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# Breast Reconstruction in a Coronavirus Disease 2019 Hub

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**Background:** The coronavirus disease 2019 (COVID-19) pandemic presented a dramatic challenge to healthcare systems. Humanitas Clinical and Research Hospital (Rozzano, MI, Italy) was declared a regional hub for the treatment of COVID-19 patients. Our plastic surgery team, in consultation with our breast surgery colleagues, decided to perform immediate implant-based breast reconstruction for patients undergoing mastectomy for cancer. In this report, we present our experience performing breast reconstruction with a new protocol in the first month following the COVID-19 pandemic in the most affected region in Italy.

**Methods:** We adopted a new protocol to treat patients with breast cancer during the COVID-19 pandemic. The main goals of our protocol were to reduce the risk of COVID-19 spread for both patients and clinicians, postpone nononcologic and more advanced surgery, develop rapid recovery for early patient discharge (within 24 hours from surgery) through pain management, and finally reduce postoperative consultations.

**Results:** The protocol was applied to 51 patients between early March and early April 2020. After 1 month, we decided to retrospectively review our experience. We found no significant differences in terms of postoperative pain and complication rate compared with our data in the pre-COVID period.

**Conclusion:** Our new protocol is safe and effective, enabling tumor resection and immediate implant-based breast reconstruction, without increasing risks to the patient or staff. *(Plast Reconstr Surg Glob Open 2020;8:e3043; doi: 10.1097/GOX.0000000000003043; Published online 15 July 2020.)*

## INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic in northern Italy (more specifically in Lombardy) mandated a healthcare reorganization in order to preserve resources and free up intensive care unit (ICU) beds.[1–3] Humanitas Clinical and Research Hospital was declared one of the regional hubs for the treatment of COVID-19 patients. Consequently, the whole hospital setting was reorganized: a response plan was developed to establish a cohorted ICU, emergency department, and wards dedicated to the treatment of COVID-19 patients while maintaining clinical care of non–COVID-19 patients in a different dedicated ICU and wards.[4–6] This plan required a total reorganization of hospital spaces, aiming at obtaining appropriate procedure of reception, assessment, isolation, and movement of suspected cases and maintaining a low volume of non-COVID activity.

Nonurgent/elective surgeries were cancelled, including aesthetic surgery procedures. Breast cancer resection continued, together with the breast reconstruction performed by the plastic surgeons. The hospital retained a small amount of elective nondeferrable oncologic cases, amounting to <10% of normal activity. Breast cancer treatment was not suspended because, although facing with noncritical cases, a delay could potentially impact on the overall survival of the patients. Furthermore, surgical procedures for breast cancer do not need postoperative ICU, and as a result, they did not impact on the main goal of the hub. We agreed with our breast surgeons that immediate implant-based breast reconstructions would not impact on the quality of life of the patients and would not increase

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the risk of contracting the coronavirus infection. Flap surgery, both pedicle and microvascular, was postponed together with stage II breast reconstructions, capsulotomies, revision of previous reconstructions, and autologous fat grafting procedures.

The risk related to virus outbreak determines a change and an evolution in our clinical practice, whose aim is to offer the best standard of care with the highest reduction of risk of infection as well as lowering the length of hospitalization and the number of postoperative controls as much as possible.[7] In this article, we outline the protocol adopted since the outbreak and how these new rules have impacted patients with breast cancer 1 month out from their adoption. These recommendations derive from our clinical experience and are not intended to supersede individual physician judgment, nor institutional policy or guidelines. In fact, we are experiencing wartime medicine that requires adequate response to patients' needs on the basis of empiric approaches.

## METHODS

The protocol can be divided into preoperative, anesthesia, intraoperative and postoperative recommendations (summarized in Tables 1–2).

### Team Structure and Preoperative Assessment

Our first aim was to reduce the risk of infection between the members of the Plastic Surgery Department; for this reason, we strictly divided the workforce and work shifts.

