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Patient and physician delay in the diagnosis and treatment of non-small cell lung cancer in Turkey

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ABSTRACT

Aim: The early diagnosis and treatment of lung cancer are important for the prognosis of patients with lung cancer. This study was undertaken to investigate patient and doctor delays in the diagnosis and treatment of NSCLC and the factors affecting these delays.
Materials and methods: A total of 1016 patients, including 926 (91.1%) males and 90 (8.9%) females with a mean age of 61.5 ± 10.1 years, were enrolled prospectively in this study between May 2010 and May 2011 from 17 sites in various Turkish provinces.
Results: The patient delay was found to be 49.9 ± 96.9 days, doctor delay was found to be 87.7 ± 99.6 days, and total delay was found to be 131.3 ± 135.2 days. The referral delay was found to be 61.6 ± 127.2 days, diagnostic delay was found to be 20.4 ± 44.5 days, and treatment delay was found to be 24.4 ± 54.9 days. When the major factors responsible for these delays were examined, patient delay was found to be more frequent in workers, while referral delay was found to be more frequent in patients living in villages ($p < 0.05$). We determined that referral delay, doctor delay, and total delay increased as the number of doctors who were consulted by patients increased ($p < 0.05$). Additionally, we determined that diagnostic and treatment delays were more frequent at the early tumour stages in NSCLC patients ($p < 0.05$).

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Discussion: The extended length of patient delay underscores the necessity of educating people about lung cancer. To decrease doctor delay, education is a crucial first step. Additionally, to further reduce the diagnostic and treatment delays of chest specialists, multidisciplinary management and algorithms must be used regularly.

1. Introduction

As smoking rates have increased, lung cancer has become the most frequently observed cancer in both men and women, and it has the highest rate of mortality. It is also the most fatal cancer—lung cancer is responsible for 1.3 million deaths annually across the world and continues to be a major health problem [1]. The age-standardized incidence of lung cancer in Turkey was found to be 75.8/100,000 population in men and 9.6/100,000 population in women [2]. Lung cancer incidence is 30–35/100,000 in the world, 48/100,000 in EU region among men and 13–14/100,000 in both EU region and world among women. The incidence is 7–10/100,000 in our country [3]. In Turkey, smoking rates was 27% in Turkish people, it was 46% in men and 13% in women [3].

Tumour stage is the leading factor affecting prognosis in lung cancer. Approximately 49% of cases with lung cancer have a distant metastasis at onset. Mediastinal lymphatic involvement is found in 26% of these patients [4]. During consultation, 80% of cases with lung cancer were found to be inoperable, leaving only 20% as candidates for surgical treatment [5]. NSCLC cases involving a distant metastasis demonstrated a median survival time of 4–5 months with no treatment, and only 10% of such cases lived for 1 year [6]. A five-year survival rate of 67% was reported at stage IA, 57% was reported at stage IB, 55% was reported at stage IIA, 39% was reported at stage IIB, and 23% was reported stage at IIIA. Cancer survival is a key measure of the effectiveness of health-care systems. Verdecchia et al. analysed survival data for patients diagnosed with cancer, collected from 47 of the European cancer registries participating in the EUROCARE-4 study and found that age-adjusted 5-year period survival was 10.9% in lung cancer [7]. Five year survival was low at 9–11% in the UK and Denmark versus 15–20% in Australia, Canada, Sweden and Norway [8].

Because patient and doctor delays will alter the tumour stage in lung cancer, many patients lose their chance for surgery due to diagnostic delays, although they would have been resectable when their initial symptoms appeared. Although a 30-day period has been considered to be an important criterion in patient delay in previous studies, no definite period has been specified for doctor delay and its subdomains. The British Thoracic Society (BTS) has made various recommendations concerning the onset of diagnosis and treatment times for patients with lung cancer [9]. Very few studies have been reported in the literature regarding diagnostic and treatment delays in lung cancer.

In the present study, we investigated patient and doctor delays at diagnosis and treatment stages in patients with NSCLC and the factors affecting such delays.

