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Conformational Radiotherapy of Prostatic Adenocarcinoma at the Dalal Jamm Hospital, Senegal

—(Retrospective Analysis of a Series of 62 Cases)

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Abstract

Aim: We endeavored to describe the epidemiological profile of prostatic cancer, and to evaluate its diagnostic and therapeutic aspects. **Method:** We conducted a descriptive retrospective study on the conformational radiotherapy of prostatic adenocarcinoma at the Dalal Jamm University Hospital, Senegal from June 2018 to December 2019. We included 62 consecutive patients. The average age of the patients was 68.9 years. The average consultation time was 7.6 months. **Results:** Symptom manifestation and high PSA triggered the diagnosis of cancer in 74.2% and 25.8% of patients, respectively. Symptoms: pollakiuria (72.3%), bone pain (8%) and erectile dysfunction (4.8%). The digital rectal examination: normal (33.8%), nodular (30.6%), induration (24.1%), and shielding (11.3%). The mean PSA level was 90.6 ng/ml. Histology: adenocarcinoma was the most common (98.6%). The Gleason score: <7 (45.1%), =7 (35.5%), and >7 (19.4%). The majority of patients were in the high-risk group (70.9%) and 7 patients (11.2%) were metastatic at diagnosis. Therapy: first radical prostatectomy (20.9%), first-line curative radiotherapy (67.8%), adjuvant (21%) and palliative radiotherapy in 7 patients (11.2%): patients having received palliative radiotherapy had an estimated decline in symptoms of 80%. Hormone therapy was performed in 88.8% of patients, with average duration of 12.5 months. After a mean follow-up of 15 months, 59 patients were alive, including 45 cases (81.8%) in complete remission; 3 patients with metastasis at the first visit (having received palliative radiotherapy) died. **Conclusion:** The collected data show a profile of prostate cancer that is specific to the sub-Saharan context in which the discovery is still late. Also in comparison to developed countries, the therapeutic means necessary to fight against this cancer are limited, even though

three-dimensional conformational radiotherapy remains an effective and essential treatment; this study provided fundamental data in the area of insufficient data/tools.

1. Introduction

Irradiation of prostate adenocarcinomas has been shown to reduce the rate of biochemical and clinical recurrence after early stage surgery [1]. It has been shown to achieve a 5-year survival rate of more than 80% in combination with hormone therapy for the advanced stages [2]. In 2020, the most recommended technique is radiotherapy by intensity modulation, particularly when the volume to be treated includes the lymph nodes. This technique is not available in Senegal. Moreover, the profile of our patients could be different from those in Western countries where the main studies on which the indications are based have been conducted. We have therefore conducted a descriptive retrospective study at the Dalal Jamm University Hospital in Dakar, which evaluates the profile of patients treated for prostate adenocarcinoma and the results of conformational radiotherapy.

2. Patients and Methods

The study is carried out at the Oncology-Radiotherapy Department of the Dalal Jamm University Hospital in Dakar, Senegal. It is equipped with two linear accelerators using a three-dimensional conformational technique, a brachytherapy and chemotherapy unit.

We included 62 consecutive patients with confirmed prostate adenocarcinoma in a retrospective descriptive study between June 2018 and December 2019. Using a case report form, we studied the epidemiological, clinical, para-clinical, therapeutic and evolutionary data of the disease in all the patients retained.

The purpose was to describe the epidemiological profile of prostate cancer, to evaluate these diagnosis and therapeutic aspects and the impact of three-dimensional conformational radiotherapy in its management. We used the TNM 2010 classification; the Gleason score in the anatomopathology result and the D'Amico score to estimate the risk of progression after local treatment in non-metastatic patients. We used a 4 to 6 beam technique with segmentation of target volumes (Figure 1). Our dose constraints have been set as follows (Table 1).

We considered as full recovery a PSA level lower than 0.07 ng/ml at 4 months after radiotherapy, a partial recovery a PSA level between 1 and 2.5 ng/ml 4 months after radiotherapy and this regardless of the initial PSA level. The data was entered on Epi Info from Mosaiq medical records and analyzed on Microsoft Excel 2016.
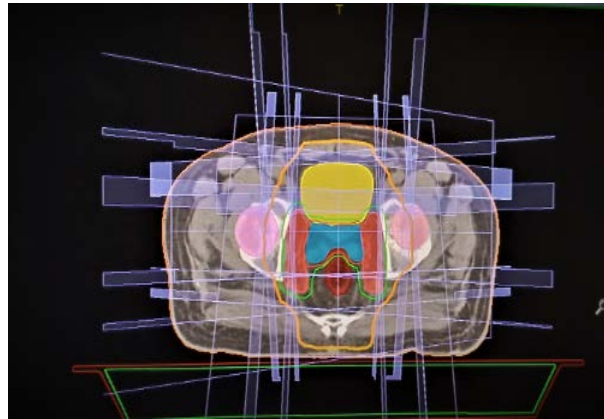
Figure 1. Determination of irradiation beams in three-dimensional conformational radiotherapy (RC3D).

