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Original Article

Rate of Complete Response on Weekly Bortezomib–Cyclophosphamide–Dexamethasone in Newly Diagnosed Multiple Myeloma: A 12-week: A Real-World Evidence

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Abstract

Objective: This study aimed to assess the rate of complete response after three cycles (12 weeks) of weekly VCD and to observe toxicity and early progression.

Methods: We conducted a prospective, observational study at a tertiary cancer center in Lahore, Pakistan. Sixty newly diagnosed symptomatic MM patients received weekly VCD for three 28-day cycles. Bortezomib 1.3 mg/m² was administered subcutaneously on days 1, 8, and 15, cyclophosphamide 300 mg/m² orally on days 1, 8, and 15, and dexamethasone 20 mg on days 1, 8, and 15. Responses were assessed at week 12 using International Myeloma Working Group (IMWG) criteria. Adverse events (AEs) were graded using CTCAE v5.0. The primary endpoint was the complete response (CR) rate. Secondary endpoints included overall response rate (ORR), very good partial response (VGPR) rate, and grade ≥3 toxicities.

Results: The cohort (median age 60 years) comprised 33 men and 27 women. Baseline International Staging System (ISS) distribution was 33.3 % ISS I, 30 % ISS II and 36.7 % ISS III. After 12 weeks, the ORR was 88.3 %. CR occurred in 10 patients (16.7 %), VGPR in 18 (30 %), partial response (PR) in 25 (41.7 %), minimal response (MR) in 3 (5 %), stable disease (SD) in 3 (5 %) and progressive disease (PD) in 1 (1.7 %). Grade ≥3 toxicities included neutropenia (10 %), anemia (6.7 %), thrombocytopenia (5 %), infections (3.3 %), and grade 3 peripheral neuropathy (1.7 %). There were no treatment-related deaths.

Conclusion: Weekly VCD achieved a high ORR and acceptable safety at 12 weeks in this real-world cohort. The CR rate compares favorably with published data for weekly VCD in elderly patients. Weekly dosing may reduce treatment burden and toxicity, making it suitable for resource-limited settings. A longer follow-up will determine the durability of the response and survival.

Key Words: Bortezomib, Cyclophosphamide, Dexamethasone, Multiple Myeloma

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Introduction

Multiple myeloma is a chronic and incurable plasma-cell neoplasm that originates from the bone marrow. It accounts for about 1% of all malignancies and 10% of hematologic tumors.[1] Monoclonal gammopathy of unknown significance (MGUS) and smoldering MM (SMM) are asymptomatic premalignant stages that cause M-protein release and an increase in plasma-cell load.[1] Half of SMM patients develop symptomatic MM within five years.[1] Patients frequently present with anemia, bone pain, renal impairment, hypercalcaemia, and sus-ceptibility to infections because of immunological paresis.[2] Diagnosis requires ≥10% clonal bone-marrow plasma cells or a biopsy-proven plasmacytoma plus either organ damage (hypercalcaemia, renal dysfunction, anemia, or lytic bone lesions) or myeloma-defining biomarkers such as ≥60% clonal plasma cells, serum free-light-chain ratio ≥100, or more than one focal lesion on MRI.[3] The International Staging System (ISS) and revised ISS stratify prognosis based on blood β2-

microglobulin, albumin, lactate dehydrogenase, and high-risk cytogenetic abnormalities such as del(17p), t(4;14), t(14;16), or gain 1q 4. Patients with high-risk traits have a median survival of three to five years, while standard-risk patients may live for more than ten years.

Therapeutic breakthroughs in the last two decades have resulted in better outcomes. Bortezomib, carfilzomib, and ixazomib are proteasome inhibitors (Pis), which impair proteasomal degradation and induce death in myeloma cells.[5] Immunomodulatory medications (IMiDs), including thalidomide, lenalidomide, and pomalidomide, activate immune effector cells and inhibit cytokine signaling. Monoclonal antibodies targeting CD38 (daratumumab, isatuximab) or SLAMF7 (elotuzumab) activate immunological systems, whereas bispecific T-cell engagers and CAR-T treatments are revolutionizing refractory disease care.[6] Standard treatment for transplant-eligible individuals is induction with a PI/IMiD/dexamethasone triplet (VRd), followed by autologous stem cell transplantation (ASCT) and lenalidomide maintenance.[3] Quadruplet regimens that include daratumumab in VRd strengthen responses and achieve high minimal residual disease (MRD) negativity.[7] Quadruplets are costly, need continuous infusions, and may not be practical in low-resource situations. Additionally, not all patients can take IMiD-based regimens. Thalidomide is limited by neuropathy and venous thrombosis, whereas lenalidomide requires dose changes for renal impairment and is not widely available.

