

Racial Disparities In The Treatment Of Non-Surgical Patients With Lung Cancer

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Abstract

PURPOSE:

Studies have shown racial disparities in the surgical rates for early stage Non-SmallCell Lung Cancer (NSCLC). We analyzed the National Surveillance Epidemiology and EndResults (SEER) database to determine if racial disparities exist with respect to reasons for not undergoing surgery and also in receiving radiotherapy in nonsurgical patients.

METHODS:

Retrospective population-based cohort study was done using SEER 18 registries database. NSCLC cases staged as IA, IB, IIA and IIB and diagnosed between 2004 and 2010 were included. Nonsurgical cases were analyzed for disparities between Caucasians and African-Americans (AA) using SEER variables "reason no cancer directed surgery", "radiation" and "CS tumor size". Chi-square and Fishers exact tests were used for statistical analysis.

RESULTS:

Total of 6628 NSCLC cases were identified. African-Americans are less likely than Caucasians to receive radiotherapy for stage IA NSCLC (p-Value<0.05). Analysis of stage IA nonsurgical cases where surgery was not recommended showed significantly fewer African-Americans received radiotherapy (62.0% Caucasians vs 48.1% of AA, p-Value< 0.05). No racial disparities were seen between patients receiving radiotherapy for stages IB, IIA and IIB (p-Value>0.05). Proportion of tumors less than 2cm in size for stages IA, IIA and less than 5cm in size for stages IB, IIB showed no significant difference between the compared races (p-Value>0.05). There were no significant disparities with respect to reasons for not undergoing surgery being surgery not recommended and/or contraindicated except for stage IIB.

CONCLUSIONS:

Significant racial differences were present with respect to radiotherapy for non-surgical cases with stage IA disease. No differences were noted with respect to tumor sizes for all stages. For stages IA and IB African-Americans are less likely to undergo their recommended surgery. Failure to recommend surgery is not accountable for lower surgical rates in African-Americans.

INTRODUCTION

Lung cancer is the second most common non-cutaneous cancer and by far the leading cause of cancer deaths in both men and women. Lung cancer comprises of estimated 13.7% of all cancer deaths and 27.5% of all new cancer cases diagnosed for the year 2013. Non-Small cell lung cancer (NSCLC) accounts for about 85% to 90% of all lung cancers. Observed five year survival rates vary between 49% for stage IA cancers to 1% for Stage IV

cancer.^{1,2,3,4} Surgical resection remains the preferable approach for medically operable stage IA, IB, IIA and IIB NSCLC cases. However for cases deemed medically inoperable and in cases refusing their recommended surgery, radiation therapy has survival advantage compared to no intervention being done. Only 52% of NSCLC cases were receiving recommended therapy according to the stage of diagnosis with significant racial disparities prevailing for all 4 stages compared. To our knowledge no large scale study

was done to analyze the racial disparities in receiving radiotherapy for non-surgical NSCLC cases. We aimed at determining racial disparities in the treatment of non-surgical patients with early stage NSCLC using SEER database, a comprehensive population based cancer data from United States.

MATERIALS AND METHODS

The Surveillance, Epidemiology and End Results database (SEER) from the National Cancer Institute collects comprehensive population based cancer data from United States population based cancer registries. The SEER 18 registries comprises of cancer data of 28% of the United States population in total. SEER contains Information including cancer incidence and mortality (including cancer type, tumor site, tumor morphology, and stage at diagnosis, first course of treatment, and follow-up for vital status), demographic information, and state and county. SEER 18 registry databases were analyzed for the study period 2004 to 2010. NSCLC cases of the lung were identified using primary site codes C34 and ICD-O3 histology code 8046/3. Only Caucasians and African- Americans (AA) that were staged as Stage IA, IB, IIA and IIB as per AJCC 6th edition classification were included in the study. Analysis was done using cases cased diagnosed from 2004 as collaborative staging variable in SEER was included from 2004, containing detailed information required to classify recorded cancers according to AJCC 6th edition TNM staging.

Included NSCLC cases were initially analyzed with respect to receiving or not receiving recommendation therapy which is Surgery. Non-surgical were further analyzed for reasons for not undergoing surgery as per SEER variable "reason for not undergoing surgery". Reasons included for not undergoing surgery were "not recommended", "not recommended-contraindicated", "recommended but died before surgery", "recommended but not done with no identifiable reason", "recommended but not done as patient refused", "recommended but surgical status unknown" and "Unknown surgical status". Non-surgical cases were stratified by reason for not undergoing surgery and then analyzed for radiotherapy status. Cases were further stratified by gender and race for further analysis. Racial disparities were analyzed with respect to receiving surgery, reasons for not undergoing surgery and reception on radiotherapy in non-surgical cases. Proportions obtained by descriptive statistics were analyzed for statistical significance using Chi-square test.

Ethics committee approval and consent for participants was not required as the study was a database dependent analysis using de-identified data. Access to SEER database was granted after a SEER data use agreement was approved.

RESULTS

A total of 6628 Stage- I and II NSCLC cases were identified for the study period. Only Caucasians and African-Americans were included in the study. Cases were predominantly male (53%), Caucasians (89.2%). Most of the cases were diagnosed in stage IA (40.2%), followed by IB (28.0%), IIB (17.6%) and IIA (4.2%). Tumors were likely distributed in the upper lobe (63.5%) followed by lower lobe (28.1%) and middle lobe (4.6%). 0.9% of cases have overlapping lesions and distribution was not defined in 3% of cases. The distribution followed the similar pattern for all the stages and races compared.