2. Materials and methods

Seventeen sites participated in the present study from various provinces of Turkey (five different sites in Ankara, two different sites in Istanbul, three different sites in Izmir, and one site each in Diyarbakir, Denizli, Tekirdağ, Antalya, Manisa, Mersin, and Isparta). This study was conducted prospectively with patients capable of giving their anamnesis, who consulted between May 2010 and May 2011, and who had a new diagnosis of NSCLC at one of the seventeen institutions. A questionnaire was completed through personal interviews with the patients. The patients' clinical files were also reviewed. Cases without a diagnosis of primary lung cancer, cases with a history other than NSCLC, patients who were not willing to complete the questionnaire, and cases from whom insufficient survey information was obtained were initially excluded from the study. A total of 1016 patients from 17 different sites who were diagnosed with NSCLC were included in the present study.

The age, sex, occupation, education, smoking status, socioeconomic status, social security status, and place of residence of each patient were recorded. Their first symptoms, the health institution first visited, the specialisation of the physician first visited, the number of non-pulmonary disease specialist physicians visited, the method of final diagnosis, historical diagnoses, the stage of their disease, the date at which the first symptoms appeared, the time passed between the first appearance of a symptom and the first presentation to a non-pulmonary disease specialist physician, and the reasons for any delay were also recorded. The time passed from the first visit to a non-pulmonary disease specialist physician until writing a referral to a pulmonary disease specialist, the time passed from seeing a pulmonary disease specialist until the diagnosis, and the time passed from being diagnosed with lung cancer to subsequent treatment were recorded. Relevant periods and delays were calculated based on these dates. The possible reasons for diagnostic and treatment delays were assessed in cases where delays were discovered.

The time between the onset of the first complaint and presentation to a non-pulmonary disease specialist physician was defined as the **Patient Presentation Time**; if this period exceeded 30 days, it was accepted as being a **Patient Delay** [10–12]. **Doctor Delay** was defined as the time passed from the first visit of a patient until treatment. Doctor delay was examined in the following three subdomains. The time passed between the first appointment of the patient with a non-pulmonary disease specialist physician until seeing a pulmonary disease specialist was defined as the **Patient Referral Time**, the time passed between seeing a pulmonary disease specialist and the pathological diagnosis was defined as the **Diagnosis Time**, and the time passed from the pathological diagnosis until treatment was defined as the **Treatment Time** [11,13,14].

Based on the periods defined by the BTS and Simunovic et al. [15], a patient referral time exceeding 2 weeks was accepted as a criterion for **Referral Delay**, a diagnosis time exceeding 2 weeks was accepted as a criterion for **Diagnostic Delay**, a treatment time exceeding 2 weeks was accepted as a criterion for **Treatment Delay**, and the time between the first presentation to a physician and treatment that exceeded 6 weeks was accepted as a criterion for **Doctor Delay**. The time passed from the first complaint of a patient until treatment was defined as **Total Delay**. Considering the times we defined for patient delay and doctor delay, a total period in excess of 72 days (6 weeks + 30 days) was taken as a criterion for **Total Delay** [10].

In Turkey, all health care and related social welfare activities are coordinated by the Ministry of Health. The Ministry is responsible to provide health care for the people and organise preventive health services, build and operate state hospitals, private hospitals, train medical personnel, regulate the price of medical drugs nationwide, control drug production and all pharmacies.

Health services are now financed through a social security scheme covering the majority of the population, the General Health Insurance Scheme. The Ministry of Health is the main actor and provides primary, secondary and tertiary care through its facilities across the country. Universities are also major providers of tertiary care. The private sector has increased its range over recent years.

A family practitioner system was extended to cover the whole country. Family practitioners are General Practitioners and family physician specialists providing primary care to the population on their lists. The major drawback of the system is the lack of a referral system between primary, secondary and tertiary care. In other words, patients are free to enter the system at whatever point they prefer. Most of the hospitals and doctors are concentrated in the cities and big towns, meanwhile there is little health service in the countryside and rural areas [16,17].

2.1. Statistical analyses

Data analysis was performed using SPSS 15.0 (Statistical Package for the Social Sciences, Chicago, IL, USA). Continuous variables were presented as mean and standard deviation, whereas categorical variables as frequencies and percentages. Multivariate logistic regression analysis was used to evaluate risk factors for delay, using selection of factors associated ($p \leq 0.10$) with delay in univariate analysis or those known to have clinical significance. The goodness of fit of the multiple logistic regression models was assessed using the Hosmer–Lemeshow test. Odds ratios (ORs) and 95% confidence intervals (CIs) were presented. A two-sided p value < 0.05 was considered significant for all analyses.

