

Effects of the COVID-19 Pandemic on the Epidemiology of Knee and Shoulder Arthroscopy

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Krystian Kazubski¹, Łukasz Tomczyk², and Piotr Morasiewicz¹ 

Abstract

The purpose of our study was to comprehensively assess the effect of the COVID-19 pandemic on knee and shoulder arthroscopy performed in an orthopedic department of a university hospital in Poland. This study compared the data on all shoulder and knee arthroscopy procedures performed in two different periods: The period of the COVID-19 pandemic in Poland (from March 4, 2020, to October 15, 2020) and the corresponding period prior to the pandemic (March 4, 2019, to October 15, 2019). The study evaluated epidemiological data, demographic data, and hospital stay duration. The total number of arthroscopy procedures conducted in the evaluated period in 2020 was approximately 8.6% higher than that in the corresponding 2019 period. The mean duration of hospital stay for orthopedic patients after their knee or shoulder arthroscopy was 3.1 days in 2020 and 2.8 days in 2019. Our study revealed the mean age of arthroscopy patients during the pandemic to be lower at 48.4 years than the 51.2 years recorded in 2019. The male-to-female ratio was shown to be lower at .85 during the pandemic, having decreased from 1.5 in 2019. The COVID-19 pandemic did not reduce the number of arthroscopy performed at our center, and the mean age of the patients did not change. However, the pandemic had a marked effect on the mean duration of hospital stay and male-to-female ratio.

Keywords

knee arthroscopy, shoulder arthroscopy, COVID-19, epidemiology, lock-down, pandemic, SARS-CoV-2

What do we already know about this topic?

Many centers limit elective surgical procedures such as arthroscopies first, before limiting other services in view of the ongoing COVID-19 pandemic.

How does your research contribute to the field?

We assessed the effect of the COVID-19 pandemic on knee and shoulder arthroscopy performed in an orthopedic department of a university hospital in Poland.

What are your research's implications towards theory, practice, or policy?

The COVID-19 pandemic had a marked effect on the mean duration of hospital stay and male-to-female ratio.

Introduction

The most common indication for shoulder or knee arthroscopy are pain due to osteoarthritis or injury, limited range of motion, signs of joint instability, problems with self-care, lower quality of life, and progressive limitations in physical activity, which do not resolve after conservative management and rehabilitation.¹

¹Department of Orthopaedic and Trauma Surgery, University Hospital in Opole, Institute of Medical Sciences, University of Opole, Opole, Poland

²Department of Food Safety and Quality Management, Poznan University of Life Sciences, Poznan, Poland

Corresponding Author:

Piotr Morasiewicz, Department of Orthopaedic and Traumatologic Surgery, University Hospital in Opole, Institute of Medical Sciences, University of Opole, al. Witosa 26, Opole 45-401, Poland.
Email: morasp@poczta.onet.pl



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The 2020 COVID-19 pandemic altered the way health care functions on the national and local levels.²⁻¹⁹ Due to the pandemic, patients have encountered considerable limitations in their access to healthcare professionals, including orthopedic surgeons. The character of work in orthopedic wards and the orthopedic admission protocols have also changed.²⁻¹⁹ Some healthcare workers contracted COVID-19 and were obligated to undergo quarantine; some were transferred to take care of COVID-19 positive patients. These changes had an impact on the number of patients hospitalized at orthopedic wards.^{2,3} In response to a spike in new COVID-19 cases, elective surgical procedures, including arthroscopies, were limited or halted altogether in some orthopedic departments.^{2-5,10} Some patients, particularly those with pre-existing illnesses, who had been scheduled to undergo arthroscopy postponed the date of the procedure due to fears of COVID-19 infection. Nonetheless, there have been recommendations to resume performing elective procedures.^{6,7,8,11} Sports injuries and road traffic accidents have also shown significant decrement as result of lock down in the COVID-19 pandemic. This could have resulted in the reduction of post-traumatic arthroscopy.

