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Lung carcinomas: Epidemiological, histological, immunohistochemical and evolving data about a cases series of 399 patients in Fez (Morocco)

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ABSTRACT: *Background:* Lung cancer is the leading cause of cancer death worldwide; non-small cell lung carcinoma (NSCLC) is the most common, accounting for 85% of all lung carcinomas.
Methods: This was a retrospective study of 399 cases of lung carcinomas who were managed between January 2011 and December 2016 at surgical pathology department at Hassan II university hospital of Fez (Morocco). The clinical, radiological, histopathological, immunohistochemical and evolving details were collected from patients's files.
Results: There were 316 men (79%) and 83 women (21%), with a mean age of 59 years. The tumors size was classified as T1 (2%), T2 (19 %), T3 (15 %) and T4 (64%) According to the 2009 UICC TNM classification, the majority of cases were in stage IV (82%). Histological examination found 262 adenocarcinomas (66%), 78 squamous cell carcinomas (18%), 47 neuroendocrine noeoplasms (11 %), 16 metastasis (2,3%) and 2 carcinomas NOS. The immunohistochemical staining was done in 365 cases (92%). Cytokeratin7 was positive in 84% of cases, including 93% (214) adenocarcinomas versus 4% (9) neuroendocrine carcinomas and 3% (7) epidermoid carcinomas (p = 0.000001). TF1 was positive in 55% of cases with 86% (158) adenocarcinomas, 14% (24) neuroendocrine carcinomas and 0% squamous cell carcinomas. CK5 / 6 was positive in 86% (35) squamous cell carcinomas versus 14% (6 cases) adenocarcinomas. P63 was positive in 99.7% of the squamous cell carcinomas versus 0.3% of adenocarcinomas. Chromogranin A and synaptophysin were positive in 100% of neuroendocrine tumors. Overall, a discordant intratumoral immunohistochemical heterogeneity was rarely observed. Although TTF-1 appeared specific (97.3%) and sensible (86.2%) in the diagnosis of adenocarcinoma.
After a median follow-up of 11 months [3-28 months], the median overall survival was 23 months. Overall survival rates were 50% at 23 months. In univariate analysis, 5 factors were statistically associated with overall survival. These factors are the histological type (adenocarcinoma versus squamous cell carcinoma versus neuroendocrine neoplasm), size tumor (T1-2 vs T3-4), lymph node status (N0 vs N +), stage of disease (I-II vs III-IV) And the performance score (PS 0-1 vs PS2-3-4) (Table 8).
It is noted that overall survival is improved in patients under the age of 60 years, female, performance statute (PS 0 or 1), non-smoking, with adenocarcinoma, localized with a small size tumor (T1 / 2) and N0.
Conclusion: Lung cancer are the leading cause of death in men worldwide, and, for many years, researchers are struggling to stop its progression and improve prognosis. In our experience locally advanced and metastatic adenocarcinomas are most common with a mean decrease of survival for delays diagnosis and the management, which joins the literature data.

KEYWORDS: Lung, Carcinoma, Histological examination, immunohistochemistry.

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1 BACKGROUND

Lung cancer is a major public problem health in worldwide and is the first cancer by incidence and mortality [1]. The Globocan 2012 database reported 3928 new cases of lung cancer in Morocco, it is the second cancer in terms of incidence all sexes combined after breast cancer, accounting for 11.21% of all cancers [2].

There are two types of lung cancers: non-small cell lung cancer (NSCLC) (80%) and small cell lung cancer (SCLC) (20%). These two tumours types behave very differently in their progression and in their sensitivity to treatments, hence the importance of distinguishing them during diagnosis [3]. The main factor in lung cancer is tobacco, in more than 90% of cases, the risk increases with the dose but especially with the duration of exposure. Other environmental factors are recognized, often acting as synergistic factors with tobacco. The diagnosis is often made at a late stage in the presence of very specific respiratory signs in an adult mostly smoking. It is mainly based on lung imaging and fibroscopy, which can be used to perform biopsies to determine the histological type [1].

