International Orthopaedics (2020) 44:1453–1459
https://doi.org/10.1007/s00264-020-04637-3

ORIGINAL PAPER

The orthopaedic and traumatology scenario during Covid-19 outbreak in Italy: chronicles of a silent war

Francesco Benazzo[1,2,3] · Stefano Marco Paolo Rossi[1] · Pietro Maniscalco[4] · Biagio Moretti[5] · Enrico Vaienti[6] · Pietro Ruggieri[7] · Alessandro Massè[8] · Antonio Medici[9] · Alessandro Formica[10] · Bruno Di Maggio[11] · Vincenzo Caiaffa[12] · Mario Mosconi[2,3] · Luigi Murena[13] · Fabio D'Angelo[14] · Alberto Belluati[15] · Emilio Luigi Mazza[16] · Fabrizio Rivera[17] · Alberto Castelli[2] · Matteo Ghiara[2] · Marco Rosolani[2] · Raffaele Cioffi[9] · Raffaele Pezzella[9] · Gabriele Scaravilli[11] · Giovanni Bove[18] · Placido Stissi[14] · Michael Mazzacane[14] · Fabrizio Quattrini[4] · Corrado Ciatti[4] · Giulia Trovarelli[7] · Elisa Pala[7] · Andrea Angelini[7] · Francesco Sanna[17] · Daniela Nonne[17] · Andrea Colombelli[15] · Filippo Raggini[15] · Agnese Puzzo[15] · Gianluca Canton[13] · Guido Maritan[13] · Angela Iuliano[16] · Pietro Randelli[16] · Giuseppe Solarino[5] · Lorenzo Moretti[5] · Giovanni Vicenti[5] · Nunzia Garofalo[12] · Vittorio Nappi[12] · Simone Ripanti[10] · Carmela Chinni[10] · Francesco Pogliacomi[6] · Alberto Visigalli[6] · Nathalie Bini[8] · Alessandro Aprato[8] · Loris Perticarini[1]

Received: 7 May 2020 / Accepted: 12 May 2020 / Published online: 26 June 2020

Abstract

Background From February 21, the day of hospitalisation in ICU of the first diagnosed case of Covid-19, the social situation and the hospitals' organisation throughout Italy dramatically changed.

Methods The CIO (Club Italiano dell'Osteosintesi) is an Italian society devoted to the study of traumatology that counts members spread in public and private hospitals throughout the country. Fifteen members of the CIO, Chairmen of 15 Orthopaedic and Trauma Units of level 1 or 2 trauma centres in Italy, have been involved in the study. They were asked to record data about surgical, outpatients clinics and ER activity from the 23rd of February to the 4th of April 2020. The data collected were compared with the data of the same timeframe of the previous year (2019).

Results Comparing with last year, overall outpatient activity reduced up to 75%, overall Emergency Room (ER) trauma consultations up to 71%, elective surgical activity reduced up to 100% within two weeks and trauma surgery excluding femoral neck fractures up to 50%. The surgical treatment of femoral neck fractures showed a stable reduction from 15 to 20% without a significant variation during the timeframe.

Conclusions Covid-19 outbreak showed a tremendous impact on all orthopaedic trauma activities throughout the country except for the surgical treatment of femoral neck fractures, which, although reduced, did not change in percentage within the analysed timeframe.

Keywords Covid-19 · Orthopaedics · Traumatology · Outbreak · Pandemic

Introduction

On Friday February 21, 2020, the first Italian citizen affected with Covid-19 infection was admitted at the Intensive Care Unit (ICU) of the Policlinico San Matteo of Pavia, transferred from the hospital of Codogno. From that moment, the social situation and the hospitals' organisation throughout the north of Italy and particularly in the Lombardy region dramatically changed. Starting from the following day, the clinical reasons and demographics of the patients accessing to the ERs changed completely and the number of patients with symptoms different from an influenza infection or a pneumonia reduced to very small units.

Particularly the number of direct accesses related to trauma reduced constantly.

