



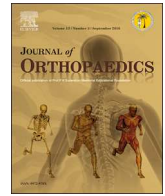
Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Contents lists available at ScienceDirect

Journal of Orthopaedics

journal homepage: www.elsevier.com/locate/jor

The role of an Orthopaedic Surgeon in the time of Covid-19 Pandemic—a German perspective



ABSTRACT

Covid-19 is a non-orthopaedic disease but is affecting the community of Orthopaedics as much as every part of our daily living. In this Editorial the different aspects of changes in our routine are described, based on the experience of this Editor in Germany.

I will try to give you a bit of background information first, as the situation is very much dependent on the specific phase of the pandemic and your place of work. The experience for an Orthopaedic Surgeon in New York or Madrid may differ from that of an Orthopaedic Surgeon in Singapore, or South Korea. As Europe is, at least at the moment, the most affected continent, it hopefully is an interesting topic for all of you.

The Covid-19 pandemic is affecting all aspects of our lives, therefore this editorial is divided into 4 sessions: Role as surgeon, as doctor, as teacher, and as family member.

Most countries have stopped elective surgeries and by that relegated Orthopaedic surgeons to a minimum of work. Keeping contact to patients with digital tools might be an option to achieve an organised restart after the end of the lock down period and to keep treating patients through that phase.

For many Orthopaedic surgeons, the principal task now is being part of an interdisciplinary team that is headed by colleagues from Internal Medicine or Anaesthesiology. Wards from the Orthopaedic department are reorganised as quarantine wards for Covid-19 patients.

Worldwide all conferences have been cancelled and nobody knows for how long this will continue. Education now has become fully digital, allowing to present and communicate without real limitations compared to conventional conferences. Some teaching options, such as hands-on workshops, fellowships, etc. are ceased and cannot be replaced by digital options.

Due to social distancing families are spending much more time together than before, while some family members, especially the people at risk (elders, ones with a fragile health) cannot be visited for a long time. Get together with friends as well as community meetings are completely suspended. For some of them, digital technology is the only option to minimize the problem of social distancing.

Overall, it has to be stated, that all parts of our lives as an Orthopaedic Surgeon are affected by the Covid-19 pandemic. As nobody knows how long these restrictions need to remain in place we have to accept them and work on improving this specific situation by following the rules. Hopefully, a vaccine will be developed in the near future, allowing us to return to a “normal” life. Nevertheless, it will never be like it was before.

1. Introduction

Before I decided to write an Editorial in an Orthopaedic Journal about a non-orthopaedic disease I thought about the Pro's and Con's. I am not an expert in epidemiology or virology, but as the pandemic is heavily affecting all parts of life in every place in the world, I finally decided to write about the changes that occurred in my professional but also in my personal life due to the disease. This Editorial is not written in the standard, scientific fashion with multiple references, but tries to document the huge impact the pandemic has on day to day living. I am sure that regardless of where you live most of you experienced something similar, under more or less dramatic circumstances. I hope it finds you all in good health and after a while we can go back to our working routine as Orthopaedic Surgeons. However, I am sure that as long as no vaccine and/or treatment has been found, tested, and produced in a sufficient number, we will have a high chance of second and third waves. Therefore, there will be a lot of restrictions and changes affecting our routine all throughout this and probably next year, too. However, finally when we will have overcome the pandemic we will look back and hopefully take the right measures as societies for future events.

1.1. Background

This editorial is written in the first 3 weeks of April. My Hospital is normally solely an Orthopaedic Hospital specialising in elective surgeries (arthroplasty, spine, sports med.,...). It is located in Bavaria, the state in Germany with the highest number of Covid-19 patients of all German states. The situation in Germany differs at that time from the situation in other EU countries, like Italy, Spain or France. Although Germany has the third highest number of Covid-19 positive patients in the EU, we still have a relatively low number of deaths (around 1.5 %) compared to the other countries (8-10%). This is more or less demonstrating that a lot of tests have been performed compared to the other countries and that in the beginning more young people were affected. The percentage might change within the next weeks as now also a lot of older patients in nursing homes are tested positive. The number of Covid-19 patients in ICU is still increasing every day, however, we still have enough ICU capacity left and scenarios like in other countries have not happened in Germany so far. However, it is still far too early for giving an all-clear. Therefore, most of us still watch the daily numbers of new infections, doubling time, and patients in ICU and hope that the curve is flattening further.

The entire country is locked down, only necessary chores or activities are allowed (i.e. the way to work, doctor visits and grocery shopping). Outdoor sports activities are allowed, as long as a maximum

<https://doi.org/10.1016/j.jor.2020.05.010>

of 2 people who normally are living together are involved and as long as a minimal distance of 1.5 – 2 meters to others not living in the same household is kept.

Some of the neighbouring countries have stricter rules with complete close of all work places except the structurally relevant ones.

