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2022 Chinese Expert Consensus Statement on the Management of Extracorporeal Shockwave Therapy in Musculoskeletal Disorders during Novel Coronavirus Pandemic Prevention and Control

Fuqiang Gao[1,2], Xiangwei Ma[3], Wei Sun[1,4], Zirong Li[1,2], Jike Lu[5]

Abstract

Novel coronavirus pneumonia (corona virus disease 2019, [COVID-19]) is a novel respiratory infectious disease that has rapidly spread in many countries or regions around the world [1-, 2, 3] . With the approval of the State Council, COVID-19 was included in the category B infectious diseases under the Law of the People's People's Republic of China on the Prevention and Control of Infectious Diseases, and the preventive and control measures for category A infectious diseases were adopted. Given the severity of the COVID-19 epidemic, the wide spread of transmission, and the human-to-human transmission, some patients with musculoskeletal disorders visiting hospitals and health care workers engaged in medical shockwave technology are at potential risk of COVID-19 infection. The 2022 Chinese expert consensus statement on the Management of Musculoskeletal Disease Extracorporeal Shock Wave during the Prevention and Control of Novel Coronavirus Epidemic is formulated.

Keywords: Chinese expert consensus; , Extracorporeal shockwave; , Management; , Musculoskeletal disorders; , Novel coronavirus pandemic.

Introduction

Novel coronavirus pneumonia (NCP, named 2019 coronavirus disease, COVID-19 by the WHO) is a new respiratory infectious disease that has rapidly spread in many countries or regions around the world [1-, 2, 3]. With the approval of the State Council, COVID-19 has been included as a Class B infectious disease under the Prevention and Control of Infectious Diseases Law of the People's People's Republic of China, and the preventive and control measures for Class A infectious diseases have been adopted. With the development of the epidemic, this disease may persist for a long time. Given the severity of the COVID-19 epidemic, the wide spread of the disease, and the human-to-human transmission, some patients with musculoskeletal disorders who come to the hospital as well as health care workers engaged in medical shockwave technology are at potential risk of COVID-19 infection. At present, the NCPnovel coronavirus pneumonia epidemic is still circulating around the world. The Omicron strain has replaced the Delta strain as the main epidemic strain. The clinical manifestations of NCPnovel coronavirus pneumonia patients show new characteristics. And Moreover, new drugs for the treatment of new coronavirus pneumonia have been launched one after another, and the treatment experience and treatment methods have been further enriched. The orthopedic shockwave technology clinic (treatment room) needs further attention and strengthening in terms of prevention awareness, preventive measures, and protective equipment. In order tTo ensure the scientific and effective management of the clinical application of orthopedic extracorporeal shock wave technology during the COVID-19 epidemic, and to reduce the risk to patients and medical workers with acute attacks of musculoskeletal diseases, the Expert Consensus on the Management of Musculoskeletal Disease Extracorporeal Shock Wave during the Prevention and Control of Novel Coronavirus Epidemic is formulated.

General Provisions

The source of COVID-19 infection is mainly patients infected with 2019 novel coronavirus (2019-nCoV), and asymptomatic infected persons may also be the source of infection. The main transmission routes are via through respiratory droplets and contact transmission, and aerosol and

[1]Shockwave Center, Department of Orthopedics, China-Japan Friendship Hospital, Chaoyang, Beijing, China,
[2]Beijing Key Laboratory of Immune Inflammatory Disease, China-Japan Friendship Hospital, Chaoyang, Beijing, China,
[3]Department of Rehabilitation Medicine, China-Japan Friendship Hospital, Chaoyang, Beijing, China,
[4]Department of Orthopaedic Surgery, School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, USA,
[5]Department of Orthopedics, Beijing United Family Hospital, Chaoyang, Beijing, China.

