TURKISH JOURNAL of ONCOLOGY

Turk J Oncol 2026;41(4):306–314
doi: 10.5505/tjo.2026.62851

ORIGINAL ARTICLE

Global Research Trends in Post-operative Radiotherapy for Non-Small Cell Lung Cancer: A Bibliometric Analysis (2000–2024)

Alaattin ÖZEN, Görkem ÖZDAĞLI, Zeynep Nur ŞEN

Department of Radiation Oncology, Başakşehir Çam and Sakura City Hospital, İstanbul-*Türkiye*

OBJECTIVE

The role of post-operative radiotherapy (PORT) in non-small cell lung cancer (NSCLC) remains controversial despite advances in radiotherapy techniques and systemic therapies. This study aimed to evaluate global research trends, citation impact, and thematic evolution in PORT research using bibliometric analysis.

METHODS

A bibliometric analysis was conducted using the Web of Science Core Collection database. Original research articles published between 2000 and 2024 on PORT in NSCLC were included. Bibliometric indicators, including publication trends, citation counts, citation rates, journal impact factors, country and institutional productivity, and collaboration networks, were analyzed. Studies were categorized by research objectives using a multilabel classification system. Citation impact was compared between prospective and retrospective studies.

RESULTS

A total of 82 studies met the inclusion criteria, including 7 prospective and 75 retrospective studies. Survival outcomes and oncologic efficacy were the most frequently studied topics, followed by prognostic factor analysis and radiotherapy technique optimization. Prospective studies had significantly higher total citations and annual citation rates compared with retrospective studies ($p<0.001$). These studies were also published in journals with higher impact factors and more frequently in Q1 journals. Collaboration network analysis showed increasing research output from Chinese academic institutions and limited intercontinental collaboration. Recent research trends focused on predictive modeling, biomarker-driven patient selection, and reducing cardiopulmonary toxicity through advanced radiotherapy techniques.

CONCLUSION

Bibliometric patterns reflect ongoing clinical uncertainty regarding PORT in NSCLC. Research has shifted toward individualized treatment strategies and risk-adapted PORT. Future progress will likely depend on prospective trials integrating modern radiotherapy techniques with systemic therapies and biologically informed patient selection.

Keywords: Bibliometric analysis; non-small cell lung cancer; post-operative radiotherapy.

Copyright © 2026, Turkish Society for Radiation Oncology

Received: June 03, 2026
Revised: July 30, 2026
Accepted: August 05, 2026
Online: November 25, 2026

Accessible online at:
www.onkder.org

OPEN ACCESS This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Dr. Görkem ÖZDAĞLI
Başakşehir Çam ve Sakura Şehir Hastanesi,
Radyasyon Onkolojisi Kliniği,
İstanbul-Türkiye
E-mail: gorkemozdagli01@gmail.com

INTRODUCTION

Non-small cell lung cancer (NSCLC) remains the leading cause of cancer-related mortality worldwide, accounting for approximately 85% of all lung cancer cases.[1] Surgery is the preferred treatment for early-stage NSCLC; however, post-operative recurrence remains a significant challenge. Post-operative radiotherapy (PORT) has been investigated as an adjuvant treatment strategy, particularly for patients with mediastinal lymph node involvement (pN2 disease), to improve local control and overall survival.[2] Despite advancements in radiotherapy techniques, the role of PORT in NSCLC has been debated due to concerns regarding potential toxicity and conflicting evidence from clinical trials.[3,4] Over the past two decades, significant efforts have been made to optimize PORT in NSCLC, including improved patient selection criteria, advanced imaging techniques, and the introduction of intensity-modulated radiotherapy (IMRT) and proton therapy to minimize toxicity.[5,6]

Recent randomized trials have further contributed to the debate regarding the role of PORT in pN2 disease, showing improved locoregional control but no clear overall survival benefit and increased cardiopulmonary toxicity in some settings.[2] These findings have reinforced the need for better patient selection and modern radiotherapy techniques. As a result, research activity in this field has expanded, focusing on prognostic factors, toxicity reduction, and individualized treatment strategies. This study aimed to conduct a bibliometric analysis of the literature on PORT in NSCLC, evaluating research productivity, citation impact, and thematic evolution over time.

MATERIALS AND METHODS

Database and Search Strategy

A bibliometric analysis was conducted to evaluate research trends related to PORT in non-small cell lung cancer (NSCLC). The literature search was performed using the Web of Science Core Collection database, which is widely used for bibliometric studies due to its standardized indexing and citation tracking capabilities.

