LETTER TO THE EDITORS

Liver transplantation during the COVID-19 pandemic: A 2020 year-end report from Lombardy, northern Italy

Andrea Lauterio[1], Riccardo De Carlis[1], Mila Valsecchi[2], Ivan Vella[1], Matteo Zaniboni[2], Roberto Fumagalli[2,3] & Luciano De Carlis[1,3,4]

1 Department of Transplantation. Division of General Surgery and Transplantation, ASST Grande Ospedale Metropolitano Niguarda, Milan, Italy

2 Department of Anesthesiology, ASST Grande Ospedale Metropolitano Niguarda, Milan, Italy

3 Department of Medicine and Surgery, University of Milano-Bicocca, Milan, Italy

4 International Center for Digestive Health, University of Milano-Bicocca, Milan, Italy

E-mail: andrea.lauterio@ospedaleniguarda.it

Dear Editors,

The COVID-19 emergency has inevitably impacted liver transplantation (LT) activity in the 4 LT programmes operating in Lombardy, the first and worst-hit area of Italy, with 553.854 infected patients and 27.598 deaths as at 10 February 2021 [1,2]. The first COVID-19 infection surge started in Italy in March and ended in May 2020, with our region of Lombardy becoming Europe's first coronavirus hotspot [2,3]. After a brief summer respite, September 2020 saw the beginning of the second wave.

Our Hospital's overall strategy entailed increasing the capacity of intensive care unit (ICU) beds from 35 to 117 in the first COVID-19 wave (+234.3%), and from 47 to 92 (including 16 ICU beds in a designated temporary hospital) (+95.7%) during the second, with clear separation of COVID-19 ICUs. Maintained throughout 2020, the mitigation strategies redistributed resources based on the severity of the pandemic with the aim of avoiding allocation restrictions [4]. Key to our dynamic transplant protection strategy was the hospital management decision to allocate non-COVID-19 ICU beds from unused recovery and operating rooms to our transplant unit, guarantee the necessary medical and nursing staff, and limit transfers from transplant wards to COVID-19-related clinical activity.

A regional decree instituting a hub-and-spoke system for time-sensitive medical emergencies designated our hospital as a trauma and neurosurgery hub, providing a potential donor pool. In fact, donors increased from 22 to 36 in 2020 (+63.6%).

The elective surgery programmes were rescheduled to include only priority cases and so not overload non-COVID-19 ICUs, with a reduction where possible of ICU length of stay of LT recipients to ensure rapid turn over of available beds. During the two waves, our Hospital performed 25 and 33 LTs, respectively, with only minor monthly variations.

Preliminary reports from other LT centres showed an initial fall of approximately 25% in LT activity at the outset of the pandemic [5-7].

Since the beginning of the outbreak, we experienced a temporary surgical staff shortage due to SARS-CoV-2 infection.

