Triple negative breast cancer: Early stages management and evolution, a two years experience at the department of breast cancer of CHSF

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Abstract

Breast cancer is the most common cancer in women and is a major public health problem. It is divided into several subtypes, including triple negatives. The general objective of our study is to establish the profile and the management of patients with triple negative breast cancer over a period of 2 years, operated in our department.

During our study period, triple-negative breast cancers accounted for 10% of our population. The most affected age group ranges from 50 to 60. The majority of patients in our sample are pauciparous. In the group of patients who received hormone therapy, it was mainly HRT for 4 to 6 years. 96.77% of patients consulted a health worker within 3 months of the discovery of the signs. Adenopathies are frequently present at the time of diagnosis. 93.54% of the cases have an invasive ductal carcinoma. Triple negative cancers are essentially poorly differentiated. Triple-negative cancer has a high rate of cell renewal. In our study, neoadjuvant chemotherapy is mostly indicated for triple-negative breast cancers ≥ 30 mm at diagnosis and a delayed lumpectomy is then performed in 23.52% of the patients. For tumors of < 30 mm size, a lumpectomy is performed immediately in 76.47% of the patients, followed by adjuvant chemotherapy.

Mastectomy was performed in 45.16% of patients; it was mainly indicated in front of a large tumor size associated with a small breast volume, then multifocal breast tumors. Breast reconstruction was performed in 21.42%. Radiation therapy is indicated in the majority of patients, postoperatively. In our population, 11 patients were proposed to have an oncogenetic survey; it was mainly indicated based on the Manchester criteria in front of a young age and a family history of cancer. There are two BRCA 1 mutations, one BRCA 2 mutation, and one case of absence of mutation. The therapeutic intake in case of a mutation is directed towards a prophylactic bilateral mastectomy and adnexectomy, proposed at the age of 40. Two patients had presented triple negative recurrences of their already treated breast cancer; first case PDL1 positive PD-L1 ≥ 1% treated with immunotherapy combined with chemotherapy (atezolizumab/abraxane) while the second and second PDL1 negative treated with chemotherapy alone.

Despite their low frequency, triple negative breast cancers represent a subgroup marked by pejorative characteristics, a reserved prognosis, with limited treatment options.
Introduction

Breast cancer is a malignant tumor that develops with no preservation of the different anatomical and functional structures of the breast. There are different types of breast cancer depending on their initial cells of origin from which they develop. The most common breast cancers (95%) are adenocarcinomas, that develop from the epithelial cells (= carcinoma) of the mammary gland (= adeno). There are also other rare types of breast cancer. Adenocarcinomas most often arise from the cells of the ducts and more rarely from the cells of the lobules of the mammary gland. A distinction is made between cancers in situ and invasive cancers [1-5].

With approximately 54,000 new cases and 12,000 deaths per year estimated in 2015, breast cancer ranks second among cancers and third among cancer deaths worldwide. However, it is the most common cancer among women in France and represents a major public health problem. The incidence of breast cancer has increased significantly in the last decades [2].

The main risk factors are age, genetic predisposition, a personal history of breast disease and a personal history of high dose chest radiation. Other risk factors are suspected, such as the endogenous hormonal exposures (puberty age, number of children, age at first pregnancy, breastfeeding, overweight/obesity) and the exogenous ones (hormone replacement therapy).

Breast cancer can be discovered at an early stage through the mammography screening. In several countries, there is an organized screening program offered to all women aged between 50 and 74. The incidence of this cancer is, therefore, influenced by the evolution of screening practices [2]. However, there are several subtypes of breast cancer [6,7]. Recent diagnostic advances have made it possible to distinguish the most frequent, hormone-dependent breast cancers, which express estrogen and/or progesterone receptors on their membranes, and are associated with a good response to hormone therapy, and “HER +” cancers “characterized by an overproduction of the HER2 protein. For the latter group, there are today very effective targeted therapies [7]. But 15% of patients have the so-called “triple negative” breast cancer, that is without any known marker on the surface of cancer cells. They have the following characteristics in common [4,6,9].

- Affect younger women.
- Have a higher risk of metastasis
- Poorer prognosis than the other subtypes:
  - Possible resistance to conventional chemotherapy protocols
  - Frequent recurrences within 2 years of the end of treatment
- Are frequent in the hereditary forms that are associated with mutations in the Breast Cancer oncogenes (BRCA)
- Progress quickly, it is often a cancer of interval (discovered between two tests of control)
- Occur in women not yet concerned by the screening
- Are more often detected at large sizes. The neoadjuvant chemotherapy is therefore more often used. Triple negative breast cancers are a priority in research, because up to date, there is no effective targeted therapy to treat women suffering from this form of cancer.

We thus initiated this work based on the following hypotheses:

- Triple negative breast cancer has a low frequency and mainly concerns the young population
- It would be associated with a group of population at risk
- Its prognostic criteria would be severe
- The therapeutic means would be limited to chemotherapy, surgery, and radiotherapy.
- Mutations of oncogenes are frequent

The general objective of our study is to establish the profile and the management of patients with triple negative breast cancer over a period of 2 years, operated in the gynecology-obstetrics department of the Center Hospitalier Sud Francilien, France.

Our specific objectives are as follow:

- To bring out the socio-demographic characteristics of the patients
- To identify the clinical and paraclinical aspects of triple negative breast cancer
- To describe their histo-prognostic specificities
- To present the treatment modalities

Method

Our study was done over the period from January 1, 2017 to December 31, 2018, spanning a 2-year period.

Type of study: This is a descriptive retrospective study.