Schematically, we distinguish: non-small-cell cancers (NSCLC) and small cell cancers (SCLC), two entities with different clinical and therapeutic characteristics. In 2011, on the basis of multidisciplinary work under the auspices of the International Association for the Study of Lung Cancer (IASLC), the American Thoracic Society (ATS) and the European Respiratory Society (ERS) Classification of pulmonary adenocarcinomas has been proposed. In 2015, this classification takes into account the mutational profile of bronchopulmonary tumors and is included in the new WHO version. There are many changes compared to 2004 version. The most important ones are the integration of data from genetic and molecular analyzes, the use of the immunohistochemistry recommended on small cytological and biopsy specimens with new terminology and recommendation specific to the sampling biopsy. An immunohistochemistry algorithm is proposed for cases whose diagnosis is not evident on the morphology [4].

In spite of the therapeutic advances, in particular, the discovery of the role of the activating mutations of the EGFR gene allowing a personalized treatment thanks to the targeted therapies, the vital prognosis of the lung cancer remains dark with a survival of 14% at 5 years. Only early diagnosis allows curative surgery [5].

In this context, we did a retrospective study to come out the epidemiological, histopathological, immunohistochemical and evolving features of lung carcinomas in our region.

2 PATIENTS AND METHODS

This was a retrospective study of 399 cases of lung carcinomas who were managed between January 2011 and December 2016 at surgical pathology department at Hassan II university hospital of Fez (Morocco). The clinical, radiological, histopathological, immunohistochemical and evolving details were collected from patients's files and pathology reports.

All cases were classified according to the criteria set by the new histological classification of lung tumors defined by the World Health Organization in 2015 [4].

Were used in immunohistochemical study those antibodies: TTF-1, cytokeratin 7, P63, cytokeratin 5/6, chromogranin A, synaptophysine (table 1).

Table 1: details of antibodies used in our study

Antibody	Type	clone	staining	differenciation
TTF1	monoclonal (lapin)	SP141 (F02687)	Nuclear	Glandular
CK7	monoclonal (lapin)	SP52 (F09586);	Cytoplasmic	Glandular
P63	monoclonal (souris)	4A4 (G03171)	Nuclear	Squamous
CK5/6	monoclonal (souris)	D5 / 16B4 (G00157)	Cytoplasmic	Squamous
Chromogranine A	monoclonal (souris)	LK2H10	Granular cytoplasmic	Neuroendocrine
Synaptophysine	monoclonal (souris)	SP11 (F09460),	Granular cytoplasmic	Neuroendocrine
PanCKAE1/AE3	monoclonal (souris)	PCK26 (F09708)	Cytoplasmic	Epithelial

All patients were staged according to the seventh edition of International Union Against Cancer/American Joint Committee on Cancer TNM classification [6].

The statistical analysis was done by epi-info version 3.5.2011 and SPSS 21.

- Frequency measurement, median, mean, standard deviation and 95% confidence intervals (95% CI).
- Survival rate is calculated by the Kaplan-Meier method and the survival curves are compared according to the log-rank test in uni varied analysis.
- A value of $p < 0.05$ was considered statistically significant for all analyzes.

3 RESULTS

EPIDEMIOLOGICAL AND CLINICAL FEATURES

There were 316 men (79%) and 83 women (21%), with a mean age of 59 years (range 20 to 89 years). Active smoking was found in 301 patients (75%), all of them were male. Passive smoking was found in 11% of women. 14% of the cases were non-smokers. Most patients presented with respiratory signs indicative of their disease. These signs were dominated by chest pain in 72% patients, cough in 69% patients, dyspnea in 66% patients, and hemoptysis in only 29% patients. Most of our patients had a score of performance according to the WHO score of 0 (39%) or 1 (45%). A chest tomodensitometry was performed for all patients, it was objectified tissue masses in 88%.

The tumors size was classified as T1 (2%), T2 (19 %), T3 (15 %) and T4 (64%). As for nodal status, there was no involvement of the lymph nodes (N0) in 35% and an involvement of the N1 stations in 20% of the cases, N2 in 30% of the cases and N3 in 15% of the cases. 78% of our patients were metastatic at diagnosis, 60% of whom had multiple metastasis. The most affected metastatic sites are contralateral lung (58%), bone (47%), pleura (28%), liver (13%), brain (11%) and surrenal (10%). According to the 2009 UICC TNM classification, the majority of cases were in stage IV (82%), stage III (12 %), stage II (4%)and stage I (2%). Details are listed in table 2.

