Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/18366
DOI URL: http://dx.doi.org/10.21474/IJAR01/18366

RESEARCH ARTICLE

CONTRIBUTION OF COMPUTED TOMOGRAPHY IN THE ASSESSMENT OF THE EXTENT OF BLADDER CANCER AT THE MOTHER-CHILD UNIVERSITY HOSPITAL CENTER "LE LUXEMBOURG"

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Manuscript Info

Manuscript History
Received: 05 January 2024
Final Accepted: 09 February 2024
Published: March 2024

Key words:-
Bladder, Tumor, CT, M-E University Hospital "Luxembourg"

Abstract

Objective: Our study aimed to study the contribution of CT scanning in the assessment of the spread of bladder cancers at the Medical Imaging Department of the Mother-Child University Hospital Center "Luxembourg".

Methodology: Descriptive cross-sectional study carried out at the Mother-Child University Hospital Center "Luxembourg", in the Medical Imaging department in collaboration with the Medical Oncology department. It included 91 cases of bladder tumors over a 38-month period from January 1, 2020 to February 28, 2023.

Results : We collected 91 cases of bladder tumors, the average age of occurrence was 55.86 years, with extremes of 21 and 80 years. The male gender was predominant with a sex ratio of 1.46. The Bambara ethnic group was the most represented with 41.8%. The dominant profession was that of housewives with a rate of 36.3%. A history of urinary bilharzia was found in 30.8% of our patients. On CT, the masses had a hypodense appearance in 81.3% and 5.5% were calcified; the contours were irregular in 57.1% of cases and budding in 41.8% of cases. The masses presented heterogeneous enhancement in 59.3% of cases after PDC injection and the long axis measurement varied from 11 to 116 mm with an average of 37.35 mm. Squamous cell carcinoma was the most common histological type with 60.4%, followed by urothelial carcinoma (35.2%). Locoregional invasion was mainly perivesical fat in 24.2% of cases, the prostate in 16.5% of cases and the cervix in 13.2% of cases. Distant metastases were present in 45.1% of patients with a pulmonary predominance, i.e. 22% of cases. Stages T4 and T3 were the most represented with 42.9% and 35.2% of cases respectively. Stage N2 represented 31.9% of cases and stage N1 represented 16.5% of cases.

Conclusion : Bladder cancers are more common in men than in women. Urinary schistosomiasis is the predominant risk factor in endemic countries. Locoregional invasion is more frequent and

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predominates at the perivesical fat level. Pulmonary metastases are more common.

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Introduction:-

Cancer is a new formation of body tissues that occurs following a disruption of cell growth, which can affect any type of tissue [1]. Bladder cancer is a urological cancer developing from different types of cells originating from the lining of the bladder called urothelial epithelium [2]. Multiple risk factors are incriminated, the most important of which are: smoking, urinary bilharzia and occupational exposure [1].

Due to their magnitude, malignant bladder tumors constitute a public health problem.

In Mali, it represents the second most common cancer of the urogenital tract after that of the prostate [3].

Worldwide, bladder cancer is the tenth most commonly diagnosed cancer, with approximately 573,000 new cases and 213,000 deaths [4].

In Canada, its incidence is estimated at 13,300 new cases and 2,500 deaths in 2022 [5].

In France, the number of new cases diagnosed in 2018 is estimated at 13,100 [6].

In Africa, bladder cancers rank eighth among cancers with an incidence of 33,196 cases and 18,747 deaths [7].

In Mali, bladder cancer ranks sixth with an incidence rate of 703 cases or 5% and the number of deaths is estimated at 426 cases [7].

The anatomopathological examination after biopsy is the reference examination for the diagnosis of bladder tumors because it makes it possible to confirm the diagnosis, specify the histological type and sometimes the staging.

