Asian Pacific Journal of Cancer Care
Vol 11 No 3 (2026), 481-488
Case series

Pathologic Response to Neoadjuvant Subcutaneous Fixed-Dose Pertuzumab–Trastuzumab (Phesgo®) and Chemotherapy in HER2-Positive Locally Advanced Breast Cancer: A Case Series and Literature Review

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Background: Globally, breast cancer (BC) is the most prevalent malignancy among females and a significant health concern in India. A notable proportion of BC cases are human epidermal growth factor receptor 2-positive (HER2+), characterized by HER2 overexpression or gene amplification, often associated with aggressive tumor behavior. Dual anti-HER2 therapy with trastuzumab and pertuzumab, combined with chemotherapy, is the standard of care, particularly in the neoadjuvant setting for tumor stage T2 or node-positive HER2+ BC. Phesgo®, a fixed-dose subcutaneous formulation of trastuzumab, pertuzumab, and hyaluronidase, offers a convenient and time-efficient alternative to intravenous infusions, with potential implications for improving patient comfort and streamlining healthcare resource utilization.

Case presentation: This case series reports on six patients with HER2+ BC who received neoadjuvant chemotherapy with Phesgo® at the Department of Medical Oncology, Tertiary Cancer Care Center, Government Medical College, Kozhikode, Kerala,India. Clinical data, including presenting symptoms, examination findings, investigations, management, and treatment response, were reviewed and reported descriptively. Among six patients, Phesgo® led to a pathological complete response in three (50%) cases. Residual cancer burden class 0 was observed in four cases. No side effects such as diarrhea or injection site reactions were reported. No patient experienced a decline in left ventricular ejection fraction or clinical cardiac events. These findings are corroborated by a literature review indicating comparable efficacy and safety between subcutaneous and intravenous modes of administrationin treating HER2+ BC.

Results: This series demonstrates that neoadjuvant Subcutaneous Fixed-Dose Pertuzumab–Trastuzumab (Phesgo®) is an effective and safe option for HER2+ breast cancer, achieving significant pathological responses without cardiac toxicity or injection-site complications.

Conclusion: It represents a viable, convenient alternative to intravenous therapy that may enhance patient comfort and healthcare efficiency.

Introduction

Globally, breast cancer (BC) is the most common cancer in females and the second leading cause of cancer- related mortality [1]. In 2022, female BC was responsible for 2.3 million new diagnoses and 670,000 deaths worldwide [2]. In India, BC has the highest incidence of 13.6%, and contributes to 10.7% of all cancer-related mortality [3]. Among BC subtypes,the human epidermal growth factor receptor 2 (HER2)- enriched subtype accounts for 15%–20% of cases. It is more aggressive and is associated with higher rates of proliferation, recurrence, lymph node metastases, and resistance to chemotherapy [4-6].

Current treatment for high-risk HER2+ BC involves combining chemotherapy with dual anti-HER2 therapy to achieve a synergistic antitumor effect [7]. Trastuzumab and pertuzumabare the key monoclonal antibodies currently approved for HER2-targeted therapy [8]. Neoadjuvant therapy with trastuzumab improves pathological complete response (pCR) rates in patients with early-stage HER2+ BC [9, 10]. However, resistance has been observed with trastuzumab, especially when used as a monotherapy [11]. The addition of pertuzumab to this regimen has shown further enhancement of pCR outcomes in the neoadjuvant setting [12]. Evidence indicates that neoadjuvant therapy using combination of pertuzumab and trastuzumab is both effective and safe, achieving higher pCR rates in patients with HER2+ early breast cancer (EBC) [13].

Recently, HER2+ BC treatment with subcutaneous (SC) injection has emerged as a convenient alternative to intravenous (IV) infusions, offering easier administration, shorter treatment duration, and improved patient experience [14]. A novel SC fixed-dose combination (FDC) of pertuzumab, trastuzumab, and recombinant human hyaluronidase was approved by FDA in 2020 for the neoadjuvant treatment of HER2+ locally advanced, inflammatory, or EBC [15]. Known commercially as Phesgo®, this SC formulation is currently available for clinical use in India [16, 17].

