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Brief report

Cardiac biometric variables and arrhythmic events during COVID-19 pandemic lockdown in patients with an implantable cardiac monitor for syncope work-up

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A B S T R A C T

Aim: To assess the changes induced by the COVID-19 lockdown on cardiac biometric variables recorded using an implantable cardiac monitor (ICM) in a patient population monitored for syncope work-up, as well to assess whether there has been an effect on arrhythmic events among the patients.

Methods: Longitudinal cohort study. We included 245 adult patients monitored with an ICM indicated for the investigation of syncope. The records from days 1 to 12 March 2020 (prior to the institution of lockdown by the state government) with days 16 to 28 March 2020 were compared.

Results: Daily physical exercise reduced markedly after the imposition of lockdown (132 [55–233] minutes vs. 78 [21–154] minutes). The mean daytime HR prior to lockdown was 77 [69–85] bpm, whereas during lockdown it was 74 [66–81] bpm. During the lockdown period, a drop in the variability in heart rate (114 [94–136] ms vs. 111 [92–133] ms) was observed. Although the incidence of AF was similar over both periods, the daily AF burden was significantly higher post-lockdown (405 [391–425] minutes vs. 423 [423–537] minutes). No differences in the number of other arrhythmias were found.

Conclusions: The establishment of mandatory lockdown has led to a marked drop in daily physical activity in this population which probably explains changes observed in other cardiac biometric variables. Although, in the short term, we have not documented an increased risk of arrhythmia, we cannot rule out an effect in the medium or long term or in other populations of at-risk patients.

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Variables biométricas cardiacas y eventos arrítmicos durante el confinamiento por la pandemia de COVID-19 en pacientes portadores de un monitor cardíaco implantable para el diagnóstico de síncope

R E S U M E N

Objetivo: Evaluar los cambios inducidos por el confinamiento durante la pandemia de COVID-19 en las variables biométricas cardiacas registradas, utilizando un monitor cardíaco implantable (ICM) en una población de pacientes monitorizada para el diagnóstico de síncope, así como evaluar si ha habido un efecto sobre los eventos arrítmicos.

Métodos: Estudio de cohorte prospectivo. Se incluyeron 245 pacientes adultos monitorizados con un ICM indicado para la investigación del síncope. Se compararon los registros de los días uno al 12 de marzo del 2020 (antes del establecimiento del confinamiento por parte del gobierno estatal) con los días 16 al 28 de marzo del 2020.

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Resultados: El ejercicio físico diario se redujo notablemente después de la imposición del confinamiento (132 [55 a 233] vs. 78 [21 a 154] min). La frecuencia cardíaca diurna media antes del confinamiento fue de 77 (69 a 85) lpm, mientras que durante el mismo fue de 74 (66 a 81) lpm. Durante el periodo de confinamiento, se observó una disminución de la variabilidad de la frecuencia cardíaca (114 [94 a 136] vs. 111 [92 a 133] ms). Aunque la incidencia de fibrilación auricular (FA) fue similar en ambos períodos, la carga diaria de FA fue significativamente mayor después del bloqueo (405 [391 a 425] vs. 423 [423 a 537] min). No se encontraron diferencias en el número de otras arritmias.

Conclusions: El establecimiento de un confinamiento obligatorio ha provocado un marcado descenso de la actividad física diaria en esta población, lo que probablemente explica los cambios observados en otras variables biométricas cardiacas. Si bien, a corto plazo, no se ha documentado un aumento del riesgo de arritmia, no podemos descartar un efecto a medio-largo plazo o en otras poblaciones de pacientes de riesgo.
of 3 [0.2–5] bpm; 95% CI from 2 to 3.3 min). During the lockdown period, a slight but significant drop in the variability in heart rate (114 [94–136] ms vs. 111 [92–133] ms; median of the differences of 3 [−3–9] ms; 95% CI from 1 to 5 ms) was observed. This drop was more pronounced over the first few days of lockdown, and tended to normalize subsequently (Panel C Figure).

In a total of 45 (18.4%) patients, we recorded atrial fibrillation (AF) during the study period. Of these, 7 (16%) were permanent and the rest were paroxysmal. Although the incidence of AF was similar over both periods, the duration (daily AF burden) of the episodes was higher post-lockdown (405 [391–425] min vs. 433 [423–537] min, with an increase of 28 min; 95% CI from 18 to 45 min) (Panel D and Table 2).

A total of 7 patients activated the device due to symptoms. Their distribution was homogeneous over both periods. Similarly, we did not find any significant differences in the number of asymptomatic arrhythmias detected by the device (Table 2).

### Table 2

|                      | Prior to the lockdown | During the lockdown |
|----------------------|-----------------------|---------------------|
| AF/AT                | 36 (14.7%)            | 34 (13.9%)          |
| Bradycardia          | 7 (2.9%)              | 6 (2.4%)            |
| Asystole             | 19 (7.8%)             | 18 (7.3%)           |
| NSVT                 | 10 (4.1%)             | 10 (4.1%)           |
| Symptoms             | 6 (2.4%)              | 5 (2.0%)            |

AF: atrial fibrillation; AT: Atrial tachycardia; NSVT: unsustained ventricular tachycardia.

### Discussion

To our knowledge, this is the first case series exploring changes in cardiac biometric variables physical exercise and arrhythmic burden secondary to mandatory lockdown in the context of the SARS-CoV-2 epidemic and exploring its implications on arrhythmic burden.

In our project, based on a patient cohort monitored with an ICM as part of syncope work-up, we observed a marked reduction in daily physical exercise after declaration of the state of emergency. This fact probably explains the change observed in other biometric variables examined, such as mean daytime HR, which also significantly dropped in parallel with physical activity. In this sense, it is of interest to mention the evolution of heart rate variability (HRV). HRV is a measurement related to activity of the autonomic nervous system on cardiac function and it has been shown to be of prognostic value in different pathologies, as well as in the general population. It is known that prolonged sedentary lifestyle significantly reduces HRV. In our study, we observed a marked drop in HRV just after the start of lockdown, which tended to normalize progressively over the following days, which suggests there is a physiological adaptation to the situation. The clinical and prognostic implications of this behavior are unknown. In our project, we carried out an exploratory study on the effect on arrhythmic events. We did not find any significant differences in this population during the first days of lockdown, other than a greater duration of paroxysms of AF, although it would be interesting to assess the possible implications that these changes may have in the medium to long term.
Conclusions

The declaration of the state of emergency and the instauration of mandatory lockdown have led to a marked drop in daily physical activity in this population which probably explains changes observed in other cardiac biometric variables. Although, in the short term, we have not documented an increased risk of arrhythmia, we cannot rule out an effect in the medium to long term or in other populations of at-risk patients. The data provided should be taken into account when planning similar strategies in the future should they be necessary.

Conflicts of interest

The authors have no conflicts to disclose.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.medcli.2020.12.005.

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