There are two types of tumors: TVIM (Muscle-Infiltrating Bladder Tumors) and TVNIM (Non-Muscle-Infiltrating Bladder Tumors). [8]

Medical imaging is involved in all stages of patient care. She participates in the diagnosis. It has a determining role in the assessment of the extent and monitoring of the disease.

Given the growing interest in imaging techniques, in this case CT scanning, in the management of this pathology, we initiated this work which aims to describe the CT particularities in the extension and follow-up assessment. bladder cancers.

Material and Method:-

Descriptive cross-sectional study with retrospective collection.

It took place in the medical imaging department of the Mother-Child University Hospital Center “Luxembourg” over the period from January 1, 2020 to February 28, 2023, i.e. 38 months.

Our study population consisted of all patients diagnosed with bladder cancer who had a CT scan at the “Luxembourg” medical imaging department during our study period.

Not included were all patients who did not have their scan performed at the medical imaging department of the “Luxembourg” mother-child hospital.

The variables described were age, sex, profession, ethnicity, medical ATCD, CT appearances, histological types and TNM classification.

The data was collected on pre-established survey sheets.

Our data were entered and analyzed using the Statistical Package of the Social Sciences (SPSS) software version 25.0 and Excel (Microsoft Office).

The references were presented using Zotero software version 6.0.21 according to the Vancouver convention.

The study was carried out with respect for patient confidentiality, anonymity of the survey sheets, respect for professional secrecy by all investigators who have access to this data.

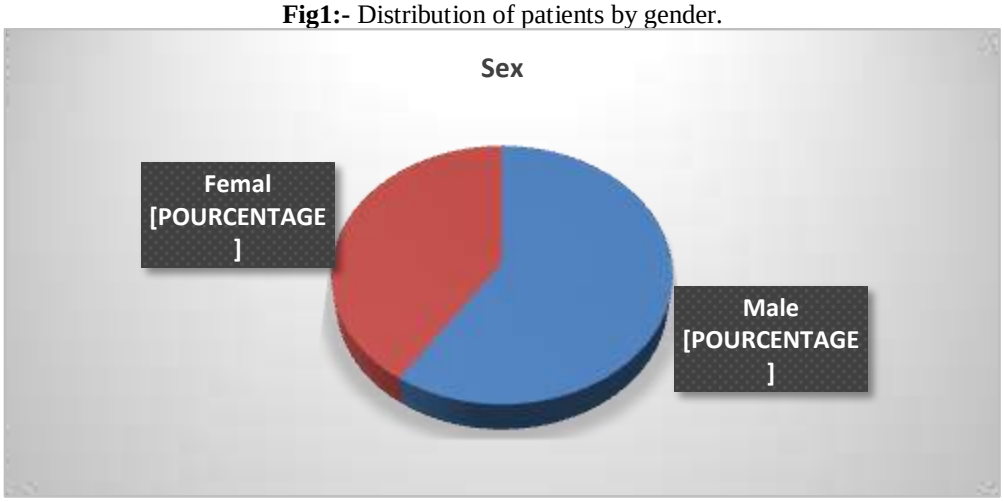
During the study we collected 190 cases of bladder tumors among 13,159 oncology consultations over 38 months, representing a prevalence of 1.44%.

Among the 190 patients, only 91 patients had a CT scan result for the extension assessment.

Results:-

Sociodemographic Data:

Fig1:- Distribution of patients by gender.



The male gender was the most reported with 54 cases or 59% compared to the female gender with 37 cases or 41%. The sex ratio was 1.46 in favor of men.

Table 1:- Distribution of Patients According to Age.

AGE	NUMBER	PERCENTAGE %
21-40	11	12,1
41-60	**42**	**46,2**
61-80	36	39,6
>U80	2	2,2
Total	91	100,0

Patients in the 41-60 age group were the most represented with 42 cases or 46.2%. The average age of our patients was 55.86 years with extreme ages of 21 and 80 years.

Table 2:- Distribution Of Patients According To Their Profession.