Table 2: Epidemiological and clinical features of our patients

CHARACTERISTICS (n=399)	N (%)
Gender	
Male	316 (79%)
Female	83 (21%)
Mean age (years)	59
Overall	59
Male	57
Female	
Age <60 years	207 (52%)
Male	160 (78%)
Female	47 (22%)
Age > = 60 years	
Male	192 (48%)
Female	156(81%)
	36 (19%)
Tabaco	
Active	299 (75%)
Passive	44 (11%)
Never	56 (14%)
Symptoms	
Pain	287 (72%)
Cough	275 (69%)
Dyspnea	263 (66%)
Hemoptysis	116 (29%)
Tumors site	
Right lung	195 (49%)
Left lung	204 (51%)
Tumors size (T) Node (N)	
T1 N0	9 (2%) 140 (35%)
T2 N1	75 (19%) 80 (20%)
T3 N2	60 (15%) 120 (30%)
T4 N3	255 (64%) 59 (15%)
Stage	
I	9 (2%)
II	15 (4%)
III	46 (12%)
IV	319 (82%)

HISTOLOGIC FEATURES (FIGURES 1 TO 4)

Non-small cell carcinomas (NSCLC) accounted for 88% of the cases, followed by small cell carcinomas (SCLC) and secondary tumors accounting for 9% and 3%, respectively.

Of all cases, we founded 262 adenocarcinomas (66%), 78 squamous cell carcinomas (18%), 47 neuroendocrine carcinomas (11%), 10 secondary tumors (3%) and 2% carcinomas NOS.

According WHO classification 2015 of lung cancers, among the 262 (66%) cases of adenocarcinomas, 56% cases showed solid pattern and 36% cases showed acinar pattern. Other morphological pattern of adenocarcinoma was rare (histologic details of adenocarcinoma are listed in table 3).

Table 3: Details of histological features

Adenocarcinoma sub type (OMS 2015) n=262 (66%)	**Frequency**	**Percent**
Solid pattern	147	56%
Acinar pattern	94	36%
Papillary pattern	8	3%
Mixed patern	6	2.3%
Lepidic pattern	4	1.5%
Mucinous invasive adenocarcinoma	3	1.2%
Micropapillary pattern	0	0%
Total	262	100,0%
Neuroendocrine carcinoma subtype (OMS 2015) : n= 47(11%)	**Frequency**	**Percent**
Small cell carcinoma (SCC)	36	76.75%
Large cell neuroendocrine carcinoma (LCNEC)	5	10.50%
Typical carcinoid carcinoma	4	8.50%
Atypical carcinoid carcinoma	2	4.25%
Total	47	100,0%
Metastasis : n= 11 (3%)	**Frequency**	**Percent**
Breast carcinoma	3	28%
Cervix squamous cell carcinoma	2	18%
Liver carcinoma	1	9%
Colic carcinoma	4	36%
Kidney clear cell carcinoma	1	9%
Total	11	100,0%

Neuroendocrine neoplasms are distributed among 76.75 % small cell carcinomas (SCLC), 10.5% large cell neuroendocrine carcinomas (LCNEC), 8.5 % typical carcinoid and 4.25% atypical carcinoid (table 3). About the metastasis are detailed in table 3.

IMMUNOHISTOCHEMICAL AND MOLECULAR FEATURES (FIGURES 5 TO 7)

The immunohistochemical staining was done in 365 cases (92%). Cytokeratin7 was positive in 84% of cases, including 93% (214) adenocarcinomas versus 4% (9) neuroendocrine carcinomas and 3% (7) epidermoid carcinomas ($p < 0.005$).

TTF1 was positive in 55% of cases with 86% (158) adenocarcinomas, 14% (24) neuroendocrine carcinomas and 0% squamous cell carcinomas ($p < 0.005$).

CK5 / 6 was positive in 86% (35) squamous cell carcinomas versus 14% (6 cases) adenocarcinomas ($p < 0.005$).

P63 was positive in 97.7% of the squamous cell carcinomas versus 2.3% of adenocarcinomas ($p < 0.005$).

Chromogranin A and synaptophysin were positive in 100% of neuroendocrine tumors.

Overall, a discordant intratumoral immunohistochemical heterogeneity was rarely observed. Although TTF-1 appeared specific (97.3%) and sensible (86.2%) in the diagnosis of adenocarcinoma. The results of the immunohistochemical study are summarized in Table 4.

