



ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

Impact of COVID-19 pandemic on changing the ratio of abdominal, vaginal, and laparoscopic hysterectomies

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SUMMARY

Introduction/Objective Coronavirus pandemic caused most hospitals in the world to suspend regular activities. The aim of this study was to analyze pandemic influence on patients who underwent hysterectomy with classical (abdominal) and minimally invasive surgery (laparoscopic and vaginal approach) at the Clinic for Gynecology and Obstetrics of the University Medical Centre of Serbia.

Methods There were 2446 hysterectomies for five-year period. The study analyzed number and types of hysterectomies before and during COVID-19 pandemic.

Results The total number of operated patients was most decreased in the first year of the pandemic. During pandemic, the number of vaginal and laparoscopic hysterectomies did not change, whereas there was an increase in the number of abdominal hysterectomies. Statistical significance ($p < 0.01$) was found between abdominal and vaginal as well as between abdominal and endoscopic hysterectomies.

Conclusion The global pandemic impact on care of symptomatic patients with COVID-19 has led to the redeployment of staff and resources, which has significantly reduced the total number of operations in many hospitals around the world.

Keywords: COVID-19; gynecological surgery; laparoscopy

INTRODUCTION

The epidemic caused by the SARS-CoV-2 began at the end of 2019, and in just a few months affected almost the entire world. The high morbidity and mortality induced by this virus caused problems in the health systems in many countries, and many hospitals suspended or significantly reduced their regular activities in order to engage medical staff for patients suffering from COVID-19 [1, 2]. Due to this emergency, the number of elective surgeries has been reduced.

Hysterectomy is one of the most frequent surgeries in the field of gynecology and represents a mainstay in management of various benign and malignant diseases. An abdominal, vaginal, laparoscopic or robotic approach can be utilized depending on numerous factors such as underlying pathology, shape, and size of the uterus, adnexal pathology, surgical risk and surgeon expertise [3].

In contemporary gynecological practice, minimally invasive surgery (MIS) is considered the technique of choice in most clinical scenarios, but concern has been raised that SARS-CoV-2 could be disseminated during such procedures and when using smoke-generating devices [4]. Hence, employing MIS during COVID-19 pandemic was deemed potentially hazardous by some experts [1].

The aim of this study was to analyze whether COVID-19 pandemic had influenced the number of patients referred for hysterectomy, and whether it had affected the surgical approach selection.

METHODS

In this retrospective cohort study, data were compiled from medical records and operative protocols of the Clinic for Gynecology and Obstetrics of the University Clinical Centre of Serbia. All patients who had undergone a hysterectomy from the beginning of 2017 to the end of 2021 were included in the study. The surgical approaches were also noted – total abdominal, vaginal, and laparoscopic hysterectomy. Both total laparoscopic hysterectomy (TLH) and laparoscopically-assisted vaginal hysterectomy (LAVH) were part of the laparoscopic hysterectomy group. We have analyzed the total number of hysterectomies per year and compared the number of hysterectomies in 2019 compared to 2020. Finally, we analyzed the average number of yearly hysterectomies between the pre-pandemic and pandemic years (2017–2019 vs. 2020–2021). We used IBM SPSS Statistics for Windows, Version 23.0. (IBM Corp. Armonk, NY, USA) for statistical analysis. We chose a 0.05 level of statistical

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significance. Data were described by using ratios and percentages while discrete variables were compared using χ^2 and Fisher tests as appropriate.

The study was approved by Ethics Committee of the University Clinical Centre of Serbia (number 1038/1).

RESULTS

A total of 2446 hysterectomies were performed over a five-year period. Most of the hysterectomies (1865/2446, 76.2%) were done using the abdominal approach. A vaginal approach was used in 473 patients (19.3%), whereas laparoscopy was performed in 108 patients (4.4%) (Figure 1). The total number of hysterectomies per year by surgical approach are presented in Table 1.

