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Comparative evaluation of enoxaparin and rivaroxaban treatment outcomes in cancer patients with venous thromboembolism: a prospective cohort study

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ABSTRACT

***Introduction*:**
The purpose of this study is to assess and compare the efficacy of Rivaroxaban and Enoxaparin in the management of Venous Thromboembolism (VTE) in cancer patients, as well as to evaluate potential risk factors associated with VTE recurrence.

Materials and Methods:
A retrospective cohort study design was employed, analyzing 402 patients above 18 years of age who were diagnosed with cancer and treated for VTE at Imam Reza and Ghaem hospitals between 2023 and 2024. Exclusion criteria were also set, and treatment regimens were detailed for both drugs. The analysis was conducted using chi-square tests, independent t-tests, and logistic regression.

Results:
The data revealed that Rivaroxaban was used more frequently than Enoxaparin, although the mean age was higher in the Enoxaparin group. No significant difference was observed in terms of VTE recurrence between the two drugs.

Conclusion:
The study concludes that Rivaroxaban and Enoxaparin are both effective in treating VTE in cancer patients. The selection of medication may depend on the specific characteristics of each patient.

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Introduction

Venous thromboembolism (VTE), encompassing both deep vein thrombosis and pulmonary embolism, is a significant challenge in the management of cancer patients (1).

Despite adequate anticoagulation therapy, the threat of VTE recurrence in cancer patients remains high, necessitating a constant evaluation and improvement of our current management strategies (2).

Recent findings suggest that the optimal treatment approach for VTE may differ between cancer patients and those without cancer, leading to noteworthy reductions in VTE recurrence rates when these differences are considered (3,4).

Treatment options for VTE recurrence in cancer patients typically include anticoagulation therapy, low molecular weight heparin (LMWH), and the implementation of inferior vena cava (IVC) filters. Particularly, LMWH has emerged as the preferred choice for initial and ongoing treatment of VTE in advanced cancer patients, due to its proven efficacy, safety, and ease of use.

Many studies underscore the fundamental role of LMWHs in managing VTE in cancer patients, with the intensity and duration of treatment being tailored based on various individual patient factors (5,6).

Nonetheless, the role of novel oral anticoagulants warrants further exploration before being routinely incorporated into the treatment algorithm of cancer-associated VTE. Several areas, including the treatment of recurrent thrombosis, management of patients with concurrent bleeding issues, the potential benefits of vena cava filter insertion, and optimal duration of therapy, require urgent research attention (7,8).

Current clinical guidelines recommend similar anticoagulation treatment for both symptomatic and incidental cancer-associated VTE (9).

In light of these considerations, this study seeks to contribute to this evolving field by comparing the effectiveness of Rivaroxaban and Enoxaparin in preventing VTE recurrence among cancer patients.

Materials and Methods

Study Design and population characteristics

The current study was designed as a retrospective cohort study. A thorough review of the medical records of patients treated with Rivaroxaban or Enoxaparin for Venous Thromboembolism (VTE) at Imam Reza and Ghaem hospitals between 2023 and 2024 was conducted. The total treatment duration ranged from 3 to 6 months. The focus was on patients who met the study's inclusion criteria. The medical records provided comprehensive data on patient demographics, cancer type, anticoagulant therapy protocol, and clinical data, including any recorded instances of VTE recurrence. This data allowed for the assessment of the comparative effectiveness of the two anticoagulant therapies and the identification of potential risk factors associated with VTE recurrence.

Eligibility Criteria

Inclusion criteria entailed an age above 18 years, a cancer diagnosis, and treatment with an anticoagulation regimen due to VTE. Conversely, exclusion criteria included unwillingness to participate in the study, treatment duration of less than 30 days, individuals diagnosed with VTE more than six months ago who remained untreated, and those with a glomerular filtration rate of less than 30, a different treatment method from the anticoagulant therapy protocol.

Anticoagulant therapy protocol

The prescribed regimen for Rivaroxaban involved an initial dose of 15 mg, taken orally twice daily for the first 21 days. Following this period, the dosage was reduced to a maintenance dose of 20 mg to be taken orally once daily with food.

For the first six months of Enoxaparin treatment, patients were given an initial dose of 1 mg/kg subcutaneously every 12 hours or alternatively, 1.5 mg/kg once daily. The total treatment duration ranged from 3 to 6 months.

Statistical analysis

We presented demographic data and general patient characteristics using descriptive statistical methods, including central and dispersion indices for quantitative variables and frequency distribution percentages for qualitative

variables, exhibited in suitable tables. The association between various qualitative variables was assessed using the chi-square statistical test, while the independent t-test assessed the connection between quantitative and qualitative variables.

