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Original article

Impact of COVID-19 on hand surgery in Italy: A comparison between the Northern and the Southern regions

*Impact de la Covid-19 sur la chirurgie de la main en Italie:
comparaison entre les régions du Nord et du Sud*

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ABSTRACT

The aims of this study were to evaluate the impact of the COVID-19 pandemic on emergency and elective hand surgery in four Italian regions that had either a high (Lombardy and Piemonte) or a low (Sicilia and Puglia) COVID-19 case load to discuss problems and to elaborate strategies to improve treatment pathways. A panel of hand surgeons from these different regions compared and discussed data from the centers they work in. The COVID-19 pandemic had an enormous impact on both elective and emergency surgery in Italy, not only in highly affected regions but also – and paradoxically even at a higher extent – in regions with a low COVID-19 case load. A durable and flexible redesign of hand surgery activities should be promoted, while changing and hopefully increasing human resources and enhancing administrative support. Telematics must also be implemented, especially for delivering rehabilitation therapy.

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R É S U M É

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Les objectifs de cette étude étaient d'évaluer l'impact de la pandémie de COVID-19 sur la chirurgie d'urgence et électorve de la main dans 4 régions italiennes avec un impact COVID-19 élevé (Lombardie et Piémont) ou faible (Sicile et Pouilles), pour discuter des problèmes et élaborer des stratégies pour améliorer les voies thérapeutiques. Un panel de chirurgiens de la main des différentes régions a comparé et discuté les données des centres dans lesquels ils travaillent. La pandémie de COVID-19 a eu un énorme impact sur la chirurgie électorve et d'urgence en Italie, non seulement dans les régions fortement touchées mais aussi – et paradoxalement même à un degré plus élevé – dans les régions à faible charge de cas de COVID-19. Il faudrait promouvoir un remodelage durable et flexible des activités de chirurgie de la main, avec un changement dans la gestion des ressources humaines et, espérons-le, une augmentation des ressources humaines et un soutien administratif plus élevé. Un soutien télématique devrait également être mis en place, notamment pour dispenser la rééducation.

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Introduction

On February 21st, 2020, Italy was the first nation in Europe to report that a patient was diagnosed with COVID-19, in the region of Lombardy. After that, cases increased exponentially, leading the government to declare a country-wide lockdown on March 9th, 2020. While some regions – mainly in Northern Italy, with Lombardy being the most affected one – experienced an uncontrolled spread of the infection, others – especially in Southern Italy – experienced a much lower rate of COVID-19 infections. Despite these huge differences, the whole national health system was deeply affected, requiring an immediate, dynamic and long-term reorganization of all urgent and elective clinical activities to respond to the pandemic.

In the peak phase, major changes were adopted worldwide including suspension of elective surgery and reassignment of health professionals to COVID-19 units [1–5]. However, this pandemic forced us to profoundly reorganize healthcare delivery: patient pathways – including not only surgery but also consultation and hospitalization – hospital spaces and work time have already been modified several times in the last months and this pandemic is likely to have long-lasting impact on the treatment of all non-COVID-19 diseases also.

The aims of this study were to evaluate the impact of the COVID-19 pandemic on emergency and elective hand surgery in four Italian regions with either a high or low COVID-19 case load, to discuss the main problems encountered in daily clinical practice during this period, and to elaborate strategies to improve treatment pathways for hand surgery in light of the long-term reorganization of the healthcare system imposed by the COVID-19 pandemic. To evaluate the differences in the clinical impact of the pandemic, a panel of hand surgeons from the two Northern regions with the highest COVID-19 case load (Lombardy and Piemonte) and two Southern regions with a low COVID-19 case load (Sicilia and Puglia) compared and discussed data from the centers they work in.

