Original Article

Neoadjuvant camrelizumab followed by concurrent camrelizumab plus chemotherapy for locally advanced esophageal squamous cell carcinoma: a single-arm, phase II study

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Background: Neoadjuvant therapy combining camrelizumab with chemotherapy has emerged as a promising approach for treating locally advanced esophageal squamous cell carcinoma (ESCC). However, the optimal strategy for integrating immunotherapy with chemotherapy remains to be fully defined. This single-arm phase II study aimed to evaluate the efficacy and safety of neoadjuvant therapy with camrelizumab induction followed by camrelizumab plus chemotherapy in locally advanced ESCC.

Methods: Patients with clinical stage cT2–4N0M0 or cTxN1–3M0 ESCC were enrolled in the study. Patients received one dose of camrelizumab (200 mg) followed by docetaxel (75 mg/m^2) and nedaplatin (75 mg/m^2) plus camrelizumab (200 mg) every 3 weeks for two cycles, and then underwent surgery within 3–4 weeks. The primary endpoint was the major pathological response (MPR) rate. The secondary endpoints included the pathological complete response (pCR) rate, R0 resection rate, downstaging rate, disease-free survival (DFS), overall survival (OS), and safety.

Results: In total, 55 patients were enrolled in the study between 16 April 2020 and 30 October 2021. Of these 55 patients, 53 (96.4%) completed neoadjuvant therapy, and 48 (87.3%) underwent surgery. The MPR rate was 77.1% [37/48, 95% confidence interval (CI): 62.7–88.0%]. The pCR (ypT0N0) rate was 39.6% (19/48, 95% CI: 25.8–54.7%). All the patients had R0 resections. Primary tumor downstaging occurred in 44 (91.7%) patients, and nodal downstaging occurred in 19 (39.6%) patients. The 2-year DFS rate was 68.9% (95% CI: 53.0–80.4%), and the 2-year OS rate was 74.7% (95% CI: 60.2–84.6%). Grade ≥3 treatment-related adverse events (TRAEs) were observed in 7 (12.7%) patients.

Conclusions: In conclusion, neoadjuvant camrelizumab followed by camrelizumab plus chemotherapy showed promising efficacy in treating locally advanced ESCC and had a manageable safety profile.

Keywords: Locally advanced esophageal squamous cell carcinoma (locally advanced ESCC); neoadjuvant immunotherapy; camrelizumab; chemotherapy

Submitted Jul 17, 2024. Accepted for publication Aug 21, 2024. Published online Aug 28, 2024.
doi: 10.21037/jtd-24-1141
View this article at: https://dx.doi.org/10.21037/jtd-24-1141

Introduction

Esophageal cancer is a highly aggressive malignancy, and is the seventh most common cancer and the sixth most common cause of cancer-related death worldwide (1). It is estimated that 85% of new cases of esophageal cancer are esophageal squamous cell carcinomas (ESCCs), while 14% are adenocarcinomas (2). The randomized phase III CROSS and NEOCRTEC5010 trials revealed that chemoradiotherapy was more effective than surgery alone in prolonging patient survival (3,4). The randomized Medical Research Council OEO2 trial compared preoperative chemotherapy to surgery alone in patients with esophageal cancer, and found that preoperative chemotherapy was equally clinically beneficial for patients with ESCC and esophageal adenocarcinoma (5). For resectable esophageal adenocarcinoma, the randomized phase III ESOPEC trial showed that perioperative FLOT therapy significantly improved survival compared to neoadjuvant CROSS therapy (6). Further, the JCOG1109 NExT study found that cisplatin/5-fluorouracil (CF) was comparable to CF plus radiotherapy in terms of 3-year overall survival (OS) for locally advanced ESCC (7). The CMISG1701 trial showed that neoadjuvant chemoradiotherapy followed by minimally invasive esophagectomy did not result in significantly better OS than neoadjuvant chemotherapy alone in this setting (8). Neoadjuvant chemoradiotherapy and chemotherapy are the standard treatments for locally advanced ESCC. However, many ESCC patients experience recurrence, often in the form of distant metastasis (3-5,9,10). Therefore, more research needs to be conducted to improve treatments for this type of cancer.

The CheckMate-577 study demonstrated that nivolumab significantly prolonged disease-free survival (DFS) and distant metastasis-free survival (DMFS) compared to placebo in patients with esophageal or gastroesophageal junction cancer who had residual pathological disease following neoadjuvant chemotherapy and complete surgical resection (11). However, neoadjuvant immunotherapy may offer additional benefits. After immunotherapy, reinvigorated tumor-specific $CD8^+$ T cells can re-expand, killing existing tumors and releasing new tumor antigens, which prime naive T cells to target tumors and metastatic sites. Following tumor resection, the increased T-cell ratio aids in destroying residual tumor tissue. After tumor clearance, a stable pool of tumor-specific $CD8^+$ T cells can persist long-term (12). The combination of chemotherapy and immunotherapy has significantly improved OS in advanced ESCC compared to chemotherapy alone (13,14). These promising results drive interest in exploring neoadjuvant chemoimmunotherapy approaches.

