

SEVERE ACUTE RESPIRATORY SYNDROME (SARS) IN A GERIATRIC PATIENT WITH A HIP FRACTURE

A CASE REPORT

BY KWOK CHUEN WONG, MB, CHB, FRCSEd(ORTH), KWOK SUI LEUNG, MD, FRCSEd,
AND MAMIE HUI, MB, CHB, MRCPATH

*Investigation performed at the Chinese University of Hong Kong,
Prince of Wales Hospital, Hong Kong Special Administrative Region, China*

In March 2003, there was an outbreak of atypical pneumonia in Hong Kong. The World Health Organization (WHO) has termed the illness *severe acute respiratory syndrome* (SARS). The disease is highly contagious and has spread rapidly throughout the world. Globally, there were more than 3000 reported cases and 154 related deaths as of April 14, 2003¹.

We report a case of an eighty-one-year-old woman who sustained an intertrochanteric fracture. Her postoperative course was complicated by a suspected aspiration pneumonia. She did not have the typically reported clinical features of SARS or a definite history of contact with a patient with SARS. She died of severe respiratory failure. An autopsy showed typical findings of SARS.

Case Report

An eighty-one-year-old woman who resided in a home for the elderly had a history of chronic obstructive airway disease. She had no history of contact with a SARS patient. She was admitted to the orthopaedic ward after a fall on March 16, 2003. Radiographs of the left hip showed a comminuted intertrochanteric fracture. A closed reduction and Asiatic Gamma nail fixation was performed with the patient under spinal anesthesia one day after admission. The operation was uneventful and was completed in forty-five minutes. Postoperatively, the patient's dentures were missing, and a radiograph of the chest was made to rule out aspiration. The radiograph showed only a hyperinflated lung. On the first postoperative day, oxygen desaturation and mild shortness of breath developed. A chest radiograph revealed bilateral pulmonary infiltrates in the middle and lower lobes (Fig. 1). A pulmonary medicine consultation was obtained on the second postoperative day, and a provisional diagnosis of aspiration pneumonia was made on the basis of the episode of suspected aspiration. The clinical picture did not suggest SARS in view of leukocytosis (a leukocyte count of $14 \times 10^9/L$), an afebrile course, and no definite history of contact with a SARS patient. The only feature suggestive of SARS was lymphopenia (a lymphocyte count of $0.4 \times 10^9/L$).

Supplementary nasal oxygen, chest physiotherapy, and

broad-spectrum intravenous antibiotics (cefotaxime and Flagyl [metronidazole]) were given. We isolated the patient and adopted strict infection-control measures from the second postoperative day onward because there was an outbreak of SARS in the medical ward of our hospital at the time. Her condition deteriorated despite aggressive treatment with physiotherapy and antibiotics. Serial chest radiographs showed increasing bilateral pulmonary infiltrates (Fig. 2). All conventional microbiological investigations revealed negative findings. The patient had no fever: her temperature was never higher than 36.5°C.

The patient died seven days after surgery. Postmortem studies revealed that both lungs were consolidated, with more