This situation has subsequently involved the whole country as well as the different countries in Europe and around the world [1–6].

✉ Stefano Marco Paolo Rossi
rossi.smp@gmail.com

Extended author information available on the last page of the article

Within two weeks, all hospitals in the country closed any elective surgery schedule [7] and non-urgent outpatients' consultations, dedicating all the resources to the treatment of patients involved in the pandemic [8–10]. Each city or province designated hub hospitals dedicated to specific surgical urgencies, where all patients with that pathology where redirected. In the majority of the hospitals, a part for the hub-related specialties, all other surgical departments were closed and reassigned to the treatment of Covid-19-affected patients with different levels of complexity.

Many orthopaedic surgeons have been redirected to internal medicine, infectious disease, pneumology or Emergency Room (ER) departments in order to sustain the fight against the virus [11]. The CIO (Club Italiano dell'Osteosintesi) is an Italian society devoted to the study of traumatology that counts members spread in public and private hospitals throughout the country. A multicentre study, involving hospitals spread in the whole country, has been conducted within some of the members of this organisation to compare and analyse the data about the orthopaedics traumatology cases and scenario, in the first six weeks of the Covid-19 outbreak, with the same period of time of the previous year. The aim of this study is to present and analyse the collected data.

Materials and methods

Fifteen members of the CIO who are Chairmen of 15 Orthopaedic and Trauma Units of level 1 or 2 trauma centres in Italy have been involved in the study. They were asked to record data about surgical, ambulatory and ER activity from the 23rd of February to the 4th of April 2020. The data collected were compared with the data of the previous year (2019) in the same period. Data were registered weekly in a dedicated database (Fig. 1.).

The weeks considered were divided in the first week, from 23rd to 29th of February; the second week, from first to seventh of March; third week, from eighth to 14th of March; fourth week from 15th to 21st of March; fifth week from 22nd to 28th of March and the sixth week from 29th of March to fourth of April.

Seven involved institutions are located in the north of Italy, four in the centre and four in the southern part of the country.

Outpatient clinic activity was divided into four groups: first consultation, ordinary control visit, post-operative check and post-ER consultation.

ER activity was divided into road accidents, domestic injuries, sports injuries and work injuries.

The surgical activity recorded was divided into elective/day hospital surgery and trauma surgery. Trauma surgery was divided between femoral neck fractures and all the other fractures. Femoral neck fractures operated on within 48 hours were recorded.

Two of the 15 involved centres are referral centres for orthopaedic oncology and were asked to report data about this specific surgical activity.

Finally, we register the data about the hospital admissions of patients coming from the ER or for elective surgery.

The data obtained are the result of the effect of the pandemic on the population and of the national and regional government lockdown of all activities, including hospital non-essential activities, that happened at different times through the country according to the evolution of Covid-19 outbreak.

Results

Elective and scheduled activities were progressively closed in the country between the 29th of February and the 16th of March. Only one centre in the south of Italy delayed the closure of the non-urgent outpatient activity to April 1.

Results are shown as follows: we give a comparison in percentage of the first week included in the study (23–29 February 2020), with the same week of 2019 (25 February–3 March 2019); then we evaluate the decrease (or increase) of the activity in percentage comparing each week of 2020 with the correspondent week of 2019. We will also show the absolute values for each week of 2020.

Outpatients clinic activity

The outpatient activity (first consultation and ordinary control) was closed in different moments in the different hospitals, according to the government and regional indications, in a period between the 29th of February and the 16th of March. Only one hospital from the south of Italy closed the activity on April 1.

During the first week, the total number of consultations showed a mean reduction of 2%, with a maximum of 15%. In the next weeks, the mean reduction became 15% in the second week, 57% in the third, 67% in the fourth, 75% in the fifth and finally 74% in the sixth week as reported in Fig. 2 on the left side, in addition to cumulative data for each week of 2020 on the right side.

First consultations increased by 7% in the first week, then the reduction was respectively 25%, 85%, 91%, 95% and 90% weekly.