Several phase II studies have shown that neoadjuvant camrelizumab plus chemotherapy has encouraging efficacy and a manageable safety profile (15-17). In addition, the randomized phase 3 ESCORT-NEO/NCCES01 trial showed that camrelizumab in combination with chemotherapy achieved a superior pathological complete response (pCR) compared to chemotherapy alone (18). However, chemotherapy was often administered concurrently with programmed cell death 1 (PD-1) antibodies for ESCC (15-19). The optimal neoadjuvant chemoimmunotherapy strategy for ESCC remains unclear, especially in relation to the sequence of immunotherapy and chemotherapy. The FRONTiER (JCOG1804E) study was designed to investigate the optimal neoadjuvant chemoimmunotherapy sequence for resectable ESCC. In the phase I study, cohorts B and D received nivolumab in combination with either the CF regimen or docetaxel, cisplatin and 5-fluorouracil (DCF) chemotherapy regimen followed by one cycle of nivolumab (20). Moreover, in a phase I randomized trial of neoadjuvant treatment for locally advanced cervical cancer, two groups received one dose of atezolizumab or no atezolizumab prior to concurrent atezolizumab plus chemoradiotherapy, respectively (21). These studies showed the regimens had well-tolerated toxicity and promising

Highlight box

Key findings

- Camrelizumab induction followed by camrelizumab plus chemotherapy as neoadjuvant treatment for locally advanced esophageal squamous cell carcinoma (ESCC) resulted in a major pathological response rate of 77.1%, a complete pathological response rate of 39.6%, and a manageable safety profile.

What is known and what is new?

- Although several studies have shown that neoadjuvant camrelizumab plus chemotherapy has promising efficacy, the optimal neoadjuvant immunotherapy regimen for locally advanced ESCC has yet to be established, particularly concerning the optimal sequence of immunotherapy and chemotherapy.
- This study used camrelizumab induction followed by camrelizumab plus chemotherapy, and this regimen demonstrated encouraging clinical outcomes.

What is the implication, and what should change now?

- This novel regimen has potential as a treatment option for patients with locally advanced ESCC.

efficacy in the treatment of ESCC and cervical cancer (20,21). In this study, we conducted a single-arm phase II study using camrelizumab followed by camrelizumab plus chemotherapy in patients with locally advanced ESCC and investigated the efficacy and safety of the regimen. We present this article in accordance with the TREND reporting checklist (available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-1141/rc).

Methods

Study design and participants

This was a single-center, open-label, single-arm phase II study of neoadjuvant therapy with camrelizumab followed by camrelizumab plus chemotherapy in patients with locally advanced resectable ESCC (NCT03917966). The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Research and Clinical Trial Ethics Committee of the First Affiliated Hospital of Zhengzhou University (No. SS-2020-005-002) and informed consent was taken from all the patients.

Patients with histologically confirmed ESCC stages cT2–4N0M0 or cTxN1–3M0 were enrolled in the study. To be eligible for inclusion in this study, the patients had to meet the following inclusion criteria: (I) be aged 18–80 years; (II) have an Eastern Cooperative Oncology Group (ECOG) performance status of 0 or 1; (III) have an expected survival of at least 12 weeks; and (IV) have adequate hematologic, kidney, and liver function. Adequate organ function was defined as: hemoglobin ≥90 g/L; an absolute neutrophil count ≥1.5×10^9/L; platelets ≥80×10^9/L; albumin ≥30 g/L; alanine aminotransferase (ALT) and aspartate aminotransferase (AST) ≤2.5× upper limit of the normal (ULN) (or if there was no liver metastasis, ALT and AST ≤5× ULN); total bilirubin ≤1.5 ULN; and plasma creatinine ≤1.5× ULN or a creatinine clearance rate ≥60 mL/min. Patients were excluded from the study if they met any of the following exclusion criteria: (I) had a metabolic disorder or allergy to docetaxel or nedaplatin; (II) had an active autoimmune disease or a history of an autoimmune disease; (III) had undergone previous therapies with immunosuppressants or systemic hormonal therapy within two weeks of the study enrollment; and/or (IV) had a concomitant disease that seriously endangered their safety or would interfere with their ability to complete the study in the opinion of the treating investigator.