The search strategy included predefined combinations of disease-related and treatment-related keywords. The search was performed using title-based search terms related to NSCLC and post-operative or adjuvant radiotherapy. The publication period was restricted to studies published between January 01, 2000, and December 31, 2024. The citation search was extended to January 2025 to allow adequate time for citation accumulation for recently published articles. Only original research articles were considered eligible for inclusion. No restrictions were applied regarding country, institution, or study design.

Eligibility Criteria

Studies were included if they met the following criteria: they included patients diagnosed with NSCLC, evaluated post-operative or adjuvant radiotherapy, reported clinical outcomes, toxicity, prognostic factors, recurrence patterns, or treatment-related analyses, and were published as original research articles.

Studies were excluded if they were review articles or systematic reviews, meta-analyses, editorials or letters, conference proceedings, study protocols without reported outcomes, guideline statements, or non-English publications.

The study selection process was conducted in multiple stages. The initial search results were screened by document type, followed by title and abstract screening. Full-text evaluation was performed for potentially eligible studies. Studies that did not report original analytical data were excluded after full-text review.

The initial search yielded 190 records. After exclusion of non-article document types, 102 articles remained. Proceedings papers were then removed, leaving 92 studies. After excluding non-English publications, 90 studies underwent full-text evaluation. Eight studies were excluded after full review due to a lack of original outcome data or being non-analytical publications. A total of 82 studies met the inclusion criteria (Fig. 1).

Data Extraction and Objective Classification

For each included study, the following information was extracted: Publication year, study design (prospective or retrospective), journal name, journal impact factor and 5-year impact factor, journal citation report quartile, country of origin, number of citations, citation rate per year, research objective and study topic, and reported clinical outcomes and toxicity. Citation counts were obtained from the Web of Science database at the time of data extraction.

Bibliometric Indicators and Analysis

Bibliometric indicators were used to evaluate research productivity, citation impact, and collaboration patterns in the field of PORT in NSCLC. The following bibliometric parameters were analyzed: annual publication output, total citation counts, average citations per article, citation rate per year, journal impact factors,

Turk J Oncol 2026;41(4):306–314
doi: 10.5505/tjo.2026.62851

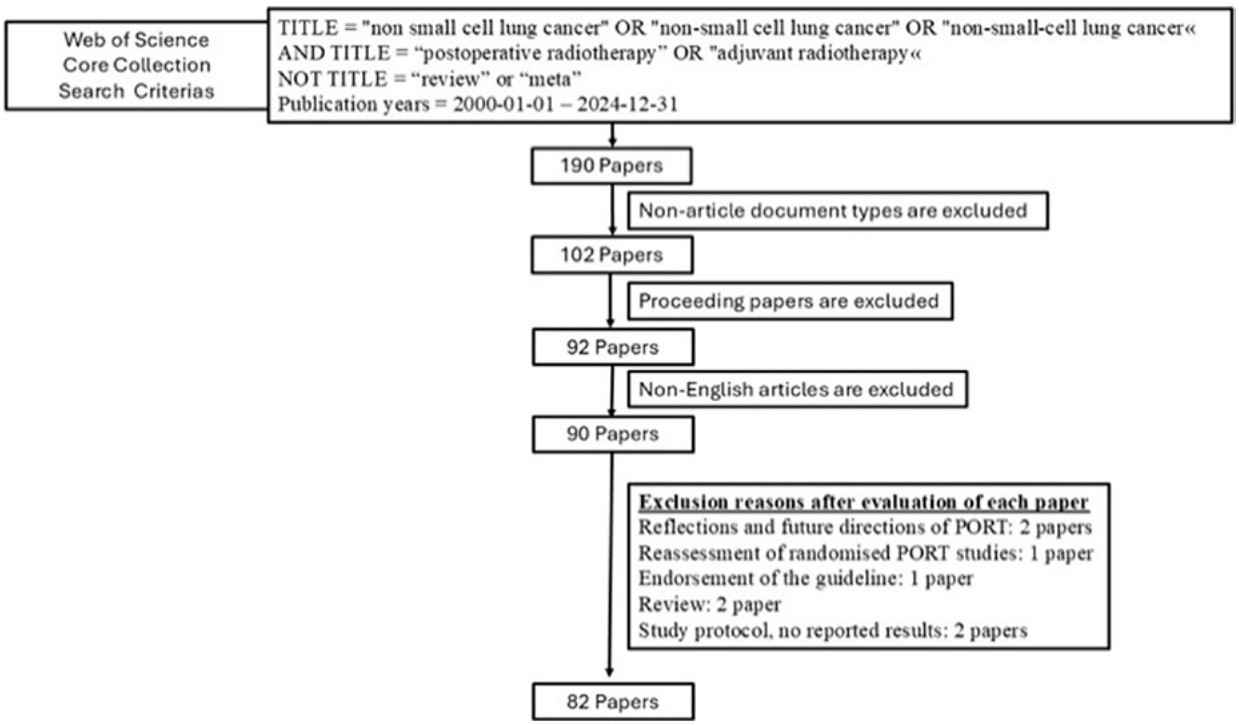


Fig. 1. The PRISMA diagram shows the selection criterias and phases of the studies.

journal quartile distribution, collaboration networks between institutions and countries, and research objective distribution and thematic trends. Citation rate per year was calculated by dividing the total number of citations by the number of years since publication.

