Clinical Practice Article

Breast Imaging in the Time of COVID-19: A Singapore-based Breast Center’s Experience in the Midst of a Pandemic

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Abstract

The emergence of the COVID-19 pandemic presented new and yet uncharted challenges to the field of radiology, and consequently to breast imaging as a subspecialty. Maintaining a certain standard of care whilst ensuring the safety of patients and staff in our small Singapore-based breast imaging center are equally important and has resulted in modifications of our clinical practice and workflows. Screening patients for COVID-19 symptoms, risk factors, and potential exposure history has become paramount. Workflow changes have also included progressively deferring, and in some cases halting, nonessential services such as biopsies deemed to have a low risk of malignancy, routine follow-up imaging in postoperative patients or those with prior Breast Imaging Reporting and Data System 3 findings, and mammographic screening. Breast radiologists within our practice are also adapting to the changing landscape by playing a more active role in general radiology and emergency department reporting in order to reduce turnaround time and facilitate the discharge of inpatients. We have also enabled a sense of geographical segregation within our breast center to reduce potential exposure and cross-contamination risks. Although the near future remains uncertain, breast imaging within the broader scope of radiology practice will have to continually adjust to meet the ever-changing realities as this pandemic evolves.

Key words: COVID; COVID-19; breast radiology; breast imaging; workflow; biopsy trends.

Introduction

A novel coronavirus emerged in Hubei province, China, in late 2019 (1). Not long thereafter, the disease spread to many countries, Singapore being among the first, with its first case diagnosed on January 23, 2020. The contagious respiratory illness now known as COVID-19 has since been declared a pandemic by the World Health Organization, affecting 210 countries and territories, with greater than 6.5 million cases and almost 400 000 deaths reported as of June 2020 (2). Singapore itself has seen greater than 37 000 cases and 24 deaths, with numbers rising daily (3).

Hospitals, and consequently radiology departments, in Singapore and around the world are grappling with this pandemic in a number of different ways (4). These include drastically scaling down, and in some cases halting, nonessential and nonurgent radiology services in order to divert manpower and resources to areas of critical need. As a small breast imaging center within Singapore’s newest public hospital, we have found ourselves continuously modifying our clinical responsibilities and adjusting our workflows in order to appropriately respond to the evolving situation.
Key Messages
- The COVID-19 pandemic has brought previously unforeseen challenges to the practice of radiology, including breast imaging as a subspecialty.
- Our breast center has had to continually adapt to the evolving situation in order to ensure safety for both our patients and our staff, including the strict screening of patients for COVID-19 symptoms and risk factors, as well as modifying workflows and radiologists’ responsibilities in order to meet the changing landscape.
- Some of the changes in our practice have included scaling down select services such as screening mammograms, nonessential biopsies, and routine follow-ups, while also ultimately preparing for a gradual and safe resumption of breast care services once the pandemic moderates.

Background
Our breast imaging center comprises two digital mammography units, three US units, an interview room (for asking the patient questions and taking consent), an observation room (to monitor patients in the event of an adverse reaction following intervention), a reporting room for the radiologists, and a work room for the radiographers. The staff comprises three breast-trained radiologists, six radiographers, and front counter personnel (a patient service associate and health care assistant) who assist in registering and changing patients in preparation for imaging and/or intervention.

Diagnostic breast imaging and intervention forms the crux of our workload, with our patients predominantly referred by our institution-based breast surgeons, and with a smaller minority of patients referred to us by other clinical subspecialties. Inpatients requiring diagnostic breast imaging forms a minority subset of patients. As much as possible, we maintain a “one-stop” model in conjunction with our breast surgery colleagues whereby after surgical consultation, patients can have diagnostic breast imaging and, if necessary, biopsy performed on the same day.

Mammographic screening is not a major clinical service provided by our breast imaging center, as breast screening is a national program that falls ultimately under the purview of the Ministry of Health. As such, screening mammograms are primarily performed in publicly-funded outpatient clinics (referred to as polyclinics) scattered throughout Singapore. However, an in-house mammographic screening service is provided to the health care staff based at our hospital, which we refer to as the Well Woman Program.