Address of Correspondence
Dr. Wei Sun, Shockwave Center,
Department of Orthopedics, China-Japan Friendship Hospital, Chaoyang, Beijing, China.
E-mail: sun887@163.com


Dr. Fuqiang Gao


Dr. Xiangwei Ma


Dr. Wei Sun


Dr. Zirong Li


Dr. Jike Lu

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Table 1: Indications and contraindications of shock wave technology for musculoskeletal diseases proposed by ISMST 2016
Approved indications
Chronic tendinopathies
Calcific tendinitis of the shoulder joint
External humeral epicondylitis (tennis elbow)
Greater trochanteric pain syndrome
Patellar tendon terminal disease
Chronic Achilles tendinopathy
Plantar fasciitis (with or without heel spurs)
Bone disease
Delayed healing of fractures
Bone discontinuity (pseudoarthrosis formation)
Stress fractures
Femoral head necrosis (no joint destruction)
Exfoliative osteochondritis (without joint destruction)
Indications based on clinical experience
Tendinopathy
Rotator cuff non-calcified tendinitis
Internal epicondylitis of the humerus
Intrinsic tendinopathy syndrome
Goose foot tendinopathy syndrome
Peroneal tendinopathy
Foot and ankle tendinopathy
Bone diseases
Bone marrow edema
Osgood Schlatter's disease-Tibial tuberosity epiphysitis
Tibial stress syndrome (tibial osteochondritis)
Muscle diseases
Myofascial syndrome
Muscle strains (unbroken)
Special indications recommended by experts
Musculoskeletal disorders
Osteoarthritis
Palmar fascial contracture
Plantar fibromatosis (Ledderhose disease)
Stenosing tenosynovitis
Rattling fingers
Neurological disorders
Ankylosing (spastic) states
Multiple peripheral neuropathies
Carpal tunnel syndrome
Exploratory indications
Complex regional pain syndrome
Peripheral nerve injury
Spinal cord and brain lesions
Osteoporosis
Contraindications
Low-energy evanescent and focused shock waves
Therapeutic area: malignant tumors (not the primary cause)
Therapeutic area: Fetus
High-energy focused shock wave
Therapeutic area: Lung tissue
Therapeutic area: Malignant tumor (not the primary cause)
Therapeutic area: Epiphyseal plate
Therapeutic area: Brain and spinal cord
Severe coagulation disorders
Therapeutic area: Fetus

gastrointestinal transmission routes are yet to be defined [4-, 5, 6]. The population is universally susceptible, and the incubation period is generally 1-14 d, commonly 3-7 d, and up to 27 d [7]. Studies have shown that 2019-nCoV is UV and heat sensitive, and that irradiation at 56°C for 30 min, volume fraction 75% ethanol, peracetic acid, chlorine-containing disinfectants (e.g., 84 disinfectant), chloroform, and other lipid solvents can effectively inactivate the virus [8].

Therefore, it is particularly important to protect oneself and cut- off the transmission route, as medical personnel have occupational exposure to patients' patients' blood, body fluids, secretions (excluding sweat), excretions, and non-intact skin and mucous membranes. To reduce the risk of nosocomial infections, strict preventive and control measures should be taken, including hand hygiene, use of personal protective equipment, and cough etiquette.

Under the condition of priority of prevention and control, the technical indications of extracorporeal shock wave therapy (ESWT) should be more strictly controlled, and the multi-disciplinary team (MDT) online treatment model should be implemented to achieve individualized treatment for patients with musculoskeletal diseases in the context of epidemic prevention and control. The purpose of individualized treatment for patients with musculoskeletal diseases in the context of epidemic prevention and control. During the epidemic prevention and control period, all non-emergency treatment of musculoskeletal disorders with ESWTextracorporeal shock wave therapy was suspended, and the Internet internet plus medical technology was fully utilized to provide feedback on the treatment effect and reduce the flow and waiting time of patients in the hospital. Ask patients and their family members and accompanying persons specifically about their travel history, residence history, and history of possible disease exposure. Register their names, home addresses and contact numbers in detail, and establish an online treatment platform for patients with acute disease attacks to facilitate consultation with patients and their families.

Operation Room or Treatment Room Protection Management

Implement the pre-screening and triage system, reasonably set up isolation areas, take effective measures such as setting up waiting areas, one doctor, one patient, avoid crowd gathering, and keep the treatment area well ventilated and regularly cleaned and disinfected. The establishment of three-level protection system, the implementation of clean, contaminated partition management process. The operation room or treatment room consultation room is equipped with convenient and effective hand hygiene facilities and related disinfection supplies.