Procedures

Camrelizumab (200 mg) was administered once intravenously on day 1 during the induction period. Chest contrast-enhanced computed tomography assessment was performed after the completion of the induction therapy. Nedaplatin, a third-generation compound with a favorable side effect profile, was chosen for this study. Patients then received intravenous docetaxel (75 mg/m^2), nedaplatin (75 mg/m^2), and camrelizumab (200 mg) on day 1 of each 3-week treatment cycle for two cycles. During the treatment process, granulocyte colony-stimulating factor (GCSF) was used to treat and prevent neutropenia. Imaging was performed according to the Response Evaluation Criteria in Solid Tumors (RECIST) criteria (version 1.1) after two cycles of camrelizumab plus chemotherapy. Physical examinations and laboratory tests were conducted before each cycle of neoadjuvant therapy and before surgery. Surgery was performed within 3–4 weeks of the completion of the neoadjuvant therapy in patients without disease progression. Patients with disease progression underwent surgery if the tumor was resectable and there was no distant metastasis according to the investigator's assessment. Postoperative therapy followed the Chinese Society of Clinical Oncology (CSCO) guidelines for the diagnosis and treatment of esophageal cancer (2022 version). Adverse events were graded using the National Cancer Institute's Common Terminology Criteria for Adverse Events (version 5.0). Patients were followed up every 3 months for the first 2 years, every 6 months from the third year until the fifth year, and annually thereafter.

Outcomes

The primary endpoint was the major pathological response (MPR) rate. An MPR was defined as the presence of ≤10% of residual viable tumors in the primary tumor and lymph nodes. The MPR rate was defined as the proportion of patients who had an MPR. The second endpoints were the pCR rate, R0 resection rate, downstaging of primary and nodal diseases, DFS, OS, and safety. The pCR rate was defined as the proportion of patients with primary tumors and lymph nodes free of viable tumor cells (ypT0N0). Pathological regression was assessed according to the American Joint Committee on Cancer (AJCC) Tumor Regression Grading (TRG) scoring system. DFS was calculated from the date of surgery to the date of local or distant recurrence or death from any cause, whichever

Table 1 Demographic and disease characteristics at baseline

Characteristics	Patients (n=55)
Age (years), median [range]	66 [47–77]
Sex, n (%)	
Male	34 (61.8)
Female	21 (38.2)
ECOG performance status, n (%)	
0	36 (65.5)
1	19 (34.5)
Clinical stage, n (%)	
II	15 (27.3)
III	15 (27.3)
IV	25 (45.5)
Clinical T stage, n (%)	
cT2	5 (9.1)
cT3	25 (45.5)
cT4a	25 (45.5)
Clinical N stage, n (%)	
cN0	23 (41.8)
cN1	19 (34.5)
cN2	11 (20.0)
cN3	2 (3.6)
PD-L1 expression, n (%)	
CPS <1	15 (27.3)
CPS ≥1	28 (50.9)
Unknown	12 (21.8)

ECOG, Eastern Cooperative Oncology Group; PD-L1, programmed death-ligand 1; CPS, combined positive score.

occurred first. OS was calculated from the time of enrollment to death from any cause. OS was analyzed in the full analysis set, which included patients who received at least one dose of the study drug. DFS, the MPR rate, the pCR rate, the R0 resection rate, and the downstaging of primary and nodal diseases were analyzed in patients who underwent surgery (the surgery set). Safety analyses were conducted on the safety set, which included patients who had received at least one dose of the study drug (the safety set).

Statistical analysis

It was estimated that a minimum of 36 patients needed to be enrolled in this study to achieve 80% statistical power with a significance level of 5%, assuming an improvement in the MPR rate from 10% to 28% (22). A dropout rate of 10% was anticipated. Thus, the investigators aimed to recruit 40 patients. The continuous variables are summarized using the median and range, while the categorical variables are presented as the number and percentage. All the statistical analyses were conducted using PASS 15 software (NCSS, LLC., Kaysville, UT, USA) and SAS 9.4 (SAS Institute Inc., Cary, NC, USA).

Results

Patients and treatment

Between 16 April 2020 and 30 October 2021, 55 eligible patients were enrolled in the study. The patients had a median age of 66 years (range, 47–77 years). Among the 55 patients, 25 (45.5%) had stage IV disease, 15 (27.3%) had stage III disease, and 15 (27.3%) had stage II disease. Programmed death-ligand 1 (PD-L1) expression was evaluated in 43 patients, of whom 65.1% had a PD-L1 expression combined positive score (CPS) ≥1 (*Table 1*). All the patients received at least one neoadjuvant therapy dose. Of the 55 patients, 53 completed the full neoadjuvant course, one patient finished two cycles but then died from an unknown cause, and one patient completed one cycle but discontinued due to an allergic reaction. Five patients refused surgery due to surgical risks. Thus, 48 of the 53 patients underwent surgery and were included in the surgical analysis set (*Figure 1*).