The population

This study involved a total of thirty-one patients with triple negative breast cancer followed and operated at the gynecology department of the Centre Hospitalier Sud Francilien during the determined period over the study period.
Inclusion criteria
- Patients with triple negative breast cancer operated during the determined period
- Patients whose record was completed including the various studied parameters
- Patients in the non-metastatic stage

Non-inclusion criteria
- Patients with another type of breast cancer
- Patients with incomplete records
- Patients with metastatic cancer

Sampling technique
We conducted a comprehensive census of all patient records operated on for triple-negative C.H.S.F. breast cancer over our study period.

Data collection
Collection technique: Our data collection was based on the records of the gynecology department, the oncology department, and the pathology department.

Data collection tool: To collect our data, we established a fact sheet that was tested, corrected, and validated.

Data collection source
- The data were collected from:
  - Admission records
  - Patient consultation and follow-up sheets
  - Operative reports
  - Reports of pathology
  - Reports of the multidisciplinary Meetings

Collection team: The fact sheet was filled out on our own

Definition and operational aspects of variables
We defined and studied the following variables:
- Frequency
- Demography

  Sex, age at diagnosis, Body Mass Index (BMI), age of menarche, menopause, parity, age at the first child birth, breastfeeding and its total duration, hormonal treatments, personal and family history of cancer.
- Clinical issues
  o Time between the discovery of the abnormality and the consultation

  Imaging. ACR grade, histological type, histoprognostic grade, Ki67 cell renewal rate
- Therapy

  Chemotherapy and tumor size, lumpectomy by tumor size, sentinel lymph node and adenopathies, indications of axillary lymph node dissection and mastectomy, breast reconstruction, radiotherapy, oncogenetics investigation.

  The evaluation of estrogen and progesterone receptors was carried out by an immunohistochemistry technique, with a threshold of positivity established above 10%. Thus, estrogen and/or progesterone receptors are considered negative when their levels are less than 10%.

  The expression of HER 2 protein was detected by two complementary methods: immunohistochemistry (IHC), fluorescent in situ hybridization (FISH). A tumor is considered HER 2 negative when immunohistochemistry returns with a scale of 0 or 1+; however, for a result of 2+, the tumor is considered HER 2 negative if FISH is negative.

  The sentinel node technique was also performed by two additional methods: colorimetric detection by patent blue injection, and isotopic by injection of a radioactive isotope (Technetium 99), followed by a lymphoscintigraphy, and then intraoperative detection via a probe of the gamma rays that are emitted by the sentinel node.

  Oncogenetic surveys were conducted by an oncogeneticist, and positive results were confirmed on a second blood sample.

  The data was scanned in THE EXCELL software and then interpreted in THE EPI-INFO 7 software. They were represented in as frequency tables, percentages (n/∑n x 100 with ∑ = the sum of the numbers), and figures.

  However, the data were collected and analysed in strict compliance with ethical considerations.

Results

Frequency
The following table shows the frequency of triple-negative cancers in the studied population.

Triple negative breast cancers account for 10% of our population (Table 1).
Demography

**Sex:** The entire population studied was female. Note that three cases of male breast cancer were managed at our department during the considered period: two in 2017 and one case in 2018. None of them were triple negative.

**Age at diagnosis**

Table 2 shows patients by age at the time of diagnosis of breast cancer.

The most affected age group ranges from 50 to 60, with an average age of 56.68 years, and extremes from 28 to 80 years. However, 29.01% of patients with triple negative cancer less than 50.

**Body Mass Index**

The following table shows the distribution of patients according to their body mass index (BMI).

The body mass index was calculated by the weight formula (kg) divided by the square of size (meter) and interpreted as follows:

- < 18: Under nutrition
- [18-25]: normal weight
- [25-30]: overweight
- ≥ 30: obesity (Table 3)

Out of 31 patients, 19 have a normal BMI, the equivalent of 61.29% of our sample.

<table>
<thead>
<tr>
<th>Table 1: Frequency of triple negative cancers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Triple negative Cancer</td>
</tr>
<tr>
<td>other types of cancer</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Age at Diagnosis.</th>
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<tbody>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>&lt; 30</td>
</tr>
<tr>
<td>[30-40]</td>
</tr>
<tr>
<td>[40-50]</td>
</tr>
<tr>
<td>[50-60]</td>
</tr>
<tr>
<td>[60-70]</td>
</tr>
<tr>
<td>[70-80]</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Table 3: Distribution of BMI.</th>
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<tbody>
<tr>
<td>BMI</td>
</tr>
<tr>
<td>&lt; 18: denutrition</td>
</tr>
<tr>
<td>[18-25]: normal weight</td>
</tr>
<tr>
<td>[25-30]: overweight</td>
</tr>
<tr>
<td>≥ 30: obesity</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Breakdown according to the age of menarche.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>&lt; 10</td>
</tr>
<tr>
<td>[10-13]</td>
</tr>
<tr>
<td>[13-16]</td>
</tr>
<tr>
<td>[16-19]</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5: Repartition by the menopausal status.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menopause</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 6: Distribution based on parity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity</td>
</tr>
<tr>
<td>Nulliparous</td>
</tr>
<tr>
<td>Primiparous</td>
</tr>
<tr>
<td>Pauciparous</td>
</tr>
<tr>
<td>Multiparous</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 7: Age-based repartition of the birth of first child.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>[15-20]</td>
</tr>
<tr>
<td>[20-25]</td>
</tr>
<tr>
<td>[25-30]</td>
</tr>
<tr>
<td>[30-35]</td>
</tr>
<tr>
<td>[35-40]</td>
</tr>
<tr>
<td>&gt; 40</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
Breastfeeding and its total duration

Tables 8 and 9 show the proportion of breastfeeding patients, as well as its duration in months respectively.

20 out of 31 patients were breast-feeding, the equivalent of 64.51%.