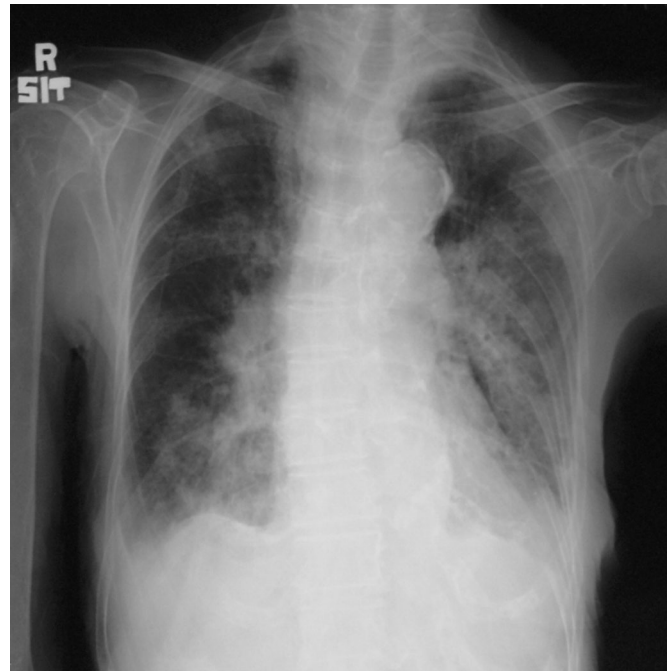


Fig. 1

Chest radiograph made on the first postoperative day, showing bilateral pulmonary infiltrates in the middle and lower lobes.



Fig. 2
Chest radiograph made on the fourth postoperative day, showing increasing bilateral pulmonary infiltrates.

marked involvement of the upper lobes. The histological features were consistent with those of severe acute respiratory syndrome (SARS) (Fig. 3). At the time of this writing, none of the 120 health-care workers who had had contact with the patient during her hospitalization had contracted the illness.

Discussion

SARS has become a global health problem, prompting WHO to issue a global alert for the first time in more than a decade¹.

On the basis of the diagnostic criteria for SARS established by the United States Centers for Disease Control and Prevention², our case definition includes fever (temperature of $>38^{\circ}\text{C}$), a chest radiograph showing evidence of consolidation with or without respiratory symptoms, and a history of exposure to a patient with suspected SARS or close contact with a person who became ill after exposure to a patient with SARS³. Close contact means having cared for having lived with a SARS patient, or having had direct contact with respiratory secretions and body fluids of a patient with SARS². (While this definition clearly includes household contacts, it has been difficult to quantify the risks to health-care workers during this outbreak of SARS.) As was demonstrated in this case report, these diagnostic criteria might not apply to elderly patients who have coexisting chronic illness.

Although the most common presenting symptom of SARS is fever³, our patient was afebrile. The hematological and biochemical findings in these patients should be interpreted with caution. Of 138 patients with SARS, forty-seven (34%) and ninety-six (70%) were reported to have leukopenia and lymphopenia, respectively³. In patients who have undergone surgery, however, reactive leukocytosis is not uncommon and might mask an underlying leukopenia. Also, many elderly patients have some degree of malnutrition, which could certainly contribute to a lower lymphocyte count. Creatine kinase levels and lactate dehydrogenase levels have been found to be elevated in SARS patients because of virus-induced myositis and tissue damage³. However, studies of these levels would be non-specific if the patient had had a recent fracture and operation. Many elderly patients may not be able to give a precise history. As for our patient, her only possible history of contact was a stay in the accident and emergency department for one hour before admission.

It is therefore crucial to have a high index of suspicion for SARS, and strict infection-control measures should be adopted early whenever a case is suspected. SARS is thought to be transmitted by droplets and possibly by fomites. We therefore followed precautions against both airborne and contact transmittal as recommended by the CDC⁴.

Since the outbreak of SARS in our hospital, we have carried out extra infection-control measures for managing patients with suspected SARS. Those in contact with such patients are expected to wear protective apparel, which includes a disposable cap, goggles, a visor or face shield, an N95 respirator, a water-resistant disposable gown, and disposable latex gloves.

Use of N95 respirators is novel for health-care workers. Their correct use requires that a good seal be obtained. The presence of facial hair will prevent a good seal, as will the wrong size of respirator. Hospital staffs must be taught how to check the fit of the N95 respirator each time they wear it.

Hand-washing precautions should be reinforced. Hands should be washed promptly and thoroughly with antiseptic (e.g., Hibiscrub) after contact with a patient; especially after contact with blood, body fluids, secretions, and excretions; and after removal of gloves and gowns. If the hands are not soiled, an alcohol hand-rub can be used when hand-washing facilities are not readily available.