Efficacy

In the surgical analysis set, the MPR rate was 77.1% [37/48, 95% confidence interval (CI): 62.7–88.0%], and all the patients underwent R0 resection. According to the AJCC TRG scoring system, 19 patients (39.6%, 95% CI: 25.8–54.7%) achieved a pCR (TRG0, ypT0N0), 14 (29.2%) achieved a near complete response (TRG1), five (10.4%) had evident tumor regression (TRG2), and 10 (20.8%) had minimal or no tumor regression (TRG3). Primary tumor downstaging was observed in 44 patients (91.7%), of whom 20 (45.5%) achieved ypT0. Additionally, nodal downstaging

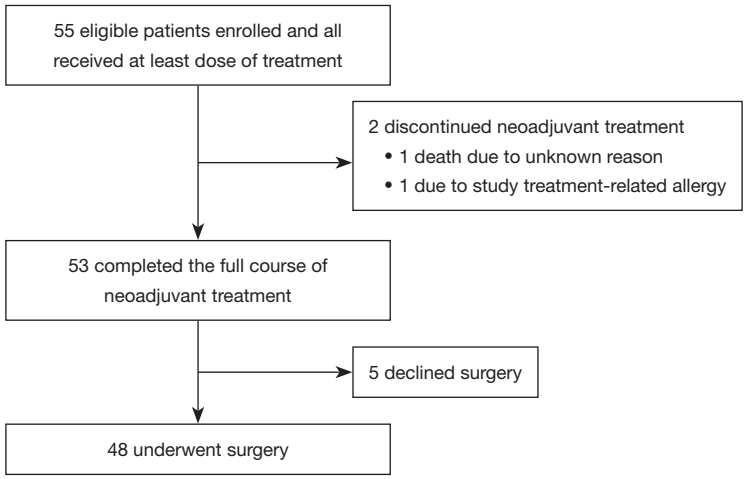

Figure 1 Trial profile. A total of 55 patients were included in both the full analysis set and the safety set, while 48 patients were included in the surgery set.

was observed in 19 patients (39.6%), of whom 17 (89.5%) achieved ypN0 (*Figure 2*). Among the 28 patients with a PD-L1 CPS ≥1, 12 (42.9%) achieved a pCR and 20 (71.4%) achieved an MPR. Among the 15 patients with a PD-L1 CPS <1, 4 (26.7%) achieved a pCR and 11 (73.3%) achieved an MPR. With a median follow-up period of 24.0 months [interquartile range (IQR), 20.0–31.0 months], the median DFS was 32.0 months [95% CI: 32.0–not evaluable (NE)] in the surgical analysis set. The 1- and 2-year DFS rates were 85.4% (95% CI: 71.8–92.8%) and 68.9% (95% CI: 53.0–80.4%), respectively. The median progression-free survival (PFS) and OS were 32.0 months (95% CI: 22.0–NE) and 34.0 months (95% CI: 34.0–NE) in the full analysis set. The 1- and 2-year PFS rates were 78.2% (95% CI: 64.8–87.0%) and 63.5% (95% CI: 48.7–75.2%), and the 1- and 2-year OS rates were 85.5% (95% CI: 73.0–92.4%) and 74.7% (95% CI: 60.2–84.6%), respectively (*Figure 3*).

Safety

Of the 55 patients, 50 (90.9%) experienced preoperative treatment-related adverse events (TRAEs) of any grade. The most common TRAEs were decreased hemoglobin (65.5%), elevated lactate dehydrogenase (23.6%), and hypoalbuminemia (21.8%). Four patients (7.3%) experienced grade 3 TRAEs, of whom three (5.5%) had decreased neutrophil counts, and one (1.8%) had elevated gamma-glutamyl transferase. Additionally, three patients experienced grade 4 TRAEs, including a decreased neutrophil count (n=1) and rash (n=2, *Table 2*). Potential immune-related adverse events (irAEs) of any grade were observed in 21 patients (38.2%), of which the most common were a decreased thyroid stimulating hormone level (18.2%) and hyperthyroidism (14.5%). Most of the irAEs were grade 1 (*Table 2*). No patients died from TRAEs. After surgery, 11 patients (22.9%) experienced hypoproteinemia, six (12.5%) experienced pulmonary infection, and one (2.1%) developed anastomotic fistula, all of which were grades 1–2. The median interval between the last administration of the study drug and surgery was 29 days (IQR, 26–33 days).

Immune microenvironment analysis

We conducted an immunohistochemical analysis of paired pre-treatment and post-treatment tumor tissues (n=19) to investigate the potential correlation of immune cell populations with the pathological response. At the baseline, no significant differences were observed between the MPR and non-MPR groups in the $CD4^+$, $CD8^+$, $CD68^+$, and PD-1^+ cell populations. However, after neoadjuvant therapy, the $CD4^+$, $CD8^+$, and PD-1^+ cells were significantly increased in both the MPR and non-MPR groups, while the $CD68^+$ cell populations remained unchanged (*Figure 4*).