Table 4: immunohistochemical expression by subtype histologic

Histological type	CK7 n=274 (68,5%)	TTF1 n=328 (82%)	P63 n=90 (22%)	CK5/6 n=139 (35%)	CHROMO n=60 (15%)	SYNAPTO n=87 (22%)
Adenocarcinoma n=262 (66%)	93%	86%	2.3%	14%	0%	0%
Squamous cell carcinoma n=78(18%)	3%	0%	97.7%	86%	0%	0%
Neuroendocrine Carcinoma n=47 (11%)	4%	14%	0%	0%	100%	100%
NSCLC NOS n=2 (2%)	_	_	_	_	_	_
***P* value**	<0,0001	0,00009	<0,0001	<0,0001	<0,0001	<0,0001
Sensitivity						
Our result	93%	58%	100%	82%	82%	78%
Koh J et al 2014 [35]	99.1%	86.2%	79.7%	93.2%		
Specificity						
Our result	34%	78%	99.69%	93.75%	100%	100%
Koh J et al 2014 [35]	65.3	97.3%	98.4%	93.6%		

The search for molecular abnormalities of the EGFR gene was performed in 10 patients with metastatic pulmonary adenocarcinoma. Only 3 patients, females with an average age of 56.6 years, had a molecular abnormality of the EGFR gene (Table 5).

Table 5 : Comparison of our results and those of the literature concerning EGFR cases

	Paik, PK 2012 [39]	**S Gahr, 2013 [40]**	**Yoshizawa, 2013[41]**	**Our result**
Cases (N)	675	1201	167	10
Country	USA	Germany	Japon	Morocco
Average age	63 years	58 years	65.4 years	56.6 years
Sexe	26%F/21%M	17.4%F/5%M	51.6%F/48.4%M	100% F
Tabaco	Never 38%	Never 24.4%	Never 44.7%	Never 100%
Percent of EGFR abnormality	24.3% (164/675)	9.8% (118/1201)	53.9% (90/167)	30% (3/10)
Deletion of exon 19	56%	61.9%	53.3%	66.7%
Mutation of exon 21	43%	33.1%	40%	33.3%

TREATMENT AND OUTCOME

Of our 399 patients, 370 patients had received treatment, the others either died before starting treatment or refused treatment. 30 patients underwent surgical treatment, 9 of whom had received adjuvant chemotherapy, 2 had radiotherapy and 2 had concomitant radio-chemotherapy.

Exclusive chemotherapy with a doublet cisplatin-navelbine (NSCLC) / cisplatin-etoposide (SCLC) was indicated in 251 patients (68%) and concomitant radio-chemotherapy (CCR) in 58 patients (15.75%).

11 patients had received targeted therapy (anti-angiogenic = Bevacizumab) in combination with platinum salts. For the 10 patients who were tested for EGFR mutation, 6 patients had received a doublet of chemotherapy, 2 patients had received a combination therapy (anti-angiogenic = Bevacizumab) and chemotherapy, and only 1 patient had Received treatment with thyrosine kinase inhibitor (anti-EGFR = Erlotinib) in the first line.

14% of patients are still being treated with chemotherapy. 38% of our patients were lost to follow-up, with 5% before starting chemotherapy. 30% had died of which 25% after 3 cures of chemotherapy.

The 45 (11%) patients with good progression were the patients operated, 8 of whom had received adjuvant therapy (CT, RT, RCC). Twenty-two cases (6%) had progression of their disease in the form of local recurrence in 2 cases operated (stage IIb and IIIA) and in the form of metastasis in 2 patients who received RCC (Stage IIIb) and in 18 patients Chemotherapy alone in the form of metastatic progression.

After a median follow-up of 11 months [3-28 months], the median overall survival was 23 months. Overall survival rates were 50% at 23 months. (table 6).

In univariate analysis, 5 factors were statistically associated with overall survival. These factors are the histological type (adenocarcinoma versus squamous cell carcinoma versus neuroendocrine neoplasm), size tumor (T1-2 vs T3-4), lymph node status (N0 vs N +), stage of disease (I-II vs III-IV) And the performance score (PS 0-1 vs PS2-3-4) (Table 6-7).