Although a few studies have explored the combination of pertuzumab and trastuzumab, particularly in SC administration [17, 18], the overall body of evidence remains relatively limited.Real-world evidence from India on neoadjuvant Phesgo® remains scarce, particularly regarding pathological response and cardiac safety. To address this gap, this retrospective case series investigates the response rate and toxicity of neoadjuvant chemotherapy with Phesgo® in six patients with HER2+ locally advanced BC at the Department of Medical Oncology, Tertiary Cancer Care Center, Government Medical College, Kozhikode, Kerala, India, between January 2023 and December 2024, and is supported by a literature review.

Case series

Case 1

A 60-year–old postmenopausal female with no comorbidities or family history of malignancy presented with a left breast lump persisting for 4 months.Examination revealed a 4×4 cm hard lump in the lower inner quadrant of the left breast, along with multiple 2×1 cm axillary nodes. Mammography revealed a breast imaging- reporting and data system (BI-RADS) 4B lesion in the left breastperiareolar region (7–9 o’clock position), measuring 2.8×2.1×3cm, along with a 1.6 cm left axillary node. Positron emission tomography–computed tomography (PET–CT) confirmed a 2.8×2.3 cm left breast primary with metabolically active multiple left axillary and internal mammary nodes.

The patient received neoadjuvant chemotherapy with four cycles of doxorubicin and cyclophosphamide every 2 weeks, followed by four cycles of docetaxel and SCP hesgo®every 3 weeks. The treatment was well tolerated, with no side effects such as diarrhea or injection site reactions. Subsequently, the patient under went left modified radical mastectomy (MRM), with histopathology revealing a pCR. Adjuvant radiation therapy was administered to the left chest wall, supraclavicular fossa, and internal mammary nodal area. Postoperatively, due to financial

constraints, the patient continued with 13 cycles of trastuzumab, completing treatment in August 2024. Serial echocardiograms (ECHOs) showed no decrease in ejection fraction (EF). The patient remains under regular follow-up with no evidence of disease.

Case 2

A 56-year–old perimenopausal female with type 2 diabetes mellitus, hypothyroidism, and a positive family history of malignancy (relatives) presented with a right breast lump persisting for 3 months.Examination revealed a 4×3 cm hard lump in the right breast and a right axillary node measuring 2×1 cm. Mammography showed a BI- RADS 5 lesion in the right breast measuring 4×3 cm, along with a 2 cm right axillary node. CT of the thorax and bone scans showed no evidence of distant metastasis.

The patient received neoadjuvant chemotherapy consisting of three cycles of 5-fluorouracil, epirubicin, and cyclophosphamide, followed by two cycles of docetaxel and trastuzumab at an outside center, and was subsequently referred to the current center for further treatment. The patient then received two additional cycles of docetaxel and three cycles of Phesgo® every 3 weeks, which were well tolerated. The patient underwent the right breast-conserving surgery (BCS). Histopathology revealed invasive ductal carcinoma with extensive ductal carcinoma in situ (DCIS) showing comedo necrosis and free margins. The invasive component was 2×1 mm (ypT1aN0). The patient continued adjuvant Phesgo® for 14 cycles. Serial ECHOs showed no decrease in EF. The germline hereditary panel revealed a pathogenic succinate dehydrogenase subunit B (p.Asp48Val;variant allele fraction: 39.09%) variant. The patient was referred to a medical geneticist for further evaluation. The patient remains on regular follow-up with no evidence of disease.

Case 3

A 40-year–old premenopausal female, with no significant comorbidities or family history of malignancy, presented with a left breast lump persisting for 3 months. Clinical examination revealed a 6×5 cm hard lump in the lower outer quadrant of the left breast and a 2 cm left axillary node. The mammogram showed a BI-RADS 5 lesion in the lower outer quadrant of the left breast measuring 4×3 cm, along with multiple axillary lymph nodes in left levels I, II, and III, the largest measuring 1.5 cm.

