRT) was performed by Primus Linear Accelerator (Varian Medical Systems, USA).

To monitor the treatment effectiveness and changes in the patient's condition, various examinations were conducted before each treatment cycle. These include routine blood, urine, and stool tests, as well as blood biochemistry and tumor marker assessments. Additionally, imaging evaluations will be performed every two cycles, utilizing the RECIST 1.1 criteria to assess the extent of tumor reduction. Based on the evaluation results, disease control rate (DCR) and overall response rate (ORR) can be calculated to assess the treatment effectiveness.

Blood routine test

During the inpatient treatment of the patients, blood samples were collected before the initiation of the first chemotherapy and before the start of the third cycle of chemotherapy. During sample collection, patients needed to fast, and blood was drawn from the midline of the inner elbow on the same side. After blood collection, the samples will be sent to the hospital's laboratory for testing. In the laboratory, a complete blood count (CBC) analyzer will be used to perform routine blood tests on the blood samples. CBC was a commonly used diagnostic method to assess a patient's blood condition and overall health. It involves the measurement and analysis of indicators such as red blood cells, white blood cells, and platelets in the blood. CBC testing provided information on blood cell counts, hemoglobin levels, hematocrit, white blood cell differentials, and platelet counts. Regular CBC testing allows for the monitoring of the patient's blood cell status, enabling the timely detection and management of any abnormalities that may arise. This helps doctors assess the effectiveness of treatment, make adjustments to the treatment plan, and provide the best possible treatment outcomes and quality of life for the patients.

Detection of tumor-related indicators

Using the chemiluminescence method, CEA and vascular endothelial growth factor (VEGF) levels were recorded for both patient groups before treatment and after receiving four cycles of chemotherapy. CEA is a tumor marker frequently applied to assess the diagnosis and treatment effectiveness of cancer. It is often increased in cancers such as those of the intestines, pancreas and lungs. Measuring the CEA levels in patients provides insights into the tumor's activity and the treatment effectiveness. Pre-treatment measurements of CEA levels serve as a baseline, while measurements after four cycles of chemotherapy can evaluate the effectiveness of the chemotherapy. VEGF is a protein that promotes blood vessel formation. In many tumors, overexpression of VEGF is linked with tumor growth, metastasis, and angiogenesis. Therefore, measuring the patient's serum VEGF levels can provide information about tumor angiogenesis and treatment response. Measuring VEGF levels before and after

chemotherapy allows the assessment of changes in tumor angiogenesis and the effectiveness of chemotherapy. The specific operational steps were illustrated in fig. 1.

Analysis of patient survival

By assessing the PFS of patients, a better understanding of the effectiveness of anti-tumor drug treatment and the prognosis of patients can be gained. The follow-up cutoff date for this study was June 30, 2022, indicating that the research team conducted long-term tracking of disease progression and survival of the patients. The PFS of patients was calculated from the initiation of their first anti-tumor drug treatment and its calculation was based on whether the patient experienced tumor progression or death. If a patient had not experienced tumor progression or death by the end of the follow-up, their PFS is the duration from the initiation of treatment to the end of the follow-up. Evaluating the patients' PFS can assist doctors and researchers in better understanding the effectiveness of anti-tumor drug treatment and the prognosis of patients. If a patient's PFS was longer, it indicated that the treatment had better disease control, resulting in a better prognosis. On the contrary, if a patient's PFS was shorter, it may suggest poor treatment effectiveness and a poorer prognosis.

Drug-related adverse reaction

By referring to the Common Terminology Criteria for Adverse Events (CTCAE) version 4.0 by the National Cancer Institute (NCI), patients' adverse reactions were graded, and symptomatic treatment was promptly administered. The criteria classified adverse reactions into five levels, ranging from Grade 0 to Grade 4. As the grade increased, the severity of adverse reactions gradually intensified. Grade 0 adverse reactions indicated no adverse effects, and patients experienced no discomfort or adverse reactions during the treatment. Grade 1 adverse reactions represented mild effects, typically causing minimal impact on the daily lives of patients. These reactions may include slight nausea, headache, fatigue, etc., but do not lead to treatment interruption or modification. Grade 2 adverse reactions fell into the category of moderate effects, potentially influencing the daily lives of patients to some extent. These reactions may involve moderate nausea, vomiting, diarrhea, skin itching, etc., and may require adjustments to the treatment plan or symptomatic treatment. Grade 3 adverse reactions denoted severe effects significantly affecting the daily lives and treatment of patients. These reactions may include severe nausea, vomiting, diarrhea, skin damage, pain, etc., and may necessitate a temporary pause or discontinuation of treatment, with corresponding therapeutic measures. Grade 4 adverse reactions were the most severe and may pose a threat to the patients' lives. These reactions may encompass severe bleeding, infections, organ failure, etc., requiring immediate cessation of treatment and emergency interventions.