Materials and methods

A questionnaire on changes in hand surgery activity during the COVID-19 lockdown was completed by hand surgeons from 7 centers in Northern Italy and to 16 centers in Southern Italy. All Sicilian centers of the "Sicilian Hand Club" were included. The panel included hand surgeons working in specialized public hospitals for hand trauma and/or elective surgery, but also hand surgeons working in accredited private practice (private facilities providing services payable by the national health care service) and

in private practice, to provide a comprehensive view of the different clinical realities.

The questionnaire addressed the changes in elective and trauma surgery activities (from March 9th to June 30th compared to the previous 3 months), the perioperative protocols, the postoperative management and rehabilitation of the patients, the management of human and material resources (Table 1). Ischemic conditions (amputation or subamputation) and active bleeding were considered as emergency cases, while all other traumas (including exposed fractures, nerve or tendon injuries) were considered as urgent cases. Finally, difficulties encountered during the pandemic in clinical work, local protocols and strategies adopted or suggested to improve the management of hand surgery patients were discussed among all the hand surgeons involved.

Results

Lombardy and Piemonte

In the two northern regions with the highest COVID-19 impact, there was a suspension of all elective or non-urgent hand surgery activity imposed by the regional government starting on March 9th. The load of emergency hand cases increased in three centers, decreased in another three centers (<20% in two centers and 20–50% in one center) and was unchanged in one center for elective surgery only. In all but two centers, emergency hand surgery on COVID-19 positive patients was performed, with less than 10 COVID-19 positive patients operated in each center.

In 6/7 centers, a PCR nasopharyngeal swab test for SARS-Cov2 was always performed before surgery, except for emergency cases where patients were operated in a dedicated operating room for suspected or confirmed cases of COVID-19. All centers reported a delay in urgent but not emergency surgery and two centers reported an increase in conservative treatment as alternative to surgery (e.g.: for closed fractures).

In all but one center, patients were followed regularly at the treating center after discharge; in the other center, patients were referred to their general practitioner for postoperative dressing changes to minimize hospital traffic. However, every center but one reported difficulty in the performing postoperative rehabilitation therapy due to a delay in first visits (4/7 centers) or reduction in the number of clinical sessions (4/7 centers). In two centers, the surgeons discharged the patients with a list of exercises to perform independently. Telehealth consultations for rehabilitation were available in two centers only.

In two centers, inferior clinical outcomes were perceived in most patients as the result of changes in the surgical and

Table 1

Questionnaire completed and discussed by the panel of hand surgeons. Activities from March 9th to June 30th, 2020 were compared to the prior 3 months.

Questionnaire on hand surgery and Covid-19
1. In which region do you work?
2. How many COVID-19-positive patients were operated at your hospital?
3. Has your hospital experienced a reduction or an increase in elective surgery activity and if so, by what percentage?
4. If there was a reduction in elective surgery, what percentage would you give it?
5. Has your hospital experienced a reduction or an increase in emergency surgery and is so, by what percentage?
6. Has your hospital set out a specific pathway with an operating room dedicated to suspected or confirmed COVID-19 patients?
7. Was a nasopharyngeal swab test for SARS-Cov2 performed before emergency surgery?
8. Were there any differences in the time to surgery for emergency cases?
9. How were patients followed up after discharge?
10. How was postoperative rehabilitation therapy organized?
11. Was there any change in the postoperative evaluation protocol?
12. Has there been reorganization in the management of the medical and nursing staff?
13. Has there been any cases of COVID-19 infection among the healthcare staff at your hospital?
14. Where there any shortages of personal protective equipment or basic consumables?
15. What COVID-19 related issues did you observe for elective and emergency or urgent hand surgery?
16. What strategies or solutions did you put in place or do you think would improve the perioperative management of patients?

rehabilitation protocols, and in one case the evaluation was difficult due to lack of adequate follow-up.

Elective activities restarted gradually beginning on May 11th, at a slower rate than before the pandemic.

With regard to the management of human and material resources, the healthcare staff was reorganized in 5/7 centers with some professionals taking COVID-19 shifts or different teams alternating on a weekly or longer basis.