PROFESSION	NUMBER	PERCENTAGE %
TRADER	12	13,2
FARMER	16	17,6
RETIRED	8	8,8
WORKER	7	7,7
HOUSEWIFE	**33**	**36,3**
PUBLICSERVICE OFFICER	11	12,1
OTHER JOB	4	4,4

Total	91	100,0

Housewives were more represented with 33 cases or 36.3%.
Other professions: drivers, breeders and marabouts.

Table 3:- Distribution of Patients According to the Ethnicity.

ETHNIC GROUPS	NUMBER	PERCENTAGE %
SONINKÉ	14	15,4
SONGHAÏ	5	5,5
PEULH	11	12,1
MALINKÉ	10	11,0
DOGON	6	6,6
BAMBARA	**38**	**41,8**
AUTRES	7	7,7
TOTAL	91	100,0

The Bambaras and the Soninkés were the most represented ethnic groups with respectively 38 cases or 41.8 and 14 cases or 15.4%.
Other ethnic groups: Bozo, Diawando, Mianka, Sénoufo and Mossi.

Table 4:- Distribution of Patients According to the Medical Histories.

MEDICAL HISTORIES	NUMBER	PERCENTAGE %
NO MEDICAL HISTORIES	53	58,2
URINARY BILHARZIA	**28**	**30,8**
HIGH BLOOD PRESSURE	7	7,7
DIABETES	2	2,2
GATRODUODENAL ULCER	1	1,1
Total	91	100,0

The majority of patients, 53 cases or 58.2%, had no known medical history.
The 28 cases, or 30.8% of patients, have a history of urinary bilharzia in childhood.

Table 5:- Distribution Of Patients According To Histological Type.

HISTOLOGICAL TYPE	NUMBER	PERCENTAGE %
SQUAMOUS CELL CARCINOMA	**55**	**60,4**
UROTHELIAL CARCINOMA	32	35,2
ADENOCARCINOMA	2	2,2
OTHERS	2	2,2
Total	91	100,0

The histology was dominated by squamous cell carcinoma with 55 cases or 60.4%.
Other types: Papillary carcinoma 1 case or 1.1% and Undifferentiated carcinoma 1 case or 1.1%.

Table 6:- Distribution Of Patients According To The Spontaneous Density Of The Tumor On Ct Scan.

DENSITY	NUMBER	PERCENTAGE %
HYPERDENSE	12	13,2
HYPODENSE	**74**	**81,3**
CALCIFIED	5	5,5
TOTAL	91	100,0

The masses had a Hypodense appearance in 74 cases or 81.3% and calcified in 5 cases or 5.5%.

Table7:- Distribution Of Patients According To The Contours Of The Lesion On Ct Scan.

OUTLINES	NUMBER	PERCENTAGE %
BUDDING	38	41,8

IRREGULAR	**52**	**57,1**
REGULAR	1	1,1
TOTAL	91	100,0

The contours were irregular in 52 cases or 57.1% and budding in 38 cases or 41.8%.

Table 8:- Distribution Of Patients According To The Type Of Tumor Enhancement On Ct Scan.

HEIGHTENING	**NUMBER**	**PERCENTAGE %**
HETEROGENEOUS	**54**	**59,3**
HOMOGENEOUS	37	40,7
TOTAL	91	100,0

Tumor enhancement was heterogeneous in 54 cases or 59.3% after injection.

Table 9:- Distribution Of Patients According To The Measurement Of The Long Axis Of The Lesion On Ct Scan.

MEASURE OF THE LONG AXIS OF THE LESION (mm)	**NUMBER**	**PERCENTAGE %**
11- 40	**63**	**69,2**
41- 70	20	22
71- 100	6	6,6
101- 130	2	2,2
Total	91	100,0

The lesions had a long axis varying from 11 to 116 mm, with an average of 37.35 mm.

Table 10:- Distribution Of Patients According To Locoregional Invasion.