Ethical approval

This study has been approved by the Medical Ethics Committee of the 908th Hospital of Chinese People's Liberation Army Joint Logistic Support Force (ethics approval number: 908YYLL2024005), and all patients signed informed consent.

STATISTICAL ANALYSIS

Data were statistically analyzed employing SPSS 26.0. Descriptive statistics for continuous data were presented as mean ± standard deviation. Independent sample t-tests or paired t-tests were employed for comparisons, depending on the nature of the data. Categorical data were expressed as percentages, and comparisons were made using chi-square tests or Fisher's exact tests. Survival curves were plotted adopting the Kaplan-Meier method, and comparisons were performed using the Log-rank test. Multivariate analysis was carried out with the Cox regression model. Statistical significance was considered when $P<0.05$.

RESULTS

General characteristics of patients

There were no significant differences in gender, age, pathological type, or clinical stage between groups ($P>0.05$), ensuring comparability in the study. (table 3).

Comparison of short-term efficacy of patients in various groups

Both groups of patients completed four cycles of chemotherapy and there were no patients with discontinued treatment due to severe adverse reactions in their medical records. After four cycles of chemotherapy, the DCR in the ACD group was 79.7%, while the DCR in the DOC group was 60.9%, showing an obvious difference. The ORR for ACD was 23.4% and for DOC, it was 17.2%, exhibiting no visible difference. These results were detailed in fig. 2.

Survival conditions of patients after different groups

Follow-up was conducted until June 30, 2020, with specific results shown in fig. 3. The median PFS for patients receiving ACD was 5.7 months (95% CI: 5.032~6.525), whereas that for patients receiving DOC was 2.9 months (95% CI: 2.587~3.146). This comparison exhibited a remarkable difference with $P<0.05$.

Tumor-relevant parameters of patients in ACD and DOC groups

Fig. 4 compared the CEA and VEGF of patients before and after different treatments. Before treatment, differences in serum CEA and VEGF levels for all patients were not greatly different ($P>0.05$).

Table 1: Criteria for patient inclusion

No.	Criteria for patient inclusion
1	The patient was diagnosed with NSCLC and had stage III b or IV non-squamous NSCLC.
2	Women of childbearing age needed to use effective contraception and ensure that the pregnancy test results were negative 72 hours before the first treatment.
3	Informed consent forms were signed by patients and their families.

Table 2: Criteria for patient exclusion

No.	Criteria for patient exclusion
1	The patient suffered from brain metastases or mental disorders;
2	Pregnant or lactating women were excluded;
3	Tuberculosis appeared in the tumor tissue;
4	Patients had double or multiple cancers
5	The patient suffered from central type lung cancer

Table 3: General characteristics of patients

Group	Gender (males/females)	Age (years old)	Pathological type (squamous cell carcinoma/adenocarcinoma)	Clinical stage (IIIB/IIIC/IV)
ACD group	34/30	58.8±8.23	30/34	8/26/30
DOC group	36/28	57.6±7.84	31/33	10/25/29