The disinfection of the floor of the operation room or treatment room is carried out in strict accordance with the Technical Specification for Disinfection in Medical Institutions of China [9]. Object surfaces and floors in the room are thoroughly wiped and disinfected with 1,000 mg/L chlorine-containing disinfectant, and records are kept. If the surfaces of environmental objects and floors are contaminated with patient excretions, secretions, vomit, etc., the visible contamination is first removed with moisture- absorbing materials such as paper towels, then covered with a rag soaked in 2,000 mg/L chlorine-containing disinfectant for 30 min, and then wiped and disinfected. Disinfect the air according to the requirements of the Hospital Air Purification Management Code of China, and disinfect thoroughly four 4 times a day for 1 h each time by using UV irradiation disinfection method or ultra-low volume spraying method [10]. Close the laminar flow and air supply, and usually deactivate the central air conditioning fresh air system to maintain natural ventilation. The operation room or treatment room should be opened at least 30 min per day to maintain air circulation. Shock wave treatment adopts the management principle of ""limited flow"," after each patient's patient's treatment, the balloon that touches the patient will be wiped with 75% alcohol twice, and after all patients are treated, the shock wave instrument, C-arm, and ultrasound machine will be wiped with 75% alcohol twice. Indoor office supplies were disinfected every 4 h. The table, chairs, and surfaces of used items were disinfected by wiping with sodium hypochlorite disinfectant [11]. The disinfection work needs to be recorded in detail.

Disposable items in direct contact with suspected or confirmed COVID-19 patients during extracorporeal shock wave treatment, objects contaminated with patients' patients' blood, body fluids, and secretions should be sealed in double-layer yellow garbage bags, well well-marked, and disposed of as infectious medical waste. In accordance with the requirements of the hospital's hospital's induction department, operating instruments should be disinfected by spraying and wiping with disinfectant solution containing an effective chlorine concentration of 2000 mg/L. Sampling and testing should be performed after disinfection, and only after passing the test

can they be used again [12]. Ventilation system filters should be replaced in a timely manner in the operating room or treatment room. Non-COVID-19 patients who have been excluded, follow the routine treatment process.

Medical Staff Protection Management

All shock wave clinic (treatment room) medical staff and other staff should measure their body temperature before and after work daily (if there are any symptoms of discomfort, take measurements at any time), and if there is any abnormal body temperature (above 37.3°C), immediately remove them from the work environment and take medical intervention and isolation measures as appropriate. If there is a return of field personnel need to home isolation for 14 d, no symptoms before going to work [13]. In accordance with the requirements of the Ministry of Health (health industry standard WS/T311-2009) Technical Specification for Hospital Isolation of China, medical personnel strictly enforce standard precautions according to the graded protective management regulations for medical personnel established by the local hospital , and select personal protective equipment according to the risk of exposure [14]. Staff should wear surgical masks or medical protective masks, goggles or protective masks (protective face screens), and isolation gowns when they are likely to be sprayed with blood, body fluids, secretions, and other substances from COVID-19 patients [14-, 15, 16]. Strictly enforce hand hygiene, standardize the use of hand sanitizer, wash hands with running water, or use quick-drying hand disinfectant containing chlorine, alcohol, or hydrogen peroxide for disinfection.

The department does a good job of recording bed retention, and once a suspected patient is found , isolation and examination are performed according to the requirements of the local health- care commission and hospital, and the COVID-19 diagnosis and treatment exclusion process is initiated. Medical staff and patients, family members and accompanying persons to explain the condition or sign informed consent and other treatment process should wear overalls, work caps, and medical surgical masks throughout. Hand hygiene disinfection treatment should be done after contact. Staff should preferably dine in separate areas at different times, not to discuss together and minimize gathering.

Patient and Accompanying Personnel Protection Management

Focus on screening patients who come to the hospital for consultation and treatment, following the principle of consultation and treatment close to the local area or the place of residence during the outbreak. Ask patients for detailed medical history, focusing on the following conditions: (1) History of contact with confirmed COVID-19 patients and suspected patients; (2) Feverfever; (3) Dry dry cough, fatigue, muscle pain in the limbs or lower back, diarrhea, chest tightness, difficulty in breathing, etc. If necessary, blood tests and chest computed tomographyCT should be completed before treatment to exclude asymptomatic COVID-19 [17-, 18, 19]. Whether the patient is a returning worker from abroad and clarify the travel and recent movement trajectory 14 d ago, including the accompanying person at the time of the visit is also recorded. The above encourages online completion of the screening and defines the signature process prior tobefore treatment. Strictly verify the relationship between the accompanying person and the patient, and ask them in detail about their travel history, residence history, and possible disease exposure history. Avoid or reduce the number of accompanying persons during the consultation and treatment, and limit the number of accompanying persons to one to two for those with mobility problems.