Ordinary control visits showed as well a progressive reduction from 11 to 17%, 72%, 78%, 86% and 79% in the last week.

Post-operative checks were reduced by 2%, 6%, 29%, 39%, 58% and 51%, respectively.

Post-ER consultation showed a reduction of 0%, 15%, 59%, 49%, 57% and finally 67%.

HOSPITAL N.1		WEEK				
		2020	2019	DIFFERENCES	%	DIFF %
Outpatient clinic Activity	FIRST CONSULTATION					
	ORDINARY CONTROL VISIT					
	POST-OPERATIVE CHECK					
	POST-ER CONSULTATION					
	TOTAL					
Surgical Activity	ELECTIVE / DAY HOSPITAL					
	OTHER FRACTURES					
	FEMORAL NECK FRACTURES WITHIN 48 H					
	FEMORAL NECK FRACTURES AFTER 48 H					
	ONCOLOGY ACTIVITY					
	TOTAL TRAUMA SURGERY					
	TOTAL FEMORAL NECK SURGERY					
	TOTAL SURGICAL CASES					
Hospital Admission	ADMISSION FROM ER					
	ADMISSION FOR ELECTIVE SURGERY					
	TOTAL					
ER Activity	ROAD ACCIDENTS					
	DOMESTIC INJURIES					
	SPORT INJURIES					
	WORK INJURIES					
	TOTAL					
		WEEK 1-2-3-4-5-6				

Fig. 1 Image of an Excel file completed weekly by each centre

ER activity

Data from the hospital registry showed that the number of total ER access in the first week improved by 17%, and from the subsequent week, the activity started to decrease by 28% in the second week, 60%, 57%, 66% and 71% in the following weeks as reported in Fig. 3 on the left side, as well as the cumulative data for each week of 2020 on the right side.

In particular, the road accidents that were increased at the end of February by 43%, in the subsequent weeks reduced by 22%, and then by 68%, 87%, 94% and 77% in the last week, reflecting the lockdown imposed.

Sports injuries increased by 70% in the first week, then there was a progressive reduction of 51%, 84%, 96%, 98% up to 100% as any team or individual outdoor sports activity of individuals and teams was prohibited.

Considering work injuries, we found an increase of 60% of traumas in the first week, and a progressive weekly reduction of 30%, 73%, 55%, 63% and 72% afterwards.

Domestic injuries increased by 15% in the first week and subsequently decreased by 25%, 41%, 40%, 56% and to 41% in the last week considered.

Surgical activity

The elective surgery was closed in all the hospitals involved in the study in a period between the 23rd of February and 14th of March.

In the first week, the mean of elective surgery decreases of 5%, 15% in the second week, 69% in the third week, 99% in the fourth and up to 100% in the last two weeks as shown in Fig. 4 on the left side, in addition to the all surgical activity data for each week of 2020 on the right side.

Concerning trauma surgery, fractures operated during the considered timeframe with the exclusion of femoral neck fractures increased by 46% in the first week and successively decreased by 9%, 12%, 39%, 51 and 50%. The trend of proximal femoral fractures was represented by an increase in the number of cases of 9% in the first week, and afterwards by a decrease of 20%, 14%, 26%, 7% and 15% for each week. Considering those operated within 48 hours, the range of variation compared with 2019 went from + 23% to − 23%, and the range of change of the ones operated after 48 hours went from + 7% to − 65%.