The patient received neoadjuvant chemotherapy with four cycles of doxorubicin and cyclophosphamide every 2 weeks, followed by 12 weekly doses of paclitaxel and four cycles of SC Phesgo® every 3 weeks. The treatment was well tolerated with no side effects, such as diarrhea or injection site reactions. The patient underwent BCS, and histopathology revealed no residual tumor in the breast or lymph nodes (ypT0N0). The patient has since received 11 cycles of adjuvant trastuzumab and is also on tamoxifen and 6-monthly zoledronic acid.

Case 4

A 53-year–old postmenopausal female with hypertension who was on regular medication,with no significant family history of malignancy, presented with an 8-month history of a left breast lump and nipple retraction. The examination revealed a 5×5 cm hard lump with nipple retraction, no skin or chest wall involvement, and small axillary nodes. Mammography showed a BI-RADS 5 lesion measuring 4.8×3.3 cm in the central quadrant with suspicious axillary nodes. PET–CT revealed the left breast primary measuring 5×5 cm in the upper outer quadrant and retroareolar region, with metabolically active left level I, II, and III axillary lymph nodes.

The patient received neoadjuvant chemotherapy with four cycles of doxorubicin and cyclophosphamide every 2 weeks, followed by weekly paclitaxel for 12 weeks, along with four cycles of SC Phesgo® every 3 weeks. The treatment was well tolerated without side effects. The patient underwent left MRM, with histopathology showing residual disease (3×1.2×1 cm) in the breast and one positive lymph node out of twelve (ypT2N1).The patient received 13 cycles of adjuvant trastuzumab and remains on follow-up.Serial ECHOs showed no decrease in EF. The patient is also on anastrozole and receives zoledronic acid every 6 months.

Case 5

A 57-year–old postmenopausal female, with no comorbidities and a family history of malignancy in her sister, presented with a right breast lump persisting for 6 months, along with reddish discoloration over the lump for the past 3 months. Examination revealed a 10×10 cm lump with a peaud'orange appearance in the right breast, along with a 1 cm right axillary node. Mammography revealed a BI-RADS 4C lesion measuring 10×10 cm. PET–CT showed a right breast primary measuring 8×8 cm, infiltrating the nipple–areolar complex, with F-18 fluorodeoxyglucose (FDG)-avid right level I axillary node, and few non-to-mild FDG-avid sclerotic lesions in the D11 and L5 vertebrae.Contrast-enhanced magnetic resonance imaging of the spine confirmed hemangiomas in the D11 and L5 vertebrae.

The patient received neoadjuvant chemotherapy consisting off our cycles of doxorubicin and cyclophosphamide every 2 weeks, followed by weekly paclitaxel for 12 weeks, along with Phesgo® every 3 weeks for four cycles. The treatment was well tolerated without any side effects.The patient underwent a right MRM, and the histopathological report revealed a single 1 mm focus of residual high-grade DCIS in the lower quadrant, staged as ypTis (DCIS) N0M0. The patient completed adjuvant radiation therapy and has received seven cycles of Phesgo®. The patient is currently on anastrozole and receives zoledronic acid every 6 months, with regular follow-up.

Case 6

A 48-year–old premenopausal female with no family history of malignancy was diagnosed with left breast carcinoma (cT2N0M0) in 2019, identified as invasive ductal carcinoma,estrogen receptor-positive, progesterone receptor-positive, HER2/neu 3+, with a Kiel 67 (Ki-67) proliferation index of 60%. The patient underwent left BCS, and the pathological stage was pT2N0M0. The patient previously received six cycles of docetaxel, carboplatin, and trastuzumab, followed by 11 cycles of trastuzumab maintenance therapy over a total duration of 1 year. Adjuvant radiation therapy was completed, and the patient was treated with tamoxifen for 3.5 years, followed by letrozole for 6 months. During the visit, the patient presented with a right breast lump that had been present for 2 months. Examination revealed a 3×3 cm lump in the right breast, with small axillary nodes. The mammogram revealed a BI-RADS 4A lesion in the right breast with an associated axillary node. PET–CT showed a spiculated 3×3.5 cm lesion in the upper inner quadrant of the right breast with adjacent nodules, as well as FDG-avid right internal mammary and level I axillarynodes.