3. Results

In total, 926 (91.1%) of the 1016 cases included in the present study were male and 90 (8.9%) were female. Their mean age was 61.5 ± 10 years. A total of 880 of the cases were smokers who smoked an average of 50.3 ± 28 packs/year (Table 1).

Additionally, 35.9% of the cases were retired and 98% of them received social security (Table 2). The most frequent complaints of the patients were cough (55.4%) and shortness of breath (40.7%). The physician most frequently visited first by patients with lung cancer was a chest specialist (41.5%).

By assessing the number of (different) non-pulmonary disease specialist physicians visited by the patients and their total number of non-pulmonary disease specialist physician visits, we found that 261 (28%) patients visited two or more non-pulmonary disease specialist physicians, and the number of visits ranged between 1 and 15.

When the cases were reviewed in terms of diagnostic method, it was observed that diagnoses were made mostly using bronchoscopic methods. Non-small cell carcinoma of squamous type was found most frequently at a rate of 39.7% among patients with lung cancer.

18.6% of patients were treated by surgery, 20.4% of patients with radiotherapy or radiotherapy and chemotherapy, and 7.1% patients with supportive care treatment. The others (53.9%) were treated with chemotherapy.

When the patients with lung cancer were assessed, the mean patient presentation time was found to be 49.9 ± 96.9 days. Although the patient presentation time was 30 days or shorter in 63.9% of the patients, this period was longer than 30 days in 36.1% of the cases.

No statistically significant relationship was found between patient delay and age, sex, social security, education, income level, presence of symptoms, or place of residence ($p > 0.05$). However, patient delay was longer in workers than in other occupational categories (odds ratio (OR): 1.8, $p < 0.027$).

In 366 cases (36.1%) where the patient presentation time was longer than 30 days, the most frequent reason for patient delay was "patients' disregard of their complaints," followed by associating complaints with an additional disease, fear, and economic reasons (Table 3).

The average time between the first presentation to a doctor and treatment was 87.7 ± 99.6 days. The average times between the first presentation to a doctor and visit to a pulmonary disease specialist, between the visit to a pulmonary disease specialist and diagnosis, and between the diagnosis and treatment were 61.6 ± 127.2, 20.4 ± 44.5, and 24.4 ± 54.9 days, respectively. Doctor delay was experienced by 67.3% of the patients; there was referral delay in 65.1% of the cases, diagnostic delay in 37.6% of them, and treatment delay in 42.8% (Table 4).

When the major factors for these delays were examined by multivariate analyses, it was found that as the number of doctors

Table 1
Demographic characteristics of the patients.

	n	%
Sex		
Male	926	91.1
Female	90	8.9
Age (years)		
Mean age	61.5 ± 10	
Youngest–oldest	19–87	
Education		
No education	51	5.5
Literate	82	8.8
Primary school	484	52
Secondary school	142	15.3
High school	116	12.5
University	55	5.9
Smoking habits		
Smokers	880	91.7
Former smokers	18	1.9
Non-smokers	62	6.4

Table 2
Occupation, social security status, and place of residence of the patients.

Occupation	*n*	%
Retired	327	35.9
Government employee	41	4.5
Farmer	172	18.9
Housewife	63	6.9
Worker	79	8.7
Self-employed	216	23.7
Unemployed	14	1.5
Social security status		
SGK (Social Security Institution)	883	88.8
Green card	91	9.2
On payroll	20	2.0
Place of residence		
Province	488	50.6
Borough	321	33.3
Village	155	16.1

Table 3
Possible reasons for patient delay.

Reason for delay ($n = 366$)	*n*	%
Disregard of complaints	254	69.4
Associating disease with an additional disease	84	22.9
Fear	41	11.2
Economic reasons	38	10.4
Lack of health insurance	12	3.3
Other (e.g., socio-cultural or family reasons, workload, or associating their complaints with smoking)	64	17.5

Table 4
Doctor delay and the delay in each subgroup.

	n	%
Doctor delay		
≤6 weeks	252	32.7
>6 weeks	519	67.3
Referral delay		
≤2 weeks	328	34.9
>2 weeks	612	65.1
Diagnostic delay		
≤2 weeks	576	62.4
>2 weeks	347	37.6
Treatment delay		
≤2 weeks	429	57.2
>2 weeks	321	42.8

Table 5
Reasons for the delay in patient diagnosis.