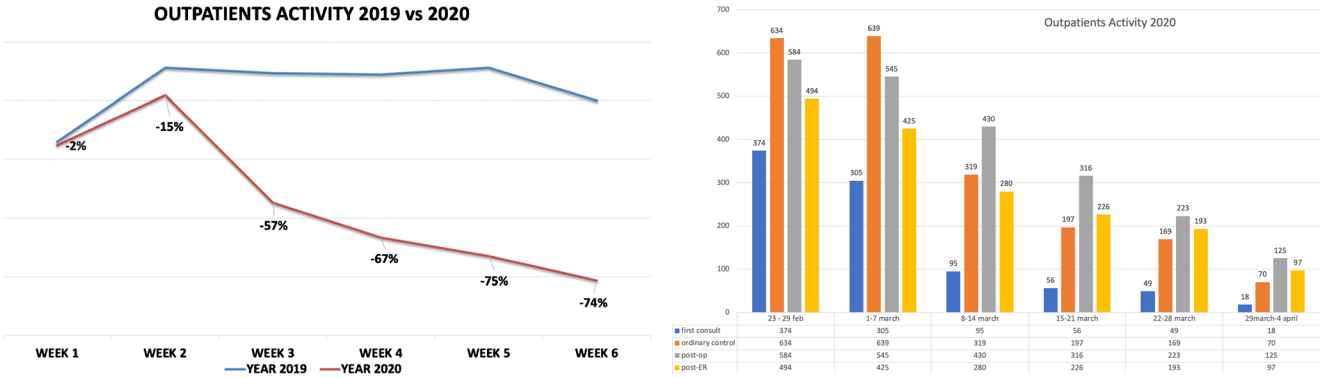

Fig. 2 On the left side, comparison of the overall outpatient clinic activity between 2020 and 2019; on the right side, cumulative data of outpatient clinic activity per each week considered in 2020 divided for each category

Oncology activity

The two centres located in north Italy dealing also with orthopaedic oncology presented a mean reduction of the activity of 14.8% during the period considered, with a maximum of 41% in the third week.

Hospital admissions

The hospital admission due to trauma patients presented in OR decreased in comparison with 2019 of a mean value of 10.8%, with a maximum in the fifth week (− 31%). The admission related to elective surgery decreased by 34% in the first week, 21% in the second week, 91% in the third week and up to 100% in the last three weeks.

Discussion

The most important finding of this study is related to the huge reduction of trauma cases registered in the ERs throughout the country starting from the second week from the beginning of the outbreak and even before the lockdown that started one week afterwards. This is mainly related to the public campaign started by the media and the government to reduce the access to ERs, unless strictly necessary, associated with the fear of the general population to get infected by Covid-19.

Lockdown and quarantine measures associated with progressive closing of commercial activities and industries determined a progressive abatement of trauma cases related to work and sports activities [12]. Decrease of these traumas was respectively up to 72 and 100%.

Despite the fact that people were at home and in quarantine, also the number of domestic traumatic incidents decreased progressively with a significant reduction of minor injuries. Minor trauma cases not necessarily needing the access to an ER self-reduced progressively up to 50%.

These data can be justified in two ways: first, citizens self-reduced exposure to dangerous domestic activities in order to avoid the risk to access to hospitals, and secondarily, there is, in normal situations, an abuse of self-presentation to the ERs for minor traumas.

In general, surgical treatment of upper and lower limb trauma reduced within the six weeks and was dramatically decreased comparing with the previous year; surgical activity for trauma different from femoral neck fractures reduced up to 50%.

This can be justified, on one side, with the reduction of traumatic events in general, and, on the other, with a decrease of indication to surgical treatment and an increased tendency

Fig. 3 On the left side, comparison of the overall ER activity between 2020 and 2019; on the right side, cumulative data of ER trauma cases per each week considered in 2020 divided for each category