Cyclophosphamide, an oral alkylating agent, has been combined with bortezomib and dexamethasone (VCD or CyBorD) to offer a more cost-effective alternative to VRd. VCD has a response rate of 70–86% in phase II studies and real-world evaluations, although complete response (CR) rates are low.[8] The regimen is commonly administered over 21- or 28-day cycles, with bortezomib administered twice weekly. However, twice-weekly bortezomib is linked to dose-limiting peripheral neuropathy, with grade 3/4 neuropathy rates reaching 34% in some studies.[9] Subcutaneous treatment and once-weekly doses reduce neuropathy while maintaining efficacy.[10] A real-world analysis of 2,497 patients found no significant difference in progression-free or overall survival between once- and twice-weekly bortezomib dosages. However, weekly dosing resulted in significantly reduced peripheral neuropathy rates (18.5 % vs. 34.7 %).[9] Data on early (12-week) response rates with weekly VCD in normal practice is limited, especially in South Asia, where resource restrictions influence regimen selection.

Aim of present study was to assess the rate of complete response after three cycles (12 weeks) of weekly VCD and to observe toxicity and early progression. By focusing on early response, we aimed to provide comparative statistics for clinicians and policymakers choosing VCD against more rigorous regimens, as well as identify patients who may benefit from treatment escalation or early transplant.

Methods

Study Design and Ethical Considerations; The Institutional Review Board of the Institute of Nuclear Medicine & Oncology Lahore approved this prospective observational study (INMOL/53-(201). The trial followed the standards of the Declaration of Helsinki and the Good Clinical Practice Guidelines. All participants provided written informed consent.

Participants; Eligibility criteria included (1) age ≥18 years; (2) newly diagnosed symptomatic MM defined by IMWG 10 (3) measurable disease with serum M-protein ≥1 g dL^{-1} or urine M-protein ≥200 mg/24 h or involved FLC ≥10 mg dL^{-1} and abnormal FLC ratio; (4) ECOG performance status 0-2; and (5) adequate organ function (bilirubin <2.0 mg dL^{-1}, alanine aminotransferase/aspartate aminotransferase <3× upper limit of normal, creatinine clearance ≥30 mL min^{-1}). Exclusion criteria were smoldering MM or MGUS, plasma-cell leukemia, past systemic therapy for MM, concurrent active malignancy, uncontrolled infection, grade ≥2 peripheral neuropathy, pregnancy or lactation, and uncontrolled diabetes or cardiovascular disease. Patients who took high-dose corticosteroids for reasons other than MM were also eliminated. Sixty patients who met the requirements were enrolled sequentially between April 2024 and March 2025.

Treatment Protocol; All participants got a weekly VCD regimen. Each 28-day cycle included bortezomib 1.3 mg/m^2 subcutaneously on days 1, 8, and 15, cyclophosphamide 300 mg/m^2 orally on days 1, 8, and 15; and dexamethasone 20 mg orally or intravenously on days 1-2, 8-9, and 15-16 pm. c.ncbi.nlm.nih.gov. Dose modifications were allowed for grade 3-4 effects. Bortezomib was withheld for grade 3Peripheral neuropathy or grade 4 hematologic toxicity until recovery, after which it was resumed at 1.0 mg/m^2. Cyclophosphamide doses were reduced (to 200 mg m^{-2}) for grade 3/4 neutropenia and thrombocytopenia. For uncontrolled hyperglycemia or mood disturbances, the dose of dexamethasone can be lowered to 12 mg. Antiviral prophylaxis with acyclovir (400 mg twice daily) was required to prevent herpes zoster. Patients underwent weekly clinical examinations that included full blood counts and serum chemistry. Bisphosphonates, analgesics, and blood product transfusions were among the supportive care options available. The use of granulocyte colony-stimulating factors, antibiotics, or antifungals was up to the

physician.