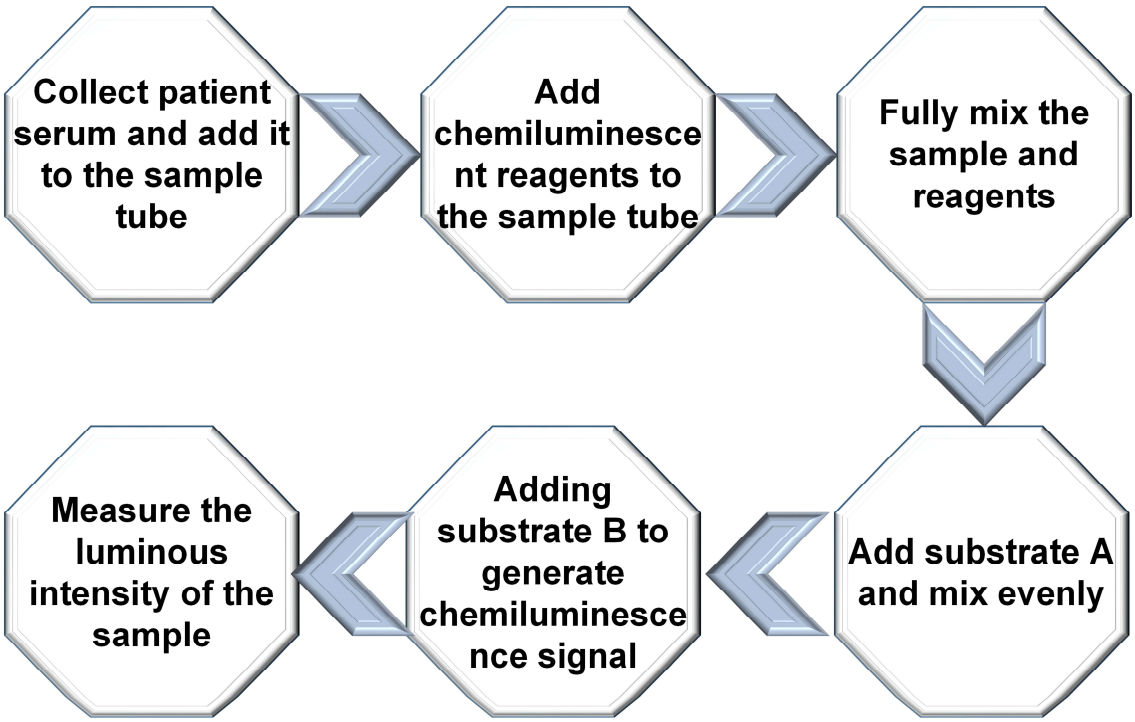
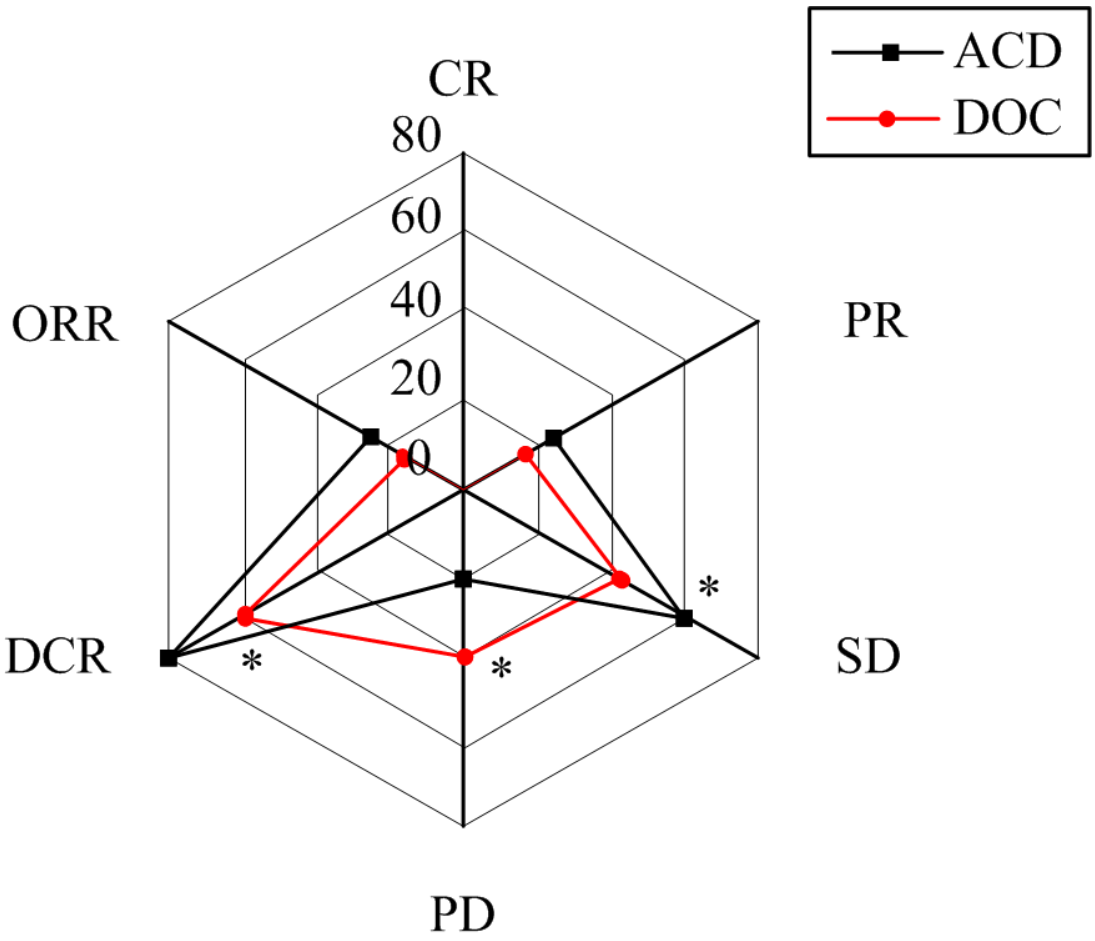


Fig. 1: Tumor related indicators detection chemiluminescence method to detect VEGF, CEA specific flow chart

After four cycles of chemotherapy, both groups of patients demonstrated a decrease in serum CEA and VEGF levels, with a more pronounced reduction in the ACD group to those in the DOC group (P<0.05).

