

## CLINICAL STUDY

# Suicide attempts as a cause of pelvic injuries during the COVID-19 pandemic

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**ABSTRACT**

**OBJECTIVES:** We decided to compare the incidence and spectrum of pelvic fractures in 2020 affected by the anti-pandemic measures due to COVID-19 with previous years 2018 and 2019.

**METHODS:** This retrospective study included 391 patients treated at the author's clinic for pelvic fractures. From the medical records we recorded gender, age, mechanism of injury, trauma energy, fracture type based on the AO classification and severity of injury.

**RESULTS:** As expected, we observed no difference in the number of fractures caused by simple falls. However, we failed to prove a reduction in the number of high-energy injuries. In contrary, we observed an increase in the number of high-energy injuries in the period between lockdowns ( $p=0.0375$ ). A surprising result was a dramatic increase in suicide attempts as a cause of pelvic fractures, with 6 (2.2 %) in 2018 and 2019 compared to 13 (10 %) in 2020 alone ( $p=0.0017$ ).

**CONCLUSION:** We observed the increased number of suicidal attempts only on a limited number of specific patients with pelvic fractures; therefore, we cannot formulate any general conclusions regarding the incidence of suicide during the COVID-19 pandemic. Nevertheless, we consider this to be a warning signal highlighting the worsened population mental health due to COVID-19 pandemic (Tab. 2, Fig. 1, Ref. 34). Text in PDF [www.elis.sk](http://www.elis.sk)

**KEY WORDS:** pelvic fracture, suicide, epidemiology, COVID-19, pandemic.

**Introduction**

The COVID-19 pandemic has affected and limited the lives of people all over the planet. The Czech Republic was one of the most affected countries. By the end of 2020, it was ranked 5th in terms of the number of infected people per 100,000 inhabitants, and if we consider only countries with populations of over 1 million, it was first (1). In 2020, the Czech government declared a state of emergency twice, from 12.03.2020 to 17.05.2020 and from 05.10.2020 to 31.12.2020. Both lockdowns were associated with restrictions on the free movement of the population. There

have been several recently published studies tracking the incidence of fractures during COVID-19 lockdowns. Most authors observed a reduction in the overall number of fractures along with a decrease in high-energy injuries and an increase in the proportion of fractures occurring in the home setting (2–6). We did not find any papers focused on pelvic fractures; therefore, we decided to compare the causes of pelvic fractures and the change in their spectrum during the COVID-19 pandemic with the previous two years.

Pelvic fractures can be divided into two groups according to the injury energy (7, 8). The first group consists of low-energy injuries caused mainly by simple falls, mainly in elderly patients, especially women, due to osteoporosis (9–11). The second group, i.e., high-energy injuries, occur mainly in younger males; these pelvic fractures are primarily caused by road traffic accidents and falls from height (12, 13). Based on the results from other authors, we expected a decrease in high-energy injuries, especially during the lockdown period, and a stable number of low-energy injuries throughout the whole of 2020 relative to the previous two years, i.e., 2018 and 2019.

**Material and methods**

In this retrospective study, we included 391 patients treated at the author's institution (a level I trauma center with a catchment

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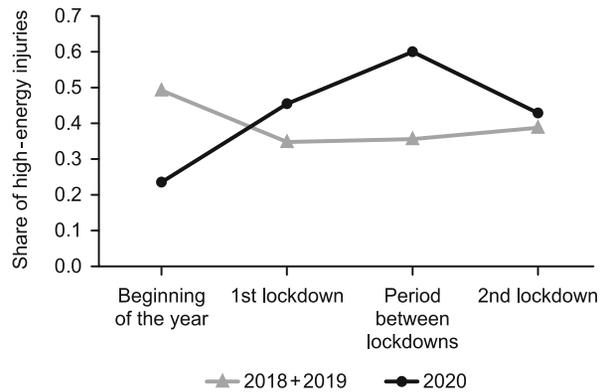
**Tab. 1. Comparison of the control group with the year 2020.**

	2018+2019	2020	p
Women	177	86	
Men	85	43	0.9089
Overall	262	129	
<b>Age</b>			
Range	13–98	15–96	
Average	65.2	58.6	<b>0.0108</b>
Median	73	64	
<b>Cause of injury</b>			
Road traffic accident	52	26	1
Fall from height	41	29	0.1223
Sports	11	6	0.7981
Simple fall	156	66	0.1289
Suicide	6	13	<b>0.0017</b>
<b>Exerted energy</b>			
High	103	57	0.3824
Low	159	72	
<b>Injury severity</b>			
Monotrauma	176	76	0.1166
Associated trauma (ISS < 16)	55	36	0.1612
Multiple trauma (ISS ≥ 16)	31	17	0.7439
<b>Fracture type</b>			
A	146	74	0.8284
B	101	46	0.6571
C	15	9	0.6569