Research Objective Classification

To better understand the thematic distribution of research topics, each study was categorized according to its primary research objective. Because many studies addressed multiple research questions, a multilabel classification system was used. Studies could therefore be assigned to more than one objective category.

Objective domains included survival and oncologic outcomes, prognostic or predictive clinical factors, toxicity and safety outcomes, radiotherapy techniques and dosimetry, recurrence patterns and failure analysis, prediction models, nomograms, or artificial intelligence, timing and sequencing of PORT, biomarkers and molecular predictors, practice patterns and database analyses, and quality of life and functional outcomes.

Collaboration and Network Analysis

Collaboration patterns between countries and institutions were analyzed using co-authorship and institutional collaboration networks. Network visualization maps were generated to illustrate relationships between research institutions and countries contributing to PORT research. These analyses were used to identify major research clusters and collaboration patterns within the field.

Statistical Analysis

Statistical analyses were performed to compare bibliometric indicators between study groups, particularly prospective and retrospective studies. Continuous variables were summarized using mean and standard deviation or median and interquartile range, depending on data distribution. Normality of distributions was assessed using the Shapiro–Wilk test.

For comparisons between two groups, the independent samples t-test was used for normally distributed variables, and the Mann–Whitney U test was used for non-normally distributed variables. Categorical variables were compared using the Chi-square test.

Spearman's rank correlation was performed to assess the association between publication year and citation rate. All statistical tests were two-sided, and a $p<0.05$ was considered statistically significant. Statistical analyses were performed using statistical software.

Table 1 Distribution of studies by research objective (n=82)

Objective group	Description of objective domain	Number and percentage of studies (n, %)
Survival benefit of PORT	Overall survival, cancer-specific survival, subgroup survival benefit, comparative effectiveness	35 (42.7)
Prognostic/predictive clinical factors	Clinicopathologic factors (LNR, nodal features, margins, histology, pulmonary function, and subgroup selection) associated with PORT benefit	27 (32.9)
Toxicity and safety outcomes	Radiation pneumonitis, lymphopenia, cardiopulmonary toxicity, treatment morbidity	15 (18.3)
Radiotherapy techniques/dosimetry	IMRT versus 3D-CRT versus proton therapy, dosimetric comparisons, contouring protocols, treatment delivery analysis	12 (14.6)
Recurrence patterns/failure analysis	Patterns of locoregional failure, recurrence risk mapping, and control rates	8 (9.8)
Prediction models/nomograms/AI	Survival prediction tools, dosimetric models, risk calculators, scoring systems	7 (8.5)
Timing and sequencing of PORT	Optimal timing, interval from surgery/chemotherapy, treatment sequencing strategies	5 (6.1)
Biomarkers/molecular predictors	Immune markers, gene mutations, miRNA, angiogenic markers, tumor microenvironment	5 (6.1)
Practice patterns/database analyses	National registry studies, utilization trends, and real-world practice patterns	5 (6.1)
Quality of life/functional outcomes	Quality of life, long-term pulmonary function, survivorship outcomes	2 (2.4)

PORT: Post-operative radiotherapy; LNR: Lymph node ratio; IMRT: Intensity-modulated radiotherapy; 3D-CRT: Three-dimensional conformal radiotherapy; AI: Artificial intelligence. Studies could be classified into more than one objective domain; therefore, totals exceed 100%.

RESULTS

The selection process yielded 82 eligible studies. Most focused on survival outcomes and oncologic effectiveness of PORT, followed by prognostic factors, radiotherapy techniques, and toxicity. Because many studies addressed multiple objectives, totals across domains exceeded the number of included studies. Survival benefit was the dominant theme, with increasing attention to risk stratification and technical optimization (Table 1). Figure 2 illustrates the keyword co-occurrence network generated using VOSviewer. PORT emerged as the central and most strongly connected keyword, demonstrating its pivotal role in the literature.