Upon identification of a suspected case of SARS, the patient should be isolated in a single room with negative-pressure ventilation whenever possible. The staff should wear full protective apparel while caring for such a patient. Procedures such as obtaining nasopharyngeal aspirates and inserting a nasogastric tube should be kept to a minimum. Airway management procedures such as intubation, which could generate droplets, should be done by an experienced anesthetist wearing full protective apparel, and should be performed as an elective procedure if possible. Additional precautions, such as the use of a disposable coverall suit and a full-face mask, can be considered.

The Centers for Disease Control and Prevention have

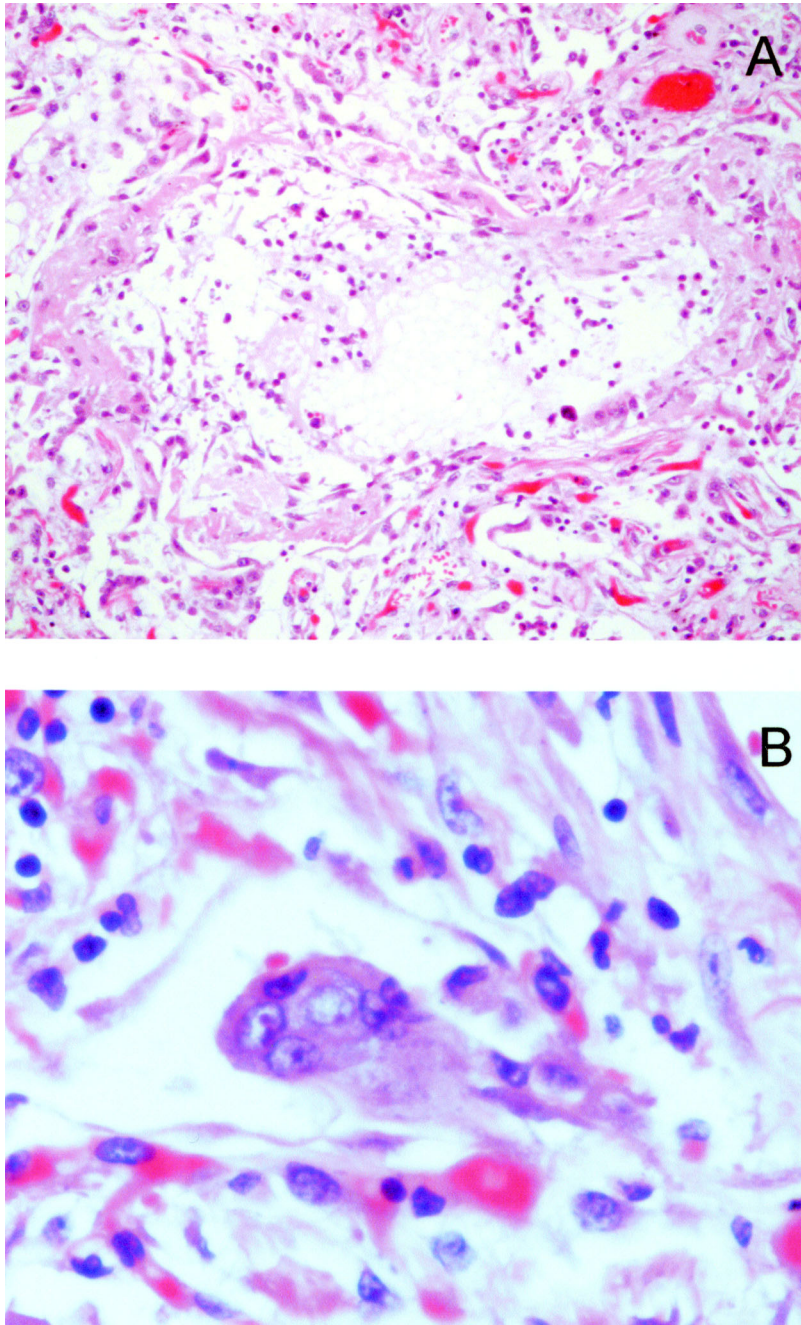


Fig. 3

Lung biopsy specimens obtained at autopsy. A: Section showing diffuse alveolar damage with pulmonary edema and formation of hyaline membrane. Rare inflammatory cells were noted (hematoxylin and eosin, ×200). B: A multinucleated pneumocyte with enlarged atypical nuclei (center). Definite viral inclusion was not apparent (hematoxylin and eosin, ×400).

