




Impact of the COVID-19 pandemic on breast surgery in a reference service for breast cancer treatment

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ABSTRACT

Introduction: The pandemic caused by the spread of the SARS-CoV-2 virus posed unprecedented challenges to health systems and societies worldwide. Among the greatest challenges was the importance of balancing the treatment of patients with potentially lethal diseases alongside the pandemic. Treatment for breast cancer, a time-dependent disease, was also compromised, as financial resources, supplies, medicines, and, especially, hospital beds needed to be allocated to assist those infected with the new coronavirus. Surgeries were suspended and surgical centers closed. To compare the number of breast surgical procedures before and during the pandemic and assess their impact on the proportional number of surgeries performed. **Methods:** This is a retrospective cohort study, reviewing procedures recorded from January 2015 to June 2021. **Results:** A total of 899 patients were included, the majority of whom were female; 58.5% of cases were oncological. The most prevalent surgery in both periods was conservative oncology (sectorectomy or quadrantectomy). There was a significant difference in the number of procedures performed before and during the COVID-19 outbreak, with a 43% drop during the pandemic. There was no significant difference in the pattern of surgeries. **Conclusion:** The pandemic caused a significant reduction in the total number of elective surgical interventions in the period analyzed — a delay that the literature identifies as a potential risk factor for disease progression and increased death rates.

KEYWORDS: pandemics; breast neoplasms; covid-19; elective surgical procedures.

INTRODUCTION

The first cases of severe acute respiratory syndrome 2 (SARS-CoV-2), caused by coronavirus 2019 (COVID-19), were documented in December 2019 and rapidly disseminated worldwide¹. In Brazil, the first confirmed case was identified on February 26, 2020, at Albert Einstein Hospital, in São Paulo. The World Health Organization (WHO) officially declared the pandemic on March 11th, 2020^{1,2}. The unexpected surge in demand for treating COVID-19 patients, coupled with the need to establish and sustain the treatment of other pathologies like cancer, exerted substantial pressure on healthcare services and instigated societal transformations³.

According to data from the Brazilian Society of Cancerology (*Sociedade Brasileira de Cancerologia* — SBC), cancer stands as one of the major global public health problems and the second leading cause of deaths (accounting for one in every six deaths) in the world⁴.

In Brazil, 625 thousand new records of the disease were projected for each year of the 2020–2022 triennium. Non-melanoma skin cancer emerged as the most prevalent, followed by breast and prostate cancer in females and males, respectively⁵.

One of the preventive and control measures implemented by public authorities during the COVID-19 pandemic was the provisional suspension of elective surgical procedures⁴. These measures aimed to redirect resources to address the pandemic, by preserving hospital beds for patients with respiratory infections, particularly in intensive care units^{4,6}. The debate surrounding the postponement of cancer treatment is controversial, since the definition of severity depends on the type of cancer and staging⁷.

Data from the National Cancer Institute (*Instituto Nacional de Câncer* – INCA) estimated an incidence of 66,280 new cases of breast cancer in women in 2020, a disease responsible for around 18,000 deaths in 2019⁸.

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As reported by the Brazilian Society of Oncological Surgery (*Sociedade Brasileira de Cirurgia Oncológica* – SBCO), in April and May 2020, the number of cancer-related surgeries decreased by 70%, and biopsies were reduced by 50 to 90%. It is estimated that between 50 and 90 thousand Brazilians were deprived of a cancer diagnosis in the first two months of the pandemic⁴.

In major Brazilian hospitals like Albert Einstein, in São Paulo, the decline in the volume of oncological surgeries, from March to May 2020, amounted to a 60% reduction compared to the corresponding period in 2019. At Hospital A.C. Camargo Cancer Center, also in São Paulo, the number of patients undergoing breast surgery during the same three months of 2020 was 13.17% lower than the figures recorded in the same quarter of 2019⁹.