Among the 82 studies, 7 (8.54%) were prospective, and 75 (91.46%) were retrospective. The total citation count was 1972, with a mean of 24.04 citations per article. Prospective studies had a significantly greater

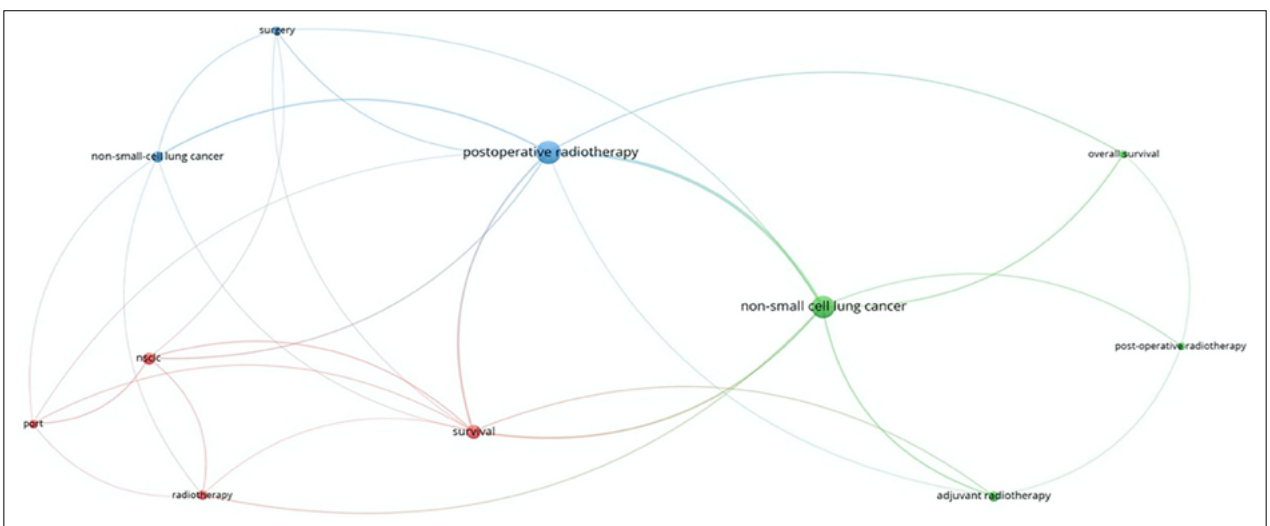


Fig. 2. Illustration of keyword co-occurrence network map analysis.

Turk J Oncol 2026;41(4):306–314
doi: 10.5505/tjo.2026.62851

Table 2 Comparison of total citations and average citations per year according to the study design

	Total citation count	Average citation per year	p*
Prospective (n=7)			
Mean	95.00	3.65	<0.05
Median	85.00	3.26	
Range	0.00–197.00	0.00–7.58	
Retrospective (n=75)			
Mean	17.42	0.67	<0.05
Median	9.00	0.34	
Range	0.00–106.00	0.00–4.98	

*: Student's t-test.

impact than retrospective studies, with higher total citations (mean 95.0 vs. 17.4) and higher annual citation rates (mean 3.65 vs. 0.67; p<0.001) (Table 2). They were also published in higher-impact journals, with greater 2024 and 5-year JIF values (p=0.002 and p<0.001, respectively) (Table 3). While journal subject categories were similar between groups, prospective studies appeared more often in Q1 journals (71.4% vs. 24.0%; p=0.035) (Table 4).

Collaboration analysis showed that PORT research is concentrated in major academic centers, particularly in China, where dense intra-national collaborations were observed. Intercontinental links were less common. Country-level mapping confirmed China as the leading contributor, with strong connections to several European nations, whereas earlier research activity was more prominent in Europe and Japan (Figs. 3, 4). Coauthorship networks formed distinct institutional clusters linked by a limited number of bridging investigators. Recent years have seen the expansion of research teams and a growing emphasis on predictive modeling, advanced radiotherapy techniques, and individualized treatment strategies (Fig. 5).

DISCUSSION

This bibliometric analysis provides a comprehensive overview of the scientific literature on PORT in NSCLC published between 2000 and 2024. The findings demonstrate that research activity in this field has been driven by persistent clinical uncertainty regarding the survival benefit of PORT, concerns about treatment-related toxicity, and ongoing efforts to improve patient selection through risk stratification and predictive modeling.

Table 3 Comparison of the 2024 journal impact factor and 5-year journal impact factor according to the study design

	2024 journal impact factor	5-year journal impact factor	p*
Prospective (n=7)			
Mean	13.14	15.82	0.002
Median	6.50	9.90	
Range	0.70–35.90	3.70–42.00	
Retrospective (n=75)			
Mean	5.00	5.02	<0.05
Median	3.30	3.40	
Range	0.50–43.40	0.50–38.20	

*: Student's t-test.

