

TIMING AND DELAYS OF ADJUVANT RADIOTHERAPY FOR BREAST CANCER IN THE PUBLIC HEALTH SYSTEM IN BELO HORIZONTE

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Abstract: Introduction: Breast cancer requires a multidisciplinary approach, including surgical and clinical oncology and radiation. The synergy between these is associated with better outcomes and reduced mortality. Radiotherapy (RT) should be initiated within eight weeks after surgery when chemotherapy is not indicated. If administered first, it should be started within seven months of surgery. A delay in these terms can lead to poor results. Several problems in Brazil's public healthcare system, SUS, are responsible for the deficit of RT for patients with breast cancer. **Objective:** The present study was developed to estimate the time required to start adjuvant RT and its delays at Hospital das Clínicas of the Federal University of Minas Gerais (UFMG). **Method:** In the presented service, one hundred twenty-two charts of female breast cancer patients were randomly selected from patients submitted to treatment with curative intent from 2003-2017. The primary endpoint was to set the median time from surgery to adjuvant RT, and the secondary was to set the median RT time. **Results:** Ninety-four patients were included, and 26 were not due to a lack of information. The median age was 49 years old (21 to 90). 21.5% were stage I, 41.9% stage II, and 34.4% stage III at diagnosis. The first potential obstacle to delaying breast cancer treatment was the interval between the biopsy and its result, with a median time of 13 days but with a heterogeneous interval (1 to 77). The most extended median times were: referral to RT start and completion, 54 days (1 to 238) and 97 days (43 to 285), respectively. The median time from surgery to RT start was seven months (1 to 16), from diagnosis of cancer to RT completion nine months (2 to 29), and RT starts, and RT completion was 42 days (20 to 80). **Conclusion:** The results show significant heterogeneity for the completion of adjuvant RT, primarily due to long delays in RT start. Although the same oncology

team conducted all our cases, the fragmented system makes it even more challenging to receive multidisciplinary care. Besides that, most patients have a low level of education and need to fully understand the value of RT and the importance of performing it in the correct terms. Unfamiliarity with the bureaucracies of the health system and family insufficiency are also factors contributing to delayed treatment. Improving these deadlines is a complex task involving education, equipment acquisition, and planning. Some proposed solutions are the RT2030 project, hypo-fractionated RT techniques, and multidisciplinary support.

Keywords: Radiotherapy; public health; cancer treatment.

INTRODUCTION

Cancer treatment is usually multimodal and may include systemic therapy with drugs, surgery, and radiotherapy (RT), and has shown constant incorporation of new technologies and improvement of existing techniques. RT, including all its advances, remains essential in the approach to malignant neoplasms¹.

In the case of breast cancer, the synergy between RT and other treatments is associated with better results and reduced mortality. RT can be applied for the following purposes: neoadjuvant, before surgery, to reduce the size of the tumor and facilitate the procedure, in addition to preserving healthy tissues as much as possible; adjuvant, after surgery, to reduce the chance of tumor recurrence; definitive, when it is the cornerstone of treatment, not followed by surgery, but may be exclusive (isolated) or associated with systemic drug treatments. Radiotherapy (RT) should be started within eight weeks of surgery when chemotherapy is not indicated. If given first, it should be started within seven months of surgery. A delay in these terms can lead to poor results.

Radiotherapy treatment proved cost-

effective, with the estimated expenditure for setting up an RT center of approximately 5 million dollars. Considering that approximately 50% of patients diagnosed with cancer are of working age, if they are appropriately treated, they can generate income for the country at the end of the treatment, investing in teletherapy units interesting from an economic point of view.²

In 2007, the International Atomic Energy Agency (IAEA), together with Latin American (LA) specialists, identified a deficit of trained professionals, a lack of validated protocols and manuals, an implementation of infrastructure that disagreed with international parameters, and a lack of updated data about the infrastructure and human resources in this region³ proving that RT services in Latin America do not meet the needs of the population⁴.

In Brazil, there is significant difficulty in accessing radiotherapy treatment, reflected in inadequate deadlines for it to be performed. The large deficit in the number of RT services and devices is public knowledge⁵. If we analyze IAEA recommendations, corroborated by other authors, 60% of patients diagnosed with cancer in LMICs would be candidates for RT, with a device capable of treating an average of 500 patients per year, allowing us to calculate the deficit of teletherapy equipment in Brazil. Considering the estimated incidence of cancer in Brazil for 2020 being 625,000 cases, 375,000 would require radiotherapy treatment, requiring about 750 machines (versus 412 accounted for in the last RT census).