In the United States and Europe, the decrease in cancer patient visits per week during the pandemic's peak infection rate was 44%⁹. In England, postponing cancer surgeries for six months is projected to elevate the mortality rate of cancer patients by 30% over five years, regardless of age, site, and stage of the disease¹⁰. In the United Kingdom, a 20% rise in mortality from cancer, including breast cancer, is expected as a result of the pandemic¹¹.

Caxias do Sul, the second most populous city in Rio Grande do Sul, experienced its most challenging period of the pandemic between March and July 2021, according to data from the State Health Secretariat (*Secretaria Estadual de Saúde* – SES). The department recommended the cancellation of elective surgeries for 30 days on February 22nd and again on May 25th of that year¹².

Delays in medical care, diagnosis, and initiation of treatment are strongly associated with a worsening of the prognosis of patients with breast cancer, potentially impacting survival rates³. Evaluating the risks and benefits of therapeutic and diagnostic measures requires personalized consideration, taking into account the oncological prognosis and the risk of COVID-19 transmission, especially in regions with high transmissibility^{1,3}.

Thus, the primary aim of this research was to compare the number of surgical procedures performed by the mastology team at Hospital Geral de Caxias do Sul in the pre-pandemic period, from January 2015 to February 2020, in relation to the pandemic phase, from March 2020 to June 2021. Additionally, the study endeavors to ascertain the proportion of procedures performed during both periods and to compare the pattern of interventions over the years.

METHODS

Type of study

This is a retrospective cohort study.

Population and sampling

The group studied consists of a review of 905 cases involving patients who underwent surgical procedures carried out by the

mastology team, from January 2015 to June 2021, at Hospital Geral de Caxias do Sul, a regional reference health facility in oncology for patients in the mountainous region of Rio Grande do Sul, Brazil.

Inclusion and exclusion criteria

The study included 899 patients who underwent surgery by the mastology team, at Hospital Geral de Caxias do Sul, from January 2015 to June 2021, regardless of gender and the purpose of the surgery — whether therapeutic, diagnostic, reconstructive, or aesthetic. Six cases were excluded from the study due to incomplete surgical information found in the electronic medical records.

Data collection

The data were extracted from the electronic medical records of the operated patients through a comprehensive review of the surgical maps for the period studied. These data were then tabulated in an Excel[®] spreadsheet, whose access was restricted to research participants, respecting the confidentiality agreement.

Analysis and interpretation of data

The information collected was analyzed from the database created. The significance level adopted was 0.1% ($p < 0.001$).

The qualitative variables were analyzed by calculating their absolute and relative frequencies and the quantitative variables, using standard deviation and central tendency (mean, mode, or median). To compare patients, χ^2 was used, based on two models. The analysis focused on comparing the number of surgical procedures conducted during the pre-pandemic years with those performed during the COVID-19 outbreak.

Ethical aspects

The researchers involved committed to keeping the data confidential, in accordance with the confidentiality agreement. The work was submitted to the Plataforma Brasil ethics committee. The study was approved by the Scientific and Editorial Board (*Conselho Científico e Editorial* – COEDI) of Fundação Universidade de Caxias do Sul — Hospital Geral.

RESULTS

Population analysis

899 patients who underwent surgery between January 2015 and June 2021 were included in the study, 868 of whom were female (96.6%). Of the total cases, 58.5% referred to cancer patients. Due to the diversity in surgical names and to standardize the analysis, patients were classified into seven surgery categories:

1. Conservative: sectorectomies and quadrantectomies in patients without a diagnosis of malignant neoplasia, such as resection of fibroadenomas, intraductal papillomas, ductal

ectasia, any benign tumors, recurrent abscesses, and other benign pathologies;

2. Oncological conservative: sectorectomies or quadrantectomies with an axillary approach, as indicated, in patients diagnosed with malignant neoplasia;
3. Mastectomy: complete removal of the mammary gland, with or without preservation of the nipple-areolar complex and the skin;
4. Mastectomy + reconstruction: complete removal of the mammary gland, with or without preservation of the nipple-areola complex and skin, and invariably includes reconstruction with an expander or silicone prosthesis;
5. Aesthetic, reparative, or corrective: excision of accessory mammary glands, resection of supernumerary nipples, prosthetic implants to repair congenital defects and genetic anomalies, mastopexies, reduction mammoplasties, and correction of gynecomastia;
6. Lymphadenectomy: excision of lymph nodes for diagnostic and/or therapeutic purposes;
7. Reconstruction: implantation of a silicone prosthesis or expander following oncological surgery.