30% of the patients breastfed over a period between 9 and 12 months, followed by 25% beyond 24 months.

Hormonal treatments

The following table shows the repartition of patients based on the use of hormonal treatments (contraceptives, Hormone Replacement Therapy HRT) and the total duration of treatment, in years.

64.51% of patients with triple negative breast cancer did not receive hormone therapy. In the group of patients who received hormonal treatments, it consists mainly of HRT (19.35%) for 4 to 6 years. Hormonal contraceptives accounts for 16.12% over a period of 2 to 4 years (Table 10).

Tobacco and alcohol consumption

61.12% of patients do not consume alcohol and tobacco. In the group of patients who use it, it is mainly tobacco at 22.58% (Table 11).

Personal history of malignant tumors

The following table 12 divides patients according to the personal history of malignant tumor.

2 out of 31 patients have a personal history of malignant tumors, or 6.45%. It is a controlling breast cancer, and ENT cancer.

A history of benign breast lesions

Table 13 shows the history of benign breast injury in our patients.

16.12% of patients with triple-negative breast cancer initially developed benign breast lesions. It is essentially the fibroadenomas.

Family history of 1st and 2nd degree cancer

Table 14 shows the types of cancer in the patient’s family: first and second degree.

67.74% of patients with triple-negative cancer have a family history of cancer at the level of first- and second-degree relatives. Mainly, it is breast cancer, colorectal cancer, gastric cancer, endometrial cancer.

Time between discovery and consultation

We present in the table 15 the time elapsed between the
discovery of a breast abnormality and the consultation of the patient (Table 15).

**Initial tumor size**

The following table shows the size of the tumor at the time of diagnosis.

At the time of diagnosis, the majority of patients have a tumor larger than 30 mm. The majority of sizes range from 30 to 40 mm (29.03%) and from 50 to 60 mm (22.58%) (Table 16).

**Tumor site**

In table 17, we present the seat of tumors according to the different quadrants of the breast.

The upper-outer quadrant of the breast is the most affected by the tumor (38.70%) followed by the union of external quadrants (22.58%) (Table 17).

**Adenopathies**

We present in the following table the association of adenopathies with triple negative cancers at diagnosis, as well as the conclusion of pathology.

Adenopathies are frequently associated with triple negative cancer (58.06%) at the time of diagnosis; with a lymph node invasion (n = 14) (Table 18).

**Imaging**

**Type of imaging**: Table 19 presents the imaging methods used to explore patients.

All patients in our sample received the following imaging methods: mammography, ultrasound, MRI, PET-Scan.

**ACR Grade**: We detail in the table below the grades of lesions found at mammography, according to the classification of the American College of Radiology.

ACR 5, were mainly found (77.41%), followed by ACR 4 (22.58%) (Table 20).

**Preoperative histology**

**Histological type**: The following table shows the type of tumor found on pathological anatomy examination of preoperative sampling.

Patients with triple-negative breast cancer have 93.54% infiltrating ductal carcinoma (Table 21).

**Histo-prognostic grade**: We present the histo-prognostic profile of triple negative breast cancers in the following table 22.
Triple negative cancers are mainly poorly differentiated, classified as grade III (83.87%), according to Elston-Ellis.

**Ki67 cell renewal rate:** The following table shows the percentage rate of cell renewal, according to the Ki67 coefficient.

Triple-negative cancer has a high rate of cell renewal, ranging from 80% to 100% (38.70%) 60% - 80% (34.37%) (Table 23).

**Initial tumor size and chemotherapy**

Table 24 shows the type of chemotherapy that was indicated based on the size of the tumor at the time of diagnosis.

Neoadjuvant chemotherapy is mostly indicated for triple-negative breast cancers of size ≤ 30 mm at diagnosis.

**Tumorectomy and tumor size**

Table 25 shows the indicated immediate and delayed lumpectomies, depending on the size of the tumor.

The lumpectomy is performed immediately in 76.47%, when the size of the tumor is 30 mm; it is deferred in 23.52% for sizes ≥ 30 mm.

**Sentinel lymph node indications according to adenopathies**

Table 26 shows the indications of the sentinel node technique based on the presence of satellite adenopathies.

The sentinel node technique was indicated in 45.16%, in the absence of adenopathies. It was recused in 54.83% in the presence of adenopathies.

Indications of the Axillary lymph node dissection:

The following table 27 lists the indications of axillary lymph node dissection.

**Axillary lymph node dissection**

Axillary lymph node dissection is performed in 18 patients (58.06%); and mainly indicated for invaded adenopathies on fine needle biopsy (77.77%).

**Mastectomy indications**

Table 28 shows the different indications of mastectomy in our patients.

Mastectomy is indicated in 14 patients; it is essentially done in the case of large tumor size associated with a small breast volume (35.71%), followed by multifocal breast tumors (28.57%).

**Breast reconstruction**

In table 29, we present the frequency of breast reconstructions and their timing in the patient care.

14 patients had a mastectomy. 21.42% had an immediate breast reconstruction (n = 2), deferred (n = 1).

**Radiotherapy indications**

Table 30 shows the different indications of radiotherapy, as well as its timing in relation to the surgical procedure.

Radiation therapy is indicated in the majority of patients (96.66%), postoperatively (n = 30).

**Oncogenetic survey indications**

Table 31 shows the indications of oncogenetic consultations in patients with triple-negative breast cancer.