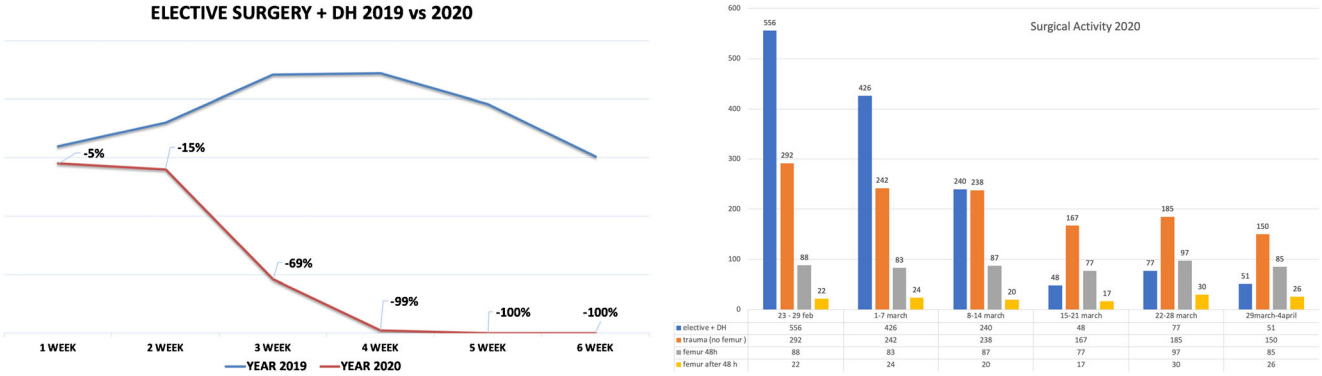

Fig. 4 On the left side, comparison of the overall elective surgical activity between 2020 and 2019; on the right side, cumulative data of surgical activity per each week considered in 2020 divided for each category

to conservative treatments in order to reduce the hospitalisation hazard and the risk of exposure to the infection for the majority of the patients.

Moreover, some patients decided to refuse surgical treatment to avoid hospitalisation and related risks.

Trauma for road accidents decreased progressively and dramatically to very small numbers (up to a reduction of 94%) and consequently polytrauma cases almost disappeared. The increase of the number of road accidents in the last week (reduction of 77% versus 94% of the week before) may be ascribed to a decrease of the attention of drivers because of the reduced traffic along the roads and/or to a partial increase of traffic.

Despite a significant reduction from the previous year, the only traumatic events that remain constant during this period of time were femoral neck fractures in elderly patients.

Our results reflect the fact that the decrease of femoral neck fractures in the elderly (2020 vs 2019) is less than the reduction of the fractures due to high energy trauma, as they occur due to falls at home or in hospices. Furthermore, the greater availability of dedicated operating rooms, after the lockdown of the elective surgery, led to a reduction of the rate of femoral neck fractures operated on after 48 hours compared with the previous year.

It looks like that this dramatic decrease of traumatic events, and surgical activity in general, was not well considered by health authorities throughout the country: trauma centres have been selected, centralised and powered, but, in the end, staff have been under-utilised shortly after the beginning of the lockdown in these hubs.

Concerning elective surgery, even before the lockdown, a progressive reduction of the activity was registered, with a subsequent full closure of any scheduled surgical activity throughout the country. Oncology activity showed a decrease but was still carried on as classified as urgencies.

Concerning outpatients' consultations, numbers reduced dramatically after the lockdown. First consults for non-urgent reasons and ordinary control visits decreased up to 90% almost straight away partially because cancelled by the institutions but mainly because patients called to cancel them as they were afraid to get exposed to the virus, and limited by difficulties in travelling and moving because of the lockdown. Post-op consults reduced progressively, up to 58%, for three reasons: non-urgent visits were postponed or cancelled but on the other side patients themselves did not present for scheduled consultation again to reduce their risk of contagion. Finally, also post-ER controls reduced rapidly, up to 67%, and quicker than expected in the second and third week with many patients cancelling or not presenting to scheduled visits. This finding can be related on one side to the situation of panic that the population was facing; on the other, it shows that these visits are considered not urgent and the final decrease reflects the reduction of the ER activity during this period.

In all countries affected by the epidemic, and where measures of social distancing and lockdown have been adopted, activities will be resuming slowly and progressively. Therefore, we can presume that trauma events will not increase as rapidly as they have been reducing in this unique period of social experiment of limitation of the personal freedom to move around. However, availability of places in public transportation, to respect the rules of distance between individuals, will be dramatically limited, pushing many workers to commute to work by car and/or by other means of transportation, increasing the risk of road accidents and traumas. These considerations may be taken in account by health authorities in allocating resources in the unlocking phases: consultations and small traumas will probably not reach the same numbers of the pre-Covid-19 outbreak time, but traffic accidents may do it and as well their severity.