Grouped by type of procedure, the analysis revealed that 315 patients underwent breast-conserving oncological surgery, constituting 35% of the sample and representing the most prevalent surgical indication. Another 263 cases involved non-oncological conservative surgery, accounting for 29.3% of the total. Mastectomy was performed in 109 cases (12.1%), while 101 cases involved aesthetic, reparative, or corrective surgery (11.2%). Additionally, 80 cases (8.9%) involved mastectomy with reconstruction, 20 cases (2.2%) were categorized as reconstruction procedures, and 11 cases (1.2%) involved lymphadenectomies (Table 1).

When comparing periods, the number of surgeries performed each year was as follows: 124 surgeries in 2015 and, successively, 139 in 2016; 146 in 2017; 160 in 2018; 173 in 2019; 123 in 2020, and 34 in the first half of 2021 (Table 2).

It is possible to observe the number of procedures in each semester of the period in Graphic 1.

Table 1. Surgical procedures performed from January 2015 to June 2021.

By type of surgery	Quantity (%)
Conservative	263 (29.3)
Oncological conservative	315 (35.0)
Mastectomy	109 (12.1)
Mastectomy + reconstruction	80 (8.9)
Cosmetic, reparative, or corrective	101 (11.2)
Lymphadenectomy	11 (1.2)
Reconstruction	20 (2.2)
Total	899 (100)

Pre-pandemic period

From January 2015 to February 2020, a total of 774 surgical procedures were recorded. Of this total, 57.1% were due to malignant breast neoplasia. Oncological conservative surgeries were also the most prevalent, accounting for 260 procedures (33.6%), followed by 232 non-oncological conservative surgeries (30%), 97 cosmetic, reparative, or corrective surgeries (12.5%), 95 mastectomies (12.3%), 65 mastectomies with immediate reconstruction (8.4%), 18 reconstructions (2.3%), and 7 lymphadenectomies (0.9%) (Table 3).

For direct comparison over the same number of months, in the 16 months immediately prior to the pandemic, from December 2018 to February 2020, a total of 220 procedures were recorded.

Pandemic period

Since the onset of the pandemic in March 2020 until the end of the first half of 2021 (16 months), a total of 125 surgeries were performed. Among these, 91 surgeries occurred between March and December 2020, and 34 in the first half of 2021. Notably, 67.2% of these patients were diagnosed with breast cancer.

Oncological conservative surgery remained the most frequent procedure, totaling 44% of cases, followed by 31 non-oncological conservative surgeries (24.8%), 15 mastectomies with immediate reconstruction (12%), 14 mastectomies (11.2%), 4 cosmetic, reparative, or corrective surgeries (3.2%), 4 lymphadenectomies (3.2%), and 2 reconstructions (1.6%) (Table 3).

It is possible to compare the proportion of procedures in the two periods in Graphic 2.

The χ^2 test was used to analyze the number of surgeries before and during the pandemic. There was a statistically significant difference, indicating a reduction in the number of procedures during the pandemic. The likelihood ratio was 20.58 and Pearson's χ^2 was 19.21.

DISCUSSION

The data from this research substantiated the hypothesis of a disparity between the number of surgical procedures prior to the pandemic and during the COVID-19 outbreak, wherein a 43% reduction was observed, consistent with findings from similar studies^{2,9}.