To date, there has been little research into such an important issue as the effect of the COVID-19 pandemic on the epidemiology of shoulder and knee arthroscopy procedures; hence, there continue to be many unknowns. The available reports—based on questionnaires sent to orthopedic surgeons—estimated the effect of the COVID-19 pandemic on reducing the number of orthopedic procedures, including arthroscopy, in German, Austrian, and Swiss centers.^{4,5}

We hypothesized that the number of arthroscopy procedures decreased during the COVID pandemic. The purpose of our study was to comprehensively assess the effect of the COVID-19 pandemic on knee and shoulder arthroscopy performed in an orthopedic department of a university hospital in Poland.

Materials and Methods

The epidemiology of shoulder and knee arthroscopy was assessed in a Polish university medical center dealing with such procedures and offering medical rehabilitation. Two time periods were analyzed and compared: the period of the COVID-19 pandemic in Poland (Mar. 4-Oct. 15, 2020) and the corresponding period prior to the pandemic (Mar. 4-Oct. 15, 2019).

In order to collect data for the study, the medical database of all data of patients treated in our department was analyzed. In our study, we analyzed all arthroscopic procedures of the shoulder or knee (including diagnostic arthroscopy, post-traumatic arthroscopy, meniscus repair, anterior cruciate ligament [ACL] reconstruction, rotator cuff repair, and labral repair) conducted in the period between Mar. 4, 2019, and Oct. 15, 2019, or between Mar. 4, 2020, and Oct. 15, 2020, with full medical and epidemiological data available. The exclusion criterion was the lack of all medical and

epidemiological data. None of the patients we evaluated were excluded from the study. This study had been approved by the local review board. All patients were tested for COVID during the pandemic. All elective patients were given 10 days of home quarantine prior to admission to hospital.

Patients admitted to our ward who were scheduled for shoulder or knee arthroscopy were tested for COVID-19 48 h before admission to the ward. Then, after the result was checked, they were admitted to the ward when they had a negative result.

The following data were analyzed: the total number of shoulder and knee arthroscopy; total number of women who underwent shoulder arthroscopy (including diagnostic arthroscopy, post-traumatic arthroscopy, and rotator cuff repair); total number of men who underwent shoulder arthroscopy; total number of women who underwent knee arthroscopy (including diagnostic arthroscopy, post-traumatic arthroscopy, meniscus repair, and ACL reconstruction); and total number of men who underwent knee arthroscopy. Moreover, the analyzed data included the mean age of the men and women who underwent knee arthroscopy; mean age of men and women who underwent shoulder arthroscopy; mean age of the patients (without sex stratification) who underwent knee arthroscopy; mean age of the patients (without sex stratification) who underwent shoulder arthroscopy; mean duration of hospital stay of those patients (total, men, and women) who underwent knee arthroscopy; mean age of all arthroscopy patients (without sex stratification); and mean duration of hospital stay of those patients (total, men, and women) who underwent shoulder arthroscopy. We also assessed the male-to-female patient ratio.

All analyzed data from the period of the COVID-19 pandemic in Poland (Mar. 4-Oct. 15, 2020) were compared with those from the corresponding pre-pandemic period (Mar. 4-Oct. 15, 2019).

The obtained data were statistically analyzed using the Statistica 13.1 software. Pearson's chi-square test was used to compare the variables. The level of significance was set at $\alpha = .05$

Results

All results have been presented in [Table 1](#).

