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Editorial

Latest concept and practice of various rehabilitation avoiding disuse syndrome

Abstract

Formerly, bed rest was basically standard treatment of various illnesses. For bed rest, disuse syndrome causes decreased maximal explosive power (MEP) and maximal oxygen uptake (VO2max) in short period. In older people, hospitalization-associated disability is often observed from decreased physical activity. As the concept of rehabilitation becomes wider, visceral rehabilitation covers various organ dysfunction including COPD, pulmonary hypertension (PH), chronic heart failure (CHF), acute coronary syndrome (ACS), chronic kidney disease (CKD), nonalcoholic fatty liver disease (NAFLD) and peripheral arterial disease (PAD). For ideal treatment, "Adding Years to Life, and Adding Life to Years" is hopefully achieved in the future.

Keywords: disuse syndrome, maximal explosive power (MEP), hospitalization-associated disability, visceral dysfunction, adding life to years

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Hiroshi Bando[1,2]
[1]Tokushima University / Medical Research, Tokushima, Japan
[2]Integrative Medicine Japan (IMJ), Shikoku Island division, director, Tokushima, Japan

Correspondence: Hiroshi Bando, University / Medical Research, Tokushima, Japan, Tel +81-90-3187-2485, Email pianomed@bronze.ocn.ne.jp

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Abbreviations: MEP, maximal explosive power; PH, pulmonary hypertension; CHF, chronic heart failure; ACS, acute coronary syndrome; CKD, chronic kidney disease; NAFLD, nonalcoholic fatty liver disease; PAD, peripheral arterial disease

Editorial

Decades ago, the concept of bed rest was basically standard treatment of various illnesses. It is not clear how much rest can improve the despaired function. However, resting reduces physical and muscle strength in a short time, making it difficult to live independently.[1] For improving the power, several times of period is required compared to resting period.[2] Rehabilitation for muscle training is necessary again.

Disuse of muscle causes decreased maximal explosive power (MEP) of lower limbs in short period. For old subjects, 14-day bed-rest brought 15.3% decrease of MEP.[3] For some bed-rest investigation, some impacts of muscle disuse have been found. They include studies on protein synthesis,[4] brain-derived neurotrophic factor (BDNF)[5] and bone metabolism.[6]

There was a Dallas Bed Rest and Training Study for evaluation of bed rest and decline of maximal oxygen uptake (VO2max).[7] Five 20-year-old men underwent 3 weeks of bed rest and 8weeks of heavy endurance training. When they became 50 and 60years old, they received physiological tests. As a result, decline in VO2max for 40years was compatible with 3week-bed rest at 20years old, which showed 27% and 26%, respectively. For human life prognosis, lower limb muscle strength, muscle mass and VO2max are important. Five factors are closely involved in these situations, which are heart, lungs, muscles, kidneys, and blood.[8] It is not easy to improve the function of heart, lung and kidney. However, it can be conducted to improve the function of muscle and blood by the training of aerobic and anaerobic exercise.

When older people over the age of 70 are hospitalized in the United States, more than 30% of patients have new disabilities that were not observed on admission. This is called hospitalization-associated disability.[9] The reason may be that resting during admission has reduced physical movement, associated with disuse syndrome. Disuse syndrome exacerbates muscle weakness, joint contracture, osteoporosis, obesity, diabetes, and dyslipidemia. Furthermore, it develops arteriosclerosis progresses, causing cardiovascular disease and pneumonia, leading to shortening of lifespan. Such situation would be rather difficult to prevent. The recommended way includes to continue some physical movement after admission, and to manage resistance exercise after improving the diseased situation.[10]

Problems for the rehabilitation can be broadly divided into four groups, which are visual, hearing/speech, limb, and visceral impairments.[11] For visceral rehabilitation, visceral dysfunction (organ impairment) includes heart failure, pulmonary hypertension (PH), chronic kidney disease (CKD), liver disease and others.[12] To keep bed rest has been the basis of treatment for years. However, the direction of treatment has recently changed. Instead of rest, rehabilitation with moving the body has been recognized. Cardiac rehabilitation will be applied for acute coronary syndrome (ACS), stable angina, chronic heart failure (CHF), after heart surgery, peripheral arterial disease (PAD), and after heart transplantation.

Details are known about visceral dysfunction. PH includes pulmonary arterial hypertension (PAH) and chronic thromboembolic pulmonary hypertension (CTEPH). In PAH and CTEPH, rehabilitation medicine has been recognized as a standard treatment with giving some physical loading.[13] Rehabilitation for COPD patients is effective in increasing exercise tolerance, improving dyspnea and health-related quality of life, and reducing medical resource utilization such as length of hospital stay.[14] For patients with dialysis patients, renal rehabilitation will bring the improvement of exercise tolerance, PEW (protein-energy wasting), QOL and suppression of protein catabolism and others.[15] For conservative CKD patients, there is a possibility of new treatment for improving renal function and preventing dialysis transition. In order to improve liver function and to prevent hepatic fat disposition, exercise therapy is rather recommended for patients with nonalcoholic fatty liver disease (NAFLD) and nonalcoholic steatohepatitis (NASH).[16]

Japan has become one of the super-aging societies in the world.[17] Lots of patients with multiple disease have been increased and then the society faces the new challenge of multiple disabilities. The perspective and technique of visceral disorders also play an important role in rehabilitation medicine for multiple health problems. Exercise therapy has been effective even in patients with both of cardiac and

renal dysfunction. It depends on the attending physician whether a patient can be involved in the rehabilitation or not. Consequently, it is required to consider the future direction of performing rehabilitation and/or exercise therapy for patients with mild degree.

There are important concepts for both of medical care and rehabilitation. The former aims to improve the prognosis of life, and the goal is "Adding Years to Life".[15] On the other hand, the latter aims to improve life/motor function and quality of life, and then the goal is "Adding Life to Years".[18] For rehabilitating visceral disorders, both goals can be achieved. In order to maintain and develop this slogan, it is important to continue active lifestyle in daily life. There are recommended ways to teach patients leading such a daily life. When the patient is hospitalized, the medical staff does not teach everything, but the patient oneself creates a training menu, accompanied with some guidance of staff to complete the protocol.

In order to implement and continue the voluntary menu, it is essential that the rehabilitation medical personnel have high enthusiasm and recognize and praise the patients. Here are some examples of words that will help patients leading to successful results. It is the words of Hideki Matsui, who was Japanese Major League Baseball (MLB) player. He says "I don't think about anything that I can't control. I just focus on what I can do."

Conclusion

In summary, rehabilitation medicine has evolved and historically transitioned from resting to moving treatments.[19] Regarding the rehabilitation for diseased organ system, clinical effects include functional recovery, disability support, and activity support as well as extending the life span.[20] For the ideal rehabilitation treatment, "Adding Years to Life, and Adding Life to Years" is expected to be achieved in the future.

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Conflicts of interest

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