Table 4 Comparison of JCR category and JCR category quartile according to the study design

	Prospective (n=7), n (%)	Retrospective (n=75), n (%)	p*
JCR Category			
Oncology	6 (85.7)	64 (85.3)	N.S.
Non-oncology	1 (14.3)	11 (14.7)	
JCR category quartile			
Q1	5 (71.4)	18 (24.0)	0.035
Q2	0	28 (37.3)	
Q3	1 (14.3)	23 (30.7)	
Q4	1 (14.3)	6 (8.0)	

*: Chi-square. JCR: Journal Citation Reports.

One of the most notable findings of this study is the overwhelming predominance of retrospective studies in the literature. More than 90% of the included studies were retrospective in design, highlighting the difficulty of conducting prospective and randomized studies in the post-operative setting. Despite their small number, prospective studies had significantly higher citation counts and higher annual citation rates and were more frequently published in high-impact journals. This suggests that prospective trials have a disproportionate influence on the scientific direction of the field and play a major role in shaping clinical guidelines and treatment recommendations. The high citation impact of prospective studies likely reflects the influence of landmark randomized trials evaluating PORT in pN2 disease, including the Lung ART and PORT-C trials, which have significantly influenced modern clinical decision-making.[2,7]

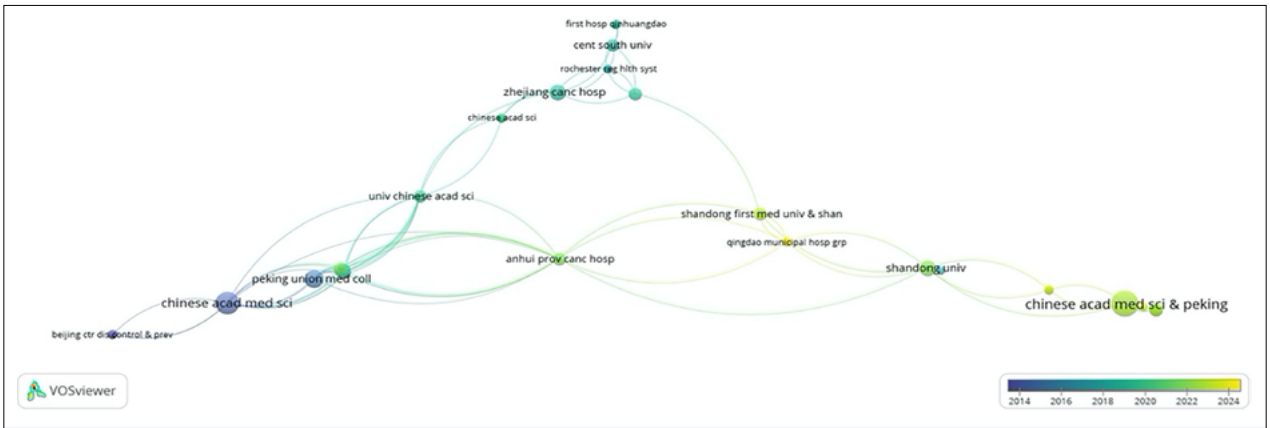


Fig. 3. Illustration of institutional collaboration network map analysis.

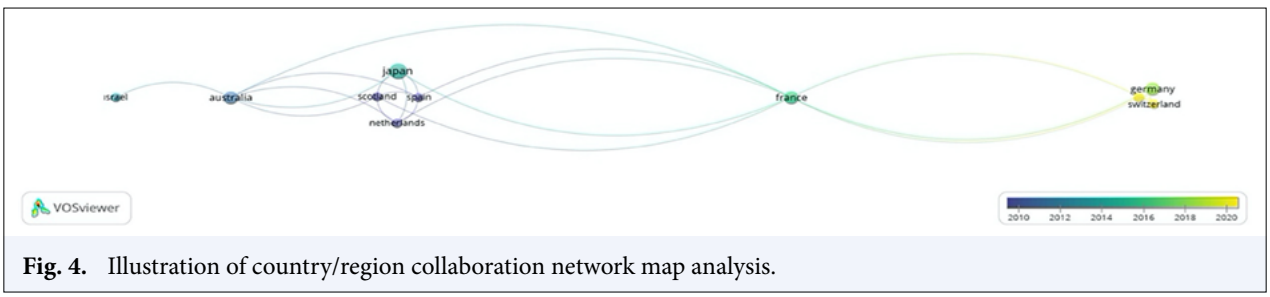


Fig. 4. Illustration of country/region collaboration network map analysis.