Strong doubts exist on the transition to a more sustainable health care reality which accommodates a Covid-19 world [5].

First and main limitation of this study is that it is an observational study. It also provides a picture of a limited timeframe.

On the other side, it may be of interest giving a direct image of the consequences of both the pandemic and the lockdown on one of the more active surgical fields in normal times. It also provides a view of the social consequences that a

catastrophic situation, such as Covid-19 outbreak, may have on normal life activities and drawbacks.

Our final consideration is that this pandemic has succeeded in prevaricating any other type of hospital activity and has in particular managed to overtake and cancel one of the most prolific surgical specialties (elective orthopaedics and traumatology), with potential disastrous social and economic implications for the health system and its environment.

Conclusions

Covid-19 outbreak showed a tremendous impact on all orthopaedic and trauma activities throughout the country except for the surgical treatment of femoral neck fractures, which, although reduced, did not change in percentage within the analysed timeframe.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent No informed consent needed.

References

1. Giacomo P, Damiano S, Elena D et al (2020) CoViD-19 and ortho and trauma surgery: the Italian experience. Injury. https://doi.org/10.1016/j.injury.2020.04.012
2. Gogna A, Punamiya S, Gopinathan A et al (2020) Preparing IR for COVID-19: the Singapore experience. J Vasc Interv Radiol. https://doi.org/10.1016/j.jvir.2020.03.021
3. Li Q, Guan X, Wu P et al (2020) Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. N Engl J Med 382:1199–1207
4. Schwarzkopf R, Maher NA, Slover JD et al (2020) The response of an orthopedic department and specialty hospital at the epicenter of a pandemic: The NYU Langone health experience. J Arthroplast. https://doi.org/10.1016/j.arth.2020.04.041
5. O'Connor CM, Anoushiravani AA, DiCaprio MR et al (2020) Economic recovery following the COVID-19 pandemic: resuming elective orthopaedic surgery and total joint arthroplasty. J Arthroplast. https://doi.org/10.1016/j.arth.2020.04.038
6. Tay K, Lee Y (2020) Trauma and orthopaedics in the COVID-19 pandemic: breaking every wave. Singap Med J. https://doi.org/10.11622/smedj.2020063
7. D'Apolito R, Faraldi M, Ottaiano I, Zagra L (2020) Disruption of arthroplasty practice in an orthopedic center in Northern Italy during the coronavirus disease 2019 pandemic. J Arthroplast. https://doi.org/10.1016/j.arth.2020.04.057
8. Massey PA, McClary K, Zhang AS et al (2020) Orthopaedic surgical selection and inpatient paradigms during the coronavirus COVID-19 pandemic. J Am Acad Orthop Surg 1. https://doi.org/10.5435/jaaos-d-20-00360
9. Stinner DJ, Lebrun C, Hsu JR et al (2020) The orthopaedic trauma service and COVID-19 – practice considerations to optimize outcomes and limit exposure. J Orthop Trauma 1. https://doi.org/10.1097/bot.0000000000001782
10. Wright RW, Armstrong AD, Azar FM et al (2020) The American Board of Orthopaedic Surgery response to COVID-19. J Am Acad Orthop Surg 1. https://doi.org/10.5435/JAAOS-D-20-00392
11. Ashford RU, Nichols JS, Mangwani J (2020) Annotation: the COVID-19 pandemic and clinical orthopaedic and trauma surgery. J Clin Orthop Trauma. https://doi.org/10.1016/j.jcot.2020.04.002
12. Gilat R, Cole BJ (2020) COVID-19, medicine, and sports. Arthrosc Sports Med Rehabil. https://doi.org/10.1016/j.asmr.2020.04.003

