The Usefulness of Low-Intensity Physical Activity Management for Malaise in Type 2 Diabetic Patients after Ablation

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Abstract
Purpose
To report the data and subjective evaluation of the progress of the application and appropriate use of low-intensity physical activity management techniques to improve the symptoms of daily inactivity due to general malaise experienced by myself.

Subjects and methods
A case of type 2 diabetes mellitus at the age of 35 years, who had been living with good glycemic control for 17 years, had a gradual increase in A1C in the 18th year, from 6.2% to 12% in one year, and then increased the dose of SGLT2 for one year, and lowered it to 9.0% at February 2020.

The patient was assessed for general malaise and inactivity on a 10-point scale using a POLAR M430 active tracker with 24-hour pulse and postural recording and a SPO2 meter, and physical activity management. The number of times per day that the heart rate rose above one hundred beats immediately after an ADL activity was monitored.

Results
Immediately after discharge from hospital, general malaise was nine, daily inactivity eight and number of spikes twenty. Measure A was implemented for 2 months. The patient had a general malaise of nine, a decrease in daily activity of eight, and a steepness of fifteen. The A1C was 10%. At 18 months, Measure D was terminated, and Measure A was implemented. At this point, general malaise had improved to three, daily activity had decreased to three, the number of spikes had decreased to two, and the resting HR level at sleep had recovered to 66 bpm. The A1C was 9.0%. At this point, the patient was no longer anxious about the occurrence of sudden onset of motor fatigue associated with activities of daily living.

Conclusion
Low-intensity physical activity management techniques, together with glycemic control, were found to be effective in the treatment of symptoms of reduced daily activity due to general malaise, using active trackers and SPO2 meters. We present an example of the use of low-intensity physical activity management as a method of improving these symptoms.

Keywords: low-intensity physical activity, malaise, type 2 diabetic patients, ablation

Introduction
“The Coronavirus disease 2019 (COVID-19), caused by a novel coronavirus, SARS-CoV-2 (severe acute respiratory syndrome coronavirus-2) has reached pandemic dimension worldwide. In the absence of a preventive vaccine and specific pharmaceutical options, public health measures are essential to contain the spread of the virus. Successful strategies have already been identified; beyond strict hygienic rules these measures include isolation, social distancing, and quarantine. A rapid Cochrane systematic review, based primarily on simulation studies, indicates that quarantine, especially if combined with other measures, such as school closures, travel restrictions and social distancing might reduce the number of COVID-19 infections and deaths. A report from China confirms these findings. Mathematical modelling projecting potential scenarios for SARS-CoV-2 transmission in the future foresee that prolonged or intermittent social distancing may be necessary into 2022.”

A literature review in the databases PubMed and Medline through August 2020 showed that high-intensity and prolonged exercise produces counterproductive changes in the immune system and increases the likelihood of contracting infections, while low- and moderate-intensity exercise reverses these effects and increases the body's protection against viruses. Low- and moderate-intensity exercise was recommended if COVID-19 was associated with coughing, dyspnea, pulmonary obstruction, hypoxia, myalgia, or neuromuscular symptoms, while low-intensity exercise was recommended for those with gastrointestinal symptoms or fatigue. Exercise was completely contraindicated in the presence of fever or myocarditis.

The number of patients with type 2 diabetes mellitus with severe arrhythmias is increasing. The number of ablation procedures for these patients is increasing in Japan. Post-operative general malaise has been reported as a symptom of reduced daily activity. In this study, we applied the low-intensity physical activity management method to improve the symptoms of HIV and longCOVID-19.

Objectives
The purpose of this study is to report the data and subjective evaluation of the progress of the application and appropriate use of low-intensity
physical activity management techniques to improve the symptoms of daily inactivity due to general malaise experienced by myself.