IoAE of patients

During the treatment, both groups of patients experienced adverse reactions such as fatigue, HFS, mild hypertension, and gastrointestinal reactions, as explicated in fig. 5 below. The incidences of HFS, hypertension and hemoptysis in the ACD group were 25%, 23% and 18.75%, respectively, which were observably higher compared to the DOC group (1.56%, 7.81% and 12.5%, respectively), demonstrating remarkable differences (P<0.05). Incidence of other adverse reactions signified no remarkable differences for comparison between the ACD and DOC groups (P>0.05).



Note: * suggested a great difference with $P<0.05$ between the ACD and DOC groups.

Fig. 2: Comparison of short-term efficacy of patients in various groups

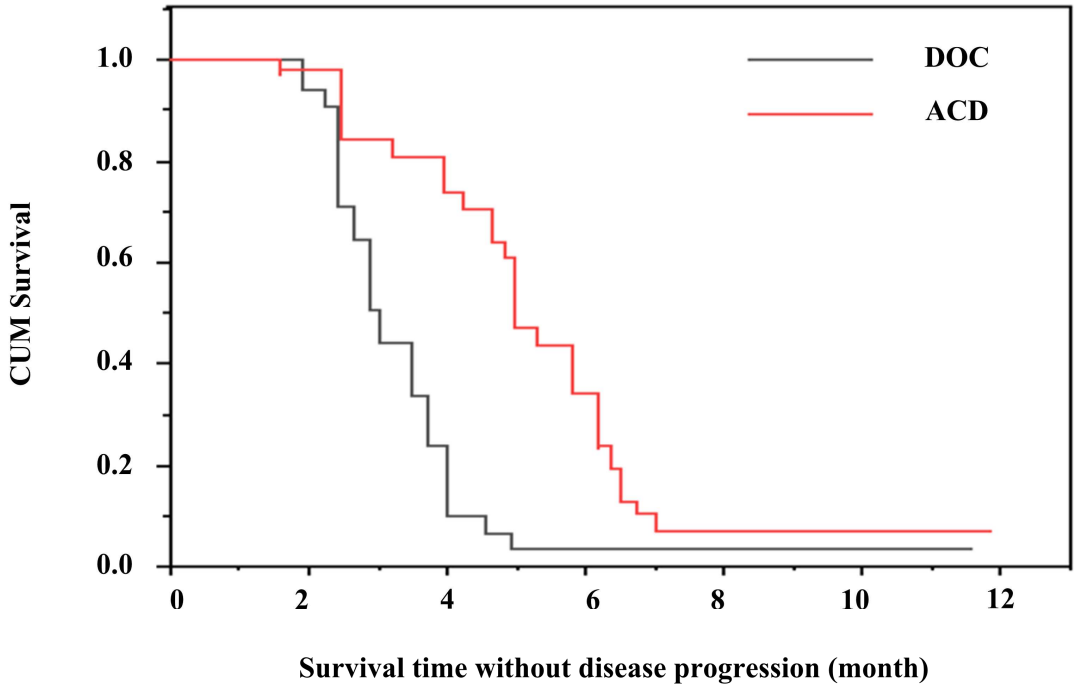
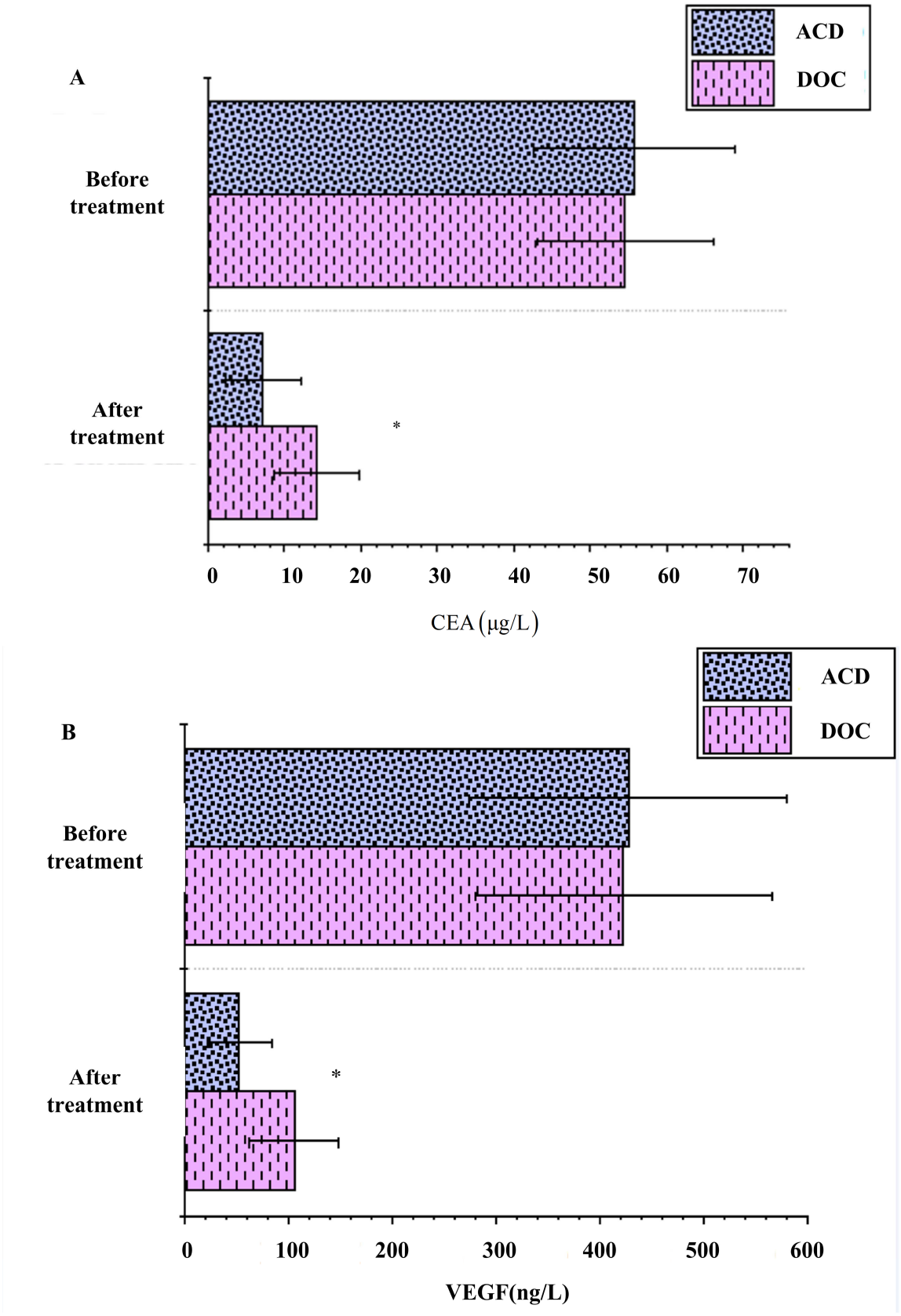
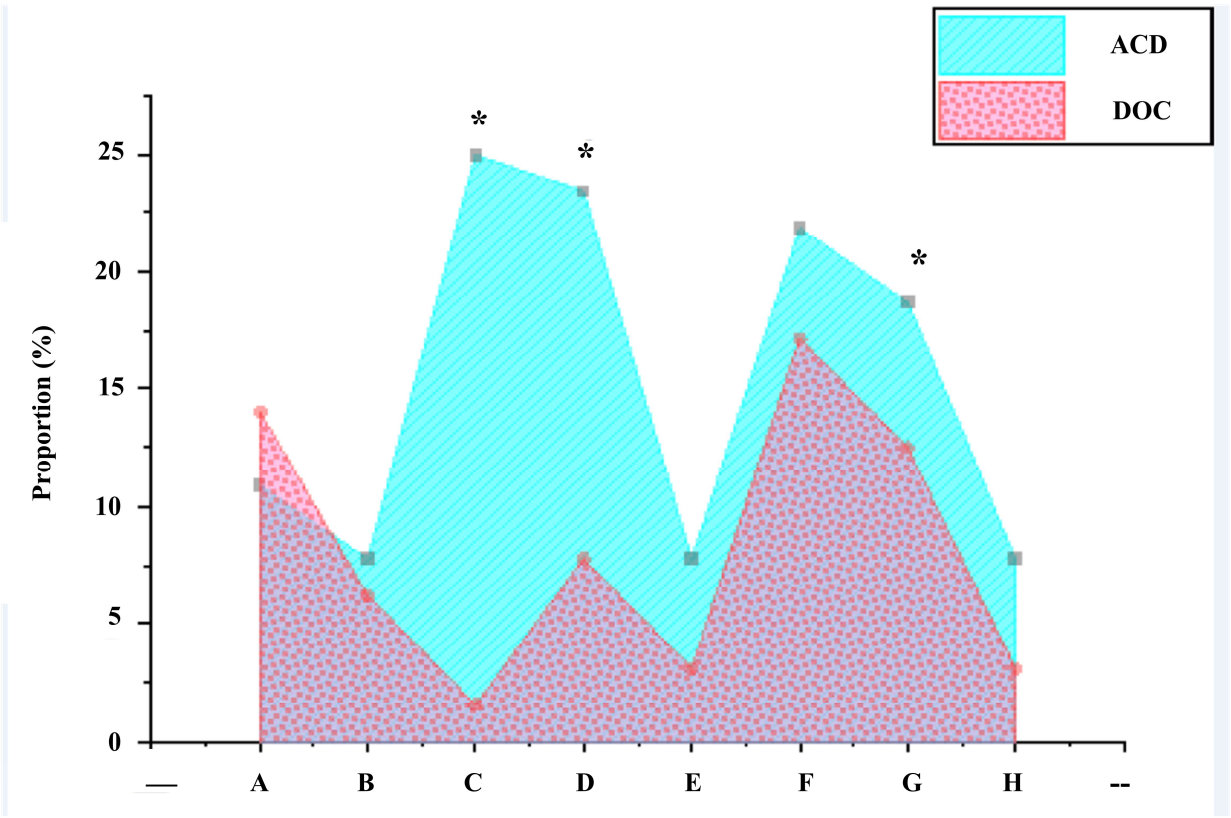