**Tab. 2. Comparison of the period between the lockdowns 18.5. – 4.10.**

	2018+2019	2020	p
Women	67	28	
Men	37	17	0.8536
Overall	104	45	
<b>Age</b>			
Range	21–96	18–94	
Average	66.28	46.67	<b>&lt;.0001</b>
Median	75	40	
<b>Cause of injury</b>			
Road traffic accident	9	10	0.0666
Fall from height	19	14	0.0903
Sports	2	0	1
Simple fall	67	17	<b>0.0038</b>
Suicide	4	7	<b>0.0183</b>
<b>Exerted energy</b>			
High	37	27	<b>0.007</b>
Low	67	18	
<b>Injury severity</b>			
Monotrauma	74	22	<b>0.0148</b>
Associated trauma (ISS < 16)	17	17	<b>0.0059</b>
Multiple trauma (ISS ≥ 16)	13	6	1
<b>Fracture type</b>			
A	58	25	1
B	37	16	1
C	8	4	0.7542

area of 1.25 million people) for pelvic fractures between 01.1.2018 and 31.12.2020. From the medical records, we recorded age, sex, cause of injury (simple fall, fall from height, road traffic accident, sports injury), injury energy, injury severity, and fracture type based



**Fig. 1. Share of high-energy injuries out off all pelvic fractures.**

on the AO classification (14). Additionally, we evaluated the data separately for the first state of emergency between 12.3.2020 and 17.5.2020, for the second state of emergency between 05.10.2020 and 31.12.2020 and for the periods in between. Informed consent was not required due to only using data from medical records. We used Microsoft Excel (2016) for data analysis. Categorical data were evaluated using Fisher’s exact test, and group age differences were evaluated using the two-sample t-test, with  $p < 0.05$  as the level of significance.

**Results**

The control group from 2018 and 2019 consisted of 262 patients, the pandemic group from 2020 consisted of 129 patients. The mean age was 65.2 years in the control group and 58.6 years in the pandemic group ( $p=0.0108$ ). In both groups, the proportion of females and males, the proportion of low-energy and high-energy injuries, the severity of the injury, and the AO fracture type were comparable. A surprising result was a dramatic increase in suicide attempts as a cause of pelvic fracture, with 6 (2.2 %) in 2018 and 2019 compared to 13 (10 %) in 2020 alone ( $p=0.0017$ ). More details are provided in Table 1.

When comparing the two lockdowns, we found no difference compared to the same periods in 2018 and 2019. We observed fewer high-energy traumas at the beginning of 2020 before the first lockdown compared to the control group (31 [49.2 %] versus 8 [23.5 %];  $p=0.0172$ ).

Furthermore, when we compared the period between the two lockdowns, we observed significantly lower patient age (66.28 versus 46.67;  $p < 0.0001$ ), a greater number of high-energy traumas (37 [35.5 %] versus 27 [60 %];  $p=0.0070$ ), fewer simple falls (67 [64.4 %] versus 17 [37.7 %];  $p=0.0038$ ) and a greater number of suicide attempts in 2020 than in the control group (4 [3.8 %] versus 7 [15.5 %];  $p=0.0183$ ). We also observed an increase in road traffic accidents (9 [8.6 %] versus 10 [22.2 %]), however the difference was not significant ( $p=0.0666$ ). Details are shown in Table 2, and graphical representation of the number of high-energy traumas is shown in Figure 1.

## Discussion

### *Total number of traumas*

The main finding of our study is the fact, that we did not identify the expected reduction in the number of injuries during the lockdown periods as other authors did (3, 5). This may be explained by the specific type of injury studied in our cohort. Pelvic fractures normally have a low incidence, only representing 3–5 % of all skeletal fractures (15). Another explanation could be the substantial non-compliance of the Czech population with the government's restrictive measures compared to other countries. However, this assumption is not based on any verified data; it is only our subjective assessment of the situation as we perceived it at the time of the lockdown.

### *High-energy injuries and age development*

The increase in high-energy injuries during the summer months after the first lockdown can be explained by a certain type of rebound effect. It could have been caused by the severe restrictions imposed during the first lockdown, which then lead people to take more risks (or even some “acting out” maladaptive behaviors) during the summer months. This explanation is supported by the increased number of road traffic accidents in our sample during that period. These risky activities and the associated high-energy injuries are a characteristic of younger age groups (12, 13); this may explain the observed overall younger mean age during this period. Alternative explanation for this finding could stem in the well-established links between economic recessions and suicide. We can expect that the economic hardship, uncertainty about future, and fear of job loss impacted Czech population during the summer 2020. Importantly, unemployment alone can lead to up to three-fold increased relative-risk of death by suicide, compared with being employed (16). In general, we consider this increase to be a secondary finding of our study; which may indicate that pandemics have delayed effects associated with changes in population behaviors after lockdowns.