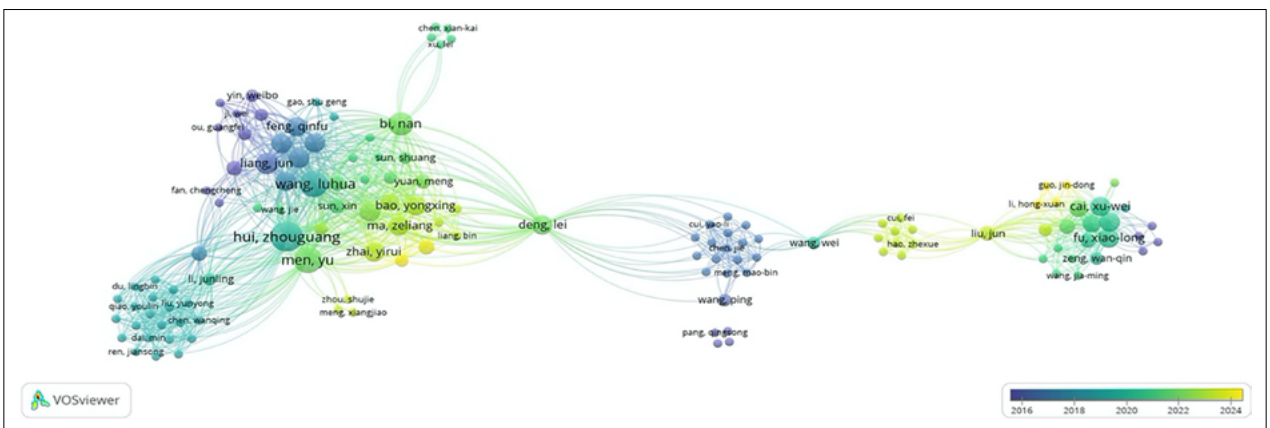


Fig. 5. Illustration of co-authorship network showing investigator clusters and bridging researchers.

The thematic distribution of research objectives demonstrates that the primary focus of PORT research has remained survival outcomes and oncologic efficacy. This finding reflects the central clinical question that has persisted for decades: whether PORT improves overall survival in patients with resected NSCLC, particularly in those with mediastinal lymph node involvement. Earlier meta-analyses suggested a potential detrimental effect of PORT, largely attributed to outdated radiotherapy techniques and increased cardiopulmonary toxicity.[3] However, more recent studies using modern radiotherapy techniques have reported improved locoregional control and possible survival benefits in selected high-risk patients.[8,9] The continued dominance of survival-focused studies in the literature indicates that the survival impact of PORT remains unresolved.

Over time, research focus has shifted toward identifying subgroups of patients most likely to benefit from PORT rather than evaluating PORT as a uniform treatment approach. A substantial number of studies have investigated prognostic factors such as lymph node ratio, number of involved lymph nodes,

Turk J Oncol 2026;41(4):306–314
doi: 10.5505/tjo.2026.62851

extracapsular extension, surgical margin status, histological subtype, and pulmonary function as predictors of PORT benefit.[10–14] This reflects a broader paradigm shift in oncology toward personalized treatment strategies. Instead of applying PORT uniformly to all patients with nodal disease, current research increasingly supports a selective approach based on individual risk factors and expected toxicity.

The strongest co-occurrence relationship was observed between PORT and non-small cell lung cancer, indicating that most publications primarily focus on the role of PORT in surgically treated NSCLC. Three major thematic clusters were identified. The blue cluster represents studies focusing on surgery and PORT, the green cluster emphasizes clinical outcomes including overall survival and adjuvant radiotherapy, whereas the red cluster reflects traditional research centered on radiotherapy, survival, and PORT. Overall, the network demonstrates that survival outcomes and the integration of PORT into multimodal treatment strategies constitute the dominant research themes in this field.

Another important emerging research area is the development of prediction models, nomograms, radiomics, and dosiomic analyses. These approaches aim to integrate clinical, pathological, and dosimetric variables to estimate survival benefit or toxicity risk on an individual patient basis. Several recent studies have focused on predictive modeling and artificial intelligence-based decision support systems for PORT patient selection.[15–18] The increasing number of studies in this area suggests that future decision-making regarding PORT may rely more on predictive modeling and data-driven tools rather than traditional staging parameters alone. This trend also reflects the growing integration of data science and radiation oncology research.