Discussion

To the best of our knowledge, this single-arm phase II study was the first to examine the efficacy and safety of camrelizumab followed by camrelizumab plus chemotherapy

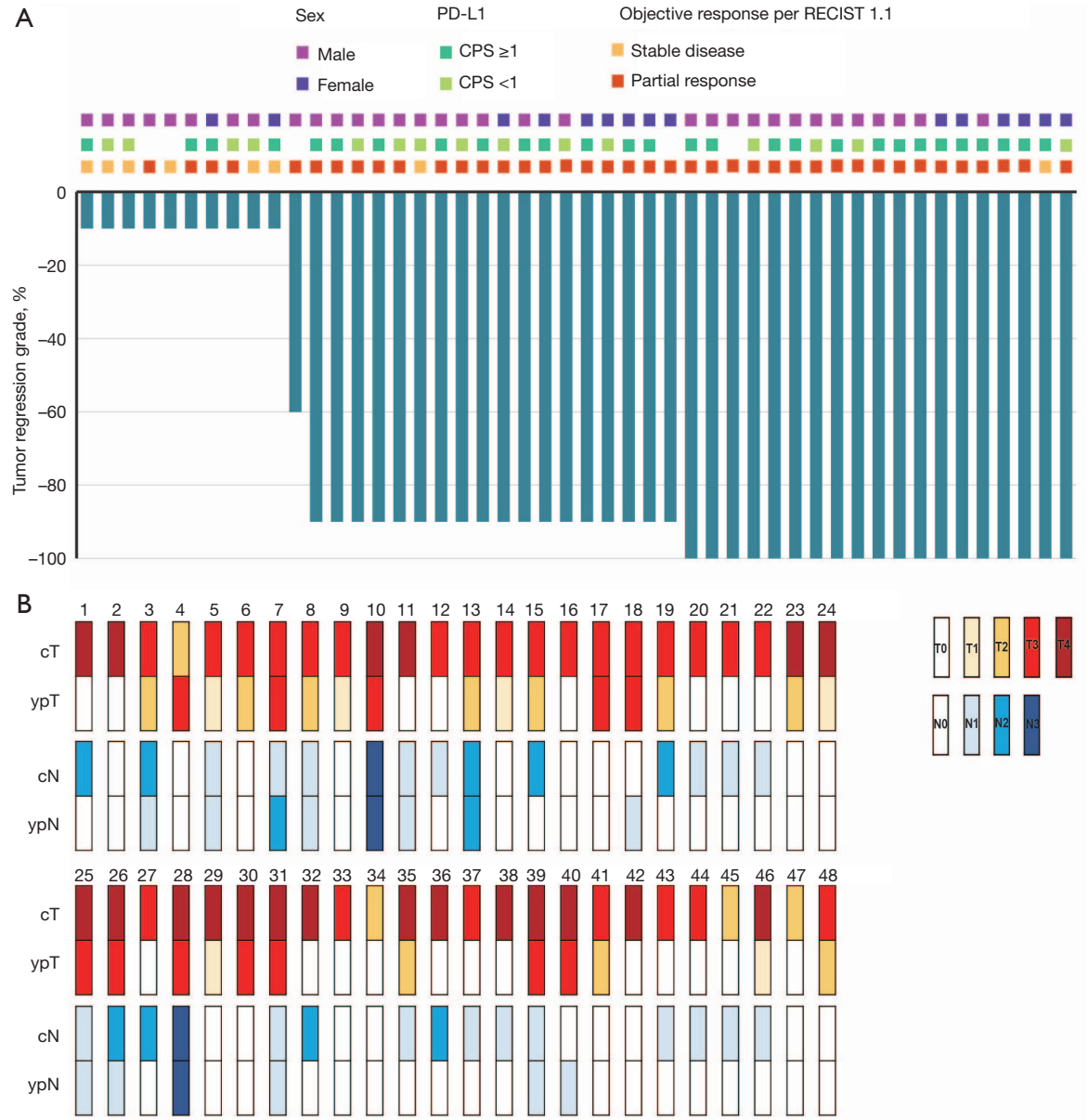

Figure 2 Waterfall plots of pathological regression (A) and pre-treatment clinical staging and post-neoadjuvant therapy staging (B). Each bar represents one patient. PD-L1, programmed death-ligand 1; CPS, combined positive score; RECIST, Response Evaluation Criteria in Solid Tumors.

as neoadjuvant therapy. The patients had an MPR rate of 77.1%, a pCR rate of 39.6%, and a R0 resection rate of 100%. The safety profile of the regimen was manageable, with 7.3% and 5.5% of patients experiencing grade 3 and 4 TRAEs, respectively.