### *Suicide as a cause of pelvic fracture*

Unexpectedly, we observed an increase in suicide attempts, although our sample was small and involved only pelvic fractures. Most of the suicide attempts were jumps from height and, in one case, the person jumped under a passing train. Jumps from height represent the third most frequent cause of suicides in both males and females (8 % and 21 % of all completed suicides) (17). These attempts could have been the result of long-lasting mental illness or a spontaneous decision. It is much too speculative at this time to draw any general conclusions regarding the incidence of suicide attempts during the COVID-19 pandemic. Nevertheless, we consider this particular study finding to be an important warning sign, suggesting the need to further monitor and confirm this phenomenon, with a special focus on remediation of mental health consequences that can develop during pandemics and lockdown periods (18).

Other authors have reported an increase in the prevalence of mental illness during the pandemic (19, 20). An increase in the

number of suicides was reported by authors from Nepal and during the second half of 2020 from Japan (21, 22). Also, studies modelling the effect of the COVID-19 pandemic on suicide rates estimate the increase of suicides and suicide attempts (23, 24). However, some authors did not observe an increase in suicide rates (25–28). Farooq et al, summarized nineteen reports which included 79 cases of suicide and 13 cases of attempted suicide (29). The main concerns related to COVID-19 in cases of suicide and attempted suicide included: fear of being infected or infecting others, shame and guilt, economic recession and financial hardship, stress due to COVID-19 pandemic and lockdown, self-isolation, being unable to access alcohol, lack of access to educational resources and prejudice from communities (29). It should be noted that targeted nationwide studies focusing on suicide rates in the context of Central Europe during the pandemic are lacking, and thus, different results may reflect different geographical locations.

On the other side, the increased prevalence of suicidal ideation during COVID-19 has been well documented. Pooled data of the recent meta-analysis (sample size of more than 100 thousand) confirmed the high prevalence of suicidal ideation (12.1 % of general population) during COVID-19 pandemic (29). This result is fully in line with the repeated cross-sectional surveys on a representative sample of Czech adults. This study comparing prevalence of mental disorder between reference period in 2017 with May 2020 documented the increased prevalence of both suicide risk (3.88 vs 11.88 %) and major depressive disorder (3.96 % vs 11.77 %) (19).

In the past, an increase in suicides was observed during, and even one year after, the SARS pandemic (30). An increase in suicides associated with job loss was observed during the economic crisis in 2008 (31). With more than 100 million jobs expected to be lost globally in 2020, anticipating and preparing for a continuation of this trend in crisis-related suicides is critical, with a special focus on suicide prevention (32).

### *Long-term impact of the COVID-19 pandemic*

At the end of the discussion, we want to quickly mention the long-term impact of the pandemic on population health and the implications for health care systems in the future. The first major issue will be the underdiagnosis of serious, potentially treatable diseases. Institutions both in the USA and Europe report significantly lower numbers of cancer screening visits during the pandemic (33, 34). These later diagnosed patients with higher stage diseases will have worse outcomes and will require more intensive and expensive therapy. The second category is patients with chronic diseases. For these patients, the later diagnosis might not necessarily mean worse outcomes, but it may cause higher therapy costs, than if the treatment was started earlier (e.g., diabetes mellitus, renal disease). This could within a few years be a financial problem even in developed countries. In the third category are patients, who were for many months delayed of adequate treatment due to overcrowded hospitals during the pandemic. Examples might include orthopedic patients with e.g., coxarthrosis indicated for hip arthroplasty. In this particular case, there are not only increased direct medical costs (medication while waiting for

surgery), but also indirect costs, such as a burden on social security systems (sickness benefits, postponement of work). Finally, there is the group that our study wanted to highlight. The lack of access to adequate psychological and psychiatric care in times of pandemic will surely require higher costs in the future, both for the specialized psychiatric treatment and also for dealing with other social and medical consequences.

## Conclusion

We did not confirm the predicted decline in high-energy injuries related to pelvic fractures during the COVID-19 pandemic. In the period after the relaxation of anti-epidemic measures, we observed a rebound effect in pelvic fractures, mostly caused by an increase in road traffic accidents. A secondary finding of our study was the significant increase in pelvic fractures due to suicide attempts, particularly jumping from height. This highlights the fact that the prevention and treatment of mental health issues may have been both insufficient and inadequate during the COVID-19 pandemic.

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