LOCOREGIONAL INVASION	**NUMBER**	**PERCENTAGE %**
PERIVESICAL FAT	**22**	**24,2**
CERVIX	12	13,2
PROSTATE	15	16,5
SEMINAL VESICLES	8	8,8
PELVIC WALL	4	4,4
RETZIUS SPACE	2	2,2
DIGESTIVES	3	3,3
URETERAL MEATUSES	8	8,8
NO LOCOREGIONAL INVOLVEMENT	17	18,6
TOTAL	91	100,0

The perivesical fat was invaded in 22 cases or 24.2%, the prostate was invaded in 15 cases or 16.5% and the cervix in 12 cases or 13.2%.

Table 11:- Distribution Of Patients According To Primary Tumor

PRIMARY TUMOR	**NUMBER**	**PERCENTAGE %**
T4	**39**	**42,9**
T3	**32**	**35,2**
T2	15	16,5
T1	1	1,1
TUMOR IN SITU	4	4,4
Total	91	100,0

Stages T4 and T3 were the most represented with respectively 39 cases or 42.9% and 32 cases or 35.2%.

Table 12:- Distribution Of Patients According To Regional Lymph Node Involvement.

REGIONAL LYMPH NODES	**NUMBER**	**PERCENTAGE %**
N3	4	4,4
N2	**29**	**31,9**
N1	**15**	**16,5**
N0	30	33,0
Nx	13	14,2
Total	91	100,0

The regional lymph nodes were invaded: N2 in 29 cases or 31.9% and N1 in 15 cases or 16.5%.

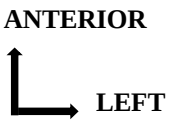
DISTANT METASTASES	**NUMBER**	**PERCENTAGE %**
PULMONARY	**20**	**22**
HEPATIC	7	7,7
BONE	7	7,7
M0	57	62,6
TOTAL	91	100,0

Table 13:- Distribution Of Patients According To Remote Secondary Locations.

Secondary pulmonary locations were the most represented in 20 cases or 22%.

Iconographies:

Observation No. 1: Thoraco-abdomino-pelvic CT without and with PDC injection in a 58-year-old patient in axial section in the arterial phase showing a budding endoluminal mass of the bladder (Fig2) with moderate enhancement encompassing the ureteral meatuses responsible for significant bilateral uretero-hydronephrosis, left lumbo-aortic lymph node invasion (Fig3) and right posterior basal subpleural nodule Fig4. No location elsewhere (Fig5): classified T4N1M1.



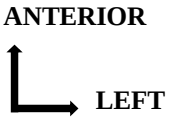


Fig1: Endoluminal budding tumor process of the bladder.

Fig3: Right posterior basal subpleural nodule.

Fig2: Left lumbo-aortic lymphadenopathy (17.4mm) and bilateral uretero-hydronephrosis.

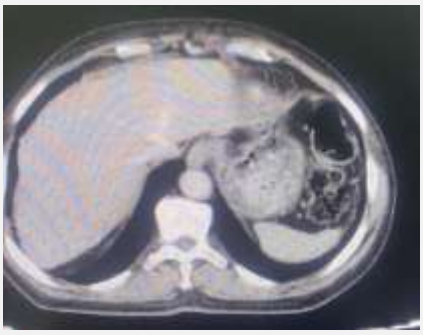


Fig4 : No secondary liver injury.

Observation N°2 : Thoraco-abdominopelvic CT without and with PDC injection in a 47-year-old patient in axial section at late time showing an irregular circumferential thickening of the wall predominating on the right with infiltration of perivesical fat, the right seminal vesicle (Fig6), left internal iliac lymph node invasion (Fig7) and secondary bony locations (Fig8) no pulmonary nodule (Fig9): classified T4N1M1.

Fig5 : Tumor process of the bladder wall predominating on the right with invasion of the ipsilateral seminal vesicle and the perivesical fat.