Minas Gerais (MG), the state of Brazil where we are inserted, has a sizeable territorial extension (the 4th largest in the country) and significant heterogeneity in social, economic, and cultural characteristics. It is the second most populous state, with an estimated population (in 2019) of 21,168,791 inhabitants, according to IBGE⁶. The Brazilian state has

the most significant number of municipalities: there are 853, corresponding to 15.5% of the total number of municipalities in the country.

The state of MG as a whole, and more specifically the city of Belo Horizonte (BH), the state capital, suffered a crisis associated with access to RT, exacerbated from November 2016 with the suspension of sessions on three devices in the capital due to malfunctions, with patients waiting in line for five months to start treatment^{7,8}. Belo Horizonte has seven services accredited for cancer treatments by the SUS⁹.

The Hospital das Clínicas of the Federal University of Minas Gerais (HC UFMG) is a public hospital located in the capital, general, university, integrated into the SUS, Special Unit of the UFMG and its main characteristics are: to serve all the specialties and subspecialties offered by the SUS; to be a teaching hospital certified by the Ministry of Education and Culture (MEC); act in serving society, in the training of human resources, in the development of research, production and the incorporation of technology in the health area. At HC UFMG, around 36,000 outpatient consultations are performed per month¹⁰, but unfortunately this hospital does not have its own RT center.

Usually, HC patients who should receive RT undergo it at the following centers, with the respective inter-hospital distances: Hospital da Baleia (5 km), Instituto Mário Penna/Luxembourg (5.4 km), Hospital Felício Rocho (3.5 km), Santa Casa de BH (1.1 km) and Hospital São Francisco (3.6 km). Some patients undergo radiotherapy treatment in other centers defined by the municipality of origin. On August 27, 2019, it was defined that HC patients with an indication for concomitant chemo-radiotherapy treatment (even more complex) would have the Hospital São Francisco as their direct reference.

Delays in starting and/or completing

radiotherapy treatment can have deleterious effects on the patient's treatment, including lower response rates, higher recurrence rates, and shorter survival ^{11,12}. The development of research focused on breast cancer in our country is highly relevant, involving studies aimed at pharmacological improvements in treatment and exploring issues related to the socioeconomic impact of the disease and access to radiotherapy.

Numerous initiatives to solve this problem have been tried in the public and private spheres but have failed. Thinking about the incredible complexity of the sector, and the different fronts of necessary work, mainly in the long term to achieve the results, the SBRT (Brazilian Radiotherapy Society) announced the creation of the RT2030 project. This project is conducted by SBRT itself, with the technical supervision of Fundação Dom Cabral, which will seek solutions so that within 10 years, that is, in 2030, the Brazilian population has full access to RT and, above all, to a Quality RT ¹³.

METHODOLOGY

This is a retrospective study (historical

control), initially including 122 breast cancer patients who had undergone adjuvant RT treatment in 2003-2017 and remained under oncological follow-up at HC UFMG. The primary objective was to define the median time from surgery to adjuvant RT, and the secondary objective was to define the median time to RT.

RESULTS

Of the 122 charts analyzed, 94 patients were included; 26 were not due to lack of information. The median age was 49 years (21 to 90). 21.5% were stage I, 41.9% stage II, and 34.4% stage III at diagnosis. The first potential obstacle to delaying breast cancer treatment was the interval between the biopsy and its result, with a median time of 13 days but with a heterogeneous interval (1 to 77). The longest median times were: the start and end of RT referral, 54 days (1 to 238) and 97 days (43 to 285), respectively. Median time from surgery to initiation of RT was 7 months (1 to 16), from cancer diagnosis to completion of RT 9 months (2 to 29) and initiation of RT and completion of RT was 42 days (20 to 80).