Reason for delay (*n* = 347)	*n*	%
Physician's opinion of another diagnosis	135	38.9
Delays in pathologic examination	126	36.3
Additional disease assessment	100	28.8
Delays in radiologic examination	87	25.1
Patient refusal to undergo procedure	44	12.7
Reasons related to the health system	43	12.4
Delays in bronchoscopic examination	20	5.8
Delays in consultative examination	45	12.9
Long waiting time for hospitalisation	18	5.2
A large patient volume/lack of beds	43	12.4
Referral to another unit	36	10.4
Other	108	31.1

visited increased, referral delay, doctor delay, and total delay also increased ($p < 0.05$). Additionally, diagnostic delay and treatment delay were longer at the early stages of the tumour ($p < 0.05$). Referral delay was longer in those who lived in villages, and total delay was longer in cases with no education ($p < 0.05$).

An assessment of cases with a diagnosis delay showed that the most frequent reason for the delay was "physician's opinion of another diagnosis" (Table 5).

The major reasons for treatment delays were prolonged examinations for tumour staging, patient refusal of treatment, a large volume of patients, and extra time required for additional disease assessments before treatment (Table 6). The average total delay from the onset of the first complaint until treatment was 131.3 ± 135.2 days. The total delay was longer than 72 days in 62.6% of the patients.

4. Discussion

The most important issue in the treatment of cancer today is to diagnose patients at an early stage and enable them to have a chance for surgery. In lung cancer, the time it takes for a tumour to double its volume is between 4 and 56 weeks [18,19]. Delays in diagnosis in particular can cause a change in the tumour stage in many patients, resulting in a loss of their chance for surgery. Periods over 30 days have been taken as criteria for patient delay in previous studies; however, no definite period has been specified for doctor delay and its subdomains. The BTS has suggested that diagnostic procedures should not exceed 2 weeks, and that the time between presentation to a chest specialist and thoracotomy should not be longer than 8 weeks [9]. The Swedish Lung Cancer Study Group suggested that diagnostic tests should be completed within 4 weeks following consultation with a chest specialist, and that treatment should begin within 2 weeks thereafter [20]. A study conducted in Canada suggested that the time between the first presentation to a doctor and diagnosis should not exceed 4 weeks, and that the time between the completion of diagnostic tests and surgery should not exceed 2 weeks [15].

Table 6
Reasons for delay in patient treatment.

Reason for delay (*n* = 321)	*n*	%
Long waiting time for tests required for staging	40	12.5
Patient refusal of the treatment	38	11.9
A large volume of patients	36	11.2
Additional disease assessment before treatment	34	10.6
Reasons related to the health system	25	7.8
Delays in consultative examination	12	3.7
Referral to another unit	20	6.2
Long time for radiotherapy appointment	12	3.7
Other	12	3.7
No comment	92	28.7

There are growing international efforts to describe and measure patient journeys prior to a cancer diagnosis. Accurate descriptions of these patient journeys and valid measurement of diagnostic intervals are essential to determine the effectiveness of interventions to reduce them. Weller et al. suggested that the Aarhus checklist would facilitate the standardised and uniform definition and reporting of studies in this area [21].

Few studies in the literature have reported on patient and doctor delays in lung cancer. Importantly, our study reflects the data for Turkey as a whole because it involved 17 different sites from various Turkish provinces and we explored the lengths of diagnostic and treatment delays and the possible reasons for them in an NSCLC patient group. The mean patient delay was found to be 49.9 ± 96.9 days in our study, and 36.1% of our cases had patient delays.

In lung cancer, studies have reported diverse results with respect to patient and doctor delays. We believe that the reason for such diverse results includes the assessment of patient groups from different countries, different socioeconomic levels, and different health policies. Milleron et al. [22] reported in their series of 72 cases that the average time was 103 days for patient delay, 88 days for doctor delay, and 155 days for total delay. In their prospective study involving 134 cases with lung cancer and chest tumours, Koyi et al. [13] reported the average patient delay to be 43 days, and the total delay was reported to be 203 days. They further reported that there were cases where the total delay exceeded 2 years. Salomaa et al. [11] found in their study of 132 cases that the patient delay was 14 days, first doctor delay was 16 days, second doctor delay was 15 days, and treatment delay was 15 days.