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**Table 24: Initial tumor size and chemotherapy.**

<table>
<thead>
<tr>
<th>Tumor size</th>
<th>Neoadjuvant Chemo</th>
<th>Adjuvant chemo</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30 mm</td>
<td>0</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>≥ 30 mm</td>
<td>16</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>%</td>
<td>51.61</td>
<td>48.38</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 25: indications of lumpectomies depending on tumor size.**

<table>
<thead>
<tr>
<th>Tumor size</th>
<th>Immediate tumorectomy</th>
<th>Deferred tumorectomy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30 mm</td>
<td>13</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>≥ 30 mm</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>%</td>
<td>76.47</td>
<td>23.52</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 26: Sentinel lymph node indications according to adenopathies.**

<table>
<thead>
<tr>
<th>Adenopathies</th>
<th>Sentinel node</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>45.16</td>
<td>54.83</td>
</tr>
</tbody>
</table>

**Table 27: Indications of axillary curage.**

<table>
<thead>
<tr>
<th>Indications</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive sentinel node</td>
<td>1</td>
<td>5.55</td>
</tr>
<tr>
<td>Positive Fine needle lymph node biopsy</td>
<td>14</td>
<td>77.77</td>
</tr>
<tr>
<td>Suspicious adenopathies with negative fine needle biopsy</td>
<td>3</td>
<td>16.66</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 28: mastectomy indications.**

<table>
<thead>
<tr>
<th>Indications</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large tumor size and small breast</td>
<td>5</td>
<td>35.71</td>
</tr>
<tr>
<td>Multifocal tumor</td>
<td>4</td>
<td>28.57</td>
</tr>
<tr>
<td>Carcinomatous mastitis</td>
<td>2</td>
<td>14.28</td>
</tr>
<tr>
<td>BRCA gene Mutation</td>
<td>1</td>
<td>7.14</td>
</tr>
<tr>
<td>History of contralateral breast cancer</td>
<td>1</td>
<td>7.14</td>
</tr>
<tr>
<td>Post-tumorectomy recurrence</td>
<td>1</td>
<td>7.14</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 29: indications of breast reconstructions.**

<table>
<thead>
<tr>
<th>Breast Reconstruction</th>
<th>Immediate</th>
<th>Deferred</th>
<th>No</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>1</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>1</td>
<td>11</td>
<td></td>
<td>78.57</td>
</tr>
</tbody>
</table>

**Table 30: Radiotherapy indications.**

<table>
<thead>
<tr>
<th>Timing</th>
<th>Preop.</th>
<th>Postop.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neoadjuvant radiotherapy</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Adjuvant radiotherapy</td>
<td>0</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>%</td>
<td>3.33</td>
<td>96.66</td>
<td>100</td>
</tr>
</tbody>
</table>
11 patients received the proposition for an oncogenetic investigation based on the Manchester criteria (Table 32); Indicated mainly in front of a young age and a family history of cancer.

Oncogenetic survey results and impact in management

The following table presents the results of the oncogenes mutation research, as well as its contribution in the management of the concerned patients.

The oncogenetic survey was proposed in 11 patients. There are two BRCA 1 mutations (20%), one BRCA 2 mutation (10%), and absence of mutation in 40% (Table 33).

The therapeutic intake is directed towards a prophylactic bilateral mastectomy and adnexectomy in the case of mutation.

<table>
<thead>
<tr>
<th>Table 31: Indications of the oncogenetic survey.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indications</td>
</tr>
<tr>
<td>Age &lt; 30 Years</td>
</tr>
<tr>
<td>Ages 30-39 and 1 family history of cancer</td>
</tr>
<tr>
<td>Ages 30-39 and 2 family histories of cancer</td>
</tr>
<tr>
<td>Age ≥ 40 and 1 family history of cancer</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 32: Manchester Scoring System 3.</th>
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</thead>
<tbody>
<tr>
<td>Index cases of Cancers AND 1st - 2nd degree relatives</td>
</tr>
<tr>
<td>Breast Cancer F &lt; 36 years</td>
</tr>
<tr>
<td>Breast cancer F 36-39 years</td>
</tr>
<tr>
<td>Breast cancer F 40-49 years</td>
</tr>
<tr>
<td>Breast cancer F 50-59 years</td>
</tr>
<tr>
<td>Breast cancer F &gt; 59 years</td>
</tr>
<tr>
<td>Breast cancer M &lt; 60 years</td>
</tr>
<tr>
<td>Breast cancer M ≥ 60 years</td>
</tr>
<tr>
<td>Ovarian Cancer &lt; 60 ans (except mucinous)</td>
</tr>
<tr>
<td>Ovarian Cancer ≥ 60 ans (except mucinous)</td>
</tr>
<tr>
<td>pancreatic Cancer</td>
</tr>
<tr>
<td>prostatic Cancer &lt; 60 years</td>
</tr>
<tr>
<td>prostatic cancer ≥ 60 years</td>
</tr>
<tr>
<td>Ovarian cancer pathology (index cases OR relatives)</td>
</tr>
<tr>
<td>High grade serous</td>
</tr>
<tr>
<td>Breast Cancer Pathology (index case only)</td>
</tr>
<tr>
<td>Grade 3</td>
</tr>
<tr>
<td>Grade 1</td>
</tr>
<tr>
<td>RO+</td>
</tr>
<tr>
<td>RO-</td>
</tr>
<tr>
<td>Triple negative</td>
</tr>
<tr>
<td>Intraductal</td>
</tr>
<tr>
<td>Family information</td>
</tr>
<tr>
<td>Adoption or one of the parents is unknown</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Score ≥ 12 confirmed indication</td>
</tr>
<tr>
<td>Score between 9 and 11</td>
</tr>
<tr>
<td>Score &lt; 9</td>
</tr>
</tbody>
</table>

Table 33: Results and therapeutic impact of the oncogenetic survey.

