The Impact of Lockdown during COVID-19 Pandemic on Hip Fracture Cases in Austria

Malle Oliver (✉ oliver.malle@medunigraz.at)

Medical University of Graz

Brozek Wolfgang

Agency for Preventive and Social Medicine, Bregenz

Szivak Michael

Austrian Trauma Insurance Agency (AUVA)

Hans Peter Dimai

Medical University of Graz

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Abstract

Mini Abstract

Social lockdowns may have an impact on fracture cases. During the first lockdown in Austria (March 16th to May 31st 2020), hip fracture cases did not significantly change, except a decreased rate in female patients aged 50-69 years.

Introduction

Social lockdown has been repeatedly imposed worldwide due to the coronavirus disease 2019 (COVID-19). Resultant isolation with less physical activity and restricted health care access may have an impact on fracture incidences. The aim of this analysis was to assess the effect of a social lockdown on hip fracture cases in Austria.

Methods

This analysis is based on the data of the Austrian Workers' Compensation Board (AUVA), which is the social insurance for the majority in Austria. Hip fracture cases in the time period March 16th to May 31st, 2020 (first lockdown period in Austria) were compared with those in the same period of previous years (2016-2019). Further analysis included stratification by gender, age and weekly intervals using repeated measures analysis of variance (ANOVA), while a p-value of less than 0.05 was considered statistically significant.

Results

In the time period March 16th to May 31st 2020 the fracture cases of 445 lied within the standard deviation (SD) of years before (438 ± 20.1). The mean cases of weekly separated intervals in 2016-2019 did not differ significantly from those in 2020. In patients aged 50 to 69 years, the fracture cases in 2020 was below the SD of those in years before (64 vs. 77 ± 10). Stratified by weekly intervals and age group, mean fracture cases of years before were comparable with those of 2020, except 2018, which had significant lower rates in patients aged 50-69 years ($p < 0.05$). Separated by gender, this difference was only seen in women.

Conclusion

Hip fracture cases did not significantly change during first social lockdown (March 16th to May 31st 2020) in Austria, except a decreased fracture rate in female patients aged 50-69 years.

Introduction

The coronavirus disease 2019 (COVID-19) has taken an unprecedented impact on health care systems worldwide (1, 2). The first case in Europe was detected on January 25th 2020 (3). After rapid expansion, it

was catalogued as a global pandemic on March 11th 2020 by the World Health Organization (WHO) (4). As in many other countries, the Austrian government repeatedly imposed mandatory social lockdown for its population to prevent further spread, while the first lockdown period was initiated on March 16th 2020 and cancelled stepwise until May 31st 2020 (5). This first lockdown included quarantine resulting in isolation and limited free movement.

Previous reports in other countries have already shown a negative impact on the epidemiology of fractures during a lockdown (1, 6, 7). Leaving the citizens in isolation for a considerable period of time resulted in less physical activity, higher frailty and restricted health care access. (8) Emergency department admissions especially due to trauma occurred in smaller amounts (7). However, hip fractures in the elderly appeared at an unchanged rate (7). Other reports described a higher rate of fragility fractures (9). Weakness and fatigue arising from COVID-19 may represent contributing factors leading to more frequent falls (9). Furthermore, a higher frequency of falls were also seen in asymptomatic COVID-19 patients (10). These conditions resulted in a worse clinical outcome in fractured patients, who subsequently tested positive for COVID-19. (2, 8) Even worse, this issue was also shown in patients who tested negative for COVID-19 (11–14), suggesting that COVID-19 is not the only determinant of increased morbi-mortality and that other factors such as delayed surgical intervention, prolonged operative time or focusing a non-operative management contributed to the worse clinical outcome. (7, 15)

Austria is classified as having one of the best health care system worldwide by the World Health Organization (WHO), while having one of the highest incidences of osteoporotic fractures worldwide. (16, 17) Conditions resulting from social lockdown may underline suggestions, albeit anecdotal, that the fracture rate has increased in Austria. The purpose of this analysis was to assess the effect of mandatory social lockdown due to COVID-19 on the hip fracture cases in Austria.

Methods

This analysis is based on the data of the Austrian Workers' Compensation Board (AUVA), which is the social insurance for occupational risks for more than 3.1 million employees and 1.4 million pupils and students living in Austria. Hip fracture cases in the time period March 16th 2020 to May 31st 2020 were compared with matching time periods of previous years (2016–2019). Descriptive analysis was used to present the fracture cases over time periods. Fracture rates were compared within the time periods in total, but also after having the time periods divided into weekly intervals. Further analysis included separation by gender as well as by age (50–69 years, 70–84 years, > 85 years). Differences in fracture cases were assessed using repeated measures analysis of variance (ANOVA) with Greenhouse–Geisser correction, while a p-value of less than 0.05 was considered statistically significant. The statistical software package used was IBM® SPSS® Statistics Version 23.