The patient received neoadjuvant chemotherapy comprising four cycles of doxorubicin and cyclophosphamide every 2 weeks, followed by 12 weekly doses of paclitaxel, along with four cycles of SC Phesgo® every 3 weeks. The treatment was well tolerated, with no side effects such as diarrhea or injection site reactions. The patient underwent right BCS, and the histopathological report revealed a pCR in both the breast and axillary nodes. The patient completed 13 cycles of trastuzumab without cardiac toxicity. Hormone therapy with anastrozole was resumed, along with trastuzumab and zoledronic acid. The germline hereditary panel revealed no pathogenic variant or variant of unknown significance. Details of all six cases, along with the biopsy, immunohistochemistry (IHC), and post-operative histopathology details, are presented in Table

1.ypTNM criteria were followed to define pCR.

Parameter	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Family history of malignancy	Absent	Present	Absent	Absent	Present	Absent
Clinical presentation	A hard lump palpable in thelower inner quadrant of the left breast, with multiple axillary nodes	A hard lump palpable in the right breast, with a right axillary node	A hard lump palpable in the lower outer quadrant of the left breast, along with a left axillary node	A hard lump palpable in the left breast with nipple retraction and small axillary nodes	A right breast lump with peaud'orange appearance, along with a right axillary node	A left breast lump with small axillary nodes
Mammogram	BI-RADS 4B lesion	BI-RADS 5 lesion	BI-RADS 5 lesion	BI-RADS 5 lesion	BIRADS 4C lesion	BI-RADS 4A lesion
Biopsy	Invasive ductalc arcinoma-NOS, grade 3	Invasive ductal carcinoma-NOS, grade 2	Invasive ductal carcinoma-NOS, grade 2	Invasive ductal carcinoma-NOS, grade 3	Invasive ductal carcinoma-NOS, grade 3	Invasive ductal carcinoma-NOS, grade 3
IHC	ER-negative,PR-negative, HER2/neu 3+,Ki-67: 40%	ER-positive, PR-positive, HER2/neu 3+,Ki-67: 50%	ER-positive, PR-positive, HER2/neu 3+,Ki-67: 50%	ER-positive, PR-positive, HER2/neu 3+,Ki-67: 70%	ER-positive, PR-negative, HER2/neu 3+,Ki-67: 55%	ER-negative,PR-negative, HER2/neu 3+,Ki-67: 50%
Clinical stage	cT2N3bM0	cT2N1M0	cT3N3aM0	cT2N3aM0	cT4bN1M0	cT2N3bM0
Surgery	Left MRM	Right BCS	BCS	Left MRM	Right MRM	Right BCS
Outcomes with Phesgo®						
Safety	Well tolerated	Well tolerated	Well tolerated	Well tolerated	Well tolerated	Well tolerated
Post-operative histopathology report						
Primary and lymph nodes	No residual tumor or DCIS inthe primary site	Invasive ductal carcinoma grade 2 of size 2×1 mmwith extensive DCIS with comedo necrosis	No residual tumor or DCIS in the primary site	Invasive ductal carcinoma grade 3 of size3×1.2×1 cm in the breast	A single 1 mm focus of residual high-grade DCIS in the lower quadrant	No residual tumor or DCIS in the primary site
Lymph node	All 15 of 15 lymph nodeswere free of residual disease	All 14 of 14 lymph nodes were free of tumor	All 15 of 15 lymph nodeswerefree of residual disease	One of the 12 lymph nodes was positive for macroscopic metastasis	All 15 of 15 lymph nodeswere free of residual disease	All 14 of 14 lymph nodeswere free of residual disease
Margin	Negative for invasive or insitu component	Negative for invasive or insitu component	Negative for invasive or insitu component	Negative for invasive or insitu component	Negative for invasive or insitu component	Negative for invasive or insitu component
ypTNMstage	ypT0N0	ypT1aN0	ypT0N0	ypT2N1a	ypTis (DCIS) N0M0	ypT0N0
RCB class (score)	0	I (1.08)	0	II (2.96)	0	0