Surgical status was unknown in 1.6% of the cases and these cases were removed from further analysis. Of the remaining 6525 cases, surgical intervention was done only in 36.1% of the cases. African Americas were less likely to receive surgery compared to Caucasians (30.4% vs. 36.2% with p-Value of 0.002), however stratified by stage, statistically significant difference was only noted for stages IA (31.8% vs. 39.6%, p-Value- 0.03) and IB (28.0% vs. 33.5%, p-Value = 0.043). No significant difference in the surgical status based on lobar distribution was noted for all stages comparing (p-Value > 0.05) for upper, middle and lower lobe tumors. However, overlapping lesions are more likely to undergo surgery compared to lobar tumors (p-Value<0.05). In cases that haven't undergone surgery the leading cause is not recommending surgery with 73.7% of cases followed by surgery contraindicated in 15.4%. For all stages compared, no significant racial disparities were present with respect to "surgery being not recommended" and "surgery being contraindicated" except for stage IIB in which more Caucasians having contraindications for surgery (12.3% vs. 3.9%, p-Value = 0.02). Recommended surgery was refused in 4.7% on non-surgical cases, with no racial disparities noted for all stages compared. Proportion of tumors less than 2 cm in size for stages IA, IIA and less than 5 cm in size for stages IB, IIB showed no significant difference between the compared races (p-Value >0.05).

Of 4168 non-surgical cases, radiotherapy status was not known for 75 cases and were excluded from further analysis. Of 4093 non-surgical cases where radiotherapy could be determined, 58.5% of cases received radiotherapy. No

significant racial disparities were present with respect to radiotherapy being received except for stage IA where only 54.1% of AA received radiotherapy compared to 63.1% of Caucasians (p-Value= 0.03). Subgroup analysis of stage IA nonsurgical cases where surgery was not recommended revealed significantly fewer African Americans received radiotherapy (62.0% Caucasians vs 48.1% of AA, p-Value =0.006).

Table 1

Demographics of early stage Non-Small Cell Lung Cancer cases

	Caucasians	African Americans
Male	73 (9.9)	67.5 (10.6)
Female	68 (10.3)	63 (11.4)
Male %	52.7	56.1
AJCC 6 th Edition		
IA	40.9	33.9
IB	37.0	46.0
II A	4.4	3.1
II B	17.7	17.0
Lobar Distribution (%)		
Upper Lobe	63.3	64.8
Middle Lobe	4.4	6.3
Lower Lobe	28.5	24.7
Overlapping lesion	0.9	0.8
NOS	2.9	3.4

DISCUSSION

Lung cancer is the second most common non-cutaneous cancer and by far the leading cause of cancer deaths in both men and women. Lung cancer comprises of estimated 13.7 % of all cancer deaths and 27.5% of all new cancer cases diagnosed for the year 2013. Non-Small cell lung cancer (NSCLC) accounts for about 85% to 90% of all lung cancers. Overall Observed five year survival rates are 49% for Stage IA, followed by 45% for stage IB, 30% for IIA and 31% for IIB. 1 1

Surgery remains the preferred approach for medically operable early stage NSCLC cases with no contraindications for surgery. Accepted 5 year survival rates for surgical patients include 60% to 85% and 30 to 50% for stages I and II respectively compared to only 15% for non-surgical cases. 4,5 The overall use of recommended therapy in NSCLC is low with only 69% of stage I and 48% of stage II cancers receiving either pneumonectomy or lobectomy. Previous studies found a consistent decline in the use of recommended therapy with increasing age after adjusting to other co-morbidities and socioeconomic status3.

African Americans have worse survival rates compared to Caucasians. When controlled for age appropriate treatment and social economic status, similar survivals were noted in both races emphasizing the importance of surgical role in

improving survival in African Americas. 6-10 The reasons for not receiving surgery in African Americans include advanced stage of diagnosis, unequal access to care, delay in receiving treatment after diagnosis, insurance status, socioeconomic status, and belief of accelerated tumor spread during surgery.11 Significant differences in receiving recommended surgery was noted in our analysis especially for stages IA and IB with African Americans less likely receiving surgery.

In cases where surgery was not recommended, contraindicated, or refused, given the poor prognosis on NSCLC with no therapeutic intervention, radiotherapy had been proven to be a viable alternative, especially for Stage I NSCLC. Even though conventional radiotherapy is far inferior to surgery with local recurrence rates of as high as 40%, stereotactic radiotherapy (SRT) was proven to be an effective alternative in non-surgical cases. 12 SRT when given at biologically effective doses can achieve local tumor control rates of as high a 90% with recurrence rates of as low as 8.4%.13-16 SRT can achieve 5 year survival rates comparable to surgical resection especially inpatients who refused surgery16. SRT is relatively safe with reported long-term toxicity in less than 10% of cases, especially when given lower doses.17-19

With radiotherapy being the important modality of treatment providing survival advantage for early stage non-small cell lung cancer cases which are deemed inoperable or for cases where recommended surgery was refused, eliminating the racial disparities in radiotherapy being given for non-surgical cases can improve survival in the African-American population

The major limitation of our study includes no information available regarding the chemotherapy status.

CONCLUSION

Existing racial disparities in receiving radiotherapy in non-surgical African-Americans in the setting of lower surgical rates definitely pose a greater survival disadvantage in this group of our population. More studies should be done to better identify the reasons for not receiving a recommended therapy. Multidisciplinary tools should be developed to address economic, cultural, literacy level, access to health care and other factors that are precluding African-Americans from receiving recommended therapy.

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survival rates by stage

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