Results

From 2016 to 2019, the mean fracture cases were 438 (range 412 to 455) in the time period March 16th to May 31st. In the same period of 2020, the fracture cases were 445, which lies within the standard deviation (± 20.1) (Table 1). The mean fracture cases of weekly separated intervals in 2016–2019 did not differ significantly from those of 2020 (Table 2). Stratified by age group, the mean fracture rate from March 16th to May 31st 2020 lied below the SD of those in years before in patients aged 50 to 69 years (Table 3). Stratified by both weekly intervals and age group, the mean fracture rates between March 16th and May 31st of 2020 were significant lower in patients aged 50–69 years compared to the same age group in the same time period of 2018 (Table 4). After having further separated this analysis by gender, this significant difference was still present in women, but not in men (Table 5, Table 6).

Table 1
Fracture cases of the patient cohort and stratified by
gender in the time period March 16th to May 31st of year
2016 to 2020

Fracture cases	All	Women	Men
March 16th – May 31st 2020			
2016	433	306	127
2017	412	295	117
2018	455	326	129
2019	453	295	158
2020	445	301	144

Table 2

Fracture cases stratified weekly intervals in the time period March 16th to May 31st of year 2016 to 2020

Fracture cases separated by weekly intervals	2016	2017	2018	2019	2020
16.3.-22.3.	32	33	32	51	36
23.3.-29.3.	35	50	34	48	36
30.3.-5.4.	43	46	42	34	43
6.4.-12.4.	39	47	53	37	58
13.4.-19.4.	47	35	38	45	27
20.4.-26.4.	44	30	48	31	45
27.4.-3.5.	34	35	37	43	31
4.5.-10.5.	47	33	44	35	45
11.5.-17.5.	33	29	38	45	40
18.5.-24.5.	38	35	42	48	40
25.5.-31.5.	41	39	47	36	44
Mean $\pm$ SD	39.4 $\pm$ 5.5	37.5 $\pm$ 7.1	41.1 $\pm$ 6.3	41.2 $\pm$ 6.8	40.5 $\pm$ 8.2
p-value (paired t-test vs. 2020)	0.70	0.31	0.54	0.86	-

Table 3

Fracture cases stratified by age groups in the time period March 16th to May 31st of year 2016 to 2020

Fracture cases March 16th – May 31st 2020	50–69 years	70–84 years	> 85 years
2016	72	167	194
2017	66	170	176
2018	89	183	183
2019	80	195	178
2020	64	203	178

Table 4
Fracture cases stratified by weekly intervals and age in the time period March 16th to May 31st of year 2016 to 2020

Fracture cases					
50–69 years	2016	2017	2018	2019	2020
16.3.-22.3.	7	11	5	4	6
23.3.-29.3.	4	9	5	10	1
30.3.-5.4.	11	8	9	4	10
6.4.-12.4.	10	5	11	10	10
13.4.-19.4.	6	4	5	7	2
20.4.-26.4.	11	5	10	9	7
27.4.-3.5.	7	4	4	9	1
4.5.-10.5.	5	3	11	6	9
11.5.-17.5.	2	9	9	7	8
18.5.-24.5.	4	4	10	11	8
25.5.-31.5.	5	4	10	3	2
Mean ± SD	6.5 ± 3.0	6.0 ± 2.7	8.1 ± 2.7	7.3 ± 2.8	5.8 ± 3.6
p-value (paired t-test vs. 2020)	0.55	0.89	0.01	0.32	-
70–84 years					
16.3.-22.3.	12	12	14	26	13
23.3.-29.3.	11	23	12	26	16
30.3.-5.4.	10	16	18	17	13
6.4.-12.4.	12	21	24	15	26
13.4.-19.4.	19	17	18	14	14
20.4.-26.4.	15	8	19	14	22
27.4.-3.5.	9	14	17	18	19
4.5.-10.5.	20	14	17	16	23
11.5.-17.5.	22	11	12	21	20
18.5.-24.5.	17	17	13	16	17

Fracture cases					
25.5.-31.5.	20	17	19	12	20
Mean ± SD	15.2 ± 4.6	15.5 ± 4.3	16.6 ± 3.6	17.7 ± 4.7	18.5 ± 4.3
p-value (paired t-test vs. 2020)	0.08	0.14	0.16	0.76	-
> 85 years					
16.3.-22.3.	13	10	13	21	17
23.3.-29.3.	20	18	17	12	19
30.3.-5.4.	22	22	15	13	20
6.4.-12.4.	17	21	18	12	22
13.4.-19.4.	22	14	15	24	11
20.4.-26.4.	18	17	19	8	16
27.4.-3.5.	18	17	16	16	11
4.5.-10.5.	22	16	16	13	13
11.5.-17.5.	9	9	17	17	12
18.5.-24.5.	17	14	19	21	15
25.5.-31.5.	16	18	18	21	22
Mean ± SD	17.6 ± 4.0	16.0 ± 4.0	16.6 ± 1.9	16.2 ± 5.0	16.2 ± 4.2
p-value (paired t-test vs. 2020)	0.42	0.87	0.73	0.99	-