Notably, this study included 25 patients with clinical stage T4a, accounting for approximately half of the trial participants. Among the 20 patients with clinical stage T4a who underwent surgery, six (30.0%) achieved a pCR, eight (40.0%) achieved an MPR, and seven (35.0%) had the ypT0 stage. Conversely, in the NEOCRTEC5010 study, 29% of the patients in the chemoradiotherapy group had clinical stage T4. The pCR (ypT0N0) rate of the patients who underwent surgery in the present study was 43.2% (4). In two studies of neoadjuvant camrelizumab plus chemotherapy, the rates of patients with clinical stage T4a

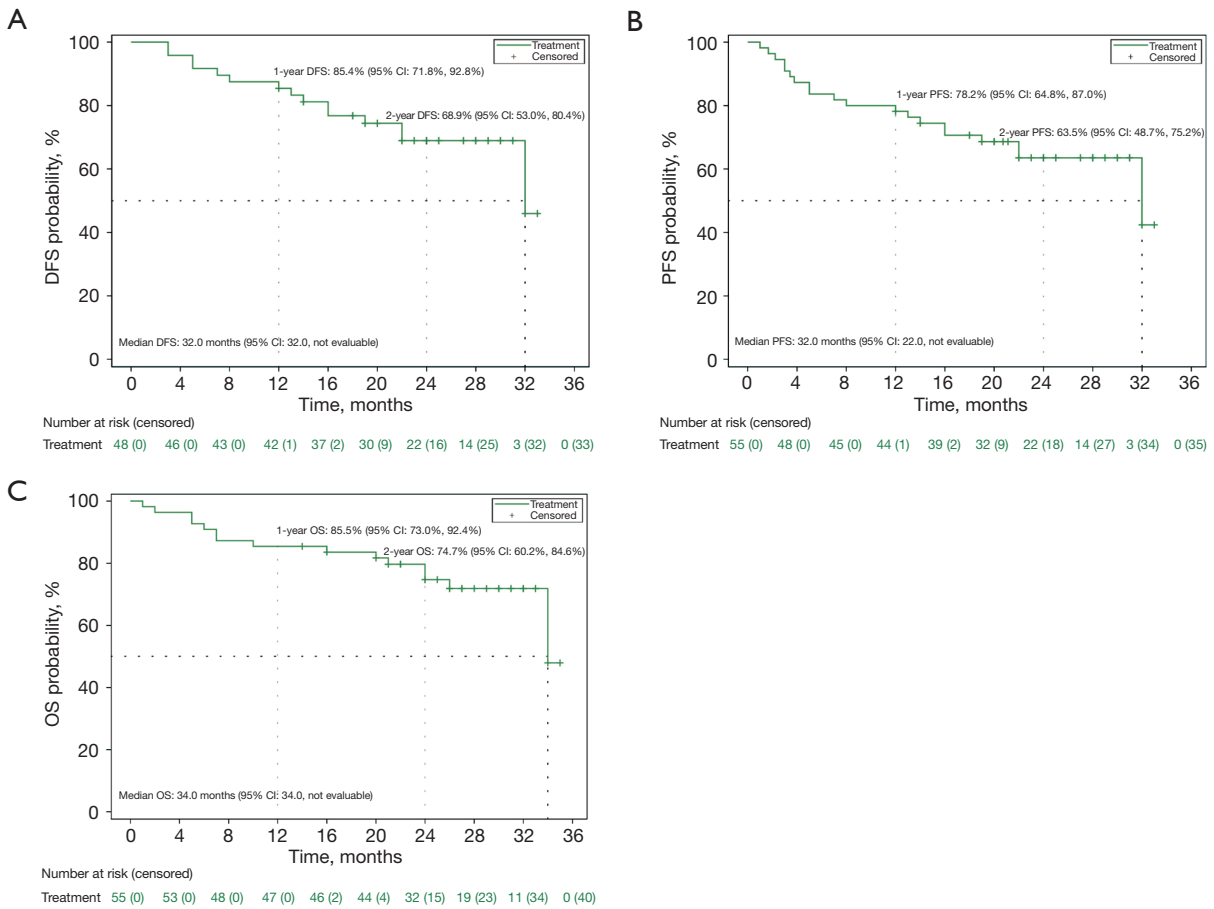

Figure 3 Survival outcomes. (A) DFS in the surgical analysis set. (B) PFS and (C) OS in the full analysis set. DFS, disease-free survival; CI, confidence interval; PFS, progression-free survival; OS, overall survival.

were only 3.6% and 6.7%, respectively (15,17), while the pT0 rates reached 35.3% and 51.0%, respectively.

Several phase II studies have investigated the pathological response of resectable ESCC patients to neoadjuvant chemoimmunotherapy. Three of these studies used two cycles of camrelizumab plus dual chemotherapy and reported pCR rates of 25–39.2% and MPR rates of 50–68.6% (15-17). Further, one study that used three cycles of tislelizumab plus dual chemotherapy reported a pCR rate of 41.7% and an MPR rate of 72% (23). Another study used four cycles of socazolimab plus dual chemotherapy, and reported a pCR rate of 41.4% and an MPR rate of 69.0% (24). The current study reported higher pathological responses compared to studies using two cycles of immunotherapy plus chemotherapy, and comparable pathological responses to studies using three or four cycles of immunotherapy plus chemotherapy. These findings highlight the clinical benefits of camrelizumab followed by camrelizumab plus chemotherapy.

