Role of FDG-PET CT in the Management of Muscle Invasive Bladder Cancer
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INTRODUCTION

Bladder cancer is the second urologic cancer in terms of incidence. The prognosis of MIBC is poor, with a 5-year survival rate from 45 to 50% (1). Main prognostic factors are the quality of the surgery (with a complete resection R0), a pelvic LN dissection with at least 10 LN and a pathological Complete Response (pCR) after neoadjuvant chemotherapy (NAC) (2,3). Treatment decisions are taken during a tumor board, based on the staging of local disease, LN status and distant localization.

Usually, CT and less frequently Magnetic Resonance Imaging (MRI) are recommended for LN and metastatic staging of MIBC. For LN staging, CT is used, despite a low reported sensitivity, around 30-53%, but a high specificity between 68 to 100% (6,7). MRI is more accurate for LN staging, mostly by using DWI sequences (sensitivity of 56% and specificity of 94%) (8). FDG-PET CT combines anatomical and metabolic imaging. The sensitivity is usually better for detecting pathological infra centimetric LN, but the specificity is low. In cases of MIBC, several studies have evaluated FDG-PET CT as imaging for initial nodal staging before cystectomy and reported a sensitivity between 29% and 81% and a specificity between 86.7% and 97%, depending on interpretation criteria (9-12). Two meta-analysis evaluated the accuracy of FDG-PET CT in MIBC. The first one found a sensitivity of 57% and a specificity of 92% for preoperative LN staging of MIBC by using FDG-PET CT (13). The second one published in 2018 compared accuracy of CT, MRI and FDG-PET CT for staging bladder cancer (14). MRI and FDG-PET CT had a higher sensitivity (respectively 60% and 56%) compared to CT (40%) while the specificity of all modalities was similar. Other studies evaluated the rate of treatment modification based on the results of FDG-PET CT, around 25% (from 13.5% to 68%) mainly due to the confirmation of metastatic spread (9,15-18). FDG-PET CT has also be indicated to evaluate therapeutic response after chemotherapy (19,20).

To date, FDG-PET CT is not recommended for the staging of MIBC, as a standard of care but rather as an option (21). We aimed to investigate the role of FDG-PET CT and its accuracy in LN staging of MIBC at diagnosis and how it may improve treatment decision.

Patients and Methods

Patients will be retrospectively included from both the University Hospital and the Cancer Center from Bordeaux. To be included in the study, patients should have undergone a FDG-PET CT at the time of diagnosis of MIBC. Only patients with diagnosis of predominant urothelial carcinoma, $\geq$ pT2 of the bladder will be included.

Clinical data collected: center of reference, date of birth, history of tobacco intoxication, performance status, date of relapse and site of relapse, date of the latest news or date of death and status (alive or dead).

Pathological information (which is the gold standard) included biopsy site, date of biopsy, histology, pathological result of cystectomy and LN dissection (TNM classification, status R, number of LN resected, number of positive LN, necrosis, and presence of pCR after NAC). CT data will be extracted from radiological or medical reports (before and after NAC) and the lesions described will be classified according to the 8th TNM classification, actualized in 2017 (22). RECIST1.1 criteria allowed to describe pathological LN (corresponding to LN with smallest axis greater than 15mm). For metastatic lesion, patients will be classified as "M0" (without metastasis), without suspect ^{18} FDG intake, or as "M1a" in case of metabolic activity of non-regional LN, and as "M1b" in case of distant metastatic lesions. FDG-PET CT results will be extracted from nuclear medicine reports for the University Hospital, or by exam reviewing for Institute Bergonie exams. Data collected were: size, SUV max, Tumor Lesion Glycolysis for each lesion (tumor, LN or metastasis) and TNM staging. If patients undergo a FDG-PET CT before and after NAC, a metabolic response (such as complete, partial, stable, progressive or dissociated) will be notified. Treatment characteristics will be extracted from the database (chemotherapy regimen, type of surgery (Table 1) and radiotherapy modalities).

Objectives

Objective of this study is to evaluate the performance accuracy of FDG-PET CT for LN staging at the diagnosis of MIBC (before and after NAC and before cystectomy and LN dissection).

Statistical analysis

Qualitative values will be described by total numbers and percentage. Quantitative values will be presented as median, minimum and maximum value, average and standard deviation. For diagnosis accuracy of CT and FDG-PET CT, we will calculate the sensitivity, specificity, false positive rate, false negative rate, Youden index.