Table 5
Fracture cases stratified by weekly intervals in the time period March 16th to May 31st of
year 2016 to 2020 in women aged 50–69 years

Fracture cases	2016	2017	2018	2019	2020
50–69 years					
women					
separated by weekly intervals					
16.3.-22.3.	4	5	2	1	2
23.3.-29.3.	1	5	4	7	0
30.3.-5.4.	6	4	4	0	6
6.4.-12.4.	4	2	8	5	5
13.4.-19.4.	0	3	4	6	1
20.4.-26.4.	2	1	6	7	2
27.4.-3.5.	5	3	2	5	1
4.5.-10.5.	5	2	7	3	0
11.5.-17.5.	0	3	6	4	2
18.5.-24.5.	4	3	5	5	5
25.5.-31.5.	1	1	6	1	2
Mean ± SD	3.0 ± 2.2	2.9 ± 1.4	4.9 ± 1.9	4.0 ± 2.4	2.4 ± 2.1
p-value	0.44	0.49	0.01	0.17	-
(paired t-test vs. 2020)					

Table 6
Fracture cases stratified by weekly intervals in the time period March 16th to May 31st of
year 2016 to 2020 in men aged 50–69 years

Fracture cases	2016	2017	2018	2019	2020
50–69 years					
men					
separated by weekly intervals					
16.3.-22.3.	3	6	3	3	4
23.3.-29.3.	3	4	1	3	1
30.3.-5.4.	5	4	5	4	4
6.4.-12.4.	6	3	3	5	5
13.4.-19.4.	4	1	1	1	1
20.4.-26.4.	6	4	4	2	5
27.4.-3.5.	2	1	2	4	0
4.5.-10.5.	5	1	4	3	9
11.5.-17.5.	2	6	3	3	6
18.5.-24.5.	0	1	5	6	3
25.5.-31.5.	4	3	4	2	0
Mean ± SD	3.6 ± 1.9	3.1 ± 1.9	3.2 ± 1.4	3.3 ± 1.4	3.5 ± 2.8
p-value	0.83	0.70	0.73	0.84	-
(paired t-test vs. 2020)					

Discussion

Based on the data of a large social insurance carrier, we evaluated the hip fracture rates during the first social lockdown in Austria due to COVID-19 and compared them with matching time periods of previous years (2016–2019). Overall, we did not detect a significant change in hip fracture cases during social lockdown in 2020. However, after having stratified the cohort by age groups, we found decreased fracture cases in patients aged 50–69 years. Stratified further by sex, we could confirm this difference only in women.

Considering that particularly in middle-aged adults (18–20) the majority of fractures would occur outdoors, fewer outdoor activities due to social lockdown and thus less accidents, less falls and less subsequent fractures may explain our findings. On the other hand, given that in elderly people the majority of hip fractures would occur indoors, one could hypothesize that reduced outdoor activities

might result in an increased hip fracture rate incidence to more frequent falls indoors (21). However, we did not see a significant change in hip fracture cases in this age group, which, however, does not preclude the possibility that a shift in the frequency of falls from outdoors to indoors has led to an according shift in the rate of hip fractures.

Another reason for decreased fracture rates may be the fear of getting infected with COVID-19 when being transferred to a hospital, although this might be of less importance in patients with hip fracture, since at least in so-called western countries it is very unlikely that patients with a hip fracture would not be immediately admitted to a trauma unit. Our findings are largely in line with few studies of other countries (6, 7). However, all of them were carried out at single centers, whereas our data has been collected from one of the largest Austrian social insurance carriers which is well representative of the entire population. Thus, we can preclude this potential cohort based bias in our findings.

To our knowledge, this is the first study investigating hip fracture cases during the first social lockdown in Austria. Nevertheless, there are limitations in our analysis. Although our data is representative of the majority of the Austrian population, hip fracture patients, who have been admitted to trauma units covered by other social insurances than the AUVA, were not captured in our analysis. Furthermore, it is very unlikely that COVID-19 based changes in hip fracture rates would depend on the respective social insurance carrier.

While the first lockdown in Austria was imposed from March 16th to May 31st 2020, there have been further lockdowns with varying social restrictions. Currently, there is an ongoing lockdown with less stringent restrictions. It will be of interest to analyze the fracture cases for these time periods as well, in order to improve our understanding about the effect of limited mobility as imposed by COVID-19 induced lockdowns.

Abbreviations

ANOVA	analysis of variance
AUVA	Austrian Workers' Compensation Board
COVID-19	coronavirus disease 2019
WHO	World Health Organization

Declarations

Ethics approval

Not applicable.

As this is an retrospective analysis of statistic data describing epidemiological data, an ethics approval was not requested. Thus, this study has not been granted ethics committee approval.

All methods of this analysis was performed in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

All authors (Malle O, Brozek W, Szivak M and Dimai HP) declare that they have no competing interests

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Authors' contribution

OM and HPD wrote the manuscript, WB and MS generated data and performed statistical analysis. All authors reviewed the manuscript critically.

All authors approved the final version for this manuscript and gave their consent for publication.

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