Assessments; Baseline evaluations included a complete medical history, physical examination, blood count, metabolic panel, β2-microglobulin, C-reactive protein, lactate dehydrogenase, serum and urine electrophoresis, FLC assay, and cytogenetic analysis by fluorescence in situ hybridization (FISH). Skeletal involvement was evaluated with low-dose whole-body CT or MRI. ISS stage was determined using β2-microglobulin and albumin levels (myeloma.org). High-risk cytogenetics include del(17p), t(4;14), t(14;16), and gain (1qencyclopedia.pub). Responses were evaluated at baseline and at the end of three cycles (week 12). The IMWG universal response criteria were used to define the following: strict complete response (sCR), complete response (CR), very good partial response (VGPR), partial response (PR), minimal response (MR), stable disease (SD), and progressing illness. Adverse events were recorded and assessed throughout each visit using CTCAE v5.0. Compliance was assessed using nurse-checked injection records and patient self-reports. Patients who developed or suffered unacceptable toxicity were taken off medication but continued to be monitored.

Endpoints and statistical analysis; The primary endpoint was the proportion of patients who achieved CR after 12 weeks. Secondary endpoints included ORR (≥PR), rate of VGPR or higher, frequency of grade ≥3 adverse events, rate of therapy discontinuation, and early progression. The sample size calculation was based on an older VCD trial that reported CR/very excellent partial response rates of 25.3% at four cycles. With a 95% confidence interval and a margin of error of ±10%, 56 patients were needed; we enrolled 60 to account for dropouts. Categorical variables are represented as counts and percentages, while continuous variables are represented as medians (range). Proportions were calculated using exact 95% confidence intervals (CIs). Response differences across ISS or cytogenetic risk groups were analyzed using chi-square or Fisher's exact tests. Due to the short follow-up period, no survival analysis was planned. However, progression-free and overall survival will be published in future analysis. Statistical analyses were performed using SPSS version 26 (IBM Corp., Armonk, NY, USA), with two-sided p-values < 0.05 deemed significant.

Results

Sixty patients participated in three cycles of weekly VCD. The baseline characteristics are summarized in Table 1. The median age was 60 years (range 40-75); 33 patients (55%) were men and 27 (45%) were women (see gender breakdown pie chart below). Most patients (78.3%) had ECOG performance status 1-2. The ISS distribution was ISS I in 20 patients (33.3%), ISS II in 18 (30%), and ISS III in 22 (36.7%) depicted in Figure 1 Twelve patients (20%) had high-risk cytogenetics, including six with del(17p), three with t(4;14), and three with gain 1q. The median hemoglobin was 9.7 g dL-1, and the median creatinine was 1.6 mg dL-1; 11 patients (18.3%) required haemodialysis at baseline. Bone disease affected 45 individuals (75%), and 8 patients (13.3%) had extramedullary plasmacytomas. Prior to treatment, all patients were tested for hepatitis B, hepatitis C, and HIV. Five patients were hepatitis C positive but had suppressed viral levels.

Table 1: *Baseline demographics and disease characteristics (n = 60)*

Characteristic	Value
Age, median (range)	60 years (40 –75)
Sex	33 male (55 %), 27 female (45 %)
ECOG performance status	0: 7 (11.7 %); 1: 29 (48.3 %); 2: 18 (30 %); 3: 6 (10 %)
ISS stage	I: 20 (33.3 %); II: 18 (30 %); III: 22 (36.7 %)
High-risk cytogenetics	12 (20 %)
Haemoglobin, median (range)	9.7 g dL^{-1} (6.8 –13.5)
Serum creatinine, median (range)	1.6 mg dL^{-1} (0.7 –4.2)
Bone lesions	45 (75 %)
Extramedullary disease	8 (13.3 %)
Dialysis at baseline	11 (18.3 %)

Treatment exposure and compliance; All patients received three cycles of weekly VCD. The median relative dose intensity was 97 % for bortezomib, 95 % for cyclophosphamide, and 90 % for dexamethasone. Four patients (6.7 %) required a bortezomib dose reduction to 1.0 mg m^{-2} due to grade 2 neuropathy or thrombocytopenia. Cyclophosphamide dose was reduced in three patients (5%) because of prolonged neutropenia. Two patients (3.3 %) omitted dexamethasone doses due to glycemic complications. Treatment delays of one week occurred in six patients (10 %) because of infection (n=3), neutropenia (n = 2), and missed visits (n = 1). Compliance was high; oncology nurses administered all subcutaneous injections, and pill counts indicated >95 % adherence to oral medication. One patient was temporarily relocated during cycle 2 but returned for evaluation and maintained therapy under local physician supervision.