Initial Outbreak
The initial stage of the COVID-19 outbreak in Singapore was marked by a few sporadic and predominantly imported cases, with no prevalent community spread of disease. Social, economic, and professional life continued with no major modifications on a day-to-day basis. Similarly, the breast surgeons’ clinics functioned as usual, with no major changes to the patient volume or clinical spectrum of diagnostic cases presenting for breast imaging. However, as evidence of community spread mounted and the need for enhanced precautions became more apparent (in line with the elevation of the Ministry of Health’s alert status), stricter infection control measures were put in place throughout Singapore’s health care institutions (5,6).

A Segregated Workforce
As a small radiology department, in addition to subspecialty work, the radiologists are expected to report a range of general imaging cases, including plain film, US, fluoroscopy, emergency imaging, and routine body imaging. Breast-trained radiologists move between different reporting rooms and workstations depending on what station they are assigned to during that session. With elevated infection control measures put in place, the radiology department was segregated into smaller teams. The concept of team segregation is not new; it is one of the lessons borne from reflections on the SARS outbreak in 2003 and its impact in radiology in Singapore (7,8). The breast radiologists are now stationed only in the reporting room within the breast center itself, maintaining physical distancing of at least one workstation, every effort has been taken to limit professional and social contact with members of the other radiology teams, both during and after work hours. At the workstations, the radiologists wear surgical masks and attempt to limit patient contact whenever possible.

Similarly, the radiographers have been divided into teams as well. Whereas previously some radiographers would frequently cross cover between general radiology, US, and breast imaging, this practice was suspended upon adoption of the segregation policy. Two or three radiographers are now stationed solely at the breast imaging center, with the added goal of maintaining a degree of physical distancing within the work room. The two trained sonographers in our department are designated to their own particular US room to further reduce the risk of cross-contamination.

Workflow Changes
In an effort to maintain service continuity and to keep our patients and staff safe, our department, including our breast imaging center, started a robust screening for COVID-19 workflow for outpatients. In addition to “patient-facing” staff being instructed to wear surgical face masks at all times, this also involved requiring all outpatients to complete a declaration form, which was reviewed by our front counter personnel (Figure 1). The form asked patients to declare their recent travel history, if they had contact with a person with COVID-19, and if they had fever and/or respiratory symptoms.
During the initial phase, when the outbreak was attributed to predominantly imported cases, recent travel history to particular countries was deemed highly significant. Patients with a positive travel history from those countries but otherwise well were allowed to proceed with imaging in our imaging center after being provided with a surgical mask by our front counter staff. If patients had respiratory symptoms, they would be ushered into an isolation room where a doctor would work them up for COVID-19. For these patients, breast imaging was deferred until they were found to be negative for COVID-19.

With the pandemic spreading quickly across the world, there was no longer a list of typical countries that would confer a patient to have a higher risk of COVID-19 infection. Any recent travel history was deemed significant, and if the patient additionally had fever and/or respiratory symptoms, they would be isolated and treated as a suspected case, with deferment of their breast imaging. From March 20, 2020, the Ministry of Health in Singapore also started issuing 14-day stay home notices to all Singaporeans, permanent residents, and long-term pass holders returning from overseas. With this new advisory, outpatients on stay home notices were offered rescheduling of their breast imaging until 14 days later.

Apart from being labor intensive, the other main challenge for this screening for COVID-19 workflow occurs when patients complete this declaration form in a cursory manner. At times, the history of recent travel history or acute respiratory symptoms were only elicited when consenting patients for a breast biopsy. This almost always creates immediate alarm
and stress for staff. The mammography, US, and interview rooms the patient had been in would have to undergo terminal cleaning, resulting in downtime. To overcome this, our front counter staff were retrained to be more proactive in highlighting to our patients the importance of completing the declaration form accurately. This also underscores the importance of using a surgical face mask when interacting with all patients in the current climate.

**Breast Screening**

In line with the statements issued by the American Society of Breast Surgeons, American College of Radiology, and Society of Breast Imaging (9,10), screening services were assumed not to constitute a necessary medical service during this time. As such, our in-house screening, Well Woman Program has been largely suspended. An additional impetus for this suspension is to minimize unnecessary staff movement between various departments within the hospital itself.