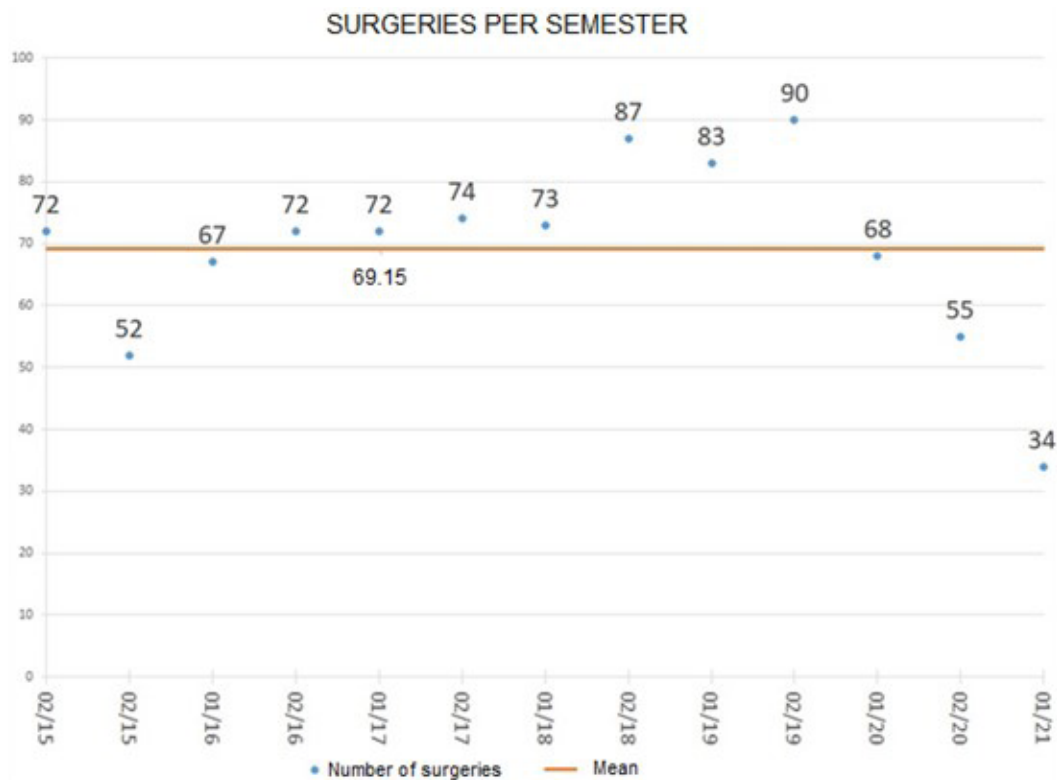
It is evident that conservative surgeries remained the most performed, especially oncological surgeries, regardless of the period evaluated. This fact reflects an evolution in increasingly earlier diagnosis, combined with advances in cancer treatment, such as neoadjuvant treatment. Furthermore, the multidisciplinary approach to patient care enables the implementation of less invasive surgical techniques.

The study also revealed a progressive increase in the total number of surgeries over the years, a phenomenon driven by population growth and the positioning of the service as a regional reference.

Table 2. Surgical procedures performed annually.

Surgery	2015	2016	2017	2018	2019	2020	2021*
Conservative	46	43	48	46	46	26	8
Oncological conservative	23	40	50	62	73	47	20
Mastectomy	22	13	14	22	20	16	2
Mastectomy + reconstruction	8	14	14	10	17	14	2
Cosmetic, reparative, or corrective	23	23	16	12	12	15	0
Lymphadenectomy	2	4	0	1	0	3	1
Reconstruction	0	1	4	7	5	2	1
Total	124	139	146	160	173	123	34

*First Half of 2021.



Graphic 1. Frequency of surgeries per semester in the period.