Toxicity and treatment safety remain important research themes in the PORT literature. Historical studies suggested increased cardiopulmonary toxicity associated with PORT, which contributed to the decline in its routine use in earlier decades.[3] However, advances in radiotherapy techniques, including IMRT, image-guided radiotherapy, and proton therapy, have significantly reduced radiation exposure to organs at risk and improved the therapeutic ratio.[6,19,20] The continued presence of toxicity-focused studies in recent years indicates that safety considerations remain a major factor influencing PORT utilization, particularly in patients with limited cardiopulmonary reserve.

The collaboration network analysis demonstrated that research activity in this field has increasingly shifted geographically over time. Earlier studies were predominantly conducted in European and Japanese institutions, whereas more recent research output is dominated by Chinese academic centers. This shift likely reflects increased research funding, expanding radiotherapy infrastructure, and the availability of large national cancer databases that facilitate retrospective analyses. Despite the overall increase in research productivity and institutional participation, international collaboration networks remain relatively limited. Greater international cooperation may improve study quality, increase sample sizes, and facilitate prospective multicenter trials.

Overall, the bibliometric patterns observed in this study mirror the clinical evolution of PORT in NSCLC. Early research focused on determining whether PORT should be used at all, whereas more recent studies focus on identifying which patients may benefit, how toxicity can be minimized, and how treatment decisions can be individualized. This transition reflects a shift from a uniform treatment paradigm toward precision radiotherapy and biologically guided treatment strategies.[15–18,21]

This study has several limitations inherent to bibliometric analyses. First, the analysis was limited to the Web of Science database, and relevant publications indexed in other databases, such as Scopus or PubMed, were not included. Second, the search strategy was restricted to title-based search terms, which may have resulted in the exclusion of relevant studies that did not include specific keywords in the title. Third, citation counts are influenced by publication year, journal impact factor, and research visibility, and therefore do not necessarily reflect methodological quality or clinical importance. Fourth, self-citations were not excluded from citation analysis. Finally, the relatively small number of prospective studies limited the statistical power of comparisons between study designs.

CONCLUSION

This bibliometric analysis demonstrates that research on PORT in NSCLC has been dominated by retrospective studies, whereas prospective studies, although limited in number, have had a greater scientific impact. The literature has primarily focused on survival outcomes and patient selection, reflecting ongoing clinical uncertainty regarding the role of PORT, particularly in patients with mediastinal nodal disease. Over time, research trends have shifted toward risk stratification, predictive modeling, and toxicity reduction using modern radiotherapy techniques. These findings indicate that the role of PORT is becoming increasingly individualized rather than routine.

Ethics Committee Approval: Since this study is a bibliometric analysis based entirely on publicly available secondary data and does not involve any human participants or animal subjects, ethics committee approval was not required.

Informed Consent: Informed consent was obtained from all participants.

Conflict of Interest Statement: None declared.

Funding: The author declared that this study has received no financial support.

Use of AI for Writing Assistance: None declared.

Author Contributions: Concept – A.Ö.; Design – A.Ö., G.Ö.; Supervision – A.Ö., G.Ö.; Data collection and/or processing – A.Ö., G.Ö., Z.N.Ş.; Data analysis and/or interpretation – A.Ö., G.Ö., Z.N.Ş.; Literature search – G.Ö., Z.N.Ş.; Writing – A.Ö., G.Ö.; Critical review – A.Ö., Z.N.Ş.

Peer-review: Externally peer-reviewed.