**Modifying Radiologists’ Roles**

The number of outpatients slowly began to drop as the outbreak evolved. At the same time, the patient volume in the emergency department grew, as more COVID-19 cases within the community were diagnosed, as well as many patients with otherwise minor upper respiratory tract symptoms presented for assessment. In an effort to increase turnover and reduce wait times and exposures within the emergency department, a one-hour turnaround time initiative for chest x-ray reporting was established. All radiologists, breast-trained included, contribute to x-ray reporting to maintain this turnaround time, and more radiologist manpower is allocated for after-hours and overnight reporting to address this new need. In addition, due to diagnostic breast imaging workload decline, breast radiologists contribute more to general radiology reporting.

**The Outbreak Worsens**

Since early April 2020, Singapore has been seeing rapidly increasing numbers of cases, rising from approximately 1000 on April 1 to greater than 37 000 cases in June. In response, the government of Singapore instituted a “circuit-breaker” period spanning April 7 to June 1, during which time Singaporeans were advised to stay home as much as possible and to limit outdoor movements except for essential work or activities (11). With the spike of community spread in Singapore, a patient’s recent travel history became less significant and the presence of respiratory symptoms became paramount.

A number of issues arose as they pertain to breast imaging within this new environment. What constitutes “essential” breast imaging? How do we distinguish urgent from nonurgent cases? How can we constructively engage our surgical and primary care colleagues to limit patient referrals for nonurgent breast imaging? Is there a potential for delay in breast cancer diagnosis and treatment? There are no clear-cut answers to the above questions, and certainly each practice’s approach to this evolving pandemic are bound to have variations (12).

**Workflow Changes**

In response to this new phase, our department has found itself faced with new challenges. In an attempt to limit even more unnecessary patient contact, our surgical colleagues have largely deferred nonurgent new cases and have postponed routine follow-up appointments. Our breast imaging center has also followed suit by postponing routine follow-up diagnostic imaging by one to two months, at times reviewing cases individually to ensure such postponements are acceptable and unlikely to be detrimental to patient safety or outcomes.

All Singaporeans venturing outdoors during the circuit-breaker period were required to wear face masks regardless of symptoms, travel, or exposure history. This also applied to all outpatients and visitors to the hospital and our breast imaging center. In addition to the routine use of face masks, gloves, and occasionally surgical gowns, as well as near obsessive hand-washing practice and twice-daily temperature-taking by all staff, we also implemented further distancing policies for our patients—not just by spacing patients out within the waiting room itself, but by spacing out their appointment times.

We continue to maintain a “one-stop” clinic for patients who are referred to us by our breast surgery colleagues whenever possible. We continue to perform biopsies for those with suspicious lesions, prioritizing those with highly suspicious (i.e., Breast Imaging Reporting and Data System [BI-RADS] 5) masses, although these are performed with no major changes to the routine personal protective equipment (PPE) the radiologists wear, inclusive of a surgical face mask and gloves. For patients we deem as less urgent and with less suspicious lesions (e.g., younger patients with BI-RADS 4 probable fibroadenomas, fibrocystic changes, or other benign breast diseases), for whom we cannot perform a biopsy on the same date as their diagnostic imaging workup, we have tried to defer biopsies for four or six weeks. The aim of this is to reduce unnecessary patient movements into and out of the hospital and within the broader community. For the most part our patients are reasonable and considerate upon frank discussion in light of our new shared realities.

**Breast Cancer Workup Within the Department of Radiology**

A new diagnosis of breast cancer may be incomplete without a staging workup. Computed tomography, nuclear medicine bone scan, and at times MRI scans are required for complete assessment before tumor board meetings. These scans are prioritized to proceed if the patient is not a suspected or confirmed COVID-19 patient. In Singapore,
all patients who are positive for COVID-19 are placed in quarantine in isolation facilities rather than at home. It is unlikely that staging scans for any confirmed COVID-19 patient who is unwell or in intensive care would be prioritized. Nevertheless, for COVID-19 patients with mild or moderate symptoms in inpatient isolation wards, the decision of whether to proceed with staging scans while still positive for COVID-19 needs to be in conjunction with the clinical team as well as in concordance with newly established guidelines for the triage and treatment of such patients, as outlined in the COVID-19 Pandemic Breast Cancer Consortium (13). This scenario has yet to materialize at our institution; nevertheless, performing staging scans for COVID-19-positive patients remains possible, if necessary. Such cases would be scheduled at the end of the day, with terminal cleaning of the CT room thereafter.