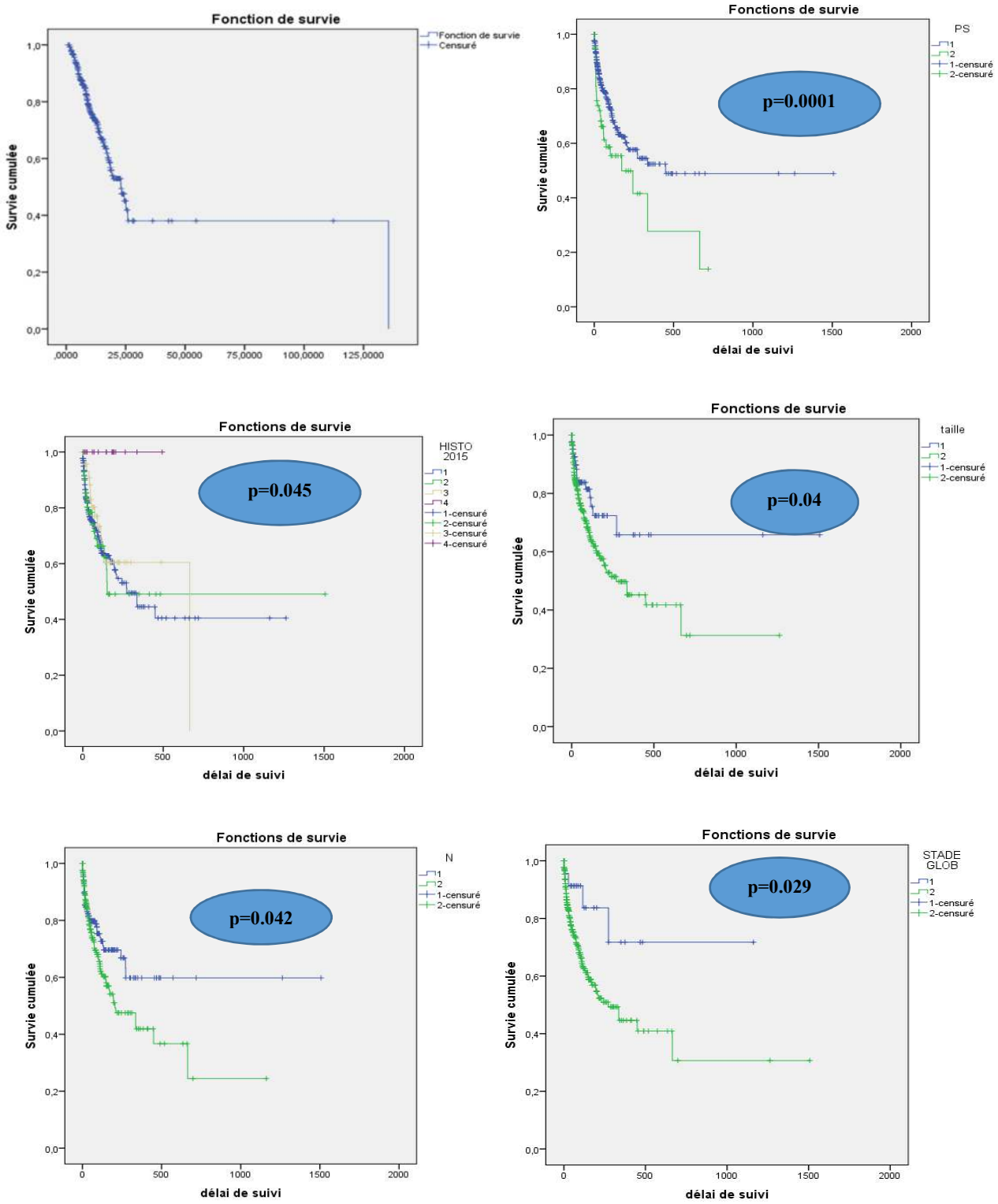
It is noted that overall survival is improved in patients under the age of 60 years, female, performance statute (PS 0 or 1), non-smoking, with adenocarcinoma, localized with a small size tumor (T1 / 2) and N0.

The associations of the various parameters collected with the overall survival are detailed in Table 6 and the overall survival curves in table 7.