Fig. 3: PFS of patients after different treatments



Note: * suggested a great difference with $P<0.05$ between the ACD and DOC groups.
Fig. 4: Changes in CEA and VEGF of patients (A: CEA; B: VEGF).



Note: * suggested a great difference with $P<0.05$ between the ACD and DOC groups.
Fig. 5: Comparison of IoAE (A: anemia; B: leukopenia; C: bleeding; D: dizziness; E: fatigue; F: susceptible to infection; G: myelosuppression; and H: hair loss)

DISCUSSION

With the aggravation of population aging, worsening environmental pollution, and increasing life stress, the number of lung cancer patients is expected to significantly increase, posing a particularly severe challenge to lung cancer prevention and control (Liu *et al.,* 2023; Zhang and Yang, 2023). Especially for NSCLC patients with negative driver genes, traditional radiotherapy and chemotherapy methods have shown poor efficacy and are often accompanied by numerous adverse reactions, making treatment exceptionally challenging and difficult to break through (Wang *et al.,* 2023; Zhu *et al.,* 2022). Hence, there is a pressing need to investigate novel treatment approaches and pharmaceuticals to confront this formidable challenge. The domestically developed drug, anlotinib, possesses the ability to bind to multiple targets, particularly exhibiting high selectivity for VEGFR-2 and VEGFR-3 (Yang and Zhao, 2023; Cui and Yang, 2022). It can effectively inhibit VEGFR-2 and VEGFR-3, thereby impeding lymphangiogenesis and restricting the metastasis of tumor cells (Chen *et al.,* 2022; Zheng *et al.,* 2022; Han *et al.,* 2020). In addition, anlotinib can efficiently inhibit the PDGFR and FGFR pathways. In comparison to alternative anti-angiogenic medications, anlotinib exhibits more pronounced efficacy (Wang *et al.,* 2021; Lin *et al.,* 2020). This study aims to compare the efficacy and safety of anlotinib combined with docetaxel versus single docetaxel as second-line treatment for NSCLC. Results unveiled that the ACD group was sharply superior to DOC in terms of PFS and ORR. This suggests that the therapeutic efficacy of the combination of anlotinib and docetaxel surpasses that of docetaxel alone in the second-line treatment of NSCLC.

During the treatment process, both groups of patients experienced a range of adverse reactions, including hematologic toxicity, hoarseness, hemoptysis, HFS, fatigue, hypertension, and gastrointestinal reactions. In the ACD group, some patients had more severe adverse reactions, but for the majority, symptoms were relieved after treatment. Similar adverse reactions were observed in DOC group, with no remarkable difference in the IoAE between the ACD and DOC groups. It is noteworthy that the incidence of adverse events in the ACD group was slightly higher than in the DOC group. However, these adverse events were mostly reversible, and no serious adverse events occurred. For NSCLC patients, drug treatment is often their primary choice. Therefore, when using anlotinib for treatment, close attention to adverse reactions is necessary, along with monitoring relevant indicators and providing psychological support to ensure the safety and comfort of the patients.