<table>
<thead>
<tr>
<th>Results</th>
<th>n</th>
<th>%</th>
<th>Therapeutic Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutation BRCA 1</td>
<td>2</td>
<td>18</td>
<td>Bilateral prophylactic Mastectomy + annexectomy proposed at 40 years + Q6 months monitoring</td>
</tr>
<tr>
<td>Mutation BRCA 2</td>
<td>1</td>
<td>10</td>
<td>Bilateral prophylactic Mastectomy + adnexectomy proposed at 40 years + Q6 months monitoring.</td>
</tr>
<tr>
<td>No mutation</td>
<td>4</td>
<td>36</td>
<td>Continuation of the established therapeutic protocol Refusal 3 30 Continuation of the established therapeutic protocol</td>
</tr>
<tr>
<td>Refusal</td>
<td>4</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Immunotherapy

The experience of immunotherapy in oncology in our department started a year ago. The patients are screened for immunotherapy. In our series, two patients had presented triple negative recurrences of their already treated breast cancer; first case PDL1 positive PD-L1 ≥ 1% treated with immunotherapy combined with chemotherapy (atezolizumab/abraxane) while the second and second PDL1 negative treated with chemotherapy alone.

Discussion

Frequency

During our study period, triple-negative breast cancers accounted for 10% of our population. This result is similar to those found in Europe: Adamo, et al. in Italy [19], Redondo, et al. in Spain [20], Wojcinski, et al. in Germany [21] which are 9.8%, 9.6% and 10.5% respectively. In the U.S.A., Bauer, et al. [24] reports an average frequency of 13.1% of the population.

However, it is found to be more often in Asian countries. Which, et al. in China [22], Widodo, et al. in Indonesia [23], and Krishan, et al. in India [4] find respectively frequencies estimated at 20.3%, 25%, and 27.9% of their studied population; This consists the double of the results achieved in European countries. These data suggest that triple negative breast cancers are more common in Asia, with a peak of frequency in India.

Sex

In our study, the entire population studied was female. This result is corroborated by Gueye M in Senegal [25], and James, et al. in New Zealand [7] who found in a population of 1390 patients, a 100% female.

Age at diagnosis

The most affected age group ranges from 50 to 60, with an average age of 56.68 years, and extremes that are from 28 to 80 years. Similar results are found in the city of Tours and in several countries in Europe and America. Indeed, Redondo et al in Spain [20], Wojcinski, et al. in Germany [21], Stead, et al. in the USA [27] find average ages of 54.7 years, 55.9 years, and 58 years, respectively in their populations. In England, Jack, et
al. report higher values, 61 years [28], while in Asia there are lower values than ours. In China, Chen, et al. has an average age of 35.4 years [29]. Hashmi, et al. in Pakistan has 48.4 years [26], and Krishan, et al. in India has 49.8 years [4].

However, it is important to note that 29.01% of patients develop triple-negative cancer before the age of 50. In Italy, Adamo, et al. [19], yields a value similar to ours: 32.9%. Higher values are reported by Redondo, et al. in Spain [20]. Vona-Davis, et al. in Virginia (USA) [30], Jack, et al. in England [28] who respectively found 51.2%, 44.5%, 39.1% of triple negative breast cancers diagnosed before the age of 50.

**Body Mass Index**

Out of a total of 31 patients, 61.29% have a normal BMI, 16.12% are overweight and 19.37% are obese. In Louisiana (U.S.A.), Mowad, et al. [32] report 13% of patients with a normal BMI, 23% of overweight patients, and 64% of obese patients. Shaheenah, et al. in the U.A.E. [33], found 34.3%, 30% and 35.7% of patients with normal weight, overweight, and obesity, respectively. These differences could be explained by the non-similar lifestyle of the patients.

However, it should be noted that a high BMI in non-menopausal women is associated with a significant increase in the risk of triple negative tumors (OR = 1.18, IC 95% (0.86-1.64), p = 0.003), while an increase in BMI appears to be a protective factor for Luminal A and B and HER2 tumors in non-menopausal women. Obesity in non-menopausal women decreases exposure to estrogen due to frequent associated anovulation. This would explain the protective effect of obesity on hormone-dependent tumors in comparison to triple negative tumors [3].

However, despite an increase in the frequency of larger and more advanced TNM Tumors, obesity is not associated with a decrease in survival with non-recurrence. This is confirmed by the study of Ademuyiwa, et al. who followed 418 women treated for breast cancer and found no relationship between obesity and overall survival or survival with non-recurrence [34].

**Age of menarche**

58.06% of patients had their menarche between the age of 10 and 13.

Note that increased age of menarches would be associated with a decreased risk of triple negative tumor in comparison to other types of tumors. This is shown by Yang, et al. study that was carried out in Poland and included 804 patients with breast cancer, 95 of them have triple negative tumors and 2502 were control patients (OR: 0.78; IC 95% 0.68-0.89, p = 0.0009 compared to Luminal A tumors for example) [35]. The meta-analysis of Barnard, et al. included 38 studies and 27629 patients with 4981 triple-negative ones, found that an advanced age of menarches reduced significantly the risk of triple negative tumor [36].

**Menopausal status**

70.96% of patients are postmenopausal when diagnosed in our population.

Stacoffe M in Tours (France) [37], James, et al. in New Zealand [7], Gueye, et al. in Senegal [25] reported rates of 63.8%, 60%, 59.1%, respectively.

**Parity and age of first motherhood**

The majority of patients in our sample are pauciparous (43.38%) with a parity of between 2 and 3. 42.85% of patients had their first delivery between the age of 25 and 30. In Senegal, Gueye, et al. returned to an average parity of 3.6.