The PALACE-1 study showed that preoperative pembrolizumab combined with chemoradiotherapy resulted in a pCR rate of 56% and an MPR rate of 89% (19). However, some patients are not eligible for chemoradiotherapy, and chemoradiotherapy is poorly tolerated in clinical practice. Further, the interval between the completion of neoadjuvant therapy and surgery may be longer when radiotherapy is added. In this study, the median interval between the last administration of the study drug and surgery was 29 days (IQR: 26–33 days). Conversely, the interval was 6.6 weeks in the CROSS trial (3), 1.4 months in the NEOCRTEC5010 trial (4), and 42.5 days in the PALACE-1 trial (19).

The safety profile observed in this study was consistent with that reported in studies using camrelizumab combined with chemotherapy (15-17,25-27), and no new safety signals were identified. The incidence of grade ≥3 TRAEs in this

Table 2 Treatment-related adverse events occurred in at least 5% of the treated patients

Variables	Any grade	Grade 1	Grade 2	Grade 3	Grade 4
Treatment-related adverse events, n (%)					
Any adverse event	50 (90.9)	32 (58.2)	11 (20.0)	4 (7.3)	3 (5.5)
Decreased hemoglobin	36 (65.5)	26 (47.3)	10 (18.2)	0	0
Elevated lactate dehydrogenase	13 (23.6)	13 (23.6)	0	0	0
Hypoalbuminemia	12 (21.8)	12 (21.8)	0	0	0
Decreased neutrophil count	10 (18.2)	3 (5.5)	3 (5.5)	3 (5.5)	1 (1.8)
Decreased white blood cell count	10 (18.2)	3 (5.5)	7 (12.7)	0	0
Decreased thyroid stimulating hormone	10 (18.2)	9 (16.4)	1 (1.8)	0	0
Elevated alanine aminotransferase	8 (14.5)	7 (12.7)	1 (1.8)	0	0
Hyperthyroidism	8 (14.5)	7 (12.1)	1 (1.8)	0	0
Decreased platelet count	7 (12.7)	7 (12.7)	0	0	0
Elevated gamma-glutamyl transferase	6 (10.9)	5 (9.1)	0	1 (1.8)	0
Increased creatine phosphokinase MB	5 (9.1)	5 (9.1)	0	0	0
Elevated aspartate aminotransferase	5 (9.1)	4 (7.3)	1 (1.8)	0	0
Increased uric acid	4 (7.3)	4 (7.3)	0	0	0
Reactive cutaneous capillary endothelial proliferation	3 (5.5)	3 (5.5)	0	0	0
Increased thyroid stimulating hormone	3 (5.5)	3 (5.5)	0	0	0
Fatigue	3 (5.5)	3 (5.5)	0	0	0
Rash	3 (5.5)	0	1 (1.8)	0	2 (3.6)
Potential immune-related adverse events, n (%)					
Any adverse event	21 (38.2)	17 (30.9)	2 (3.6)	0	2 (3.6)
Decreased thyroid stimulating hormone	10 (18.2)	9 (16.4)	1 (1.8)	0	0
Hyperthyroidism	8 (14.5)	7 (12.7)	1 (1.8)	0	0
Reactive cutaneous capillary endothelial proliferation	3 (5.5)	3 (5.5)	0	0	0
Increased thyroid stimulating hormone	3 (5.5)	3 (5.5)	0	0	0
Rash	3 (5.5)	0	1 (1.8)	0	2 (3.6)

study was 12.7%, which was similar to that observed in the two cycles of camrelizumab plus nab-paclitaxel plus CF regimen (10.7%), and much lower than that observed in the two cycles of camrelizumab plus nab-paclitaxel plus carboplatin regimen (56.7%) (15,17). The 56.7% of grade ≥3 TRAEs may be due to nab-paclitaxel being administered at a dose of 100 mg/m^2 on days 1, 8, and 15 during each cycle (15). Moreover, the incidence of grade ≥3 TRAEs in this study was lower than that of a study that used a regimen of three cycles of tislelizumab plus carboplatin and nab-paclitaxel regimen (42.2%) and that of a study that used a regimen of four cycles of socazolimab plus nab-paclitaxel plus CF (65.6%) (23,24). As in the previous studies of chemotherapy plus camrelizumab (15-17,25-27), all the irAEs were manageable and most were grades 1–2 in this study.

This study had several limitations that should be considered when interpreting the results. These limitations included the small sample size, the single-center and single-arm design, and the lack of a control group, which makes it difficult to establish definitive conclusions about treatment efficacy.