Compared to other studies (Pei *et al.,* 2023; Wu and Zhang, 2023), this research employed a larger sample size, enhancing the reliability and statistical significance of the results. This work utilized a randomized grouping method, reducing biases between the ACD and DOC groups and improving the comparability of the findings. Nevertheless, this work not only assessed efficacy but also evaluated safety, providing a comprehensive understanding of the advantages and disadvantages of the two treatment approaches. However, this work was subjected to some limitations. Firstly, due to time constraints, it may not have observed long-term changes in efficacy and safety. Secondly, it did not consider the impact of genetic backgrounds of patients on treatment outcomes, potentially introducing individual differences. Thirdly, clinical characteristics of patients (such as age, gender, and pathology type) were not taken into account, potentially introducing confounding factors and due to the time limit of the study, there is a lack of long-term follow-up data, preventing assessing the sustained efficacy and safety of the treatment regimens.

CONCLUSION

The combination of anlotinib and docetaxel as a second-line treatment for NSCLC has been confirmed to be effective. It significantly improved the disease control rate and reduced serum CEA and VEGF levels. Additionally, this treatment regimen can extend the progression-free survival time for patients. It is noteworthy that the majority of patients exhibit good tolerance to the adverse reactions associated with this treatment approach.

Conflict of interest

This study does not involve any conflicts of interest.

REFERENCES

Chen Q, Lai Q, Jiang Y, Yao J, Chen Q, Zhang L, Wang C, Zhou Y, Deng M and Xu B (2022). Anlotinib exerts potent antileukemic activities in Ph chromosome negative and positive B-cell acute lymphoblastic leukemia via perturbation of PI3K/AKT/mTOR pathway. *Transl. Oncol.,* **25**: 101516-101516.

Cui G and Yang Y (2022). Research progress of anlotinib in the treatment of advanced malignant tumors. *Mod. Oncol. Med.,* **30**(16): 3032-3036.

Fang Y, Pan H, Shou J, Hong W, Guo Q, Yang X, Zhu D, Chen J, Lu L, Rao C and Lan F (2021). Anlotinib plus docetaxel versus docetaxel as second-line treatment for advanced non-small cell lung cancer (NSCLC): updated results from a phase I/II study. *J. Clin. Oncol.,* **39**(15 suppl): e21055-e21055.

Han Q, Hou H and Zhang X (2020). Research progress on the anti-tumor treatment of domestically produced innovative drug Anlotini. *Chin. J. New Drug. Clin. Med.,* **39** (02): 65-70.

Han Y, Wang J, Sun T, Ouyang Q, Li J, Yuan J and Xu B (2023). Predictive biomarkers of response and survival following immunotherapy with a PD-L1 inhibitor benmelstobart (TQB2450) and antiangiogenic therapy with a VEGFR inhibitor anlotinib for pretreated advanced triple negative breast cancer. *Signal Transduct. Target. Ther.,* **8**(1): 429-429.

Hao H (2018). Anaplastic lymphoma kinase (ALK) receptor tyrosine kinase: Acatalytic receptor with many faces. *Int. J. Mol. Sci.,* **19**(11): 3448-3448.

Isamu O, Hiroshi N, Shogo N, Seiji N, Shunichi S, Hidehito H, Koichi A, Yasuto Y, Haruyasu M, Yukio H, Shinji A, Tomohiro O, Atsushi H, Yuka F, Hiroaki O, Masahiko A, Nobuyuki Y, Yuichiro O and Kazuhiko, N (2020). Comparison of carboplatin plus pemetrexed followed by maintenance pemetrexed with docetaxel monotherapy in elderly patients with advanced nonsquamous non-small cell lung cancer: Aphase 3 randomized clinical trial. *JAMA Oncol.,* **6**(5): e196828.

Ji X, Jing X, Liu Y, Huang J, Yang S and Yun Y (2022). Clinical application of anlotinib combined with docetaxel: Safe and effective treatment for lung carcinoma. *Dis. Markers,* 2483816-2483816.

Jin Y, Shimizu S, Li Y, Yao Y, Liu X, Si H, Sakurai H and Xiao W (2023). Proton therapy (PT) combined with concurrent chemotherapy for locally advanced non-small cell lung cancer with negative driver genes. *Radiat. Oncol.,* **18**(1): 189-189.

Li Z, Quan C, Li W and Ji M (2023). Synergistic effect of docetaxel combined with a novel multi-target inhibitor CUDC-101 on inhibiting human prostate cancer. *Pathol. Res. Pract.,* **252**: 154938-154938.