Keeble et al. indicated that patient interval for lung cancer in 2009–2010 in England was 12 days [23] and Baughan et al. found a median delay of 9 days in late 2000s in Scottish patients with lung cancer [24].

In a retrospective study by Özlü et al. in Turkey [25], the patient delay was found to be 64 days, doctor delay was found to be 48 days, and total delay was found to be 102 days. Patient delay was shorter in our study, whereas doctor delay and total delay were longer.

Sulu et al. reported that the mean times was 59.9 days for the application days, 40.3 days for the referral interval, 16.4 days for the diagnostic interval, and 24.7 days for the treatment interval [26]. A median value of 14 days for doctor delay in patients with lung cancer was found by Lyratzopoulos et al. [27] and Baughan et al. reported doctor delay was 12 days (median) [24].

A previous study reported that the most important part of doctor delays was the referral delay [11]. Our results show that only 34.9% of our patients had no referral delay. 62.4% of them were diagnosed within a period of 2 weeks, and 57.2% of them had their treatment started within a period of 2 weeks. Salomaa et al. [11]

reported that only 38% of patients were able to receive treatment within 1 month following their presentation at the centre. Yılmaz et al. [10] reported, conversely, that 63.6% of the patients had a diagnosis within 2 weeks, 30.4% of them had their treatment started within 2 weeks, and only 26.1% of the patients had no doctor delay. The percentage of patients in our study with no doctor delay was 32.7%.

The major factors that can affect patient delay are age, sex, socioeconomic conditions, and education level [28]. In our study, no relationship was found between the length of delay and patients' sex, socioeconomic conditions, social security, education level, or place of residence. However, patient delay was found to be longer in workers. A study conducted by Gonzales et al. [29] concerning patient delay demonstrated that none of the above factors affected patient presentation time other than living in rural areas versus urban areas. Milleron et al. [10] reported that delays were longer in cases where the first presentation was made to a general practitioner than in those where the visit was to a chest specialist.

The mean age our lung cancer patients (61.5 ± 10.1) was younger, in most countries the average age of a lung cancer patients was 70–73. It may be interested in the overall average age at which smokers began smoking cigarettes regularly was between the ages of 15 and 17 among Turkish people. It indicates that smokers in Turkey are smoking regularly at an earlier age. In addition, there was no relationship was found between the length of delay and patients' age.

And also, Raine et al. investigated social variations in access to hospital care for patients with colorectal, breast, and lung cancer and found that social factors strongly influence access to and the provision of care [30].

Another study performed in Brazil reported that two significant factors that might affect patient delay were people's level of knowledge about complaints and the risks of smoking and the difficulties they faced in reaching a healthcare centre or a physician [12].

Smith et al. found that patient delay was 99 days (median) and they suggested that long term smokers, those with COPD and/or those living alone are at particular risk of taking longer to consult with symptoms of lung cancer and practitioners should be alert this [31]. Breakdowns involved in the social security system and deficiencies in the healthcare system may also adversely affect patient delay. Other possible reasons for patient delay may include patients' ignorance about their complaints or associating them with their concomitant diseases, including smoking patients linking their complaints such as cough or sputum to smoking. We also found that the most important reasons for patient delays were patients' ignorance about their complaints and associating them with additional diseases. Crawfort et al. found that patients with the shortest delay had more advanced disease and survival was least likely for these patients. For this reason, they said that delay is a confounding factor [32].

Significant event audit (SEA) is a quality improvement technique that is widely used in UK primary care practice. Mitchell et al. analysis of SEAs from 92 general practices in the North of England Cancer Network. They found that most SEAs demonstrated timely recognition and referral [33].