Table 1. Overview of Cases with HER2+ BC.

BC, Breast cancer; BCS, Breast-conserving surgery; BI-RADS, Breast imaging-reporting and data system; DCIS, Ductal carcinoma in situ; ER, Estrogen receptor; HER2, Human epidermal growth factor receptor 2; IHC, Immunohistochemistry; Ki-67, Kiel 67 (marker of proliferation); MRM, Modified radical mastectomy; neu3+, Neu protein expression; pCR, Pathological complete response; PR, Progesterone receptor; RCB, Residual cancer burden.

Discussion

Chemotherapy combined with dual anti-HER2 therapy (involving IV pertuzumab plus trastuzumab) is the established treatment for HER2+ high-risk EBC [19] and HER2+ metastatic BC [20]. To streamline this regimen, Phesgo®, a fixed-dose SC combination of pertuzumab, trastuzumab, and hyaluronidase, is used in conjunction with IV chemotherapy for the treatment of both early and metastatic HER2+ BC. Trastuzumab (subdomain IV)and pertuzumab (subdomain II) bind to distinct noncompeting subdomains of HER2.They act synergistically to disrupt HER2 signaling, enhancing antiproliferative activity both in vitro and in vivo.Phesgo® also contains recombinant human hyaluronidase, which facilitates drug dispersion and absorption during SC administration [21].

HER2 amplification status is crucial for HER2 diagnosis. In this case series, HER2 status was determined using IHC. Although IHC is more commonly used to assess HER2 amplification, the one-step real-time reverse transcription-polymerase chain reaction (RT-qPCR)-based method is also a reliable alternative.It provides an accurate and reproducible approach for quantifying HER2 gene expression to guide treatment decisions. Nevertheless, literature reports a strong concordance between IHC and one-step RT-qPCR,supporting the clinical reliability of both diagnostic methods. This enables clinicians to choose either test based on availability or feasibility for accurate evaluation of disease status [22].

In the neoadjuvant setting, Phesgo® is administered every 3 weeks for 3–6 cycles [21]. In the present case series, Phesgo® was administered in all six cases of HER2+ BC undergoing neoadjuvant chemotherapy. While the chemotherapy back bonediffered (using either docetaxel or paclitaxel), all patients received Phesgo® every 3 weeks. Moreover, the number of Phesgo® cycles ranged from 3 to 4 in all cases, aligning with the recommended range of 3–6 cycles. pCR was achieved in three cases, two cases showed residual disease,and one case revealed a pathogenic variant, as determined by the germline hereditary panel. Further, four cases had a residual cancer burden (RCB) score of 0, while the remaining were classified as RCB classes I and II. The treatment with Phesgo® was well tolerated in all cases of HER2+ BC, with no side effects such as diarrhea or injection site reactions. Although direct comparative literature is limited, available data suggest that theSC formulation offers similar efficacy and safety to the IV mode of administration. Notably, the FeDeriCa study compared the FDC of pertuzumab and trastuzumab (for SC injection) with IV pertuzumab plus trastuzumab. The comparison focused on pharmacokinetics, efficacy, and safety in 500 patients with HER2+ EBC in the neoadjuvant-adjuvant setting. The study demonstrated comparable pCR rates, with total pCR achieved by 59.5% of patients in the IV infusion group and 59.7% of patients in the SC FDC group. The SC FDC group also showed a similar safety profile compared with the IV infusion group in the neoadjuvant setting.The most common adverse events in both treatment groups were neutropenia, decreased neutrophil count, febrile neutropenia, diarrhea, and decreased white blood cell count [18].