Table 1. Dose constraints to organs at risk (OAR) and target volumes (VC) in RC3D.

Organs at risk/Target volumes	Dosimetric constraint
Bladder	Maximum dose ≤ 80 Gy V60 Gy < 50%
Rectum	V60 Gy < 50% et/ou V72 Gy < 25%
Femoral heads	V55 Gy < 5%
Peritoneal bag	V45 Gy < 200 cc
Planning Target Volume (PTV)	95% < PTV < 107%

3. Results

The average age of the patients was 68.9 years with extremes of 50 and 83 years. A family history was found in 11 patients, 2 of whom were first-degree and 9 second-degree. The average time between the onset of symptoms and the first consultation was 7.6 months. The circumstance of discovery was fortuitous by PSA dosage in 25.8% and symptomatic in 74.2% of cases. The dominant clinical symptom was pollakiuria (72.3%). The mean initial PSA level was 90.6 ng/ml with a minimum value of 7 ng/ml and a maximum of 1182.2 ng/ml and 58.1% of patients had an initial PSA level greater than 20 ng/ml.

The Gleason score was strictly below 7 in 28 cases (45.1%), equal to 7 in 22 cases (35.5%) and strictly above 7 in 12 cases (19.4%). Pelvic MRI was performed in 60 patients (96.7%). It showed that one prostate lobe was affected in 36.6% of patients, both lobes were invaded in 15%, and the seminal vesicles were affected in 23.4% of cases.

Thoraco-abdominal CT scan was performed in all patients, bone scintigraphy in 38 cases (62.3%), PET CT scan in 2 cases and MRI of the dorso-lumbar spine in 3 cases. The T2 and T3 stages were in the majority representing 37% and 32.2% of cases respectively and 7 patients (11.2%) were metastatic. The majority (70.9%) of these non-metastatic patients were in the high-risk group.

Therapeutically, curative first-line radiotherapy was carried out in 67.8% of cases, adjuvant radiotherapy after radical prostatectomy in 13 cases (21%) and

palliative radiotherapy in 7 patients. Hormone therapy was prescribed in 55 patients (88.8%). Three-dimensional conformal radiotherapy was the technique used in all our patients. The total dose of 74 Gy in 37 sessions was used for 34 patients, 70 Gy in 35 sessions in 10 cases, 66 Gy in 11 patients.

The side effects that occurred during radiotherapy were mainly urinary (52.7%) and digestive effects such as diarrhea (50.9%). The majority of these side effects were grade 1 and no grade IV toxicity was noted.

Progressively, patients who received curative radiotherapy (55 cases) were in complete remission in 45 cases (81.8%) with a control PSA level ranging from 0.0014 ng/ml to 0.7 ng/ml, for an average of 0.065 ng/ml at 4 months' post-radiotherapy; in partial remission in 6 cases over an average period of 5.2 months with extremes of 4 months for the minimum and 6 months for the maximum (Figure 2). The 4 other cases presented either a biological relapse (5.4%) or a metastatic relapse (1.8%). Patients who received palliative radiotherapy had an estimated 80% reduction in symptoms. After an average follow-up of 15 months, 59 patients were alive, 45 (81.8%) of whom were in full recovery; 3 patients who were initially metastatic and who had received palliative radiotherapy died.

4. Discussion

Prostate cancer is the most common cancer in older men (>70 years) worldwide and is the second leading cause of cancer death [3]. It is a public health problem, particularly in developed countries [4]. In Senegal, the incidence of prostate cancer has increased significantly, with 959 new cases in 2018. Prostate cancer is the leading male cancer (25.1%) and the fourth most common cancer among men of all sexes [5]. It remains a pathology of the elderly in Africa (Table 2). The digital rectal examination (DRE) combined with the total PSA test is essential in the diagnostic process. The positive predictive value of DRE is around 5% - 30% [6]. With a cut-off value of 4 ng/ml, the sensitivity of total PSA to detect cancer is approximately 70%, and its specificity is 90% [7]. However, Catalona *et al.* have shown that 22% of asymptomatic men with PSA levels between 2.6 and 4 ng/ml have positive biopsies and 81% of these cancers are limited to the prostate [8]. This has led some researchers to raise the idea of simply lowering the PSA threshold from 4 to 2.5 ng/ml to increase the chances of detecting cancer at a curable stage but with a real risk of over-diagnosis and over-treatment. In our study, the circumstance of discovery was fortuitous by PSA assay in 25.8% of cases. These data are higher than those observed in the African literature [9] [10].