Despite only one center reporting difficulties in finding individual personal protective equipment during the first month of the pandemic, 4/7 centers reported COVID-19 infections among their healthcare professionals.

Sicilia and Puglia

In the two southern regions with a low COVID-19 impact, in the early phase of the pandemic, all elective or non-urgent surgical activity was suspended in 14/16 centers (88%) due to the hospital's decision, while 20-50% and 50% reductions were recorded in the remaining centers. Suspension of all elective or non-urgent activities in all centers was imposed by the regional government on April 6th in Sicilia and on March 10th in Puglia. The load of emergency hand cases was reduced or suspended in most centers (14/16, 88%: 2 suspension, 6 reduction >50%, 5 reduction 20-50%), increased in 2 centers, and no changes were recorded in 1 center. Emergency hand surgery on COVID-19 positive patients was performed in only 4 centers, with less than 10 patients operated overall.

In 14/16 centers, PCR nasopharyngeal swab tests for SARS-Cov2 were always performed before surgery. In emergency cases, patients were operated in a dedicated operating room (1 center) but more often, patients followed a specific protocol (10 centers, protocols included use of appropriate personal protective equipment, patient isolation and no further use of the operating room until the PCR test result was available). In three centers, no specific operating rooms or protocols were identified.

Nine centers reported a delay in emergency/urgent procedures (in all but one case due to pending PCR test results) and 1 center

reported an increase in conservative second-choice treatment as alternative to surgery.

In the postoperative period, patients were followed regularly in just 7 centers (44%), while in most cases, patients were totally (2 centers) or partially (7 centers) referred to their general practitioner for postoperative dressing changes to minimize hospital traffic. However, all centers reported difficulty in performing postoperative rehabilitation therapy due to a delay in the first visit (7/16 centers), while rehabilitation therapy was not available at all in 50% of centers and patients were discharged by the surgeon with a list of exercises to perform independently. Telehealth consultations for rehabilitation were available in four centers only.

Inferior clinical outcomes were perceived in most patients as the result of changes in the surgical and rehabilitation treatments in one center, while the evaluation was difficult due to lack of adequate follow-up in six centers.

Elective activities restarted gradually on May 13th in Puglia and on May 25th in Sicilia, at a slower rate than before the pandemic.

With regards to the management of human and material resources, the healthcare staff was reorganized in 6/16 centers with some professionals taking COVID-19 shifts or different teams alternating on a weekly or longer basis. Most centers (11/16, 69%) reported having difficulty in finding personal protective equipment but also consumables in general. COVID-19 infections among healthcare professionals were reported in 2/16 centers.

Discussion

The COVID-19 pandemic had an enormous impact on both elective and emergency hand surgery in Italy, not only in highly affected regions but also – and paradoxically even at a higher extent – in regions with a low COVID-19 case load (Figs. 1 and 2). The reorganization of hand trauma, the temporary stoppage and the slow-down in elective activities, the difficulties encountered in the postoperative rehabilitation and follow-up are expected to affect our clinical practice for a long time. Flexible strategies are needed to improve clinical health care and clinical outcomes and to prepare for future pandemics.

The COVID-19 pandemic completely reshaped health care priorities and patient care pathways worldwide, with emergency treatment being deeply reorganized and elective activities mostly being suspended [6–9]. However, there were significant local variations in infection rates, utilization of the health care system and availability of personal protection equipment. In the regions of Italy analyzed for this study, Sicilia and Puglia were deeply affected despite a lower rate of COVID-19 infections. Elective surgery was suspended by regional governments about 1 month after Lombardy, but most hospitals already suspended elective activities on March 9th based on a local decision. Also, while elective activities gradually restarted on May 11th-13th in Lombardy, Piemonte and Puglia, regional government in Sicilia allowed elective surgery to restart on May 25th, most hospitals were not able to resume elective activities until the end of June due to lack of personal protective equipment and also basic consumables such as gloves, surgical masks and gowns. This dramatic lack of medical supplies, which was worst in the South, was mostly due to an increased need in the throughout the country, a higher request in the COVID-19 “red zones” – which were prioritized at a National level – and to delays in supplies being delivered by manufacturing companies due to the lockdown period.