Interval	Median Time (days)
Biopsy to results	13 (1-77)
Referral to RT initiation	54 (1-238)
Referral to RT completion	97 (43-238)
RT initiation to RT completion	42 (20-80)
Surgery to RT initiation	7 (1-16)
Diagnosis to RT completion	9 (2-29)

Table 1 - Enrollment and Outcomes

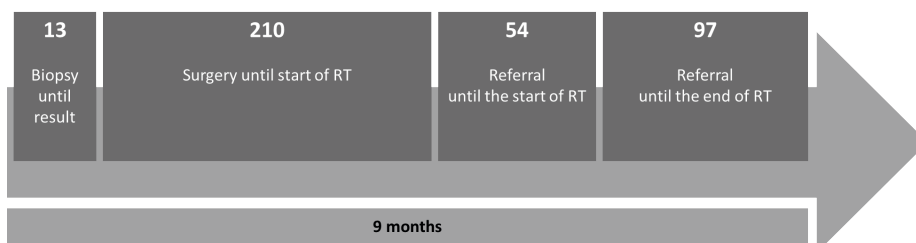


Figure 1 - Median time in days of the patient's journey

DISCUSSION

Although there is no publication of data in this regard, previously identified obstacles, in a non-systematic way, for cancer patients at HC UFMG to undergo radiotherapy treatment include a lack of knowledge on the part of the patient about the importance of this therapeutic modality, lack of understanding of the complex flow for scheduling and authorizing treatment; difficulties in providing the necessary documents to authorize the treatment; long distances from home to specialized centers (sometimes intercity transport is not adequately provided by the municipality of origin); difficulties in moving between the HC (where systemic treatments are carried out) and the RT center (especially in treatments where concomitance is essential); lack of financial resources for food while they are away from home; family failure.

As a way to optimize available radiotherapy resources, the role of hypofractionated RT techniques can be discussed. These consist of performing the treatment in fewer sessions than previous RT studies proposed, with a higher dose of RT applied in each session. Studies on the definitive treatment of head and neck cancer have shown that this technique is feasible, using 20 treatment fractions instead of the 35 usually used 14. Some studies used an even smaller number of fractions, such as five ¹⁵. Although studies suggest similar disease control rates, there are concerns about the possibility of greater toxicity with hypofractionated treatments.

Since the operational systems of the RT centers are not integrated, pending issues generated in the authorization process may take time to be resolved, directly impacting the treatment time. To authorize the treatment, for example, the tomography report performed to plan the RT fields is required to avoid fraud, but this also generates delays. Simple

solutions, such as an electronic medical record and an authorization system for automated and integrated high-cost procedures, would allow better identification of the demands for oncological treatments and greater agility for their releases. In addition, more excellent theoretical knowledge about neoplasms and their oncological treatments on the part of the audit, which in most cases does not have training in the oncological area, could simplify this process.

What can also lead to delays in the time to complete the treatment is corrective maintenance, which generally takes more than 15 days. Since most of the machines are considered obsolete, this corrective maintenance occurs much more frequently than desired, with a negative impact on the treatment of patients.

The distance to radiotherapy centers also impacts the approach to cancer patients, even reducing treatment adherence. In LA, there is a concentration of oncology services in large urban centers, and the rural population has to undergo long journeys, which delays diagnosis and treatment, potentially impacting the prognosis negatively. This poor distribution of services contributes to the migration of patients to large cities and increases pressure on cancer reference centers ¹⁶. Some case series have shown an increase in the rates of mastectomies for early breast carcinomas ¹⁷ and a reduction in the use of adjuvant RT after conservative surgery ¹⁸ for patients living in regions far from specialized clinics.

Health systems in LA face many challenges in cancer care, such as insufficient funding; concentration on the distribution of resources and services; inadequacy in numbers; insufficient training and distribution of professionals and equipment; lack of care based on socioeconomic, geographic, and ethnic specificities; among others ¹⁹. Added to these factors are political and humanitarian

crises, such as the current crisis experienced by the population of Venezuela, which end up preventing the maintenance of essential health services, leaving cancer care even more uncovered.

Another major challenge these countries face is related to information systems, and their collection on a systematic, routine, and national scale is essential for planning and expanding public policies. In addition, cancer education programs can be culturally insensitive and irrelevant, contributing to poorer patients suffering more when diagnosed with cancer²⁰.

CONCLUSION

Results are heterogeneous regarding the timing of adjuvant RT, mainly due to long

delays in starting RT. Although all cases are treated at HC UFMG by the same Oncology team, the system is fragmented, contemplating consultations in other hospitals, making multidisciplinary care even more difficult. In addition, most patients have a low level of education and need to fully understand the value of radiotherapy treatment and the importance of performing it on time. Ignorance of health system bureaucracies and family insufficiency are factors that lead to delayed treatment. Improving these deadlines is complex and involves education, equipment acquisition, and planning. Some proposed solutions are the RT2030 project, hypofractionated RT techniques, multidisciplinary support and patient navigation programs.

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