While the FeDeriCa study primarily addressed pharmacokinetics and clinical outcomes, the PHranceSCa study explored patient preferences between the SC FDC and IV administration of pertuzumab plus trastuzumab HER2+ EBC. Most patients preferred the SC FDC over the IVformulation (85.0% vs. 13.8%). The main reasons cited for the SC preference were reduced clinic time and comfort during administration. Additionally, 88.1% of patients reported being very satisfied or satisfied with SC injection, compared with 67.5% of patients with IV infusion. Overall, 86.9% chose the SC FDC of pertuzumab and trastuzumab. The SC treatment was well tolerated, with no new safety concerns reported [23].

Further, a case series from India involving 27 patients with HER2+BC evaluated the efficacy of Phesgo® combined with chemotherapy and assessed patient satisfaction. Of these, 12 patients received neoadjuvant Phesgo® alongside chemotherapy, with a pCR observed n 83.3% of patients. In the metastatic setting, 85.7% experienced a partial response after three cycles of Phesgo®. Overall, 92% of patients reported satisfaction with SCP hesgo®, mainly due to the time saved (100%), fewer hospital visits (95.6%), and reduced pain and discomfort (65.2%) [17].

In the present case series, a pCR rate of 50% was observed, which is comparable to the 59.7%

reported in the FeDeriCa study but lower than the 83.3% reported in the Indian case series by Nag et al.This variation may be attributed to differences in hormone receptor status. Four of the six patients in the present case series were estrogen receptor-positive (ER+), consistent with the FeDeriCa study, in which 61% of patients in the SC FDC group were ER+. In contrast, 80% of patients who achieved pCR in the Indian case series were estrogen receptor-negative (ER-). These findings align with existing evidence showing that patients with HER2+/ER- EBC generally achieve higher pCR rates following chemotherapy and dual anti-HER2 therapy, compared to those with HER2+/ ER+EBC [12, 24, 25].

The binary classification of pCR vs. residual disease provides limited prognostic information, as it does not account for differences in the extent of residual disease among patients [26]. To overcome this limitation, the RCB method was developed in 2007 as a standardized system for quantitatively assessing residual disease in the breast and axillary lymph nodes after neoadjuvant chemotherapy [27]. This method generates a continuous RCB score, where a score of 0 corresponds to pCR. Empirically defined cutoff values categorize patients into four RCB classes: RCB 0 corresponds to pCR, RCB I represents minimal burden, whereas RCB II and RCB III indicate moderateand extensive burden, respectively. The RCB score offers additional prognostic value beyond the binary distinction between pCR and residual disease, as higher scores are associated with poorer event-free survival outcomes [26]. In the present case series, RCB scores were calculated using an online tool [28]. Patients were classified according to the following ranges: RCB 0 (score=0), RCB I (score >0 to 1.36), RCB II (score 1.37–3.28), and RCB III (score >3.28) [26, 27]. Based on these criteria, four patients achieved pCR, defined as RCB 0, while the remaining cases were classified as RCB I and RCB II. Notably, although pCR was reported in three patients, four patients met the criteria for RCB 0. This discrepancy is explained by one case classified as ypTis (DCIS) N0M0, where only residual DCIS was present. As DCIS in the absence of invasive disease is still considered consistent with pCR, this case was included in the RCB 0 category [29].

Reductions in left ventricular ejection fraction (LVEF) are relatively common during trastuzumab therapy; however, these declines are typically reversible following temporary discontinuation or cessation of treatment, with or without the addition of cardioprotective agents [30]. The cardio toxicity of trastuzumab is primarily attributed to HER2 receptor blockade, which impairs cardio protective signaling pathways and leads to myocardial contractile dysfunction. This hypothesis is supported by clinical observations that trastuzumab-associated declines in LVEF are often reversible [30].