COVID-19 infections in hand surgery patients occurred in 72% and 25% of Northern and Southern centers respectively, although the number of cases was low. COVID-19 infections occurred among healthcare professionals in 57% and 13% of centers, respectively.

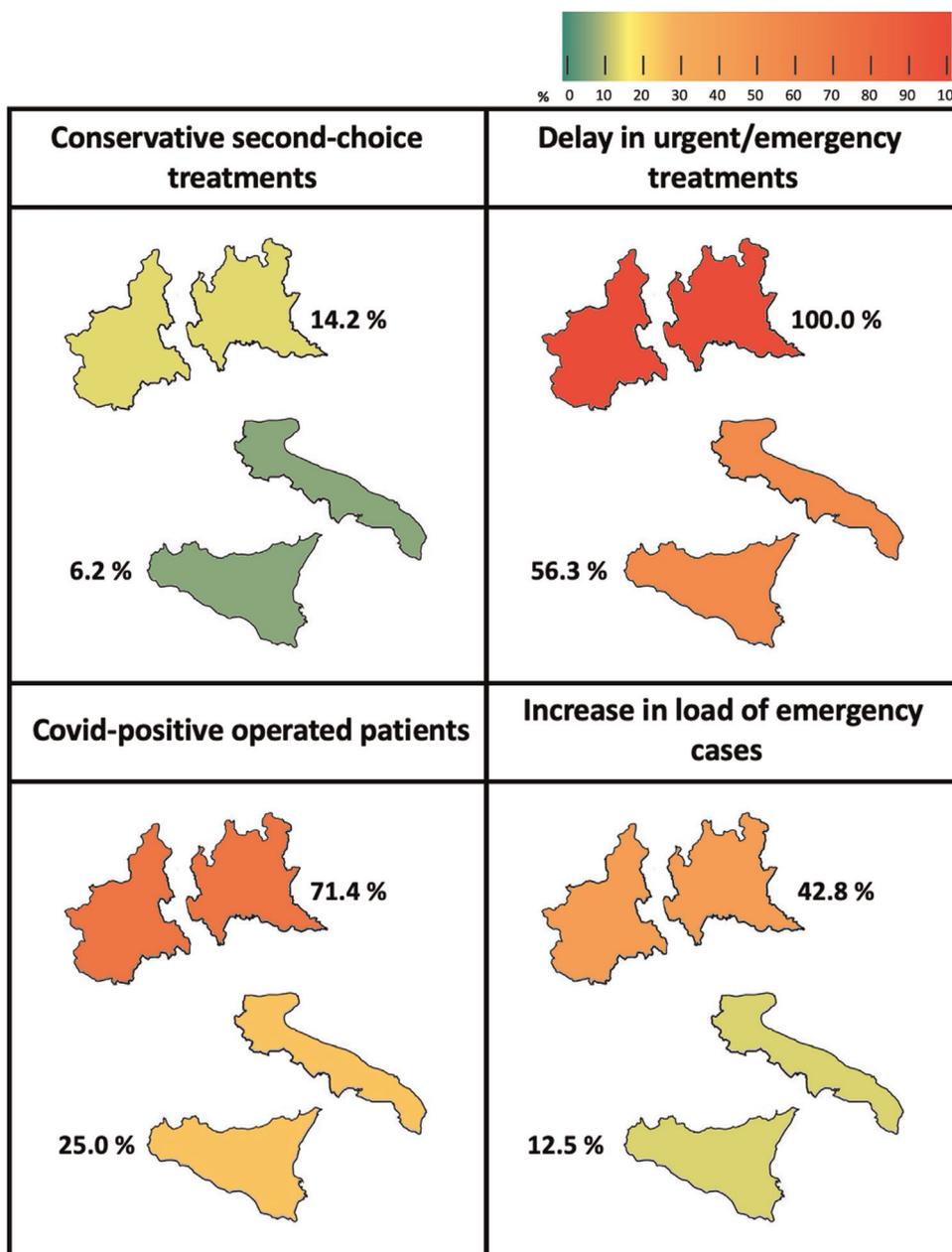


Fig. 1. Main data on hospital organization during the COVID-19 pandemic in Northern and Southern Italy. The percentage of hospitals who reported an increase in number of emergency cases, operated on COVID-positive patients, reported a delay in urgent/emergency surgery or an increase in conservative second-choice treatments are presented. *A delay in urgent but not in emergency surgery was reported for all northern Italy hospitals.

These data indicate that even in the setting of a low COVID-19 infection rate and good availability of personal protective equipment, a high threshold of attention needs to be maintained to prevent infections.

In both Northern and Southern regions, the load of emergency hand cases was decreased or suspended in most centers, concentrating the cases in trauma referral centers. The emergency hand network was formally (in Lombardy) or spontaneously (other regions) reorganized to shift emergency cases to a few centers and to increase medical assistance to COVID-positive patients in all other hospitals. Both in the North and South of Italy, the increase in emergent/urgent cases was mainly due to accidents at home. This is probably due to a reduction of work-related accidents (those at a high risk for hand injury stopped working during the lockdown) and a simultaneous increase in injuries at home due to a non-professional home use of saw or drills during the lockdown. While