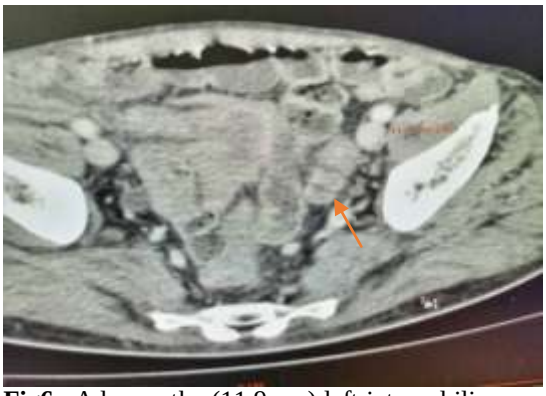


Fig6 : Adenopathy (11.9mm) left internal iliac.

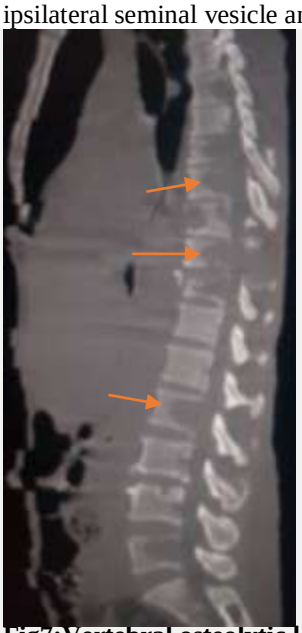


Fig7:Vertebral osteolytic lesions (arrow tip) stages associated with vertebral compression of T11.

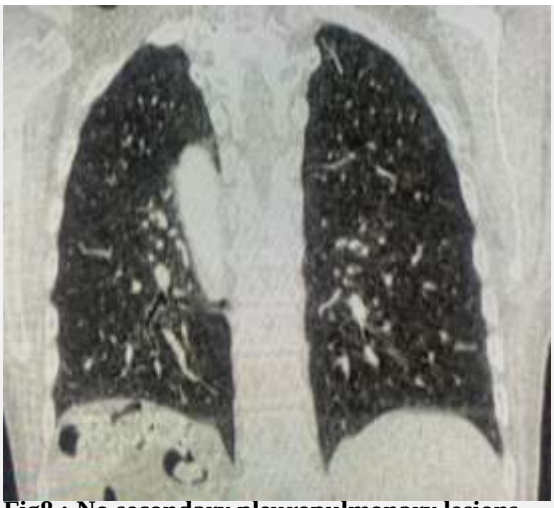


Fig8 : No secondary pleuropulmonary lesions.

Observation 3:

Thoraco-abdominopelvic CT without and with PDC injection in a 65-year-old patient in axial section at late stage showing a mass of the bladder wall predominant on the left with infiltration of perivesical fat (Fig10) and secondary hepatic localization (Fig12), bilateral parenchymal and subpleural nodules of secondary appearance (Fig11) as well as osteolytic lesions of the vertebral body of L5 and the iliac wings (Fig13): classified T3N0M1.

ISSN: 2320-5407 Int. J. Adv. Res. 12(03), 63-76

Fig9 : Tumor process of the bladder wall predominating on the left with infiltration of perivesical fat. Seminal vesicles and normal rectal wall.

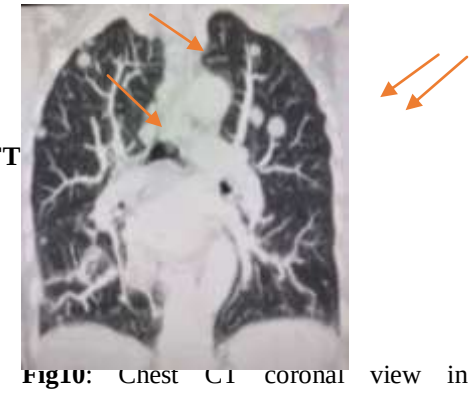


Fig10: Chest CT coronal view in pulmonary window revealing bilateral parenchymal and subpleural nodules of secondary appearance.