Table 6 : The overall survival curves as a function of the performance statute, the histological type, the tumor size, the N status and the stage

	overall survival (month)	**P=**
1-Age :		0.946
< 60ans	25	
>= 60 ans	22	
2-Sexe:		0.522
Homme	54	
Femme	71	
3-Tabaco :		0.252
Oui	19	
Non	24	
4-Performance statut		**0.0001 ***
<2	24	
>ou=2	13	
5-Histology :		0.654
NSCLC	23	
SCLC	15	
6-Histological subtype :		**0.045 ***
Adenocarcinoma	23	
Sq Cell carcinma	18	
Neuroendocrin	15	
Secondary tumor	20	
7-Lung :		0.925
Right	19	
Left	25	
8-Size :		**0.04 ***
T1/2	35	
T3/4	22	
9-Statut N :		**0.042 ***
N0	31	
N+	15	
10-Stage :		**0.029 ***
Localised	30	
Avanced	20	

Table 7 : The overall survival curves as a function of the performance statute, the histological type, the tumor size, the N status and the stage



4 DISCUSSION

EPIDEMIOLOGICAL AND CLINICAL FEATURES

The new version of the Globocan 2012 International Cancer Research Center's online database indicates that bronchopulmonary cancer is the most common cancer in the world with about 1,825,000 new cases, or 13% in terms of incidence and the leading cause of deaths with approximately 1600000 deaths, or 19.4% in total. About 60% of the world's cases occur in the less developed regions [2,7]. In Europe the incidence of lung cancer ranks third behind colorectal cancer and breast cancer and just before prostate cancer. The data base Globocan 2012 reported 3928 new cases of lung cancer in Morocco, it is the second cancer in terms of incidence all sexes combined after breast cancer [2]. In our study, we had 399 cases of lung carcinoma during 6 years (2011-2016) with an annual average of 66 cases.

The average age at diagnosis is estimated at 65 years in men and 64 in women, more advanced than that observed in our study [3]. The male predominance in all series can be explained by early age of start smoking and excessive uptake.

Any functional or clinical sign persisting more than 15 days in a smoker or ex-smoker, without a clear explanation, should lead to suspected lung cancer [8]. Chest pain was the first sign in our series (72%), which confirms that at the first consultation in most patients, the disease is locally advanced.

In the paper of Mansuet-Lupo et al [9], unlike our results. The tumor size was most frequent in T1/T2 (25%/47%) than T3/T4 (20%/8%). Julio Sánchez [10] in his work on 640 cases of lung carcinomas, he showed that 46% of the cases were classified in T4 and 21% in T3 versus 33% in T1 and T2. As same, UICC stages in this last paper were I in 47%, II in 25%, III in 26% and IV in 2% [9].

HISTOLOGIC FEATURES

The distribution of different subtypes of lung carcinoma has changed during these recent years. Adenocarcinoma became the most frequent histological type, either in smokers or non-smoker, and in male or female [11]. The histological distribution in our study is comparable to literature data with predominance of NSCLC (90%) [12]. In the first decades following the knowledge of the role of smoking in the occurrence of lung cancer, squamous cell carcinoma (SCC) was the most common among smokers followed by small cell carcinoma [11, 13]. These data agree well with our results as adenocarcinoma in our paper represent 66% and squamous cell carcinomas represent 18% of all cases.

In our study, adenocarcinoma of solid architecture was the most common histologic subtype with 56%, followed by adenocarcinoma of acinar architecture 36%. These results agree with those published by Cadioli et al. 2014 [14] where he found 64.2% cases of solid architecture adenocarcinoma and 29% of acinar architecture. While in the work carried out by K Kadota et al. 2014 [15] concerning 1038 cases of lung adenocarcinoma, he found that the adenocarcinoma of acinar pattern is the most frequent representing 40% of the cases followed by the papillary pattern (23% of cases) and solid pattern accounts for only 13% of cases.

IMMUNOHISTOCHEMICAL AND MOLECULAR FEATURES

Divers studies have been carried out to establish a algorithm diagnostic for non-small cell lung carcinomas, based on specific antibodies panels for each entity. The staining of CK7 is more sensitive (99.1%) and specific (65.3%) and TTF1 has a sensitivity of 86.2% and a specificity of 97.3% [16]. Napsin A also provides diagnostic aid for adenocarcinoma with a sensitivity of 93.6% and a specificity of 93.3% [16] (table 4).

Anti-P63 and anti-CK5 / 6 antibodies also appear to be the most useful for squamous cell carcinoma (Table 4). However, a study by JA Bishop et al [17] showed that P40 has the same sensitivity as P63 but is more specific than P63 in the diagnosis of pulmonary squamous cell carcinomas. Thus, the authors of this paper [17] suggest a systematic use of P40 in place of P63 and CK5 / 6 as a specific marker for pulmonary squamous cell carcinoma. These results mirror previous observations by Rekhtman et al [18] highlighting significant immunoheterogeneity of adenocarcinomas for markers of squamous cell differentiation, particularly for p63 (32%) [18,19].