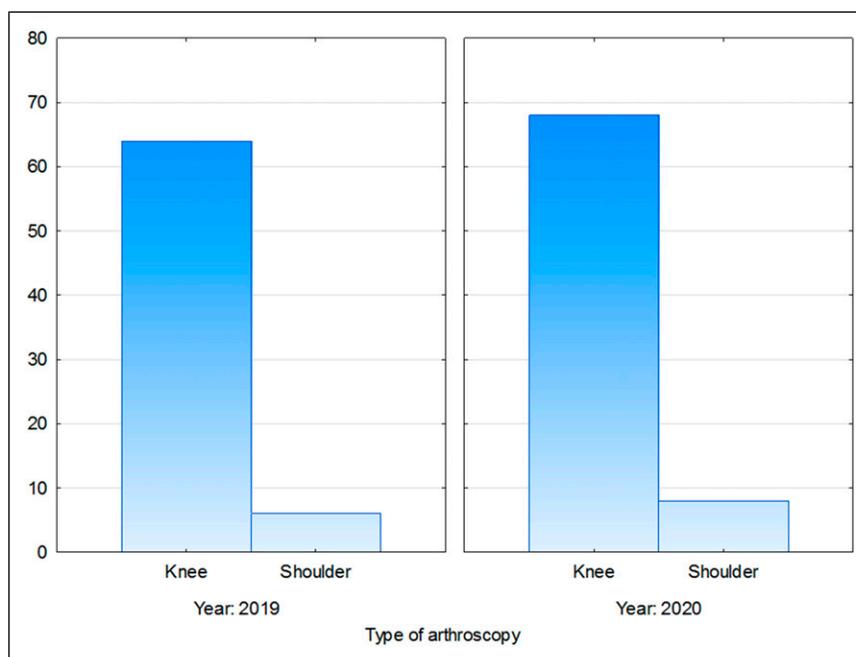
Our analysis demonstrated that the total number of arthroscopy procedures conducted in the evaluated period in 2020 (pandemic) was approximately 8.6% higher than that in the corresponding 2019 period; this difference was not statistically significant ([Figure 1](#), [Table 1](#)), ($P = .4841$).

The total number of knee arthroscopy performed in the evaluated 2020 period was 6.3% higher than that in the corresponding 2019 period (prior to the epidemic); this difference was not statistically significant ([Figure 1](#), [Table 1](#)), ($P = .68858$).

The total number of shoulder arthroscopy in the evaluated 2020 period was 33.3% higher than that in the pre-pandemic

Table 1. Epidemiological Characteristics of Patients Who Underwent Shoulder and Knee Arthroscopy.

Variable	2020 pandemic	2019 no pandemic	Differences between 2020 vs. 2019	p
Total number of patients	76	70	8.60%	0.4841
Number of women	35	28	25%	0.4607
Number of men	41	42	-2.38%	
Knee arthroscopy	68	64	6.30%	0.68858
Shoulder arthroscopy	8	6	33.30%	
Mean age of all patients	48.4	51.2	5.46%	0.1169
Mean age of women, shoulder arthroscopy	60	58.4	2.73%	0.33259
Mean age of men, shoulder arthroscopy	53.2	70	-24%	0.33259
Mean age of women, knee arthroscopy	53.1	63	-15.71%	0.2003
Mean age of men, knee arthroscopy	36.2	50.2	-27.88%	0.32835
Medium duration of hospitalization [days]	3.09	2.8	10.35%	0.03848
Medium duration of hospitalization, women, shoulder arthroscopy	2	3.4	-41.17%	0.04979
Medium duration of hospitalization, men, shoulder arthroscopy	2.4	4	-40%	0.18009
Medium duration of hospitalization, women, knee arthroscopy	2.3	3	-23.33%	0.77416
Medium duration of hospitalization, men, knee arthroscopy	3.1	2.6	19.23%	0.02399
Male-to-female ratio	0.85	1.5	-43.33%	0.03765

**Figure 1.** Total number of arthroscopy.

period; this difference was not statistically significant (Figure 1, Table 1), ($P = .68858$).

Moreover, our analysis revealed that the mean duration of hospital stay for orthopedic patients after their knee or shoulder arthroscopy was 3.1 days in 2020 and 2.8 days in 2019; this difference was statistically significant (Table 1), ($P = .03848$).

Our study revealed the mean age of arthroscopy patients during the pandemic to be lower at 48.4 years than the 51.2 years recorded in 2019 (Table 1), this difference was not statistically significant (Table 1), ($P = .1169$).

The male-to-female ratio was shown to be lower at .85 during the pandemic, having decreased from 1.5 in 2019; this difference was statistically significant (Table 1).

Discussion

Due to the high number of patients requiring shoulder or knee arthroscopy, assessing the epidemiology of shoulder and knee arthroscopy during the COVID-19 pandemic is important. Our study did not confirm the hypothesis of a reduction in the number of knee and shoulder arthroscopy performed during the COVID-19 pandemic.