Response evaluation; At week 12, responses were assessed by IMWG criteria. The overall response rate (≥PR) was 88.3 % (53/60). Complete response (CR) was achieved in 10 patients (16.7 %), and very good

partial response (VGPR) in 18 (30 %). Twenty-five patients (41.7%) attained partial response (PR). Minimal response (MR) was observed in three patients (5%), stable disease (SD) in three (5 %), and progressive disease (PD) in one (1.7 %). The PD case occurred in a patient with del(17p) and ISS III stage; this patient experienced worsening bone pain and rising M-protein. Two other patients with high-risk cytogenetics attained MR or SD but were scheduled for early ASCT. Responses by ISS stage are presented in Table 2 and Figure 2. Patients with ISS I/II had higher rates of VGPR or better compared with ISS III (53.1 % vs. 31.8 %, p = 0.12). Among high-risk cytogenetic patients, CR/VGPR occurred in 5/12 (41.7 %) compared with 23/48 (47.9 %) in standard-risk patients (p = 0.76). Depth of response correlated with baseline β2-microglobulin (p = 0.04). The median time to initial response was 30 days (range 28–56). No patients achieved stringent CR due to a lack of bone-marrow biopsy confirmation or MRD testing at this early time point.

Table 2: *Response by the ISS stage at 12 weeks*

Response	ISS I (n=20)	ISS II (n=18)	ISS III (n=22)	Overall (n=60)
CR	4 (20 %)	3 (16.7 %)	3 (13.6 %)	10 (16.7 %)
VGPR	7 (35 %)	5 (27.8 %)	6 (27.3 %)	18 (30 %)
PR	7 (35 %)	7 (38.9 %)	11 (50 %)	25 (41.7 %)
MR	1 (5 %)	2 (11.1 %)	0	3 (5 %)
SD	1 (5 %)	1 (5.6 %)	1 (4.5 %)	3 (5 %)
PD	0	0	1 (4.5 %)	1 (1.7 %)

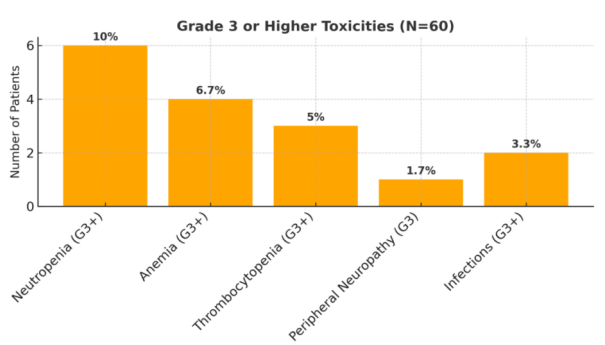

Figure I. *Incidence of grade 3 or higher toxicities.*

Safety and adverse events; Weekly VCD was well tolerated. Adverse events are summarized in Figure 3. Hematologic toxicities included grade 3 neutropenia in six patients (10 %), grade 3 anemia in four (6.7 %), and grade 3 thrombocytopenia in three (5%). Grade 4 cytopenias were not observed. Prophylactic antibiotics were administered for neutropenia; no cases of febrile neutropenia occurred. Non-haematologic AEs were mostly grade 1–2 and included nausea (25 %), fatigue (20 %), constipation (18.3 %), peripheral neuropathy (15%), and hyperglycaemia requiring insulin adjustment (8%). One patient (1.7 %) experienced grade 3 peripheral neuropathy manifesting as pain and numbness; the bortezomib dose was reduced, and symptoms improved. Two patients (3.3 %) developed pneumonia requiring hospitalization and intravenous antibiotics; one had chronic obstructive pulmonary disease. Herpes zoster did not occur due to acyclovir prophylaxis. No thromboembolic events or cardiac toxicities were reported.