Fig11 : Abdominal CT axial section in the portal phase revealing weakly enhanced hepatic nodules in the periphery.

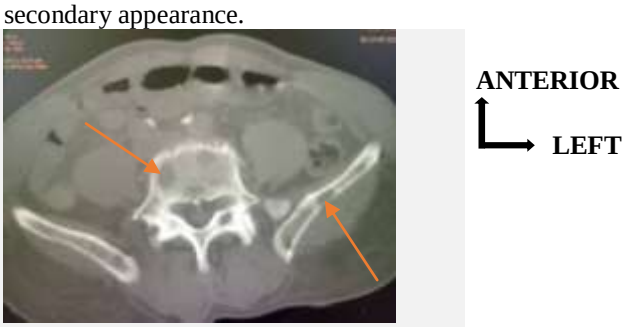


Fig12 : Pelvic CT axial cut in bone window highlighting osteolytic lesions of the L5 vertebral body and iliac wings.

Observation N°4 : Thoraco-abdominopelvic CT without and with PDC injection, performed in a 52-year-old patient with ATCD of urinary bilharziasis, in axial (Fig14), coronal (Fig15) sections at late time highlighting a large responsible bladder tissue mass a significant reduction in lumen and multiple diffuse hypodense hepatic nodules with irregular contours of secondary appearance (Fig16). Classified: T3NxM1

Fig13 : Abdominal CT in axial, coronal and sagittal sections at late time highlighting a large bladder tissue mass responsible for a significant reduction in light.

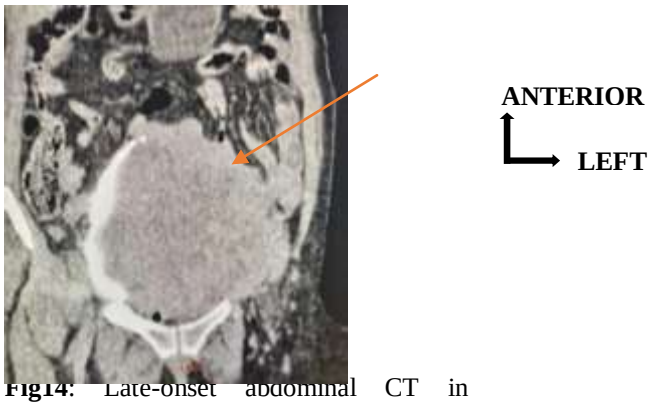


Fig14: Late-onset abdominal CT in coronal section highlighting a large bladder tissue mass responsible for a significant reduction in light.

Fig15 : Abdominal CT in axial section parenchymal window in the portal phase highlighting multiple diffuse hypodense hepatic nodules with irregular contours of secondary appearance.

Discussion:-

Limitations And Difficulties During The Study:

We were faced with difficulties in collecting information.

Missing data in patient files: absence of certain sociodemographic and anatomopathological information.

The problem of archiving scan data.

Frequency :

We had a frequency of 1.44% during the study period.

Some previous studies in Mali have shown that the frequency of bladder tumors is variable.

Patrick J. BOLEGA E. 2019 [9]. and Touré 2020 [8]. found higher figures of 3.26% and 3.14% respectively.
This low frequency could be explained by the fact that our study only concerned cases of bladder tumor having undergone a CT extension assessment at the imaging department of CHUME Luxembourg.

Sociodemographic Aspects:
AGE:
The age group most represented in our study was that of 41-60 years for an average age of 55.86 years and age ranges of 21 and 80 years.

This result is close to that of **BOURÉIMA et al**in Burkina in 2020 who found an average age of 55.6 years with extremes of 27 and 87 years [10].