operating rooms dedicated to suspected or confirmed COVID-19 cases were identified in all centers in Northern Italy, protocols to reduce the risk of infections were established in the Southern region, but only one center had dedicated operating rooms available, and there was a large heterogeneity in patient care pathways. PCR nasopharyngeal swab tests were largely employed at patient admission in all regions. All centers reported a delay in urgent cases, with emergency cases also affected in the South. Conservative treatments as an alternative to surgery moderately increased in every region. Reorganization of the staff with teams dedicated to COVID-19 positive patients or alternating on a weekly basis was more frequent in the North (71%) than in the South (38%).

As for postoperative consultation, there was a higher tendency in the South to refer patients to their general practitioners for postoperative dressing changes, to minimize hospital traffic. However, difficulties in performing postoperative rehabilitation

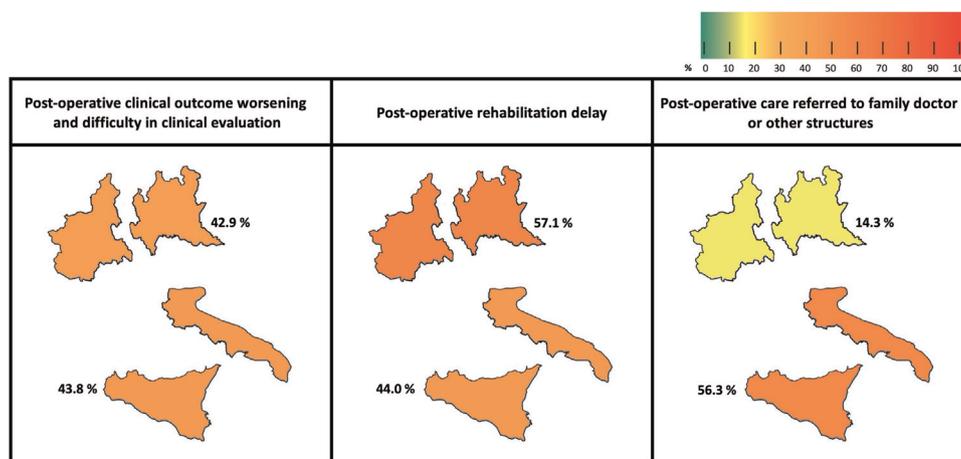


Fig. 2. Patient management during the COVID-19 pandemic in Northern and Southern Italy. The percentage of hospitals that referred patients to their general practitioner for postoperative follow-up, who reported a delay in rehabilitation therapy and who had more difficulty evaluating post-operative outcomes are presented.

were reported, especially in the South were the patients relied mostly on exercises prescribed by the surgeon. Telehealth consultations for rehabilitation was offered only in 29% (North) and 25% (South) of centers.