Early progression and subsequent therapy; One patient (1.7%) developed Parkinson's disease during the research. The 42-year-old male with del(17p) and extramedullary plasmacytoma had a baseline β2-microglobulin level of 7.1 mg/L. After two cycles, he showed minimal response and advanced to week 12 with increased M-protein levels and new lytic lesions. The patient was switched to a daratumumab-containing quadruplet (D-VCD) due to improved response rates.[11] Two further patients with MR or SD were recommended for early ASCT following the first cytoreduction. The remaining 57 patients stayed on VCD, with 10 undergoing ASCT and 47 undergoing consolidation or maintenance on lenalidomide. The follow-up for PFS and OS is underway.

Discussion

This real-world study shows that weekly bortezomib, cyclophosphamide, and dexamethasone treatment leads to high early response rates and acceptable toxicity in newly diagnosed MM patients in Pakistan. After three cycles (12 weeks), the ORR was 88.3%, with a CR rate of 16.7%. These findings are consistent with previously reported real-world outcomes for weekly VCD. A retrospective analysis of 99 elderly patients (median age 76 years) receiving weekly VCD found an ORR of 83.6 %, with CR 25.3 %, VGPR 28.6 %, and median PFS 26.6 months[8]. In a real-world investigation from Pakistan, VCD and VLD (bortezomib-lenalidomide-dexamethasone) had CR rates of 23.8 % and 23.0 %, and ORRs of 69 % and 80.5 %, respectively, with no statistically significant differences.[12] Despite shorter follow-up and a younger median age, our sample showed higher ORR and comparable CR. Differences in our study may be due to improved supportive care, precise weekly dosing, and patient selection (ECOG≤2).

The CR rate of 16.7% is lower than those reported following four cycles of VCD (25-30%) 8 or VRd induction (≥30%).[13] However, our assessment at 12 weeks may underestimate the depth of response, as responses deepen with additional cycles and following ASCT. In the Korean KMM130 study, 45.2 % of patients achieved CR or better with three cycles of CVD consolidation after ASCT.[14] Similarly, in the CASSIOPEIA trial, daratumumab + VTd achieved MRD negativity 33.7 % compared to 20.3% with VTd alone after 80.1

months.[15] Our findings should be considered as early markers rather than final outcomes.

One significant observation is the low incidence of grade 3 peripheral neuropathy (1.7%) and the absence of grade 4 neuropathy. Bortezomib use is hindered by neurotoxicity, which can cause grade 3-4 neuropathy in up to one-third of patients.[16] Subcutaneous and once-weekly treatment significantly lowers this risk.[10] In a large real-world cohort, once-weekly bortezomib was associated to a peripheral neuropathy incidence of 18.5%, compared to 34.7% with twice-weekly dosage.[9] Our lower neuropathy rate may be attributed to effective patient counseling, regular use of vitamin B complex, and avoidance of neurotoxic drugs. Hematologic effects were tolerable, with 10% of patients experiencing grade 3-4 neutropenia, similar to rates reported in VCD and VRd studies.[8,13] We saw no treatment-related deaths and just two infection problems that required hospitalization.

The lone progression case was in a patient with del (17p), highlighting the negative impact of high-risk cytogenetics. High-risk individuals often need more intense therapy. Recent trials have established the advantage of quadruplet regimens using daratumumab. The AMaRC 03-16 research found that adding daratumumab to VCD (D-VCD) enhanced the ≥VGPR rate from 28% to 52% and improved PFS in transplant-ineligible patients, albeit with more infections.[11] The PERSEUS study found that daratumumab-VRd led to 84% 48-month PFS and MRD negativity in most transplant-eligible patients.[17] Our study found that weekly VCD, even without monoclonal antibodies, produces meaningful responses early in treatment. Patients with high-risk cytogenetics may benefit from escalation to quadruplets or early ASCT.

Comparisons of lenalidomide-based regimens are helpful. VRD is the standard induction for transplant-eligible patients. In a real-world matched-pair analysis, VRd had greater response rates than VCD, although PFS and OS remained comparable after accounting for baseline differences.[13] In a transplant patient cohort, VRd and VCD had identical survival outcomes after accounting for maintenance therapy.[6] However, lenalidomide is pricey and has been linked to cytopenia, tiredness, and venous thrombosis. Weekly VCD is a cost-effective, less harmful and easy-to-administer alternative. In resource-limited situations, weekly VCD can elicit equivalent early responses to VRd while waiting for monoclonal antibodies or IMiDs.