In Germany a lot of organisation from different institutions has been started, all with the aim to get transparent data on all relevant institutions and equipment. Emergency control, for example, appointed a medical leader in every county in order to coordinate patient flow, beds, protective material and ventilators. All free beds, and in particular all free ICU beds need to be reported online, every day, at a predefined time. Based on those numbers the patient flow is optimized and the collaboration between counties and states organised. This also allows to move patients from one Hospital group to another, something that would be impossible outside of a crisis. However, only with all these regulations, areas with higher patient numbers can be relieved and units in lesser affected areas of the country can actually support the system.

1.2. Role as a Surgeon

Orthopaedic Surgeons tend to define themselves by their surgical skills and the number of surgeries they perform. One equation in our traditional thinking was: The more surgeries I do, the better a surgeon I am. We have learned over the years that the subject of quality in arthroplasty is far more complex and numbers are only one indicator in a huge spectrum of surgeon-, patient- and implant-related factors¹⁻⁴.

In times of Covid-19, this prioritising of numbers in Orthopaedics has drastically changed. Most governments have decided that elective Orthopaedic Surgery is not structurally relevant – and to be honest for the most part that is correct! This is nothing to get depressed about, it is just a fact. As an Orthopaedic surgeon we can deliver very substantial pain reduction and gain of function, our duty is to improve quality of life not to save lives. So now, in the middle of the Covid-19 crisis, our role as a surgeon has been cut back to a minimum, only trauma cases, infections and acute pain exacerbation that doesn't respond to pain medication are left for us to treat. In my Hospital that is less than 15% of my cases.

For me, it was very interesting and baffling that a large percentage of patients suddenly did not need any kind of therapy for their arthritic joints, be it conservative or operative and cancelled their appointments completely. This shows that in these critical times also patients focus a lot more on things, like family safety and food allocation. The shutdown, has demonstrated that the vast majority of patients have a relative indication and in difficult times the acceptance of pain and reduction in mobility is higher, too.

Naturally, the consequence of that behaviour will be a higher number of patients coming in at later stage with more pronounced bony defects and deformities and due to that more difficult to treat. This can also have an impact on the outcome and on the complication rate^{5,6}. Keeping in contact with patients (i.e. with the help of digital platforms, such as video consultation) is one option to help them through this time but also to give them a time line for their postponed surgery.

1.3. Role as a Medical Doctor

Orthopaedic Surgeons are specialists in their field. In a time, when all resources are bundled fighting against the virus, the role of Orthopaedics within the Hospital organisation is changing a lot. Every resource is concentrated on the Teams of Internal medicine and Anaesthesiology.

In the first phase, work load was reduced but simultaneously no Covid-19 patient was treated in our Hospital. At that time, learning about the virus and the test regimes was the main topic. A lot of protocols needed to be developed, specific for each unit. General guidelines implemented by the Robert Koch Institute (comparable to CDC), needed

to be integrated into our Hospital protocols. All team members were informed and trained on those guidelines, however, with the increasing number of Covid-19 positive patients and employees the number of contact persons who also needed to be quarantined became so high, that a routine shift sometimes was not possible. Guidelines were adapted to the changing situation.

Simultaneously, 2 wards of our Orthopaedic unit were repurposed into a Covid-19 quarantine unit. In this new unit, only Covid-19 positive patients with mild symptoms will be bundled and all orthopaedic surgeons will become part of an interdisciplinary team. Now, the quality of an Orthopaedic Surgeon within the team is more based on his/her general medical education and experience and not on his/her orthopaedic training anymore. As for most senior surgeons, the time of working in an Intensive Care Unit (ICU) and dealing with critically ill patients was long ago, the role of the Orthopaedic Surgeons now is more an assisting than a leading one. Most of the Covid-19 units are led by Anaesthesiologists or specialists in critical care.

In my Hospital the first 3 weeks were characterised by restructuring the Orthopaedic unit, implementing a lot of pathways, and interdisciplinary training. Communication was the most important job of the leaders. Explaining the processes, the changes, preparing for the potential first wave of patients. Crucial in that time was not losing team members to their fear and insecurity. To provide a constant support, psychologists were additionally asked for their help.

1.4. Role as a Teacher

Education and teaching has also changed dramatically due to the pandemic. All conferences worldwide independent of their size have been cancelled and at this time remains unclear when this form of education will be possible again.

Nevertheless, education is still important and in times of potentially reduced work load in Orthopaedics the chance of attending educational programs is higher than normal. Digital technologies have become the new standard for all kinds of seminars and small conferences. Multiple platforms are on the market, all allowing talks, case presentations, surgical videos and most important the possibility to interact. Due to the interactive part, questions and answers can be addressed in a standard manner. From the content side alone, the actual digital format does not differ much from the conventional one, however, the option of interaction is limited to the time of the session. Interaction in breaks and networking activities outside of actual sessions are very much reduced to a minimum.