**Table 1. Main Goals of Breast Reconstruction in a COVID-19 Treatment Hub**

| Main Pillars of Postoncologic Immediate Breast Reconstruction in a COVID-19 Hub |
|---|
| • Cut down risk of infection for both clinicians and patients performing safe procedures |
| • Fast recovery and discharge (within 24 h from surgery) through pain management |
| • Postpone nononcologic procedures and more advanced procedures |
| • Reduction of postoperative consultations |

**Table 2. Internal Guidelines for Breast Reconstruction**

| |
|---|
| Preoperative recommendations |
| • Subdivision of plastic surgery team in subgroups |
| • Double-step screening for detection of any positive case before surgery |
| Anesthesia and pain control |
| • Proper protection of anesthesiology team and nurses |
| • Videolaryngoscopy instead of classical tracheal intubation, which adopts laryngoscope |
| • Intercostal blocks, TPVBs, and the interfascial blocks of the pectoral region to reduce postoperative pain and help fast dismiss |
| Intraoperative recommendations |
| • Proper protection of the operators |
| • Immediate breast reconstruction adopting implants (tissue expanders or breast prosthesis) |
| • Symmetrization of contralateral healthy breast postponed |
| • Pedicled flaps or microsurgical flaps postponed |
| Postoperative recommendations |
| • Reduction of postoperative consultations |
| • Tutoring patients with telemedicine to avoid access to the hospital |

TPVB, thoracic paravertebral block.

Our unit of 8 plastic surgeons was divided into teams of 2 members. Every day a team was assigned to the operating theater, another one worked in the outpatient clinic while the remaining 2 teams were at rest. Teams shifted; so they were never in contact with the members of other teams. Should one team come in contact with the virus, one of the resting teams could replace it.

The oncologic screenings were cancelled at the beginning of the outbreak. For this reason, all the patients treated in this period were the ones already scheduled to undergo breast cancer resection and reconstruction in March 2020.

Patient selection was critical, and screening for possible COVID-19–infected patients was crucial. At the time of writing, commercially available antibody assays had not been validated yet, and the 1-hour polymerase chain reaction–based assay was not available.[8–10] For this reason, in compliance with the rules enacted by the Lombardy government, we followed a double-step screening approach. Indeed, evidence shows that pharyngeal swab suffers from serious limitations (eg, high false negatives in nonsymptomatic patients).[11] Therefore, we decided as a first step to perform both a low-dose computed tomographic scan of the chest (thickness, 2.5 mm) and a pharyngeal swab during the preoperative examination to all patients. These examinations were performed close to the scheduled date of the procedure (3 days before the procedure or less). The computed tomographic scan is more sensitive in identifying possible interstitial pneumonia (even subclinical forms) in asymptomatic patients.[12–14] The combination of the 2 examinations made us confident to identify all negative patients. This was crucial because a patient with a COVID-19 pneumonia has an increased risk of developing complications during and after the general anesthesia.[4]

The second step screening was performed on the day of the operation when the patient was tested (we usually looked for signs of cough, breathing difficulties, pharyngitis, diarrhea), and the body temperature was assessed; if the patient had a temperature over 37.7°C (>3 times, at a distance of 30 minutes), the procedure was cancelled.

### Anesthesia and Pain Control

When the patient had passed the 2-step screening approach, the procedure could be finally performed, and the patient was prepared to undergo a general anesthesia. It should be underlined that even though preoperative screening had been fulfilled, for further safety, we behaved as if the patient was COVID-19 positive and therefore a potential source of infection. In fact, other operative units had some patients who were identified as infected by coronavirus in the postoperative period.

The anesthesiologist and nurse had to wear appropriate personal protective equipment, including a fit-tested disposable N95 respirator mask, eye protection, gown, caps, protective footwear, and gloves (using the double-gloving technique); in fact, intubation has a high risk for droplet dispersion.

Instead of the classical tracheal intubation (which adopts a laryngoscope to move the tongue and soft tissues of the mouth), our anesthesia department chose to adopt

videolaryngoscopy. Videolaryngoscope reduces the risk of exposure to possible droplets and contamination so that the operator does not need to stay close to the patient to see the vocal cords, but can stay at a safe distance by looking at the screen.[15] Clamping the endotracheal tube for connections and disconnections was also appropriate.

Peripheral nerve blocks of the thoracic region, including intercostal blocks, thoracic paravertebral blocks, and the interfascial blocks of the pectoral region, are not contraindicated in patients who have COVID-19. These nerve blocks are used for intraoperative anesthesia and postoperative analgesia for a variety of chest surgeries, including mastectomies. We have decided to adopt this technique in several cases to achieve a better postoperative pain control, allowing an earlier patient discharge.

**Intraoperative Recommendations**

We administered perioperative antibiotic prophylaxis with one shot of cefazolin 2000 mg endovenous (e.v.) to all patients (the patients allergic to cephalosporins were administered clindamycin 600 mg e.v.). In case of previous radiotherapy of chemotherapy, antibiotic treatment with cephalexin (1000 mg p.o. × 2) or clindamycin (150 mg per os [p.o.] × 4) was continued until removal of drains.