Affiliations

Francesco Benazzo[1,2,3] · Stefano Marco Paolo Rossi[1] · Pietro Maniscalco[4] · Biagio Moretti[5] · Enrico Vaienti[6] · Pietro Ruggieri[7] · Alessandro Massè[8] · Antonio Medici[9] · Alessandro Formica[10] · Bruno Di Maggio[11] · Vincenzo Caiaffa[12] · Mario Mosconi[2,3] · Luigi Murena[13] · Fabio D'Angelo[14] · Alberto Belluati[15] · Emilio Luigi Mazza[16] · Fabrizio Rivera[17] · Alberto Castelli[2] · Matteo Ghiara[2] · Marco Rosolani[2] · Raffaele Cioffi[9] · Raffaele Pezzella[9] · Gabriele Scaravilli[11] · Giovanni Bove[18] · Placido Stissi[14] · Michael Mazzacane[14] · Fabrizio Quattrini[4] · Corrado Ciatti[4] · Giulia Trovarelli[7] · Elisa Pala[7] · Andrea Angelini[7] · Francesco Sanna[17] · Daniela Nonne[17] · Andrea Colombelli[15] · Filippo Raggini[15] · Agnese Puzzo[15] · Gianluca Canton[13] · Guido Maritan[13] · Angela Iuliano[16] · Pietro Randelli[16] · Giuseppe Solarino[5] · Lorenzo Moretti[5] · Giovanni Vicenti[5] · Nunzia Garofalo[12] · Vittorio Nappi[12] · Simone Ripanti[10] · Carmela Chinni[10] · Francesco Pogliacomi[6] · Alberto Visigalli[6] · Nathalie Bini[8] · Alessandro Aprato[8] · Loris Perticarini[1]

[1] Sezione di Chirurgia Protesica ad Indirizzo Robotico - Unità di Traumatologia dello Sport, U.O Ortopedia e Traumatologia, Fondazione Poliambulanza, Via Bissolati 57, 25124 Brescia, Italy

[2] Clinica Ortopedica e Traumatologia, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy

[3] Università degli Studi di Pavia, Pavia, Italy

[4] Orthopaedics and Traumatology Department, Guglielmo da Saliceto Hospital, Piacenza, Italy

[5] UOC Ortopedia E Traumatologia- Azienda Ospedaliero-Universitaria, "Policlinico" Universita, Bari, Italy

[6] Clinica Ortopedica, Azienda Ospedaliero - Universitaria di Parma, Parma, Italy

[7] Department of Orthopaedics and Orthopaedic Oncology, University of Padova, Padua, PD, Italy

[8] School of Medicine Clinica Ortopedica e Traumatologica I Città della Salute e della Scienza - C.T.O, University of Torino, Torino, Italy

[9] AORN San Giuseppe Moscati, Avellino, Italy

[10] UOC Ortopedia e Traumatologia, Az. Ospedaliera San Giovanni Addolorata, Rome, Italy

[11] Orthopaedic and Traumatology Unit, A.S.L. Caserta, Piedimonte Matese Hospital, Piedimonte Matese, Italy

[12] Orthopedics and Trauma Department, Di Venere Hospital, Bari, Italy

[13] SC (UCO) Clinica Ortopedica e Traumatologica, Azienda sanitaria universitaria Giuliano Isontina (ASU GI), Trieste, Italy

[14] Division of Orthopaedics and Traumatology, ASST dei Sette Laghi, Department of Biotechnologies and Life Sciences (DBSV), University of Insubria, Varese, Italy

[15] Orto-Trauma Dept., Ospedale Santa Maria delle Croci Ravenna, Ravenna, Italy

[16] Centro Specialistico Ortopedico Traumatologico Gaetano Pini - CTO (ASST Pini-CTO), Milan, MI, Italy

[17] Orthopaedics and Trauma Department, SS Annunziata Hospital, Savigliano, CN, Italy

[18] Department of Orthopaedic Surgery, "Federico II" University, Naples, Italy