While for neuroendocrine markers, Chromogranin A, Synaptophysine, they are used only in cases of suspected morphologically neuroendocrine tumors [20,21]. In our study, these two markers had a specificity of 100% and sensitivity of 82% and 78%, respectively. Our results are consistent with those published by Cadioli [15], which showed a high sensitivity

(100%) of Chromogranin A, whereas synaptophysin had an aberrant positivity observed in 4% (6 of 155) of non-small cell carcinomas (4 adenocarcinomas and 2 squamous cell carcinomas) with poor differentiation.

In our study, 10 patients who had molecular biology study in search of EGFR gene abnormalities. Only 3 female patients had a molecular abnormality of the EGFR gene (30% of the cases), 2 of which had a deletion at exon 19 and one had a mutation of exon 21. These results are close to those found in the literature (Table 5).

TREATMENT AND OUTCOME

Treatment should be adapted for each patient to remove or slow cancer progression or metastasis, to reduce the risk of recurrence, to treat symptoms caused by the disease. Radiation therapy combined with chemotherapy is proposed for the treatment of locally advanced tumors. Metastatic adenocarcinoma with EGFR mutation or rearrangement EML4-ALK can receive specific targeted therapy in the front line [22].

In our study, 11 patients with metastatic lung adenocarcinoma received bevacizumab in combination with chemotherapy and only 1 patient had Received treatment with thyrosine kinase inhibitor (anti-EGFR = Erlotinib) in the first line.

Survival after diagnosis of lung cancer is poor, our results are similar to those found in the literature It is seemingly lower in the UK and Western countries, due in large part to late presentation with advanced disease precluding curative treatment. Recent research suggests that around one-third of lung cancer patients reach specialist care after emergency presentation and have a worse survival outcome [23]

5 CONCLUSION

Lung cancer are the leading cause of death in men worldwide, and, for many years, researchers are struggling to stop its progression and improve prognosis. In our experience locally advanced and metastatic adenocarcinomas are most common with a mean decrease of survival for delays diagnosis and the management, which joins the literature data.

ABBREVIATIONS

NSCLC: non-small cell lung carcinoma.
EGFR: epidermal growth factor receptors.
ALK**:** anaplastic lymphoma kinase.
IASLC: International Association for the Study of Lung Cancer.
ATS: American Thoracic Society.
ERS: European Respiratory Society.
WHO: world health organization.
UICC TNM: International Union Against Cancer/Tumors, Nodes, Metastasis classification.
SCLC: small cell carcinomas.
LCNEC: large cell neuroendocrine carcinomas.
ADK: adenocarcinoma.
NSCLC NOS: non-small cell lung carcinoma not other specificity
CT: chemotherpy.
RT: radiation therapy.

DECLARATIONS

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The requirement for ethics approval of this epidemiological study was waived by the Ethics Committee of the Faculty of Medicine and Pharmacy of Fez (Morocco). Formal patient consent was not required.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

The dataset supporting the conclusions of this article is included within the article (Tables 1 to 9).

"Please contact author for data requests."

COMPETING INTERESTS

The authors declare that they have no competing interests.

FUNDING

Not applicable.

AUTHORS' CONTRIBUTIONS

HE designed and coordinated the study. LT performed image and data analysis. HE, LC, HN, LT, FZE, AD, AM performed pathological examination of slides and analysed immunohistochemical staining. NA provided statistical analysis. All authors read and approved the final manuscript.

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Not applicable.

AUTHORS' INFORMATION

Not applicable.

WHAT IS ALREADY KNOW ON THIS TOPIC

- Lung carcinomas represent a major public health problem.
- Non-small cell carcinomas are the most frequent.
- Precision of histologic subtype is primordial in order to personalize the treatment and extend survival.

WHAT THIS STUDY ADDS

- This work brought to pointe the state of the situation in the center of Morocco in the field of lung carcinomas.
- The pathologist plays a major role in the management of patients with lung carcinomas and must obtain the maximum amount of information from tumor biopsy (Morphological classification, immunohistochemical classification, orientation and qualification of tissues for molecular analysis, staging).
- It has been proved that our results approximate those of literature in spite of the fact that we are in a developing country and the limit of our means.

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