Effects of mask-wearing on treadmill exercise test

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Background: Concerning about the spread of COVID-19, World Health Organization recommends wearing facemasks to minimize viral transmission. Patients are required to wear facemasks while conducting treadmill exercise tests in hospitals. The effects of mask-wearing on the results of stress exercise testing remain uncertain.

Purpose: This study aims to assess the impact of mask-wearing on the physiological parameters during treadmill exercise testing.

Methods: Patients who underwent treadmill exercise test using the Bruce protocol for the diagnosis of ischemic heart disease were retrospectively examined between 2020 and 2021. A propensity score matching was performed to adjust the baseline characteristics of patients with and without mask. Blood pressure, heart rate, exercise duration, and the interpretation of stress test were compared. The ischemic ST-segment response was defined as flat or downsloping depression of the ST seg-ment $>$0.1 mV below baseline and lasting longer than 0.08 second. Nondiagnostic result of treadmill exercise test was defined as absence of ischemic ST-segment response in which the 90% of maximal predicted heart rate for age and sex was not achieved.

Results: Following 1:1 propensity score matching, a total of 3,996 patients were enrolled for analysis, including 1,998 patients who performed treadmill exercise testing with masks, and 1,998 without masks. Baseline characteristics were similar between the two groups (mean age, 56.1±12.1 years; 38.7% female; mean body mass index, 25.5±3.9 kg/m^2). At baseline, patients with masks had significantly higher heart rate (84.8±14.7 bpm vs. 82.5±14.0 bpm; $p<0.001$) and lower systolic blood pressure (130.4±19.0 mmHg vs. 132.4±18.7 mmHg; p=0.001) than those without masks. Patients with masks conducted significantly shorter duration of exercise (435±128 seconds vs. 481±133 seconds; $p<0.001$), achieved significantly lower measurement of peak heart rate (149.5±17.1 bpm vs. 152.7±17.0 bpm; $p<0.001$), and had significantly lower rate-pressure products (26,366±5,207 mmHg·bpm vs. 27,629±5,242 mmHg*bpm; $p<0.001$) than those without masks. The proportion of patients who were unable to complete stage II of the Bruce protocol was significantly higher among patients with masks (15.1% vs. 9.0%; $p<0.001$). The proportion of nondiagnostic result was significantly higher among patients with mask (12.2% vs. 8.8%; $p<0.001$), whereas the proportion of positive ischemic ST-segment response rate was significantly higher among patients without mask (28.1% vs. 23.3%; p=0.001).

Conclusions: Our study demonstrated that performing treadmill exercise test with mask could significantly decrease the duration of exercise, reduce the maximal achieved heart rate, decease the rate-pressure product, and thus reduce the diagnostic power of treadmill exercise testing.