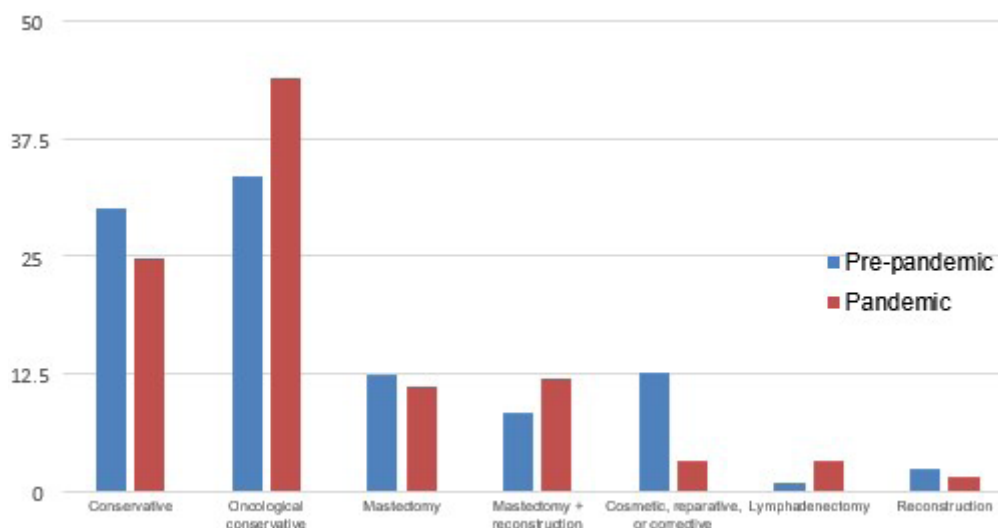
Table 3. Number of procedures performed in the pre-pandemic and pandemic periods.

Surgery	Pre-pandemic (%)	Pandemic (%)
Conservative	232 (30.0)	31 (24.8)
Oncological conservative	260 (33.6)	55 (44.0)
Mastectomy	95 (12.3)	14 (11.2)
Mastectomy + reconstruction	65 (8.4)	15 (12.0)
Cosmetic, reparative, or corrective	97 (12.5)	4 (3.2)
Lymphadenectomy	7 (0.9)	4 (3.2)
Reconstruction	18 (2.3)	2 (1.6)
Total	774 (100)	125 (100)

In 2015, 124 surgeries were registered, which increased to 139 in 2016 (12%), 146 in 2017 (5%), 160 in 2018 (9%), and 173 in 2019 (8%).

With the onset of the pandemic, there was a 28% reduction in the number of procedures in 2020 (123) compared to 2019; in the first half of 2021, the lowest volume of surgeries was recorded within the period analyzed, applying proportionality.

Comparing the 16 months immediately prior to the pandemic with the 16 months analyzed during the pandemic, the decline in the number of procedures reached 43%. This reduction corresponds to the phase marked by the most significant restrictions on scheduling elective procedures, coinciding with the peak of the pandemic in Caxias do Sul, experienced in the first half of 2021. The impact of COVID-19 on surgery schedules underscores the harm inflicted upon breast cancer patients during this period.



Graphic 2. Frequency of surgeries by period.

Despite the dedication of the administration and all health-care teams to uphold care for cancer patients, the surgical schedule endured sacrifices and many procedures were suspended during the most critical periods witnessed so far. The long-term repercussions of these delays, added to delays in the diagnosis of breast cancer, will have consequences that can be quantified in new studies.

CONCLUSIONS

The outcomes of this research converged with other studies that also demonstrated a significant reduction in the volume of surgeries during the pandemic period compared to the pre-pandemic period. There is potential for the study to progress by comparing larger samples, as the spread of COVID-19 has not yet come

to an end. Furthermore, in the long term, it may be valuable to observe whether there is any discernible impact on the survival rates of our patients.

AUTHORS' CONTRIBUTION

LHBLT: Conceptualization, Formal analysis, Investigation, Project administration, Methodology, Supervision, Validation, Writing – review & editing. CDSMD: Data curation, Software, Visualization. COMN: Data curation, Software, Visualization. FV: Conceptualization, Formal analysis, Investigation, Project administration, Methodology, Supervision, Validation, Writing – review & editing. KSDA: Data curation, Software, Visualization. MD: Data curation, Software, Visualization. MADL: Data curation, Software, Visualization. THR: Data curation, Software, Visualization.

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