Promptly report to the local hospital infection management department or COVID-19 expert consultation team any abnormal epidemiological history or clinical manifestations found during the inquiry process, and if diagnosed as a suspected case of COVID-19 infection, isolate and examine the patient according to the requirements of the local health- care committee and hospital, and initiate the COVID-19 consultation and treatment exclusion process. Patients and accompanying persons must wear protective masks and conduct temperature tests, and medical institutions with temperature guns are equipped with them. Allow one patient to enter the consultation room. Family members and accompanying persons can wait in the consultation area, maintaining at least 3 m distance.

Fully inform patients and families of the risks associated with treatment and the possibility of cross-infection, and sign an informed consent form. During the critical period of epidemic prevention and control, orthopedic cases with suspected or confirmed COVID-19 cases should be performed in designated hospitals with COVID-19 protection or consultation conditions.

Indications for extracorporeal shock wave treatment of musculoskeletal disorders during the epidemic

Shock wave is a kind of sound wave with mechanical properties that causes rapid or extremely rapid compression of the medium through vibration and high-speed motion, which can cause jumping changes in the pressure, temperature, density, and other physical properties of the medium to produce the corresponding biological effects [20], and the biological effects of shock wave include: (1) Tissue damage repair and reconstruction; (2) Tissue tissue adhesion release; (3) Dilatation dilatation (3) Vasodilation vasodilation and vascular regeneration; (4) Analgesia analgesia and nerve endings closure; (5) Highhigh-density tissue lysis; and (6) Inflammation inflammation and infection control. Shock wave technology has many advantages such as non-invasive, low tissue damage, few complications, low treatment risk, high cure rate, rapid pain relief, short treatment period, and low cost, etc. It has become a new non-surgical treatment method, and its clinical application has been widely concerned by orthopedics, sports medicine, pain, and rehabilitation departments. As ESWT basic and clinical research continues to progress, ESWT will open up a broader treatment space for orthopedic diseases, thus becoming an indispensable treatment in the field. The expanded meeting of the executive members of the international society for medical shockwave treatment (ISMST) held in Naples, Italy, on October 12, 2016, revamped the indications and contraindications for extracorporeal shockwave treatment of musculoskeletal diseases (see Table 1) [21]. The latest treatment consensus of ISMST has become the wind vane for the clinical application of shockwave technology in the new period, which has laid an important theoretical foundation for the application of shockwave technology to expand the scope of

application and operation specification in China, and facilitates the promotion of clinical application of shockwave technology. During the COVID-19 epidemic, within the indications for ESWT specified in the ISMST and the Chinese Guidelines for Extracorporeal Shockwave Therapy for Musculoskeletal Disorders (2019 Edition) [20-, 21, 22], extracorporeal shockwave technology should be a non-surgical treatment for musculoskeletal disorders where pharmacological treatment is ineffective or unavailable, and in principle mainly for acute episodes of musculoskeletal disorders, significantly affecting In in principle, it is aimed at acute attacks of musculoskeletal disorders, chronic attacks with significant impact on life, and cases requiring primary adjuvant therapy. The key to shock wave therapy is to apply the appropriate energy to the exact site.

In short, this article is only a guiding opinion of Chinese experts, fully considering China's China's national conditions and epidemic prevention policies, not as a mandatory requirement, let alone as a legal basis. In clinical practice, it is possible to formulate measures suitable for local conditions according to local conditions. During the COVID-19 epidemic prevention and control period, ESWTextracorporeal shock wave therapy in orthopaedics should be operated in strict accordance with various specifications, guidelines, consensuses, and diagnosis and treatment plans of the National Health Commission and relevant departments, so as to minimize the occupational exposure of medical staff and the possibility of nosocomial cross-infection. We will do our best to ensure the safety of doctors, patients, and medical staff, and make due contributions to winning the overall battle of epidemic prevention and control.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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