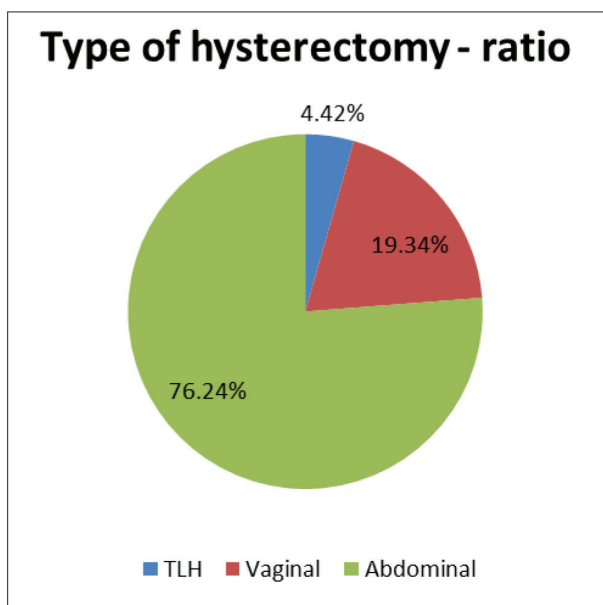


Figure 1. Total relative numbers according to the type of hysterectomy; TLH – total laparoscopic hysterectomy

Table 1. Numbers and types of hysterectomies per year

Year	2017	2018	2019	2020	2021	Total	
Types of hysterectomy	TLH/LAVH	17	25	29	19	18	108
	VAG	177	126	92	39	39	473
	TAH	421	389	375	319	361	1865
Total	615	540	496	377	418	2446	

TLH – total laparoscopic hysterectomy; LAVH – laparoscopically assisted-vaginal hysterectomy; VAG – vaginal hysterectomy; TAH – total abdominal hysterectomy

The highest number of hysterectomies was recorded in 2017, while the lowest was observed in the first year of the COVID-19 pandemic, i.e. 2020). Although there has been a steady decrease in the total number of hysterectomies per year from 2017 to 2020, the abdominal approach was still the most prevalent, followed by the vaginal, and laparoscopic approach. During the second year of the pandemic (2021), the number of hysterectomies increased but did not reach pre-COVID levels (Figure 2).

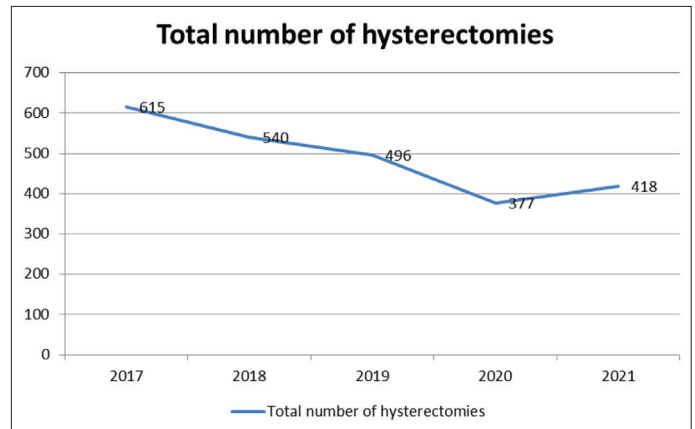


Figure 2. Total number of hysterectomies over the years

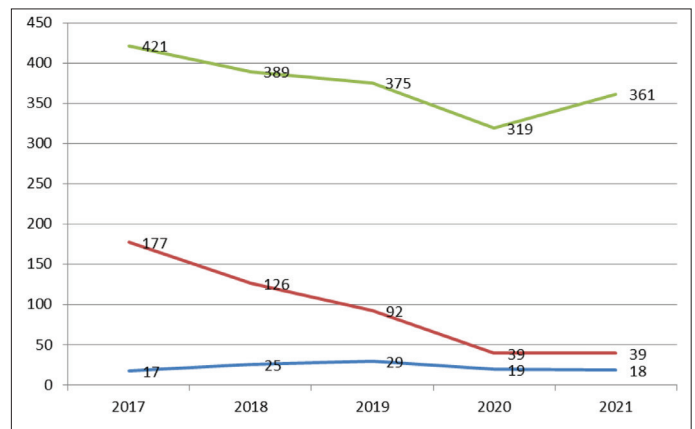


Figure 3. Number and type of hysterectomies during years; TLH – total laparoscopic hysterectomy; LAVH – laparoscopically-assisted vaginal hysterectomy

The relative change in the number of hysterectomies was most pronounced in the vaginal hysterectomy subgroup – approximately 70%. Decreases in the number of TLH/LAVH and abdominal hysterectomies can also be observed – 25% and 14% decreases, respectively (Figure 3). Also, when presented as relative numbers, it is noticeable that the total number of hysterectomies significantly dropped mostly because of the decreased number of vaginal and laparoscopic operations (Table 2 and Figure 4).