Many studies suggest that high parity is associated with an increased risk of triple-negative tumors unlike Luminal A tumors of which multiparity decreases the risk [36]. Phipps, et al. conducted a case-control study in 2008 and included 2,616 women (1140 breast cancer patients, 78 with triple negative tumors and 1,476 controls). They found that nulliparity, compared to multiparity, would result in a significant decrease in the risk of triple-negative tumors (HR - 0.61, IC 95% - 0.37 - 0.97, p = 0.02), while nulliparity would increase the risk of tumors with estrogen receptors (HR = 1.35, IC 95% = 1.20 - 1.52, p = 0.02). In multiparous, an increase in the number of pregnancies would result in increased risk of triple-negative tumors (HR for ≥ 3 births compared to a birth = 1.46, IC 95% = 0.82 - 2.63, p = 0.63), while it would decrease the risk of tumors with estrogen receptors (HR = 0.88, IC 95% = 0.74 - 1.04, p = 0.06) [38]. Similarly, Millikan, et al. in their case-control study conducted in the United States in 2008, including 1,424 breast cancer patients and 2022 controls, found a significant increased risk of triple negative tumors with the increased number of children while this association was not observed for hormone-dependent tumors [39].

**Breastfeeding and total duration**

20 out of 31 patients were breast-feeding, which consists the equivalent of 64.51%. Among them, 30% of patients breastfed over a period between 9 and 12 months, then 25% above 24 months.

The “Collaborative group on hormonal risk factors in breast cancer” has determined that breastfeeding has a protective effect on all types of breast cancer (reduced cancer risk by 4.3% for any year of breastfeeding) [40]. The mechanisms involved in the effect of lactation on gene expression and breast epithelial cells differentiation are not fully understood. They could include the complete differentiation of breast epithelial cells during breastfeeding and the decrease in the duration of estrogen exposure associated with secondary breastfeeding amenorrhea [39]. Barnard, et al. in 2014, conducted a literature review in order to study the associations between known risk factors for breast cancer (especially the hormonal ones) and different molecular subtypes. In their meta-analysis
of 38 studies of 27629 patients, including 4981 triple-negative patients, an increase in breastfeeding duration was associated with a decrease in the risk of triple negative breast cancer (as well as Luminal A and B cancers while this association was not found for Her2 positive tumors) [36].

**Hormonal treatments**

64.51% of patients with triple negative breast cancer did not receive hormone therapy. In the group of patients who received it, it was mainly HRT (19.35%) for 4 to 6 years. Hormonal contraceptives account for 16.12% and were used mainly over a 2 to 4-year period. According to the literature, there is a relationship between the development of triple negative breast cancers and exposure to hormonal treatments.

Indeed, Dolle, et al. reported an increase in the risk of triple negative tumors of 4.7 in women under the age of 40 years and who had used oral contraception for more than one year (OR: 4.2; IC 95% 1.9-9.3, p = 0.001). The risk was 6.4 times for the women who had started contraception before the age of 18 in comparison with those who had never used contraception [42]. Similarly, Ma, et al. finds an increased risk of triple negative tumors associated with oral contraceptive use, but only in women aged 45-64 who started oral contraception before the age of 18 [41].

In addition, the “Collaborative group on hormonal risk factors in breast cancer” confirms that the risk of breast cancer is increased in women using hormone replacement therapy and would be exacerbated with its duration. However, the risk disappears after 5 years of usage. In addition, the study indicates that the relative risk of breast cancer among recent users is higher in thin women than those who are high weight. This analysis studied breast cancers as a whole, without the molecular subtype repartition.

Few studies have studied the association between HRT and triple negative tumor [36].

**Tobacco and alcohol consumption**

61.12% of patients do not consume alcohol and tobacco. In the group of patients who use it, it is mainly tobacco at 22.58%.

The literature points to a link between tobacco and/or alcohol use and the occurrence of breast cancer in general. Alcohol consumption is a well-established risk factor. For each additional intake of 10 grams of alcohol per day the risk of breast cancer increases by 7%. For tobacco the risk is significantly increased in women who started smoking at a young age or more than 5 years of duration before their first pregnancy at term [36].

However, for the specific case of triple negative cancers, Geoffrey, et al. in the USA studied this relationship among 146,985 women enrolled in the Women’s Health Initiative. It included 300 cases of triple negative cancer and 2,479 cases of hormone-sensitive cancer over 8 years. It appeared that smoking and alcohol consumption are not associated with an increased risk of triple-negative breast cancer, but may be modestly associated with an increased risk of breast cancer expressing hormone receptors [43].

**Personal history of malignant tumor and/or benign breast lesions**

2 out of 31 patients have a personal history of malignant tumors, which is the equivalent of 6.45%. It consists of a contralateral breast cancer, and ENT cancer. 16.12% of patients with triple-negative breast cancer initially developed atypical breast lesions. It was essentially adenofibromas.

A patient with this type of lesions on a surgical biopsy has an increased risk of developing breast cancer within at least 15 years of diagnosis. Cancer occurs in 40% of cases in the contralateral breast. In the case of atypical ductal hyperplasia, the relative risk is multiplied by 4-5 or even more in cases of mixed atypical hyperplasia (ductal and lobular, RR of 5-6) and lobular carcinoma in situ diagnosed in a woman with a young age and a family history of breast cancer [44].

**Family history of 1st and 2nd degree cancer**

67.74% of patients with triple-negative cancer have a family history of first- and second-degree cancer. This is primarily breast, colorectal, stomach, and endometrial cancer.

In a comparative study, Khalil, et al. in Morocco found a family history in 17.4% of cases of triple negative cancers versus 57.6% of non-triple-negative cancers [6]. This difference could be explained by the small size of the triple negative breast cancer sample.

Women with a family history of breast cancer, whether in the maternal or paternal branch, have an increased risk of developing it. For example, a history of first-degree breast cancer (mother, sister, and daughter) increases the relative risk to 2.