Shifting Trends
The breast imaging workload in the department and the rate of breast biopsies have decreased substantially in the four months since the first COVID-19 case in Singapore at the end of January 2020 (Figure 2). However, it is encouraging to see that the rate of breast cancer diagnosis has remained fairly steady and that we have been able to reduce our benign breast biopsy rate with our current strategies. It remains to be seen how these trends may change in the months to come.

Breast Imaging Within the Broader Hospital Environment
We are also mindful that we function as one unit with the larger ecosystem of the hospital and community. Our hospital is situated in close proximity to the largest COVID-19 cluster in Singapore (a foreign worker dormitory). As such, we are acutely aware of the urgent need for inpatient beds for those who require closer monitoring and treatment. Therefore, we prioritize diagnostic breast imaging and intervention for routine non–COVID-19-positive inpatients when requested by our ward colleagues, with the intention of facilitating discharge to free-up valuable bed space. However, as a measure of protection for our own staff, breast imaging for inpatients with fever or other upper respiratory tract symptoms is deferred until they are deemed low risk and/or their COVID-19 swabs return negative. Even so, we manage inpatients with the utmost care, donning PPE, including N95 masks, gloves, and gowns when necessary and if any respiratory symptoms are present.

As is now, the standard practice with other multidisciplinary meetings across the hospital, our twice monthly breast radiology–pathology and tumor board meetings have now also moved online. Hospital-approved, cloud-based video conferencing applications such as Webex (www.Webex.com) allow for the continuation of these meetings that have always played an essential role in patient care, while being cognizant of issues pertaining to security and patient data protection.

Figure 2. An overview of breast biopsy trends and breast cancer diagnosis in the breast imaging center over the previous six months. T1-T4 refers to the T component of staging.
Future Directions

In Singapore, as in the rest of the world, the possibility of the outbreak worsening and widespread community transmission is ever-present. Radiology practice, including breast imaging, must be able to respond in turn.

One potential response within our breast imaging department is to enact further geographical segregation by creating another workstation post within our observation room, separate from the reporting room, which we have so far been largely able to avoid using due to the very low risk of patient adverse reactions to breast interventions. This is made possible by the presence of network points within the observation room to allow workstation access.

Another response is to enable temporal segregation by creating two separate teams within the breast imaging department. Each team would comprise one or two breast radiologists, one or two radiographers, and one front counter staff and a nurse, working staggered two to three day shifts at a time in order to avoid intermingling. These teams would be situated only within the breast imaging center, as is our current practice. This would ideally allow for continuity of care and the ability to continue urgent breast diagnostic imaging and intervention in the event one or more members within a particular team should be diagnosed with COVID-19.

We must also be prepared for the eventuality of a post- or even “new normal” COVID-19 world, one in which an overwhelming desire for a return to normalcy will be palpable. For breast imaging, this will mean a period of increased workload volume as patients return in large numbers for their screening mammograms, previously deferred biopsies, and follow-up imaging. The Society of Breast Imaging has outlined a number of implementable suggestions for breast centers to enable a safe environment while gradually resuming breast care services. This will also entail discussions with our breast surgery, pathology, and oncology colleagues to develop a plan to meet the needs of not just our patients but health care providers as well (14).

Conclusion

The COVID-19 pandemic has upended daily life and consequently medical practice on a global scale to a level most of us have never experienced or anticipated. It may also be imperative in the future to assess what, if any, long-lasting trends were established due to delays in diagnosis and treatment of breast cancer as a direct consequence of the pandemic. It is impossible to say at this juncture what the immediate future holds in store not just for radiology but for breast imaging as a subspecialty. It is, however, prudent to anticipate changes and to prepare for whatever possibilities may come to pass.

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Conflict of Interest Statement

None declared.

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