During the second year of pandemic a slight increase in the number of total abdominal hysterectomies was observed compared to the first pandemic year, whereas the number of vaginal and TLH/LAVH did not change (Figure 3).

When a χ^2 test was used to compare the number of hysterectomies by each approach between the year 2019 and the year 2020, a highly statistically significant difference ($\chi^2 = 12.05, p = 0.002$) was observed. The percentage of vaginal hysterectomies accounted for 18.5% of all hysterectomies completed in 2019, while the same percentage was 10.3% in 2020. Conversely, 75.6% of all hysterectomies were total abdominal hysterectomies in 2019 but 85.4% in 2020.

When pre-pandemic years (2017–2019) were compared to pandemic ones (2020–2021), similar conclusions to the ones outlined in the previous paragraph could be drawn.

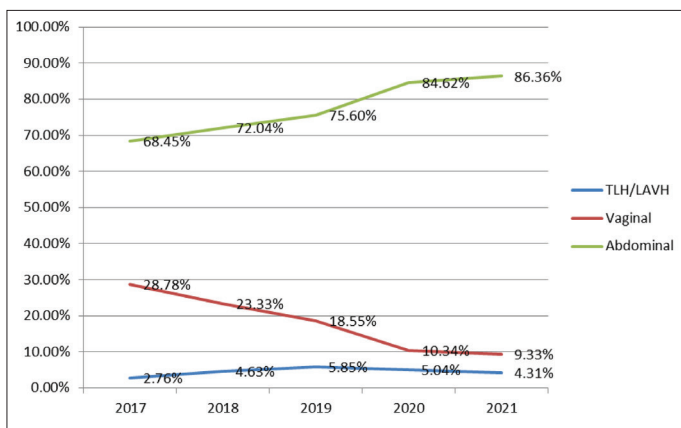


Figure 4. Relative numbers and types of hysterectomies over time; TLH – total laparoscopic hysterectomy; LAVH – laparoscopically-assisted vaginal hysterectomy

Table 2. Relative numbers and types of hysterectomies per year

Procedure	2017	2018	2019	2020	2021	Total
TLH/LAVH	2.76%	4.63%	5.85%	5.04%	4.31%	4.42%
VAG	28.78%	23.33%	18.55%	10.34%	9.33%	19.34%
TAH	68.45%	72.04%	75.60%	84.62%	86.36%	76.24%
						100%

TLH – total laparoscopic hysterectomy; LAVH – laparoscopically-assisted vaginal hysterectomy; VAG – vaginal hysterectomy; TAH – total abdominal hysterectomy

A very highly statistically significant difference ($p < 0.001$) was observed between these two groups with a smaller relative contribution of vaginal hysterectomies (9.8% vs. 23.9%) and a larger relative contribution of total abdominal hysterectomies (85.5% vs. 71.8%) in pandemic years compared to pre-pandemic ones respectively.

DISCUSSION

There was a 28% drop in the total number of hysterectomies performed at our institution over a five-year period, with the largest decrease in vaginal hysterectomies.

Although studies comparing surgical approach before and during pandemic are scarce, two studies analyzed impact of COVID-19 pandemic on gynecological surgery department. Piketty et al. [5] reported a 65% decrease of operations and surgical interventions during COVID-19 lockdown in one of Paris's gynecological departments, whereas Gupta et al. [6] reported an even higher reduction of approximately to 75%. Hence, the total reduction in our clinic was less than the one observed in developed countries and, even though not statistically significant, the increase in the number of operations during second year of pandemic implied that our health care system managed to organize activities in the extreme circumstances.

The impact of the pandemic led to the redeployment of the staff and resources due to the treatment of symptomatic patients with COVID-19, which had a significant impact on the reduction of the total number of operations in many hospitals around the world, which was mostly reflected in reduced number of elective non-emergent, vaginal and

minimally invasive procedures [7]. This is in accordance with our results which showed the highest drop for vaginal hysterectomies. The surgery organization was adapted to include emergency and oncological cases only. Although COVID-19 pandemic could have posed a risk in time delaying from symptom onset to intervention, retrospective studies showed no difference in [8]. On the other hand, non-emergency surgeries were significantly reduced during the first year of pandemic. Data from the National Inpatient Sample and the National Ambulatory Surgery Sample included 1,029,792 hysterectomies performed in the USA during 2019, while that number greatly decreased in 2020; The greatest decrease was observed from March to May of 2020, corresponding with the initial wave of COVID-19 [9].