Previous reports estimated the effect of the COVID-19 pandemic on lowering the number of orthopedic procedures, including arthroscopy, in Germany, Austria, and Switzerland; and a decrease in the number of European centers performing elective arthroscopies has been speculated.^{4,5}

There have been no studies analyzing the impact of a nation-wide pandemic-related lock down on the real-world epidemiology of shoulder and knee arthroscopy performed in individual orthopedic departments.

The COVID-19 pandemic considerably altered the way the healthcare systems (including orthopedic departments) functioned in many countries.²⁻¹⁹ Doctors, nurses, and rehabilitation specialists found themselves in a new reality. Some healthcare professionals contracted COVID-19, some were quarantined, and others were delegated to work with COVID-19-positive patients.^{2,3} Elective admissions to most trauma and orthopedic wards were limited (at first) and then completely halted in order to limit the spread of the causative pathogen, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).^{2-5,10} In other centers, a large proportion of patients canceled or postponed their scheduled procedure due to fears of COVID-19 infection. However, as the pandemic continued, recommendations to resume elective procedures, including arthroscopy, began to emerge.^{6,7,8,11}

Literature reports estimated a 23-100% decline in the total number of elective surgical procedures being performed.^{2,4,5,10} The COVID-19 pandemic saw arthroscopy being canceled or postponed (delayed) in an estimated 38.9-69.2% of centers.^{4,5} Sports injuries and road traffic accidents have also shown significant decrement as result of lock down in the COVID-19 pandemic. This could have resulted in the reduction of post-traumatic arthroscopy.

Our study shows that the COVID-19 pandemic had no significant impact on the number of arthroscopic procedures in the evaluated 2020 period in comparison with the pre-pandemic period. This may be a result of significant restrictions imposed (in our orthopedics department) on procedures involving larger numbers of personnel and those potentially requiring blood transfusions and longer hospitalization; such procedures include total hip or knee arthroplasty. The relatively long waiting list for an elective arthroscopy in our center was another reason why patients—reluctant to have the waiting period extended even more—avoided canceling their surgery and presented for the procedures as scheduled, despite the COVID-19 pandemic. Arthroscopy, especially post-traumatic ones, in contrast to total hip or knee arthroplasty, was not significantly limited in our hospital

during the COVID-19 pandemic. In Poland, similarly to other European countries, there was a lockdown. Pandemic-related restrictions were reported, as in Germany, Austria, and Switzerland, in the countries affected by the publications cited.

There have been no studies assessing the impact of the COVID-19 pandemic on the age of patients undergoing shoulder or knee arthroscopy. Our study did not show a marked effect of the pandemic and nation-wide lock down measures on the mean age of patients undergoing arthroscopic procedures. The fact that their mean age did not decrease may be due to the elderly did not fearing SARS-CoV-2 infection and its possible complications.

There have been no studies evaluating the effect of lockdown measures on the mean duration of hospital stay following shoulder or knee arthroscopy. Our data showed the mean hospitalization, which was lower at 2.8 days in 2019, increased to 3.1 days during the pandemic. This resulted from several factors: a longer waiting period before the procedure, due to the limited number of available orthopedic surgeons and anesthesiologists during the pandemic, and the priority being given to managing patients with fresh injuries.

There have been no studies assessing the effect of the COVID-19 pandemic on the male-to-female ratio in patients undergoing arthroscopy. During the evaluated 2020 period, we observed a considerable reduction in the number of male patients and a considerable increase in the number of female patients in comparison with the figures for the corresponding period in 2019. *Perhaps women are more determined to have surgery performed, even in the COVID-19 pandemic.*

In the future, we are planning another multi-center publication, on a larger group of patients, assessing the impact of the COVID-19 pandemic on the performance of arthroscopy over a longer period of time.

This study demonstrated moderate impact of the COVID-19 pandemic on the epidemiology of shoulder and knee arthroscopic procedures.

Contrary to expectations, the COVID-19 pandemic did not reduce the number of arthroscopy performed at our center and the mean age of the patients did not change. However, the pandemic had a marked effect on the mean duration of hospital stay and male-to-female ratio.

Declaration of Conflicting Interests

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ORCID iD

Piotr Morasiewicz  <https://orcid.org/0000-0002-7587-666X>

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