We compared our toxicity profile to other real-world investigations. A study of 70 VCD patients found that larger cumulative bortezomib doses (>43.1 mg/m²) resulted in deeper responses and longer PFS (24.3 vs. 9.1 months, p=0.012), without worsening neuropathy.[5] Our study could not evaluate cumulative dose due to uniform dosing; however, the relative dose intensity was high (>90%), and toxicities were manageable. The EHA 2021 cohort (median age 76 years) showed grade ≥2 neuropathy in 19.3 % and grade 3/4 myelosuppression in 4.4%,[18] which is slightly higher than our findings, due to older age and comorbidities. These comparisons show that weekly VCD is a comfortable regimen for all age groups with proper monitoring.

Early response assessment at 12 weeks can help guide therapeutic decisions. Several studies indicate that obtaining VGPR by cycle 2-3 correlates with higher PFS and OS 5. At week 12, 28 patients (46.7%) achieved VGPR or above. Among high-risk patients, 5/12 (41.7%) achieved ≥VGPR, indicating that some may still benefit from VCD. For those who do not achieve VGPR, early intensification with monoclonal antibodies or carfilzomib may be attempted, while cost remains a concern. Future decisions may be refined through ongoing MRD testing and dynamic risk-adapted techniques.

Our study has limitations. The single-center, non-randomized experiment had a small sample size, limiting generalizability and statistical power. Due to the short follow-up period, PFS, OS, and sustained MRD negativity could not be assessed. Failure to repeat bone-marrow biopsies at 12 weeks prevented confirmation of strict CR. We did not include a control arm that followed VRd or quadruplet regimens. Our work provides real-world data from a low-middle-income country, demonstrating that weekly VCD is possible, beneficial, and safe. Prospective data gathering, adherence to ethical norms, complete toxicity assessment, and standardized response evaluation are among its strengths.

Future studies should evaluate long-term outcomes, such as PFS, OS, and MRD-negative, and compare VCD to VRd or daratumumab-containing regimens in randomized trials. Further research into the use of monoclonal antibodies in VCD (D-VCD) is needed, particularly considering the findings from AMaRC 03-1619. Research on biomarkers predicting VCD response, cost-effectiveness evaluations, and patient-reported results will help guide treatment decisions in resource-limited settings.

Conclusion

This real-world study shows that weekly bortezomib, cyclophosphamide, and dexamethasone is a successful induction regimen for newly diagnosed multiple myeloma. After three cycles, the total response rate was 88.3%, with full response attained in 16.7% of patients. Toxicities were tolerable, with a minimal incidence of peripheral neuropathy and hematologic adverse effects. Weekly dose simplifies outpatient administration and may improve quality of life compared to twice-weekly

schedules. These findings suggest the continued use of weekly VCD in situations where access to lenalidomide or monoclonal antibodies is limited. A longer follow-up is necessary to ascertain if early responses lead to long-term remissions and survival. Integrating this regimen into adaptive techniques, including early intensification for unsatisfactory responders, may improve results while balancing cost and toxicity.

Ethical Approval: The IRB/EC approved this study via letter no. INMOL/53-(201) dated February 18, 2024.

Conflict of Interest: None

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Authors' Contribution

FMZ: Conceptualization of the project

RT, MM: Design of the work.

AA, FA: Data acquisition, analysis, or interpretation.

AA, FA, RT: Draft the work.

FMZ, MM: Critical review of important intellectual content.

All authors approve the version to be published.

All authors agree to be accountable for all aspects of the work.