We decided to perform only implant breast reconstruction using implants, either 2-stage expander/implant or direct to implant[16,17]; pedicled flaps (eg, latissimus dorsi flap) or microsurgical flaps were not used because they lead to a longer hospitalization and a higher risk of getting a coronavirus infection.

The prepectoral approach was used only in patients who were not smokers/obese, with previous radiotherapy or chemotherapy, no other diseases and with extremely vital mastectomy flaps. In case of prepectoral reconstruction, we used an acellular collagen matrix (Fortiva; Tutogen Medical Gmbh Industriestresse, Neunkirchen am Brand, Germany) for the coverage of the implant. In case of direct-to-implant reconstructions, we opted to postpone any procedure on the contralateral side.

As described for anesthesiologists and nurses, the surgeon too had to be protected as if the patient was infective. For this reason, the N95 respirator mask and the eye protection were mandatory during all the procedures. This is essential to avoid possible infection of the operators, which could potentially put the entire department at risk. In fact, despite none of our patients testing positive for COVID-19, we experienced cases in other operative units tested positive for the coronavirus in the first postoperative period (we assumed they contracted the infection before the admission or during the hospitalization).

For subpectoral implant placement, the pocket is created by elevating the pectoralis major muscle, from the lateral border to the sternal insertions as in the traditional technique; in a normal setting, the lateral wall of the pocket is made by elevating the serratus anterior muscle (or the fascia only), which is then sutured to the lateral border of the pectoralis major muscle. We have decided to avoid the elevation of the serratus anterior muscle to reduce postoperative pain (we elevated serratus fascia only if it was easily found). The lateral portion of the implant was kept in place by suturing the lateral border of the pectoralis major muscle to subcutaneous tissue. We placed only a single #19 French surgical drain within the submuscular pocket; we did not use >1 drain to reduce the number of postoperative consultations. Suture and medication followed the common protocol with the subcutis sutured with simple interrupted sutures and then the epidermis with intradermal suture. At the end of the procedure, an elastocompressive dressing was applied.

All the patients were discharged on the first day postoperatively, but if the procedure was performed in the early morning, we opted to dismiss them on the same day. We considered this aspect a crucial point to reduce the hospitalization as far as possible.

**Postoperative Protocol and Telehealth**

All the patients had their first follow-up consultation 1 week postoperatively; we set appointments every 30 minutes to reduce the number of patients in the waiting area. This was essential to reduce the risk of COVID-19 transmission among patients. During this examination, the dressings were removed, the area was assessed, the incision area was cleansed, the drain was removed, and a crisscross-like bra was applied to the patient as postoperative medication. The average duration of the visit was the same as in normal setting (12.3 minutes). We usually see patients every week for the first month (at least 3 visits in the first month), and we remove drains after a mean time of 12 days. In this emergency situation, we considered essential to limit the number of consultations (only one in the first month, if possible).

Each patient had a person of reference (tutor) to whom she could communicate possible symptoms, such as fever, infection, and fluid collection. If needed, the patient could send pictures through a secure system that guarantees privacy. On the other hand, the tutor was asked to call the patient once a week to monitor their clinical progression. Tissue expansions and all demandable procedures were postponed.

## RESULTS

We have applied this protocol starting from March 9th to April 9th, and after 1 month, we decided to retrospectively review our experience. A total of 51 patients have been treated since then. The average age was 53.4 years old, 13 patients (25.5%) underwent a lumpectomy in the past, 11 (21.6%) had previously undergone radiotherapy, 3 (5.9%) had received neoadjuvant chemotherapy, 16 (31.4%) were smokers, 5 (9.8%) were obese (body mass index >30), and 2 (3.9%) suffered from diabetes. All the patients were checked with the double-step screening approach, and 50 of 51 came back negative for the COVID-19. None of these patients subsequently tested positive for COVID-19. Only 1 patient out of 51 came back positive to the pharyngeal swab and was rescheduled 3 weeks later (after she had 2 consecutive negative pharyngeal swabs).