Inferior clinical outcomes or limitations in patient evaluations were reported by 43% of surgeons in both the North and South, highlighting the need for better postoperative management of patients.

As for the main problems encountered in daily clinical practice, they were very similar irrespective of the magnitude of the impact of COVID-19 in the region. Shortages in personal protective equipment was a general problem in the whole country during the first month of the pandemic, and was more prevalent in the South afterwards, due to a National decision that the equipment be distributed in the “red zones”. Also, a serious shortage of basic consumables deeply affected both elective and emergency activities in Sicilia and Puglia.

A significant lengthening of waiting lists for elective surgery was reported by all surgeons.

A significant increase in paperwork was reported due to infection prevention protocols, and a low use of telehealth resources to minimize hospital traffic (< 30% of centers), despite these having been recommended in recently published papers and guidelines by both the SIOT (Italian Society of Orthopedics and Traumatology) and SICM (Italian Society for Hand Surgery) [10–13].

The potential second or third wave of COVID-19 infections in the near future means that we must learn from the problems encountered and the strategies developed during this first wave. What emerged from the discussions among the hand surgeons in this panel is the need to anticipate the shortage of consumables and personal protective equipment, especially in Sicilia, which, as an island, experiences more supply shortages. Also, something should change in the management of human resources, perhaps increasing the number of staff. One strategy could be to plan to work in teams alternating over a weekly or longer period in order to reduce how many healthcare professionals are exposed to a potential infection, but also to increase the hospital's open hours (e.g.: outpatient consultations) in order to avoid patient traffic and to reduce the waiting lists (significantly increased since March 2020) [14]. Enhanced administrative support would also be beneficial, considering the increase in paperwork, preventive triage and screening procedures. Rapid antigens tests (which return results in 15 min) for outpatients undergoing elective procedures has been recently adopted in most centers and help to reduce the amount of patient traffic, waiting lists and to optimize surgical schedules. Also, several hospital have started to get agreements with small private

centers to decentralize simple surgical procedures, allowing for a reduction in the waiting lists and overcrowding in big hospitals, which freed up to take care of the more difficult cases. Finally, surgical pathways dedicated to COVID-positive patients are desirable to optimize resources, speed up treatment and increase safety in both COVID-positive and negative patients.

Telematics support must also be implemented. Many procedures that are usually performed face-to-face (such as check-ups or clinical exams) could be performed virtually safely and quickly. Telehealth visits are most useful for delivering rehabilitation therapy, which was not available face-to-face in most centers during the first months and may be interrupted again in the next COVID-19 wave. The COVID-19 pandemic deeply affected both elective and emergency hand surgery in Italy irrespective of the real burden of COVID-19 disease in a specific region. Having this in mind, a durable and flexible redesign of hand surgery activities should be implemented as we prepare to deal with COVID-19 infections for the long-term.

Human and animal rights

The authors declare that the work described has not involved experimentation on humans or animals.

Informed consent and patient details

The authors declare that this report does not contain any personal information that could lead to the identification of the patient(s) and/or volunteers.

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CRedit authorship contribution statement

F. Toia: Conceptualization, Investigation, Writing - original draft. **M. Romeo:** Methodology, Formal analysis. **M. Abate:** Investigation, Writing - review & editing. **E. Avarotti:** Investigation, Writing - review & editing. **B. Battiston:** Investigation, Writing - review & editing. **G. Bruno:** Investigation, Writing - review & editing. **F. Cannavò:** Investigation, Writing - review & editing. **C. Casamichela:** Investigation, Writing - review & editing.

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