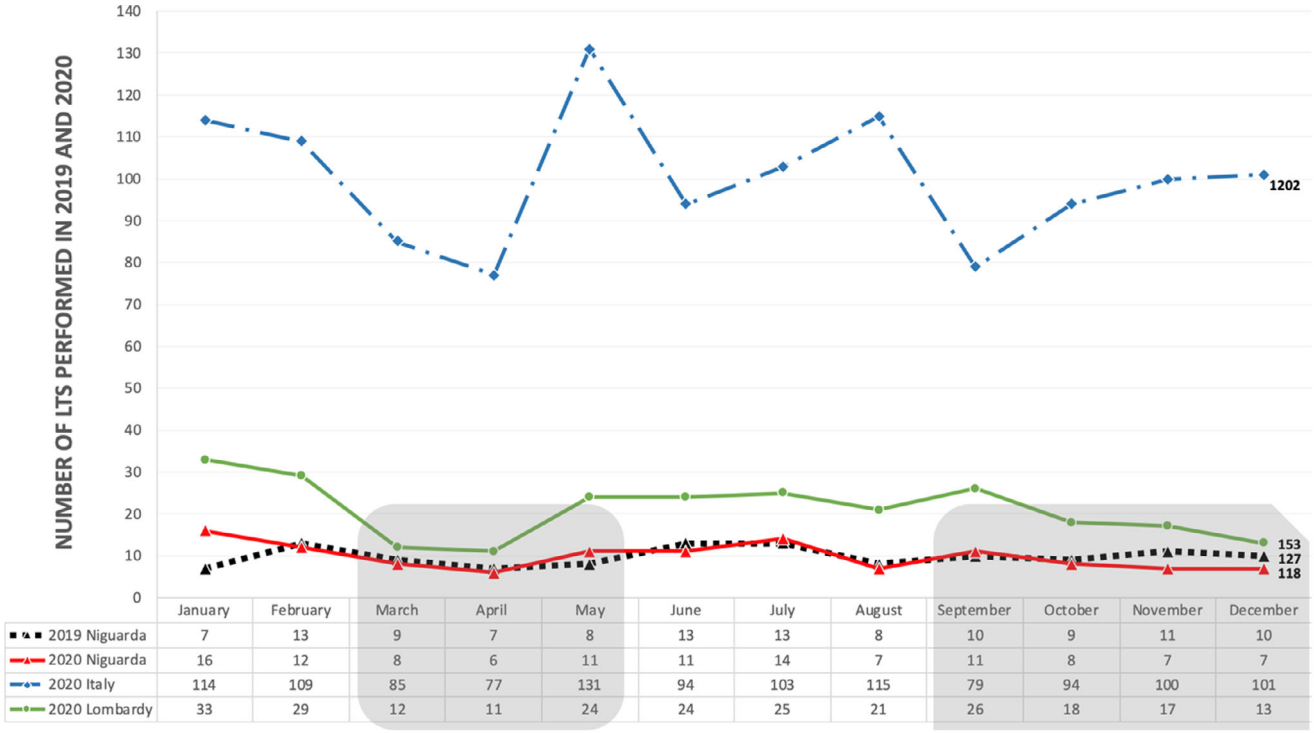
Of the 13 surgeons appointed to our surgical unit, 7 (53.8%) tested positive for COVID-19 during the first and subsequent waves on routine nasopharyngeal swab while asymptomatic or after the onset of symptoms.

However, for the entire 2020, including before the pandemic and during the summer respite, our centre carried out 118 LTs, only slightly fewer (−7%) than the 127 LTs performed in 2019 (time variations and LT activity details given in Figure 1). Of note is the fact that our centre accounted for 46.6% (118/253) of the total LT activity in Lombardy during 2020.

We believe our finding of less HCC as an indication for LT during the pandemic to be probably multifactorial.

With our hospital at full capacity with COVID-19 patients, we may not have been able to admit the same number of HCC patients normally managed. In addition, as our hospital was not designated as a cancer hub with the COVID-19-induced resource allocation, patient referral probably fell as a result during the pandemic as reported by other authors [8]. The wait-list candidates fell by 19.9% during 2020 compared to 2019 (133 vs 166) including HCC patients.

doi:10.1111/tri.13953



	LT 2020 Covid-19 (n=118)			LT 2019 (n=127)	p
	Mar-May	Sep-Dec	Overall 2020	Overall 2019	
LT activity					
LT in Italy	293	374	1202	1277	
LT in Lombardy	47	74	253	289	
LT at Niguarda Hospital	25	33	118	127	
Donors PMP in Italy	na	na	20.7	22.8	
Donors PMP in Lombardy	na	na	21.1	23.4	
Patients					
Male (n/%)	19 (76)	26 (78.9)	99 (83.9)	83 (65.3)	0.17
Recipient age (years) (median, IQR)	55 (48-61)	59 (54-65)	60 (51-62)	59 (55-63)	0.18
Donor age (years) (median, IQR)	57 (52-68)	60 (49-76)	59 (49-72)	57 (51-69)	0.71
MELD (median, IQR)	18 (16-21)	18 (16-26)	19 (14-22)	16 (10-25)	0.12
MELD >30 (n/%)	2 (8)	5 (15)	13 (11)	19 (14.9)	0.84
HCC (n/%)	11 (44)	12 (36.4)	34 (28.8)	57 (44.8)	0.017
Retransplantation (n/%)	3 (12)	2 (6)	9 (7.6)	11 (8.7)	0.77
Combined LKT (n/%)	2 (8)	2 (6.1)	5 (4.2)	3 (2.4)	0.41
DCD (n/%)	1 (4)	3 (9.1)	8 (6.8)	8 (6.3)	0.89
ICU LOS (days) (median, IQR)	3 (3-4)	3 (3-5)	3 (3-4)	4 (3-5)	0.009