Koyi et al. [13] suggested that patient delays could be reduced by educating people and making it easier for patients to access healthcare institutions. Patient delay in seeking a cancer diagnosis is an important problem, and in addition, it is a behavioural problem amenable to psychological analysis [34]. In their studies, Silva et al. [12] and Pereira et al. [35] held inadequacy of medical services, delays in referrals, and low performance of diagnostic and supplementary tests responsible for doctor delays. It was stated that an important reason for doctor delays was insufficient knowledge of lung cancer by the physicians who were involved in monitoring of patients with lung cancer, particularly primary care physicians. It is a common problem not to administer lung radiography, particularly in cases where chronic lung complaints are involved [28]. Another problem is that 25–90% of lung radiographs are assessed incorrectly, and 28% of the lesions that are assessed incorrectly have a diameter of 1–3 cm [36]. Another significant reason for delays is that doctors focus on other diagnoses, not even considering a diagnosis of lung cancer. In a study involving cases with lung cancer, it was reported that other diagnoses were considered by doctors 40% of the time [37]. The most frequent reason for a diagnosis delay was also "doctor's consideration of another diagnosis" in our study. Another important reason for doctor delays is performing unnecessary diagnostic procedures or improper performance of diagnostic methods. Patients' refusal of diagnostic procedures may also cause diagnostic delays [38,39]. Other reasons leading to doctor delay include problems in the health system and insufficiencies of medical services and laboratories. Considering these reasons, major approaches to reducing doctor delays should be educating doctors, correcting the deficiencies in clinical signs and symptoms that may indicate the presence of lung cancer and in laboratory systems, and avoiding unnecessary medical examinations [40].

Neal et al. found that the overall mean diagnostic interval fold by 5.4 days by implementation of the 2005 NICE Guidelines between 2001–2002 and 2007–2008 [41]. In our study, the major reason for treatment delays was prolonged examinations for the staging of tumours. Another remarkable result found in our study was that 65.5% of the patients had consulted two or more different non-pulmonary disease specialist physicians. Gonzales et al. [42] reported that 80% of patients consulted at least two different doctors, and that the number of visits to a doctor was more than 1 in 83% of cases. Cancer patients had twice as many GP consultations, 10 to 11 times more diagnostic investigations and five times more hospital contacts than the reference population [43]. As the number of doctors consulted increases, referral, doctor, and total delays also increased. Lyratzopoulos et al. indicated that lung cancer patients have a high proportion (30%) of 3 or more pre-referral consultations [44].

To eliminate this problem, deficiencies in the system should be corrected, and additional time should be spent on education and high-risk patients should be directed without delay to health centres utilising multidisciplinary approaches on the subject.

In the present study, we found that diagnostic and treatment delays were longer in early-stage cases. We believe the cause may be that most patients with lung cancer had no complaints at the early stages or they ignored their complaints and associated them with smoking.

We found that total delays were experienced by 62.6% of our patients. Yılmaz et al. [11] reported a longer average period, 176.2 days, for the total delay, but a similar median time, 98 days, and mentioned that 71.8% of their patients had total delays. The median time was measured as 71.5 days in another study [45].

Hansen et al. reported that median total delay was 108 days in lung cancer and suggested that system delay accounted for a substantial part of the total delay experienced by cancer patients [46].

Walter et al. systematically reviewed the literature reporting the application of Andersen's Model of total patient delay (delay stages: appraisal, illness, behavioural, scheduling, treatment) in studies which assess cancer diagnosis. They found that there was strong evidence to support the existence and importance of appraisal and treatment delay as defined in the Andersen Model, although treatment delay requires expansion [47].

In conclusion, very long patient delays indicate the need to inform patients about lung cancer and the risk factors involved, and the need to warn them not to omit periodic check-ups.

To reduce doctor delays, education should be increased at the primary care level, and at-risk patients should be directed without delay to health centres utilising multidisciplinary approaches on the subject. It is important that health centres dealing with diagnosis and treatment use multidisciplinary applications based on current algorithms and a common language to further shorten the time required to make a diagnosis and initiate treatment.

Conflict of interest statement

We have no provided any financial and personal relationships with other people or organisations that could inappropriately influence (bias) our work.

Authorship contribution

This manuscript (Patient and doctor delays in the diagnosis and treatment of non-small cell lung cancer in Turkey) has been seen and approved by all co-authors and this manuscript has not been published or submitted for publication elsewhere and we have no provided any financial and personal relationships with other people or organisations that could inappropriately influence (bias) our work.

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