Lin B, Song X, Yang D, Bai D, Yao Y and Lu N (2020). Corrigendum to "Anlotinib inhibits angiogenesis via suppressing the activation of VEGFR2, PDGFRβ and FGFR1" [Gene 654 (2018) 77-86].Gene, **723**: 144119.

Liu M, Niu X, Liu H and Chen J (2023). Germline EGFR mutations in lung cancer (Review). *Oncol. Lett.,* **26**(1): 282-282.

Liu Z, Wang X, Li C and Zhao R (2023). The function and mechanism of PSMD14 in promoting progression and resistance to anlotinib in osteosarcoma. *Cancer Cell Int.,* **23**(1): 309-309.

Markers D (2023). Retracted: Clinical application of anlotinib combined with docetaxel: Safe and effective treatment for lung carcinoma. *Dis. Markers,* 9826032-9826032.

Omer HA and Amin K (2023). TGFβ1, SMAD2, CTNNβ1 and Wnt3a gene mutational status and serum concentrations in individuals with non-small cell lung cancer. *Cell. Mol. Biol. (Noisy-le-Grand, France),* **69**(11): 81-91.

Parums D (2022). Editorial: Recent approval of sotorasib as the first targeted therapy for KRAS G12C-mutated advanced non-small cell lung cancer (NSCLC). *Med. Sci. Monit.,* **28**: e938746-e938746.

Pei S, Zhang X and Lu W (2023). The efficacy of amlotinib

hydrochloride combined with docetaxel in the treatment of advanced esophageal cancer and its impact on serum tumor markers and immune function. *Chin. J. Clinicians,* **51**(04): 443-446.

Taminya A (2023). Long-term survival of patients with advanced non-small cell lung cancer treated using immune checkpoint inhibitors. *Resp. Invest.,* **62**(1): 85-89.

Wang Q, Niu W and Pan H (2021). Targeted therapy with anlotinib for a H3K27M mutation diffuse middle glioma patient with PDGFR-α mutation: A case report. *Acta Neurochir.,* **164**(8): 1-4.

Wang Y, Du J and Gong S (2023). Analysis of quality of life and prognostic factors in patients with stage I non-small cell lung cancer treated with stereotactic radiotherapy. *J. Pract. Cancer.,* **38**(07): 1145-1147+1151.

Wang Z, Wang C and Feng L (2023). The efficacy of immunotherapy combined with anlotinib in the treatment of refractory advanced non-small cell lung cancer. *Chin. J. Clin. Ration. Drug Use,* **16**(35): 74-77.

Wu C and Zhang Y (2023). The combined application of oral administration of anlotinib with docetaxel chemotherapy and intensity modulated radiotherapy in the treatment of early-stage small cell lung cancer after first-line treatment failure. *Shandong Med. J.,* **63**(06): 51-54.

Yang S and Zhao Y (2023). Evaluation of the efficacy of amlotinib hydrochloride in the treatment of advanced non-small cell lung cancer. *Chin. J. Metall. Ind. Med.,* **40**(04): 449.

Yang W, Xuan B, Chen M, Li X, He J, Si H and Zhang Y (2022). Comparison of efficacy and safety between immunotherapy and docetaxel monotherapy in NSCLC patients#13. *Front. Oncol.,* **12**: 883514-883514.

Zhai X, Liu Y, Liang Z, Wang W, Qin T, Liu SV, Um S, Luo F and Liu J (2022). Classical ALK G1202R resistance mutation was identified in a lung adenocarcinoma patient with rare LOC388942-ALK fusion after sequential treatment with ALK-TKIs and anlotinib: A case report. *Ann. Transl. Med.,* **10**(21): 1180-1180.

Zhang L and Yang X (2023). Comment on: quitting smoking at or around diagnosis improves the overall survival of lung cancer patients: Asystematic review and meta-analysis. *J. Thorac Oncol.,* **18**(2): e17-e19.

Zheng W, Sun G, Li Z, Wu F, Sun G, Cao H, Zhou J and Ma Y (2022). The effect of anlotinib combined with anti-PD-1 in the treatment of gastric cancer#13. *Front. Surg.,* **9**: 895982-895982.

Zhou Y, Li F, Zou B, Zhou X, Luo L, Dong S, He Z, Zhang Z, Liao L, Liu H, Cai C, Gu D and Duan X (2023). β-Arrestin2 promotes docetaxel resistance of castration-resistant prostate cancer via promoting hnRNP A1-mediated PKM2 alternative splicing. *Discov. Oncol.,* **14**(1): 215-215.

Zhu X, Yu Y and Lu S (2022). Frontline treatment of advanced non-small cell lung cancer in the elderly. *J. Pract. Oncol.,* **37**(03): 221-226.