And that of Niang et al in Dakar in 2014 with an average age of 55 years and extremes of 14 to 84 years [11].

KAMISSOKO in Mali in 2015 and TOURÉ in 2020 in Mali found slightly lower figures with an average age of 52.8 years and 49.79 years respectively; age extremes of 11 to 89 years and 15 to 83 years (1) [8].

On the other hand, TRAORÉMT et al in Senegal in 2018 found slightly higher figures with an average age of 57 years; age extremes of 18 and 85 years [12]

SEX:
The male gender was the most represented in our study with 59.3% compared to 40.7% for women. The sex ratio was equal to 1.46 in favor of men.

This male predominance was also observed in the study by PATRICK J. BOLEGAE in Mali in 2019 which found 52% in men and 48% in women (sex ratio equal to 1.1) [9].

As did Kamissoko in 2015 who found in his study a male predominance with a sex ratio equal to 1.17 (1).

Kadouri et al in 2020 (3); Niang et al in 2014 in Dakar [11] also noted a male predominance. .

The male predominance in Africa could be explained by the more frequent exposure of men to risk factors such as urinary schistosomiasis, tobacco and industrial carcinogens.

Occupation :
The most affected professions in our study were housewives and farmers, with respective rates of 36.3% and 17.6%.

These rates are close to those of **Patrick J. BOLEGA E** in 2019 who found respective rates of 41.2% housewives and 15.7% farmers [9].

Also comparable with the rates of **Kamissoko** in 2015, respectively 43.2% and 24.3% (1) and **Touré** in 2020, respectively 22.22% and 17.95% [8].

This could be explained by the fact that farmers are most often exposed to urinary bilharzia, as are housewives in rural areas.

Ethnic Group
The Bambara ethnic group was the most represented followed by the Soninké ethnic group with respective rates of 41.8% and 15.4%.

BouramaD in Mali in 2012 found similar results for the Bambaras and the Soninké with 29.7 and 17.6% respectively [13].

Medical Histories
In our study, urinary schistosomiasis represented the majority of ATCD with 30.8% and 58.2% had no known medical histories.

This result is comparable to that of **Traoré MT** et al who found that 36% of his patients had a history of urinary schistosomiasis[12] and that of **Kamissoko** in 2015 who found that 25.7% of his patients had a history of urinary bilharzia (1).Ces résultats sont en accord avec la littérature, qui identifie la bilharziose urinaire et le tabac comme les principaux facteurs de risque des tumeurs de la vessie [10]

Histological Types
In our study the two main histological types found were: squamous cell carcinoma with 60.4%, and urothelial carcinoma with 37.4%. Other histological types were also found in a small proportion (adenocarcinoma 2.2%)

These results are similar to those of Patrick J. BOLEGA E. 2019 who found: squamous cell carcinoma (73.5%), urothelial carcinoma (20.6%) and as other histological types adenocarcinoma (2.9%) [9].

Similarly, Kamissoko 2015 found 57.9% squamous cell carcinoma (1).

Niangandal 2014 in Dakar found: squamous cell carcinoma 48.3%, followed by urothelial carcinoma in 37.9%, adenocarcinoma 6.9% [11]

On the other hand, Mr. Mohamed Lemine Taleb ETHMANE 2022 in MOROCCO found: Urothelial carcinoma: 88%; Squamous cell carcinoma: 3% and Adenocarcinoma: 6% [14].

However, this observation is different in the West and in the Maghreb countries where transitional (urothelial) carcinomas are by far the most frequent, favored by smoking and certain occupational exposures (32).

CT Extension Assessment
Our patients all benefited from a CT examination which allowed us to highlight:

Density
The bladder lesions presented a hypodense appearance in 81.3% of cases. Calcifications were found in 5.5%.