We used a logistic regression statistical test to compare the outcomes of Rivaroxaban and Enoxaparin, eliminating the confounding effects of other variables. We considered a p-value >0.05 as the threshold for statistical significance in all calculations and statistical tests.

Results

Our study included a cohort of 402 patients, composed of 181 women (45%) and 221 men (55%). The patients' mean age was 52.94 ± 16.62 years. A comprehensive review of the patient demographic and baseline characteristics is provided in Table 1.

As delineated in Table 2, our findings indicated that Rivaroxaban was employed significantly more than Enoxaparin (58.8% vs. 48.5%, P = 0.038). Further, an independent T-test also established a higher mean age in the Enoxaparin group relative to the Rivaroxaban group (56.91 ± 13.57 vs. 48.80 ± 18.45, P < 0.001).

Using logistic regression analysis, we gauged the odds ratios on the occurrence of VTE in patients treated with Rivaroxaban as opposed to Enoxaparin. The analysis disclosed no statistically significant difference in terms of VTE type and VTE recurrence between Rivaroxaban and Enoxaparin (P > 0.05). The details of this analysis are encapsulated in Table 3.

Discussion

According to our findings, there was no significant difference in VTE recurrence between the Enoxaparin and Rivaroxaban groups. Similar results were reported by the studies conducted by Faqah *et al.* (10) and Prins *et al.* (11), where Rivaroxaban exhibited an appealing alternative to treat cancer-associated thrombosis and had similar efficacy to prevent recurrent VTE in patients with active cancer.

The study conducted by Wysokinski *et al.* (12), found that Rivaroxaban was associated with lower mortality compared to the Enoxaparin group.

In terms of safety and effectiveness, our study suggests that both Enoxaparin and Rivaroxaban can be used to treat VTE in cancer patients without causing major bleeding complications. It is corroborated by the studies conducted by Simmons *et al.* (13) and Hummert *et al.* (14), where Rivaroxaban was considered a potential and convenient option for patients with cancer and VTE, exhibiting similar safety and effectiveness to Enoxaparin.

Interestingly, our study found a higher rate of deep vein thrombosis (DVT) in the Rivaroxaban group compared to the Enoxaparin group. This finding is contrary to the study conducted by Verso *et al.* (15) where the use of Enoxaparin proved to be safe in preventing deep vein thrombosis.

Overall, our findings, along with these studies, suggest that both Enoxaparin and Rivaroxaban can be effectively used to treat VTE in cancer patients.

Further research is required to explore the potential benefits and risks of these two drugs to make a more informed decision on their use in clinical practice.

The strengths of our study include its retrospective design, which allowed us to gather substantial data from a relatively large sample of patients over an extended period.

This design provided a robust set of real-world data, reflecting the actual conditions and practices of cancer patient care. Moreover, the comprehensive analysis of various factors, including patient demographics, cancer type, type of anticoagulant drug, and clinical data, offered a thorough and multifaceted view of the situation. Furthermore, the meticulous statistical analysis strengthened the credibility of our findings and insights.

Despite its strengths, our study is not without limitations. Firstly, being conducted in only two hospitals may limit the generalizability of the findings to other settings or populations. Secondly, as a retrospective study, there could be potential biases in data collection and analysis.

The possibility of missing or incomplete data might also affect the overall results. Finally, our findings are dependent on the accuracy and completeness of the medical records used in the study.

Conclusion

In conclusion, our study demonstrated that Rivaroxaban and Enoxaparin show comparable effectiveness in treating VTE in cancer patients. The comparison between these two medications provides valuable insights for clinicians. However, given the study's limitations, these findings should be a contribution to the existing evidence rather than a definitive guide. The selection of the most suitable therapeutic approach should still be individualized, and further large-scale, prospective studies are required to confirm these results and inform clinical practice.

Limitation

Despite its strengths, our study is not without limitations. Firstly, being conducted in only two hospitals may limit the generalizability of the findings to other settings or populations. Secondly, as a retrospective study, there could be potential biases in data collection and analysis. One of the main limitations was the lack of detailed data regarding the specific stage and severity of cancer for the patients. This information was not consistently available in the medical records, thus preventing a more granular analysis. Furthermore, a detailed sub-analysis of the demographic and clinical characteristics of the patient subgroup that experienced VTE recurrence was not performed. Investigating these specific characteristics could provide deeper insights and is a recommended avenue for future research. Finally, our findings are dependent on the accuracy and completeness of the medical records used in the study. These factors should be considered when interpreting the results, and further prospective studies are needed to create definitive clinical guidelines.

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