Pelvic magnetic resonance imaging has a prominent place in local and locoregional evaluation. Its sensitivity and specificity, for diagnosing extra-capsular invasion, are respectively 100% and 97% with, however, an interpretation that remains operator-dependent [11]. In recent years, there has been an improvement in diagnostic methods and better access to MRI in Africa (Figure 3).
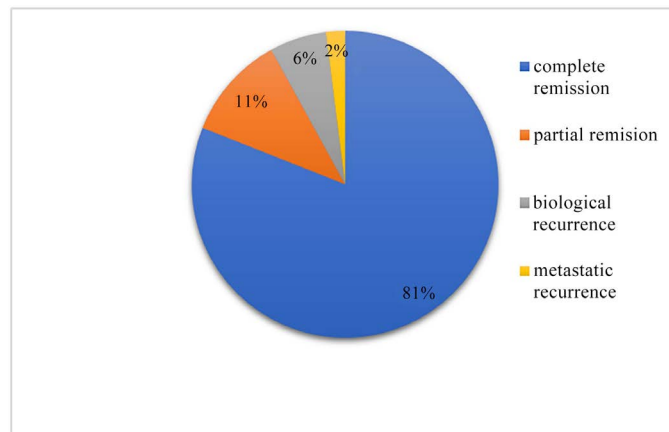
Figure 2. Therapeutic results of curative radiotherapy.
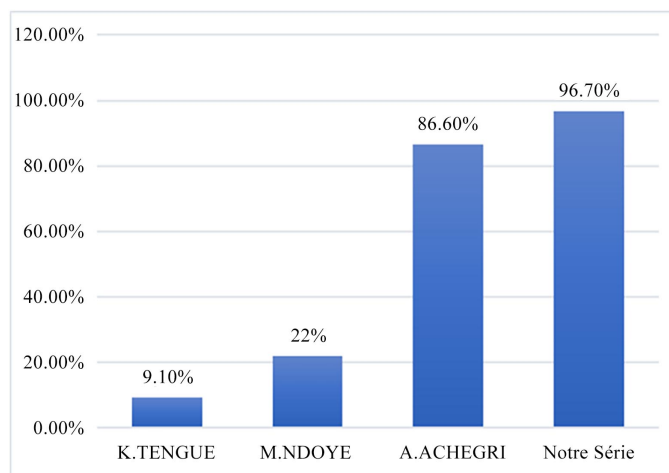
Figure 3. Comparison of the frequency of carrying out pelvic magnetic resonance imaging according to different studies in Africa.

Table 2. Comparison of the average age according to different studies.

Authors	Middle Age
NDOYE [19]	71 years
K.TENGUE [10]	68.5 years
GUEYE [9]	69 years
ACHEGRI [18]	68 years
HELFRICH [20]	70 years
BOCCON-G [21]	63.8 years
OUR STUDY	68.9 years

Prostate cancer is still discovered at a locally advanced stage despite routine screening that is increasingly practiced in Africa. In our study the T2 and T3 stages were in the majority of cases, 37% and 32.2% respectively. K. Tengue *et al.* in Togo also found a predominance of T3 and T4 tumors [10]. D'Amico's high-risk group was more representative (70.9%) in our series.

The need to hold multidisciplinary consultation meetings (RCP) before any treatment is recalled by Ennaoui *et al.* in Morocco. They have shown its importance in the success of the personalized treatment plan [12]. Radiotherapy plays a key role in this treatment [13], especially since the vast majority of incident cases in our context are in the high-risk group.

We used a three-dimensional conformational technique (RC3D) for all patients. The side effects were mainly urinary (52.7%) and digestive with diarrhea type (50.9%). They were mostly grade 1 and no grade IV toxicity was noted. Gustavo Viani *et al.* [14] compared a RC3D technique with intensity modulation (IMRT) and found a significant difference in grade II late genitourinary toxicity (13.1% vs 15.4%, p = 0.85), and grade II gastrointestinal toxicity (10% vs 24% with p = 0.0001) in favor of IMRT. No difference was observed in terms of overall survival, without progression and without metastases between the two techniques.

Comparison of radiobiological models between RC3D and IMRT shows that IMRT is more suitable for reducing bladder, rectal and digestive doses while offering more possibilities for dose escalation [15].

Hormone therapy was associated with radiotherapy in 88.8% of our patients, this is explained by the predominance of the high risk and unfavorable intermediate risk groups and the average duration of this hormone therapy was 12.5 months. Several randomized trials with a long follow-up have shown the value of this hormone therapy in terms of recurrence-free survival, disease-free survival and overall survival [16] [17]. After a 15-month follow-up, 59 patients were alive, 45 (81.8%) of whom were in full recovery. In several series using a conformational radiotherapy technique, the biological recurrence-free survival at 3 years is between 50% and 80% [2] [18].

5. Conclusion

Prostate cancer is a public health issue in developing countries. The current data illustrate a specific epidemiological and diagnosis profile in the sub-Saharan context with a still late discovery. Compared to developed countries, the therapeutic means used to fight against this cancer are limited in this context even if three-dimensional conformational radiotherapy remains an efficient and essential treatment; this study has provided fundamental data in this field of insufficient data/tools. This treatment remains multidisciplinary; it requires access to modern irradiation methods allowing dose escalation in order to further improve the results in terms of recurrence-free survival and overall survival.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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