References

1. Gay F, Marchetti E, Bertuglia G. Multiple Myeloma Unpacked. Hematol Oncol. 2025;43(Suppl 2):e70067.
2. Burton B, Brown R. StatPearls: multiple myeloma. StatPearls Publishing. 2023. Accessed from [ncbi. nlm. nih.gov].
3. Hines O, Kumar SK. Multiple myeloma: update on diagnostic criteria and treatment strategies. Am J Hematol. 2022;97(3):339-51.
4. Landgren O, Palumbo A, Kyle RA. Revisiting the International Staging System and high-risk cytogenetic features in multiple myeloma. International Myeloma Foundation; updated 2024. Accessed from: [myeloma. org]
5. Ailawadhi S, Weber DM, Chanan-Khan A. Real-world outcomes with bortezomib, thalidomide or cyclophosphamide combinations: once-weekly dosing and tolerability. Clin Lymphoma Myeloma Leuk. 2023;23(2): 104-111.
6. Richardson PG, Jacobus S, Hideshima T. Functional cure and long-term survival in multiple myeloma: current status and future directions. Haematologica. 2024;109(8):1009-22.
7. Banerjee R, Wang B, Anderson LD Jr, McCaughan G, Mehra N, Cowan AJ, et al. Once-weekly bortezomib as the standard of care in multiple myeloma: results from an international survey of physicians. Blood Cancer J. 2023;13(1):162.
8. Liapis K, Panitsas F, Hatzileontiadou S, Papadakis S, Liapis I, Vrachiolias G, et al.Weekly cyclophosphamide, bortezomib and dexamethasone (VCD) in elderly transplant-ineligible multiple myeloma: a multicentre study. EHA Library. 2021;abstract EP964.
9. Hoff FW, Banerjee R, Khan AM, McCaughan G, Wang B, Wang X, et al. Once-weekly versus twice-weekly bortezomib in newly diagnosed multiple myeloma: a real-world analysis. Blood Cancer J. 2024;14(1):52.
10. Derudas D, Capraro F, Martinelli G, Cerchione C. How I manage frontline transplant-ineligible multiple myeloma. Hematol Rep. 2020;12(Suppl 1):8956.
11. Mollee P, Reynolds J, Janowski W, Quach H, Campbell P, Gibbs S, et al. Daratumumab, cyclophosphamide, bortezomib, and dexamethasone for transplant-ineligible myeloma: AMaRC 03-16. Blood Adv. 2024;8(14): 3721 -30.
12. Saeed N, Khan Z, Jehanzeb H, Shaikh T, Shaikh U, Adil SN, et al. Real-World Outcomes in Transplant-Ineligible Patients With Newly Diagnosed Multiple Myeloma Treated With Bortezomib/ Cyclophosphamide/ Dexamethasone and Bortezomib/ Lenalidomide/ Dexamethasone as Upfront Treatment. Cureus. 2024; 16(4): e58999.
13. Kastritis E, Beksac M, Badelita SN, Katodritou E, Bila J, Spanoudakis E, et al. VCd versus VRd in Newly Diagnosed Multiple Myeloma: Matched Real-World Analysis from the Balkan Myeloma Study Group (BMSG). Clin Lymphoma Myeloma Leuk. 2025; 25 (2):e71-e81.
14. Jung J, Kim K, Jung SH, Yoon SS, Lee JH, Kim JS, et al. Cyclophosphamide, bortezomib, and dexamethasone consolidation in patients with multiple myeloma after stem cell transplantation: the KMM130 study. Cancer Res Treat. 2023;55(2):693-703.
15. Derudas D, Capraro F, Martinelli G, Cerchione C. How I manage frontline transplant-ineligible multiple myeloma. Hematol Rep. 2020;12(Suppl 1):8956.
16. Kim K, Verburgh E, Mitina T, Chen W, Yeh SP, Schutz N, et al. Treatment pathways and clinical outcomes in newly diagnosed multiple myeloma outside Europe and North America: The integrate study. Int J Hematol. 2025;122(2):231-46.
17. Kort J, Rivera A, Senigarapu S, Driscoll JJ. Revolutions at the frontline of multiple myeloma treatment: lessons and challenges to finding a cure. Front Oncol. 2025; 15:1578529.
18. Dolph M, Tremblay G, Gilligan AM, Leong H. Network Meta-Analysis of Once Weekly Selinexor-Bortezomib-Dexamethasone in Previously Treated Multiple Myeloma. J Health Econ Outcomes Res. 2021;8(2):26-35.
19. Elbezanti WO, Challagundla KB, Jonnalagadda SC, Budak-Alpdogan T, Pandey MK. Multiple Myeloma Pathogenesis and The Existing Therapies. Encyclopedia. Accessed from [https://encyclopedia.pub/entry/42279].