Vaginal and minimally invasive surgical procedures are certainly the best choice for patients, but there are objective reasons why they are performed less than expected in pandemic settings. Firstly, it is necessary to have appropriate equipment and trained personnel at your disposal. Also, one needs to properly select patients in who MIS will provide good results. Suspicion of ovarian malignancy, adnexal masses larger than 10 cm, larger pelvic tumors, scars and adhesions from previous operations represent some limitations for the laparoscopic approach [10, 11]. The training and experience of the surgical and anesthesiology teams are also important factors influencing the ratio of the number of abdominal and laparoscopic hysterectomies [12].

Also, due to the high incidence of COVID-19 in the general population, the possibility of dispersal of infected droplets and aerosols during laparoscopic surgery has once again become a topic of discussion in scientific circles [13]. Laparoscopy involves creating a pneumoperitoneum with carbon-dioxide insufflation and previously studies have demonstrated the presence of viral DNA such as that of hepatitis B virus and human papillomavirus in surgical smoke [14]. Thus, the aerosol could potentially be contaminated with the SARS-CoV-2 virus due to even minimal leakage of CO₂, as well as smoke generated during energy devices use, leading additionally to a temporary shift in favor of open surgery [7].

On the other hand, a systematic review by Matta et al. [15] on COVID-19 transmission via surgical smoke during laparoscopy found no cases of viral transmission in the operating theatre. However, a potential risk exists, and caution should be exercised while further investigations are conducted.

The pandemic also brought up potential socio-demographic problems. One American study showed significant difference in the decline in the number of hysterectomies among different races, which showed how hospitals prioritized certain gynecologic surgeries as elective [16].

Additionally, postponing scheduled operations and the fear of contracting SARS-CoV-2 in hospitals may lead to significant anxiety according to a survey including 16 European countries [15]. Also, a day case hysterectomy has been successfully proposed in order not to delay elective surgery as a solution due to redistribution of staff and capacity of hospitals [17].

CONCLUSION

The COVID-19 pandemic decreased the total number of hysterectomies at our clinic. The number of vaginal and laparoscopic hysterectomies compared to classical, total abdominal hysterectomies was significantly reduced in Serbia, as well as all around the world, due to the enormous

modifications of health care systems. Surgery postponement and consequences caused by this shift regarding progression of primary disease, survival rate and quality of life are yet to be investigated.

Conflict of interest: None declared.

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Утицај пандемије ковида 19 на промену односа броја абдоминалних, вагиналних и лапароскопских хистеректомија

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САЖЕТАК

Увод Пандемија изазвана вирусом корона довела је до тога да већина болница у свету обустави или значајно смањи редовне активности.

Циљ рада је био да се анализира утицај пандемије на однос броја болесница код којих је урађена хистеректомија класичном (абдоминалном) и минимално инвазивном хирургијом (лапароскопски и вагинални приступ) у Клиници за гинекологију и акушерство Универзитетског клиничког центра Србије.

Методе Укупно 2446 хистеректомија урађено је током периода од пет година. Студија анализира болеснице које су имале хистеректомију у последњих пет година поређећи број и врсту операција пре и током пандемије.

Резултати Укупан пад броја оперисаних болесница био је најизраженији током прве године пандемије. У време пан-

демије, 2020. и 2021. године постоји стагнација у броју вагиналних и лапароскопских хистеректомија, док се бележи пораст броја абдоминалних хистеректомија. Установљена је високо значајна разлика ($p < 0,01$) између абдоминалних и вагиналних, као и између абдоминалних и ендоскопских хистеректомија.

Закључак Глобални утицај пандемије је због збрињавања симптоматских болесника са ковидом 19 довео до прерапоредивања особља и ресурса, што је значајно утицало на смањење укупног броја операција у многим болницама широм света, а то се највише одразило на елективне, нехитне случајеве.

Кључне речи: ковид 19; гинеколошка хирургија; лапароскопија