Other teaching options such as cadaver labs had to be totally suspended for the time being. This is one of the disadvantages digital technology leaves us with, as education of manual skills cannot sufficiently be replaced by digital sessions. In some fields of surgery, i.e. arthroscopy, parts of manual training can be done using simulators and while some years back most of these simulators had been plastic models, nowadays they have become more and more virtual^{7,8}. That allows for a separation of teacher and student, which is mandatory in times of Coronavirus or other possible pandemics.

Another part of educational activities, that has completely ceased are Fellowships and Visitation centres, as well as student teaching. Due to local and international travelling restrictions, and due to a limited number of surgeries, it is impossible for now. Before we can resume these kinds of international education activities the situation in both participating countries has to have returned to normal again. But as we all fear, this might take a long time.

1.5. Role in the Family

Family life has also changed dramatically in a lot of families. On the one hand, family members now spend much more time together compared to normal days. This is - for the most part - extremely positive. Especially the younger kids benefit from the increased amount of time

their parents have, which also is extremely helpful to overcome the “school free” time. Here in Germany, most schools have tried to digitalize their teaching and parents and kids are working together on digital homework sent by the school.

On the other hand, living in close quarters and spending a lot of time together is not always without problems, as many jokes tend to illustrate. As a consequence, in some parts of society the number of domestic violence is reported to have increased.

The other extreme is that the Covid-19 pandemic leads to strict separation of family members. Grandchildren are not allowed to see their grandparents; birthday parties take place without important family members, and so on. Again, only digital technology can help us to overcome the problem of social distancing at least in part.

I do not want to imagine a Covid-19 pandemic in a world before all those digital tools had been invented.

Nevertheless, we all desperately wait for the situation to return to some kind of normalcy and to be able to have at least some kind of actual physical contact with friends and at-risk family members again.

I hope you, your family and your friends are staying safe and we will soon be able to resume our daily life as normal as possible.

References

1. Vasta S, Papalia R, Torre G, Vorini F, Papalia G, Zampogna B, Fossati C, Bravi M, Campi S, Denaro V. The influence of preoperative physical activity on postoperative outcomes of knee and hip arthroplasty surgery in the elderly: A systematic review. *J Clin Med*. 2020;9(4) <https://doi.org/10.3390/jcm9040969> Review.
2. Odum SM, Sheets SL, Curtin BM. A risk assessment tool based on orthopedic psychosocial and health status factors is associated with post-acute resources. OrthoCarolina quality improvement committee. pii: S0883-5403(20)30202-3. *J Arthroplast*. 2020. <https://doi.org/10.1016/j.arth.2020.02.041>.
3. Goodman SM, Mehta BY, Kahlenberg CA, Krell EC, Nguyen J, Finik J, Figgie MP, Parks ML, Padgett DE, Antao VC, Yates AJ, Springer BD, Lyman SL, Singh JA. Assessment of a satisfaction measure for use after primary total joint arthroplasty. pii: S0883-5403(20)30200-X. *J Arthroplast*. 2020. <https://doi.org/10.1016/j.arth.2020.02.039>.
4. Kishawi D, Schwarzman G, Mejia A, Hussain AK, Gonzalez MH. Low preoperative albumin levels predict adverse outcomes after total joint arthroplasty. *J Bone Joint Surg Am*. 2020. <https://doi.org/10.2106/JBJS.19.00511>.
5. Rai S, Liu X, Feng X, Rai B, Tamang N, Wang J, Ye S, Yang S. Primary total knee arthroplasty using constrained condylar knee design for severe deformity and stiffness of knee secondary to post-traumatic arthritis. *J Orthop Surg Res*. 2018;13(1):67.
6. Lunebourg A, Parratte S, Gay A, Ollivier M, Garcia-Parra K, Argenson JN. Lower function, quality of life, and survival rate after total knee arthroplasty for posttraumatic arthritis than for primary arthritis. *Acta Orthop*. 2015;86(2):189–194. <https://doi.org/10.3109/17453674.2014.979723>.
7. Bartlett JD, Lawrence JE, Yan M, Guevel B, Stewart ME, Audenaert E, Khanduja V. The learning curves of a validated virtual reality hip arthroscopy simulator. *Arch Orthop Trauma Surg*. 2020. <https://doi.org/10.1007/s00402-020-03352-3>.
8. Lessons taught by a knee arthroscopy simulator about participants in a European arthroscopy training programme, Baumann Q, Hardy A, Courage O, Lacombe P, Accadbled F. European paediatric orthopaedic society sports study group; Junior French arthroscopic society. *Orthop Traumatol Surg Res*. 2019;105(8S):S287–S291.

Heiko Graichen¹

Department for Arthroplasty, Orthopaedic Hospital Asklepios Lindenlohe, Lindenlohe 18, 92421 Schwandorf, Germany
E-mail address: h.graichen@asklepios.com.

¹ Medical Director, Asklepios Orthopädische Klinik Lindenlohe, Lindenlohe 18, 92421 Schwandorf, Germany