Two first-degree history confers a relative risk of 3, and if there is more than 3 (same parental branch, first and second degree) the relative risk is at least greater than 4 and makes the underlying genetic problem to be considered [44].

**Consultation time and tumor size**

96.77% of patients consulted a health worker within 3 months of the discovery of the signs of calls on the affected breast and the majority of patients had a tumor larger than 30 mm: 30 to 40 mm (29.03%), then 50 to 60 mm (22.58%) with an average of 25 mm.

Boissiere, et al. in Bordeaux reported an average size of 40 mm, Rosalind, et al. in USA has an average of 32 mm, James, et al. in New Zealand has an average tumor size of 23 mm,
while Samain in Nantes has an average of 18 mm. These results would be strongly influenced by the time elapsed between the appearance of the tumor and the consultation, as well as the various factors of tumor proliferation [5,7,15,45].

**Tumor site**

The upper-external quadrant of the breast is the most affected by the tumor (38.70%). Secondly, comes the junction of external quadrants (22.58%).

Boisserie, et al. confirm this high frequency in the upper-external quadrant with 46.6%, followed by the upper-inner quadrant with 17.8% [14].

**Adenopathies**

Adenopathies are frequently present (58.06%) at the time of diagnosis of triple negative cancer with a histological invasion of lymph nodes ($n = 14$).

Similar results are reported by Rosalind, et al. in the USA and James, et al. in New Zealand, 51% and 40% respectively [5,7]. Samain in Nantes describes a lower percentage: 23%, while Gueye, et al. in Dakar reported higher value of 68.1% [25,45]. These differences could be explained by the delay between the appearance of the tumor and the consultation, the histological peculiarities and different factors of cell proliferation.

**ACR Grade**

Cancer-suggestive lesions, ACR 5 are mainly found (77.41%) in patients with triple-negative breast cancer. These are followed by ACR 4 (22.58%) lesions.

Woodwork, et al. report in their studied population the following results: ACR 1 and 2 in 6.4% of cases, ACR 3 in 4.8%, ACR 4 in 58.7%, ACR 5 in 30.2% [14]. Thus, triple negative breast cancers present on imaging in their severe forms.

**Histological type**

Patients with triple-negative breast cancer have in 93.54% of the cases, an invasive ductal carcinoma.

James in New Zealand, Gueye, et al. in Dakar, Samain in Nantes, Rosalind, et al. in the USA, Boisserie, et al. in Bordeaux reported in their studied populations frequencies similar to ours, including 88%, 86.4%, 84.5%, 88%, 79% respectively [5,7,15,45].

Invasive ductal carcinoma is therefore the most commonly found histological type in triple negative breast cancers.

**Histoprognostic grade**

Triple negative cancers are essentially poorly differentiated, classified grade III (83.87%), according to Elston-Ellis.

Similar values are reported by other authors, including Boisserie, et al. in Bordeaux, James, et al. in New Zealand, Samain in Nantes, Gueye, et al. in Dakar, which objectively frequencies of 72.6%, 79%, 69.1%, 68.2% respectively [7,14,25,45].

**Cell Renewal Rate (Ki-67)**

Triple-negative cancer has a high rate of cell renewal, ranging from 80% to 100% (38.70% of the cases) and 60% to 80% (34.37% of the cases).

This result is corroborated by Rosalind in the USA, which finds a high Ki-67 index in its population in 79% of the patients with triple negative breast cancer [5].

**Chemotherapy and lumpectomy by initial tumor size**

In our study, neoadjuvant chemotherapy is mostly indicated for triple-negative breast cancers ≥ 30 mm at diagnosis (51.61%) and a delayed lumpectomy is then performed in 23.52% of the patients. On the other hand, for tumors < 30 mm size, a lumpectomy is performed immediately in 76.47% of the patients, followed by adjuvant chemotherapy (48.38%).

In the Gueye, et al. series in Dakar, neoadjuvant chemotherapy is indicated in 59% of patients. This high rate can be justified by the high percentage of tumours ≥ 30 mm at diagnosis, also by the average time for consultation which is 11.1 months in its series [25]. Samain in Nantes reports a lower frequency of neoadjuvant chemotherapy in its series: 34.6% in comparison to 65.4% for adjuvant chemotherapy [45].

**Indications of mastectomy and breast reconstruction**

Mastectomy was performed in 45.16% of patients; it was mainly indicated in front of a large tumor size associated with a small breast volume (35.71%), then multifocal breast tumors (28.57%). Breast reconstruction was performed in 21.42% of mastectomy patients.

James, et al. in New Zealand, reports in his series a higher frequency of mastectomy: 55% with breast reconstruction performed in 19% of them [7].

**Radiotherapy indications**

Radiation therapy is indicated in the majority of patients (96.66%), postoperatively ($n = 30$).

This result is corroborated by Samin in Nantes which had a frequency of 91%, and by James in New Zealand which reported a frequency of 66% [7,45].

**Oncogenetic survey indications**

In our population, 10 patients benefited from an oncogenetic survey; it was mainly indicated in front of a young age and a family history of cancer. Our results are similar to the recommendations of the Curie and Gustave Roussy Institute [15] which define the following criteria as oncogenetic consultation indications:
- 3 (or more) subjects with breast and/or ovarian cancer in first- or second-degree relatives if paternal transmission in the same parental branch
- At least 2 cases of breast cancer in first-degree relatives (or second-degree relatives if transmission is paternal), if one of them is diagnosed before 45-50 years or bilaterally (if the first is diagnosed before the age of 50)
- Breast cancer + ovarian cancer in first- or second-degree relatives
- Ovarian cancer (excluding borderline and germinal tumors) before age 50 or high-grade serous regardless the age
- Breast cancer before age 35 (questionable until age 40)
- Triple negative breast cancer before age 50
- Breast cancer in men
- Other clinical syndromes, cowden’s disease or LiFraumeni syndrome, association of diffuse gastric cancer with infiltrating lobular carcinoma of the breast
- Any other family of a particular nature, multiple primary tumors: take prior advice from the geneticist.