Sixteen patients (31.4%) underwent a skin-sparing mastectomy followed by retromuscular tissue expander placement, 2 (3.9%) a skin-reducing mastectomy followed

**Table 3. Number of Patients Treated and Surgical Procedure Applied**

| Surgical Procedure | No. Patients | Type of Reconstruction | Plane |
|---|---|---|---|
| Skin-sparing mastectomy | 16 | 16 tissue expanders | 16 retromuscular |
| Nipple-sparing mastectomy | 33 | 23 definitive breast implants | 3 prepectoral<br>20 retromuscular |
| | | 10 tissue expanders | 10 retromuscular |
| Skin-reducing mastectomy | 2 | 2 tissue expanders | 2 retromuscular |

**Table 4. Mean Postoperative Pain at 1 Week**

| | Mean Pain Value (VAS Scale) at 1 wk Postoperatively |
|---|---|
| Skin-sparing mastectomy | 3.5 |
| Nipple-sparing mastectomy | 3.9 |
| Skin-reducing mastectomy | 5 |

by retromuscular tissue expander placement, and 33 (64.7%) a nipple-sparing mastectomy. Among these last patients, 10 (30.3%) were reconstructed with a tissue expander, whereas 23 (69.7%) with a definitive breast implant (3 in a prepectoral fashion, the rest in a retromuscular pocket). All these patients underwent the intraoperative sentinel lymph node biopsy; 9 of them had a lymph node positive for cancer and were treated with the homolateral axillary dissection (Table 3).

The mean volume of the expanders we used was 450 cc, whereas that of breast implant was 210 cc. Mean operative reconstruction time was 52 minutes.

One month after the adoption of this protocol, we had one case of seroma in a nipple-sparing mastectomy; no hematoma, infection, skin necrosis, wound dehiscence, or implant displacement have arisen. The mean virtual analog scale (VAS) score (0–10) for the postoperative pain at 1 week was 3.5 in case of skin-sparing mastectomies, 3.9 for nipple-sparing mastectomies, and 5 for nipple-sparing mastectomies.

## DISCUSSION

The COVID-19 pandemic caused by severe acute respiratory syndrome coronavirus 2 changed our lives and hit the whole healthcare system hard, leading to a rapid change in the local healthcare policy and medical practices. Nonurgent/elective surgery was cancelled, including aesthetic surgery procedures; only breast cancer resection and reconstruction continued.

For this reason, we adopted a new protocol; its main pillars were to postpone nononcologic and more advanced surgery, to develop rapid recovery for early patient discharge (within 24 hours from surgery) through pain management, and finally, to reduce postoperative consultations. We have greatly emphasized the following concepts: screening the patients before surgery (with a double-step screening), protecting all the people working in the operatory room, performing only implant breast reconstruction using implants (either 2-stage expander/implant or direct to implant), discharging the patients as soon as possible, reducing the number of postoperative consultations, and strengthening the telemedicine.

From the data collected after the first month of COVID-19 pandemic, we can assert that our protocol has been safe and effective in achieving the goals that have been set.

Our team management and, in particular, our shifting rotation, have been sufficient to reduce contamination, and only one member of the staff contracted the virus (without developing any symptom) and was isolated, but the rest of the team could keep on working. Double-step screening has been revealed to be efficient in early detection of patients affected, and only 1 patient had to postpone surgery for a positive swab, although being asymptomatic. Surgery was postponed for 3 weeks after a double negative swab. Mean operative reconstruction time (52 minutes) was similar to the pre-COVID period (mean, 56 minutes).

We were able to reduce the length of hospitalization of these patients, thanks to improved pain control, obtaining comparable results with the pre-outbreak period. Surgical results were similar to the pre-COVID period in terms of complications and postoperative pain. However, due to the limited number of patients enrolled, a direct comparison with the pre-COVID data cannot be assessed. Finally, telemedicine offered an alternative to communicate with the patients in the postoperative period and will likely become a common part of future medical practice.

## CONCLUSIONS

The outbreak, especially in a densely populated region such as Lombardy, has radically changed our daily practice, and we had to face a total bending of our daily procedure. Nevertheless, with a complete reorganization of our activity, we were able to keep providing breast reconstruction that we consider an essential part of breast cancer treatment.[18]

We are convinced that the main challenge is to define guidelines that can be adopted by every hospital in Italy and, possibly, in other countries, to deal with patients with breast cancer not only during the acute phase of the coronavirus outbreak, but also during the secondary phase. This problem is likely to last until the discovery of a vaccine or a possible cure. Therefore, during this period, we will have to find, together with our breast surgeons, the best solution in terms of early diagnosis, management of breast cancer prevention and surgical treatment, minimizing risk of infection. Our new protocol has shown to be effective and safe, ensuring the possibility of combining the tumor resection and the reconstruction in a secure environment with the same risks for our patients as in an ordinary setting.

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