Mr. Mohamed Lemine Taleb ETHMANE 2022 in MOROCCO demonstrated a bladder tumor process of tissue density in all his patients [14]

Descotes et al found that calcified tumors are rare and correspond to 0.5 to 6% of bladder tumors treated [15]

Outlines
In 57.1% of cases the contours of the mass were irregular and budding in 41.8%.

Niang and al 2014 in Dakar had a budding appearance in 59.2% of cases [11]

Mr. Mohamed Lemine Taleb ETHMANE 2022 in MOROCCO found a budding appearance in 23 patients or irregularities in the external contours of the bladder [14]

Enhacement
On CT, all lesions improved differently after IV injection of PDC.
They were heterogeneous in 59.3% of cases.

Mr. Mohamed Lemine Taleb ETHMANE 2022 in MOROCCO found heterogeneous tumor enhancement in 68.6% of cases after PDC injection [14].

Long Axis Of The Lesion
The long axis of the lesions presented extreme sizes ranging from 11 mm to 116 mm with an average of 37.35 mm.
BouramaD in 2012 in Mali found a predominance of lesions whose size was less than 50 mm with extremes ranging from 11 to 162 mm [13]

Large lesions could be explained by a diagnostic delay.

Locoregional Invasion
Perivesical fatty infiltration was the most common at 24.2%; followed by that of the prostate with 16.5%, and the cervix in 13.2% of cases.

This is best described as follows:

Mr. Mohamed Lemine Taleb ETHMANE 2022 in MOROCCO who noted an invasion of perivesical fat in 68.75%; of the prostate in 12.5% [14].
Oussous and **Ousehal** found perivesical fatty invasion in 78.6%; of the prostate in 28.6% [16].
TUMOR, NODES AND METASTASISSTAGES
PRIMARY TUMOR:
In our study stages T4 (42.9%); T3 (35.2%) and T2 (16.5%) were the most encountered
These results are comparable to those of **GUIROU** who found the tumor at stage T4 in 41.67% of cases; T3 in 23.26% of cases and T2 in 16.28% of cases [17]
As well as **Kamissoko** 2015 which returns to stages T4 and T3 at 60.9% and 24.3% respectively (1).
REGIONAL LYMPHADENOPATHY
In our study, the CT scan revealed cases of suspicious lymphadenopathy: N2 (31.9%) and N1 (16.5%).
Mr. Mohamed Lemine Taleb ETHMANE 2022 in MOROCCO found lymph node extension in 21% of patients [14] and **Touré** et **al** in 2020 found lymph node metastases in 76.07% of cases [8]. **BouramaD** in 2012 in Mali found 18.4% of suspicious lymphadenopathy [13].
The low sensitivity of CT in predicting lymph node extension is explained by its inability to distinguish inflammatory lymphadenopathy from tumor lymphadenopathy [11].
1.1.1 SECONDARY REMOTE LOCATION
Of the 91 patients who performed the CT examination, 34 patients had distant secondary localization, i.e. a rate of 37.4%.
Lung metastases were the most predominant at 22%, followed by liver and bone metastases at 7.7% each.
This order is consistent with that of **Kadouri** et **al** 2020 who found pulmonary and lymph node metastases in 50% of cases (3).
Unlike that of **TOURE** et **al** in 2020 in Mali which found bone metastases in 11.11%; liver metastases 8.54%; lung metastases 5.98% [13] and that of **BouramaD** in 2012 bone metastases were the most predominant with 8.2%, followed by liver and lung metastases with respectively 4.2 and 2% [13]

Conclusion:-

Bladder cancers are malignant tumors that develop in the urothelial mucosa of the bladder wall and are more common in men than in women.
Urinary schistosomiasis is the predominant risk factor in endemic countries.
Squamous cell carcinoma is the most common histological type.
Endoscopic resection with anatomo-pathological analysis is the key examination for the therapeutic indication.
CT remains essential for the assessment of locoregional and distant extension, characterizes primary and secondary lesions, helps in a therapeutic decision and evaluates the treatment as well as the prognosis.

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