However, there are urgent indications, especially if it can influence the choice of treatment (surgical: mastectomy + immediate breast reconstruction rather than conservative treatment).

**Oncogenetic survey results**

The oncogenetic survey was proposed in 11 patients. There are two BRCA 1 mutations (18%), one BRCA 2 mutation (10%), and four cases of absence of mutation (36%). The therapeutic intake in case of a mutation is directed towards a prophylactic bilateral mastectomy and adnexectomy, proposed at the age of 40.

According to the National Cancer Institute [46], patients with a BRCA 1, BRCA 2 gene mutation have a risk of developing breast and ovarian cancer. Thus, depending on the age and the parental project, breast monitoring is proposed starting from 20 years of age based on: clinical examination every 6 months.

Starting from the age of 30, MRI + mammogram/ultrasound if dense breasts every year. Note that MRI is recommended first, to guide other examinations if an abnormality is suspected. The maximum time of 2 months is recommended between examinations, to be carried out if possible in the same structure for optimal synthesis and comparison.

On the other hand, the alternative to breast monitoring is a prophylactic mastectomy with maximum benefit if performed before the age of 40. A time for reflection is essential and its indication is made in the Meeting of Pluridisciplinary Concertation, and the care of the patient is done by a multidisciplinary team.

Concerning the ovarian risk, monitoring is initiated starting from the age of 35 using an annual pelvic transvaginal ultrasound. Starting from the age of 40 or as soon as the parental project is completed, a prophylactic adnexectomy is proposed after validation in the Meeting of Pluridisciplinary Concertation.

**Immunotherapy**

In general 25% of patients suffer from recurrent regional or distant recurrence with a mortality rate that can reach up to 75%. This issue can be explained by the absence of targeted therapies [46]. Immunotherapy had shown good results not only in improving survival rates but also in maintaining adequate tumor response and had recently obtained approval from the US Food and Drug Administration [47]. Most studies speak about the effect of immunotherapy through cases and controls in the context of an initial treatment for triple negative breast cancer and not treatment of its recurrence. According to Schmid, et al, survival progression-free was prolonged by immunotherapy by 7.4 months compared to 4.8 months for those who had not received it in combination with chemotherapy in advanced triple negative breast cancer [48].

Currently more than 50 clinical trials evaluate pembrolizumab, durvalumab, ipilimuma, nivolumab, tremelimumab as well as azolizumab. Immunotherapy, particularly with drugs that inhibit PD1 and PDL1 (and therefore likely to restore the person’s anti-tumor immunity), seems promising in patients with metastatic triple negative breast cancer. The combination of atzolizumab (anti PD-L1) with paclitaxel has given very promising results justifying to evaluate its real effectiveness, compared to standard treatment [49].

Tumors that present a high mutational charge seem to be more immunogenic. Based on this, these tumors would be good candidates for immunotherapy. For patients that present BRCA1 and BRCA2 mutations, anti-parp can be prescribed. Olaparib (Lymparza) was approved at the European level for breast cancers (HER2 negative with BRCA mutation) in patients treated with some meds or when medications are not adapted.

**Conclusion**

Breast cancer is the most common cancer in women and is a major public health problem. It is divided into several subtypes, including triple negatives. The subject of our study entitled “Triple Negative Breast Cancer: Early Stages Management And Evolution, A Two Years Experience At The Department Of Obstetrics And Gynecology Of CHSF” has specific objectives to highlight the socio-demographic characteristics of patients, to identify the clinical and paraclinical aspects of triple negative breast cancers, to describe their histo-prognostic specificities and to present the modalities of management.
At the end of this study, we can remember the following:

1. Triple negative breast cancer accounts for a small proportion of all breast cancers and mainly affects the female sex.

2. The age of onset is mostly above 50 years, with an average age of 56.68 years, the majority of patients develop it at menopause. On the other hand, 29.01% of women develop it before the age of 50.

3. A normal BMI is present in 61.21% of patients and would not be a protective factor in non-menopausal women, the same for high parity, oral contraceptive use, alcohol and tobacco use, a personal malignant or familial breast cancer year. Breastfeeding is protective.

4. The average tumor size is 25 mm, despite a period of time to consultation of 3 months. The main tumor site is the upper-outer quadrant with frequent adenopathies at the time of diagnosis.

5. These are mainly invasive ductal carcinomas classified as ACR 5, Elston Ellis grade III, and characterized by Ki-67 high.

6. Management is essentially based on neoadjuvant or adjuvant chemotherapy, coupled with immediate or delayed lumpectomy and radiotherapy, depending on the size of the tumor. The mastectomy is performed in 45.16% of the cases.

7. The oncogenetic survey is carried out in 11 patients in accordance with the recommendations and finds two BRCA1 mutations, one BRCA2 mutation with the proposal of a bilateral prophylactic adnexectomy and mastectomy around 40 years of age. Despite their low frequency, triple negative breast cancers represent a subgroup marked by pejorative characteristics, a reserved prognosis, with limited treatment options. In this way, they are a priority in the eyes of research.

Informed consent

Informed consent was obtained from all the considered patients in order to publish their cases.

Ethical considerations

This observational retrospective study respected the ethical issues of honesty and integrity of the reported information, of objectivity and carefulness of the data that corresponds to each patient of the serie.

Data availability

Centre Hospitalier Sud Francilien, Ile de France, France

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