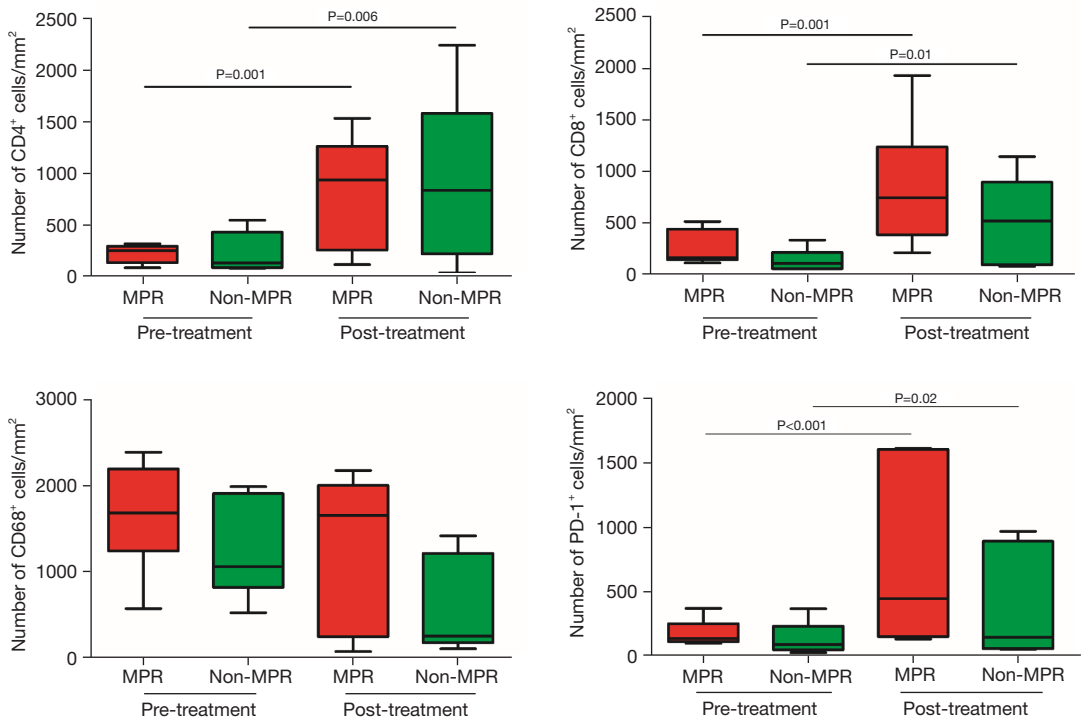

Figure 4 Comparison of CD4$^+$, CD8$^+$, CD68$^+$, and PD-1$^+$ cell populations between the MPR and non-MPR groups. At the baseline, the MPR and Non-MPR groups showed no significant differences in CD4$^+$, CD8$^+$, CD68$^+$, and PD-1$^+$ cells. After neoadjuvant therapy, the CD4$^+$, CD8$^+$, and PD-1$^+$ cells increased significantly in both groups, while the CD68$^+$ cells remain unchanged. The data for all groups were analyzed using a one-way ANOVA, followed by pairwise comparisons using the LSD-*t* test. PD-1, programmed cell death 1; MPR, major pathological response; ANOVA, analysis of variance.

Conclusions

Neoadjuvant treatment with camrelizumab followed by camrelizumab plus chemotherapy showed impressive pCR and MPR rates. This study also showed that the regimen had a manageable safety profile, and a low incidence of grade ≥3 TRAEs. Camrelizumab followed by camrelizumab plus chemotherapy may be considered as a new therapeutic option for patients with locally advanced ESCC based on these findings. Further studies are warranted to validate these results and explore the optimal sequencing and duration of therapy, as well as the potential benefits of tailoring postoperative adjuvant treatments based on individual responses to neoadjuvant therapy.

Acknowledgments

We would like to express our deep appreciation to the thoracic surgery staff for their support throughout this study.

Funding: The study was funded by the National Natural Science Foundation of China (No. 81672442), the Natural Science Foundation of Henan Province (No. 222300420557), and the Beijing Xisike Clinical Oncology Research Foundation's Hengrui Oncology Research Fund (No. Y-HR2018-219).

Footnote

Reporting Checklist: The authors have completed the TREND reporting checklist. https://jtd.amegroups.com/article/view/10.21037/jtd-24-1141/rc

Data Sharing Statement: Available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-1141/dss

Peer Review File: Available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-1141/prf

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-1141/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Research and Clinical Trial Ethics Committee of the First Affiliated Hospital of Zhengzhou University (No. SS-2020-005-002). All patients provided written informed consent prior to their enrollment in the study.

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Cite this article as: Sheng Y, Meng X, Zhang C, Shan Z, Li F, Wu B, Xu M, Li A, Guan L, Chen L, Sun S, Ma Y, Lu T, Zhao S, Fan Q, Qi Y, Wang F. Neoadjuvant camrelizumab followed by concurrent camrelizumab plus chemotherapy for locally advanced esophageal squamous cell carcinoma: a single-arm, phase II study. J Thorac Dis 2024;16(8):5337-5347. doi: 10.21037/jtd-24-1141