REFERENCES

1. Siegel RL, Miller KD, Wagle NS, Jemal A. Cancer statistics, 2023. CA Cancer J Clin 2023;73:17–48.
2. Le Pechoux C, Pourel N, Barlesi F, Lerouge D, Antoni D, Lamezec B, et al. Postoperative radiotherapy versus no postoperative radiotherapy in patients with completely resected non-small-cell lung cancer and proven mediastinal N2 involvement (Lung ART): an open-label, randomised, phase 3 trial. Lancet Oncol 2022;23:104-14. Erratum in: Lancet Oncol 2022;23:e319.
3. Burdett S, Rydzewska L, Tierney J, Fisher D, Parmar MK, Arriagada R, et al. PORT Meta-analysis Trialists Group. Postoperative radiotherapy for non-small cell lung cancer. Cochrane Database Syst Rev 2016;10:CD002142.
4. Olmetto E, Perna M, Cerbai C, Aquilano M, Banini M, Mariotti M, et al. A narrative review of postoperative adjuvant radiotherapy for non-small cell lung cancer. Mediastinum 2022;6:4.
5. Chen X, Ma Z, Ren Y, Che Y, Chen G, Liu Q, et al. Postoperative radiotherapy enhances survival in NSCLC patients with moderate lymph node metastases following surgery: A SEER-based population cohort study. Medicine (Baltimore) 2025;104:e43367.
6. Yegya-Raman N, Zou W, Nie K, Malhotra J, Jabbour SK. Advanced radiation techniques for locally advanced non-small cell lung cancer: intensity-modulated radiation therapy and proton therapy. J Thorac Dis 2018;10(Suppl 21):S2474–S91.
7. Hui Z, Men Y, Hu C, Kang J, Sun X, Bi N, et al. Effect of postoperative radiotherapy for patients with piiia-n2 non-small cell lung cancer after complete resection and adjuvant chemotherapy: the phase 3 PORT-C randomized clinical trial. JAMA Oncol 2021;7:1178–85.
8. Lei T, Li J, Zhong H, Zhang H, Jin Y, Wu J, et al. Postoperative radiotherapy for patients with resectable stage iii-n2 non-small cell lung cancer: a systematic review and meta-analysis. Front Oncol 2021;11:680615.
9. Billiet C, Decaluwé H, Peeters S, Vansteenkiste J, Dooms C, Haustermans K, et al. Modern post-operative radiotherapy for stage III non-small cell lung cancer may improve local control and survival: a meta-analysis. Radiother Oncol 2014;110:3-8. Erratum in: Radiother Oncol 2014;113:300–1.
10. Mankuzhy NP, Almahariq MF, Siddiqui ZA, Thompson AB, Grills IS, Guerrero TM, et al. The role of postoperative radiation therapy for pn2 non-small-cell lung cancer. Clin Lung Cancer 2021;22:e5–e17.
11. Zarinshenas R, Ladbury C, McGee H, Raz D, Erhunmwunsee L, Pathak R, et al. Machine learning to refine prognostic and predictive nodal burden thresholds for post-operative radiotherapy in completely resected stage III-N2 non-small cell lung cancer. Radiother Oncol 2022;173:10–8.
12. Kim BH, Kim HJ, Wu HG, Kang CH, Kim YT, Lee SH, et al. Role of postoperative radiotherapy after curative resection and adjuvant chemotherapy for patients with pathological stage N2 non-small-cell lung cancer: a propensity score matching analysis. Clin Lung Cancer 2014;15:356–64.
13. Lee S, Noh OK. Optimal positive lymph node ratio showing the benefit of postoperative radiotherapy in pathologic N2 non-small cell lung cancer: an exploratory study using the Surveillance, Epidemiology, and End Results data. Radiat Oncol J 2022;40:37–44.
14. Süveg K, Plasswilm L, Iseli T, Leskow P, Fischer GF, Putora PM. Role of adjuvant radiotherapy in non-small cell lung cancer—a review. Cancers 2022;14:1617.
15. Zeng Y, Liu J, Wan M, Li Q, Liu H, Cui F, et al. The association of postoperative radiotherapy with survival in resected N2 non-small cell lung cancer. J Thorac Dis 2023;15:42-53.
16. Zhang B, Yuan Z, Zhao L, Pang Q, Wang P. Nomograms for predicting progression and efficacy of post-operation radiotherapy in IIIA-pN2 non-small cell lung cancer patients. Oncotarget 2017;8:37208–16.
17. Ma Z, Liang B, Wei R, Liu Y, Bao Y, Yuan M, et al. Enhanced prediction of postoperative radiotherapy-induced esophagitis in non-small cell lung cancer: Dosiomic model development in a real-world cohort and validation in the PORT-C randomized controlled trial. Thorac Cancer 2023;14:2839–45.
18. Yao J, Geng Y, Xu J, Zou B, Teng F. The impact of EGFR mutation and PD-L1 status on the efficacy of postoperative radiotherapy in stage III-pN2 NSCLC. BMC Cancer 2025;25:858.

Turk J Oncol 2026;41(4):306–314
doi: 10.5505/tjo.2026.62851

19. Wang X, Song J, Long J, Zeng Z, Liu A. Effects of postoperative radiotherapy on cardiovascular-pulmonary disease mortality in patients with stage IIIA-N2 resected NSCLC: analysis of the SEER database. Radiat Oncol 2021;16:184.
20. Yu NY, DeWees TA, Voss MM, Breen WG, Chiang JS, Ding JX, et al. Cardiopulmonary toxicity following intensity-modulated proton therapy (IMPT) Versus Intensity-Modulated Radiation Therapy (IMRT) for Stage III Non-Small Cell Lung Cancer. Clin Lung Cancer 2022;23:e526–e35
21. Chen Y, Yu J, Meng X. Postoperative radiotherapy in completely resected IIIA-N2 non-small cell lung cancer: Quit or Not? Oncologist 2023;28:376–8.