Given the cardiac toxicity of trastuzumab, there is reasonable concern that combining it with another agent of a similar mechanism, such as pertuzumab, might exacerbatethis toxicity [31]. However, data from clinical trials using the trastuzumab–pertuzumab combination have shown minimal cardiac toxicity. For instance, in the TRYPHAENA trial, patients (n=225) were randomized to one of three neoadjuvant treatment arms. Arm A was treated with 5-fluorouracil, epirubicin, and cyclophosphamide, followed by docetaxel, with trastuzumab and pertuzumab given concurrently throughout. In arm B, the same regimen was followed by docetaxel with trastuzumab and pertuzumab. Arm C received docetaxel, carboplatin, and trastuzumab with pertuzumab. Symptomatic left ventricular systolic dysfunction (LVSD) occurred in 2.7% of patients in arm B during neoadjuvant therapy. Additionally, a decline in LVEF of ≥10% points from baseline to <50% was observed in 5.6% of patients in arm A, 5.3% of patients in arm B, and 3.9% of patients in arm C. Overall, the TRYPHAENA trial demonstrated that neoadjuvant administration of pertuzumab and trastuzumab whether concurrently or sequentially with anthracycline-based regimens or concurrently with a carboplatin-based regimen is associated with a low incidence of LVSD [24].

In the NeoALTTO trial, no major cardiac toxicities were reported across any treatment arms. Only one patient in each group had an LVEF <50% along with a decrease of >10% from baseline. Additionally, a single patient in the combination group developed congestive heart failure (class III). However, LVEF recovered following discontinuation of therapy [25].Cardiac toxicity of Phesgo® manifests as hypertension, arrhythmias, left ventricular dysfunction, cardiomyopathy,

congestive heart failure, and cardiac death. An asymptomatic reduction in LVEF has been associated with Phesgo® administration [21]. However, none of the cases in the present case series reported cardiac toxicity or a decline in EF.

The fixed-dose SC formulation streamlines preparation and administration. This reduces resource burden and chair time [15, 16]. From a patient perspective, Phesgo® offers a more convenient treatment experience with shorter appointments, improved quality of life, and reduced indirect costs, supporting its role as a practical alternative to IV therapy in appropriate clinical settings [32-37]. Thus, the findings of this case series align with emerging real-world evidence highlighting the healthcare system and patient-centered benefits of Phesgo®. Therefore, wider adoption of SC formulations could help reduce treatment and appointment times as well as the risk of dosing errors. However, a limited number of cases from a single center may restrict the applicability of the results to the overall Indian population. Further studies with larger populations and long-term follow-up are needed to validate these findings.

In conclusion, Phesgo®, as a neoadjuvant regimen, was effective and well tolerated in all cases of HER2+ BC. Three cases achieved pCR.No side effects, such as diarrhea or injection site reactions,were reported, and there was no indication of cardiac toxicity. These outcomes align with existing literature that supports the use of Phesgo® in the treatment of HER2+ BC. Phesgo® represents a promising advancement in BC therapy. The transition from IV to SC drug delivery reduces treatment times, optimizes patient care, and reduces the strain on healthcare infrastructure, making it a valuable treatment option for both patients and healthcare providers.

Acknowledgments

Not applicable.

Ethical Approval

The study protocol was approved by the Institutional Ethics Committee of the Government Medical College, Kozhikode (Ref. No. GMCKKD/RP/2025/IEC/03 dated 31.01.2025). Written informed consent was taken from all patients. All procedures performed in the study were in accordance with the ethical standards of the institutional and/or national research com-mittee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Declarations

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for- profit sectors.

Author contributions

All authors made substantial contributions to the conception and design of the work, or to the analysis and interpretation of the research. They participated critically in revising the intellectual content of the manuscript, approved the final version for publication, and agree to be accountable for all aspects of the work.

Conflict of interest

The authors declare no conflict of interest.

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