**Subjects and methods**

A case of type 2 diabetes mellitus at the age of 35 years, who had been living with good glycemic control for 17 years, had a gradual increase in A1C in the 18th year, from 6.2% to 12% in one year, and then increased the dose of SGLT2 for one year, and lowered it to 9.0%, but developed arrhythmia, was diagnosed as atrial fibrillation, and felt breathless. An ablation procedure was performed in August at the age of 55 years. His blood data currently was 9.8% at February 2020. During the ablation procedure, his systolic blood pressure dropped to fifty and he developed a postoperative right recurrent nerve palsy. The patient was taken off cardiopulmonary resuscitation and transferred to ICU management. 12 hours later, on awakening, the patient developed significant dyspnoea and was placed on oxygen for 48 hours before being taken to the ward. The patient was released from respiratory control 72 hours after the operation and was discharged home a week later to return to life, but with significant general malaise, which was not experienced during preoperative ADL activities. The patient was assessed for general malaise and inactivity on a 10-point scale using a POLAR M430 active tracker with 24-hour pulse and postural recording and a SPO2 meter, and physical activity management. The number of times per day that the heart rate rose above one hundred beats immediately after an ADL activity was monitored. (FIG1, FIG2)

**Results**

Immediately after discharge from hospital, general malaise was nine, daily inactivity eight and number of spikes twenty. Measure A was implemented for 2 months.

The patient had a general malaise of nine, a decrease in daily activity of eight, and a steepness of fifteen. This transitional measure was also followed by two months of measure B, in which the preoperative ADL physical activity was estimated, and priority activities were selected using the so-called spoon technique.

The general malaise was eight, the decrease in daily activity seven, and the steep frequency fifteen. Since the number of spikes did not change, the beta blocker was not reduced and at the end of 6 months, general malaise was eight, daily activity decreased by seven, and the number of spikes was twelve. At the end of 9 months, the patient's recurrent nerve palsy had worsened, he complained of severe dyspnea and was found to have pericarditis.

The patient was taken off beta blockers, resting heart rate shifted from an average of 70 to 90 bpm, general malaise with dyspnoea improved to seven, daily activity decreased to six, rapid frequency to fifteen. A1C was 12%.

Physical activity management was resumed, and measure C was implemented, which consisted of 10 minutes of resting activity with complete
rest (based on left lateral recumbency) until the resting heart rate returned to pre-movement levels. Low-intensity exercise was turned off. After this, symptoms improved rapidly and at the end of 12 months, general malaise had improved to six, daily activity had decreased to five, rapidity to ten and resting HR level to 80 bpm. At the end of a further 15 months, the patient underwent a 2-month course of measure D, which involved the selection of preferred activities using the spoon technique.

The A1C was 10%. At 18 months, Measure D was terminated, and Measure A was implemented. At this point, general malaise had improved to three, daily activity had decreased to three, the number of spikes had decreased to two, and the resting HR level at sleep had recovered to 66 bpm. The A1C was 9.0%. At this point, the patient was no longer anxious about the occurrence of sudden onset of motor fatigue associated with activities of daily living (FIG3, FIG4, Table1).

Table 1 Event and Trend data

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<th>Event</th>
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<th>M</th>
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<tr>
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<td>12</td>
<td>7</td>
<td>6</td>
<td>15</td>
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<tr>
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<td>6</td>
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<td>9</td>
<td>3</td>
<td>3</td>
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</table>

FIG4 Spoon technique and Low Intensity Physical activity

FIG3 Trends in various data (August 2019 to February 2021)

Discussion

As the relationship between exercise intensity and immunity has become clearer, it has been clearly stated during the covid19 epidemic that low intensity is recommended in cases of malaise. In the present case, the atrial fibrillation had worsened at the time of the ablation, and therefore the recommended exercise intensity was low, independent of the effect of immune function. However, it is difficult to set a low intensity. In this study, we succeeded in setting the
intensity of exercise with M430 based on the combination of heart rate and posture.

Although various mechanisms by which exercise therapy affects the pathogenesis of diabetes are being elucidated at the level of intracellular metabolic effects, specific guidance for exercise therapy cannot be given without considering macroscopic effects.

Remote guidance using an active tracker such as the M430 seems to be a very convenient way to provide appropriate exercise guidance in such an emergency.

In this case study, it would be of great value to be able to record diary data and use it for analysis.

One of the roles of a case study is to have a clear outcome of whether the outcome of the case worsened or not.

The present study may have demonstrated the effectiveness of such a program of low-intensity exercise combined relative to the amount of physical activity.

Conclusion

Low-intensity physical activity management techniques, together with glycemic control, were found to be effective in the treatment of symptoms of reduced daily activity due to general malaise, using active trackers and SPO2 meters. We present an example of the use of low-intensity physical activity management as a method of improving these symptoms.

References


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