na, not available; Covid-19, coronavirus disease 2019; LT, liver transplantation; PMP, per million population; MELD, model for end-stage liver disease; HCC, hepato-cellular carcinoma; LKT, liver-kidney transplantation; DCD, donor after cardiocirculatory death; ICU, intensive care unit; LOS, length of stay

Figure 1 Time variations of the liver transplant programme activities during the COVID-19 pandemic in 2020.

Nonetheless, we report no significant increase in waitlist mortality or drop-out rate due to HCC progression.

The four COVID-19-positive patients on our waiting list at 31 December 2020 were transferred to a dedicated ward or referred to their general practitioners for social confinement measures and then re-listed, with the exception of one who died after suspension.

Regardless the interval from transplant, 38 recipients were diagnosed with COVID-19. Our early experience in terms of disease severity, immunosuppressive treatment and outcomes was reported in the period between the two waves of infection [9].

As of 1 December 2020, every wait-listed patient with a previous history of COVID-19 and every newly listed patient is tested for neutralizing COVID-19 antibodies.

We agree that the use of COVID-19 infected liver donors will be an invaluable life-saving opportunity for what is expected to be an increasing number of positive wait-listed patients who have developed immunity.

Our experience in these exceptional circumstances shows the importance of safeguarding both the donation and transplant aspects of LT, but also the need to adjust policy as the COVID-19 emergency changes [4,10]. For while COVID-19 patients are the current priority, the rigorous standard of care achieved in recent years for patients with life-threatening diseases cannot be jeopardized.

Funding

The authors declare no funding was received for this study.

Conflicts of interest

We acknowledge no personal conflicts of interest of any of the authors.

REFERENCES

1. Protezione Civile. Available on: https://www.protezionecivile.gov.it
2. Centro Nazionale Trapianti. Available on: https://www.trapianti.salute.gov.it/trapianti
3. WHO. Covid-19 situation reports. Available on: https://www.WHO.int/emergiencies/disease/novel-coronavirus-2019/situations-reports
4. Lauterio A, De Carlis R, Belli L, Fumagalli R, De Carlis L. How to guarantee liver transplantation in the north of Italy during the COVID-19 pandemic: A sound transplant protection strategy. *Transpl Int* 2020; **33**: 969.
5. Angelico R, Trapani S, Manzia TM, Lombardini L, Tisone G, Cardillo M. The COVID-19 outbreak in Italy: Initial implications for organ transplantation programs. *Am J Transplant* 2020; **20**: 1780.
6. Gruttadauria S. Italian board of experts in liver transplantation (I-BELT) study group, The Italian society of organ transplantation (SITO). Preliminary Analysis of the impact of the coronavirus disease 2019 outbreak on Italian Liver transplant programs. *Liver Transpl* 2020; **26**: 941.
7. Turco C, Lim C, Soubrane O, *et al.* Impact of the first Covid-19 outbreak on liver transplantation activity in France: A snapshot. *Clin Res Hepatol Gastroenterol* 2021; **45**: 101560.
8. Nevermann NF, Hillebrandt KH, Knitter S, *et al.* COVID-19 pandemic: implications on the surgical treatment of gastrointestinal and hepatopancreatobiliary tumours in Europe. *Br J Surg* 2020; **107**: e301.
9. Travi G, Rossotti R, Merli M, *et al.* Clinical outcome in solid organ transplant recipients with COVID-19: A single-center experience. *Am J Transplant* 2020; **20**: 2628.
10. Kumar D, Manuel O, Natori Y, *et al.* COVID-19: A global transplant perspective on successfully navigating a pandemic. *Am J Transplant* 2020; **20**: 1773.