received anecdotal reports that aerosol-generating procedures might have facilitated transmission of the etiologic agent of SARS in some cases⁵. Such reports have major implications for orthopaedic practice. Many orthopaedic procedures

generate aerosol particles, especially during pulse irrigation, use of powered instruments (a drill, saw, or burr), and intramedullary reaming. Therefore, extra precautions should be taken when performing high-risk procedures in pa-

tients in whom SARS is suspected. In addition to wearing an N95 respirator, operating-room personnel should wear a powered air-purifying respirator with a hood covering the head and neck area⁶. A powered air-purifying respirator uses a blower to pass contaminated air through a high-efficiency particulate air filter, which removes the contaminant and supplies purified air to a face-piece of the hood⁶. Wearing such respiratory protection could protect the surgical field from the respiratory secretions of the operating-room personnel and also could protect the personnel from the infectious aerosol generated during the procedure. Protective apparel and respirators should be immediately discarded before leaving the operating theater, and the operating theater should be decontaminated between cases.

In conclusion, elderly patients with coexisting medical illnesses may present with symptoms and signs that differ from those with classic severe acute respiratory syndrome. A high index of suspicion, prompt isolation of the patient if SARS is suspected, and appropriate infection-control measures and therapy should become the standard practice in treating patients with orthopaedic conditions during an outbreak of SARS. ■

NOTE: The authors wish to acknowledge the help of Dr. Anthony W.I. Lo and Dr. K.F. To, Department of Anatomical and Cellular Pathology, Chinese University of Hong Kong, Prince of Wales Hospital, Hong Kong, for performing the autopsy of the patient and providing the histological slides of the post-mortem lung specimens.

Kwok Chuen Wong, MB, ChB, FRCSEd(Orth)
Kwok Sui Leung, MD, FRCSEd
Mamie Hui, MB, ChB, MRCPATH
Department of Orthopaedics and Traumatology (K.C.W. and K.S. L.) and Department of Microbiology (M.H.), Chinese University of Hong Kong, 5/F, Clinical Science Building, Prince of Wales Hospital, Hong Kong Special Administrative Region, China. E-mail address for K.C. Wong: skcwong@ort.cuhk.edu.hk

The authors did not receive grants or outside funding in support of their research or preparation of this manuscript. They did not receive payments or other benefits or a commitment or agreement to provide such benefits from a commercial entity. No commercial entity paid or directed, or agreed to pay or direct, any benefits to any research fund, foundation, educational institution, or other charitable or nonprofit organization with which the authors are affiliated or associated.

References

1. **World Health Organization.** Cumulative number of reported probable cases of Severe Acute Respiratory Syndrome (SARS) from 1 Nov, 2002 to 14 April, 2003. www.who.int/csr/sarscountry/2003_04_14/en/. Accessed April 16, 2003.
2. **Centers for Disease Control and Prevention.** Updated interim U.S. case definition of Severe Acute Respiratory Syndrome (SARS). www.cdc.gov/ncidod/sars/casedefinition.htm. Accessed April 16, 2003.
3. **Lee N, Wu A, Chan P, Cameron P, Joynt GM, Ahuja A, Yung MY, Leung CB, To KF, Lui SF, Szeto CC, Chung S, Sung JJ.** A major outbreak of Severe Acute Respiratory Syndrome in Hong Kong. http://content.nejm.org/early_release/sars.dtl. April 7, 2003.
4. **Centers for Disease Control and Prevention.** Updated interim domestic infection control guidance in the health-care and community setting for patients with suspected SARS. www.cdc.gov/ncidod/sars/infectioncontrol.htm. Accessed April 16, 2003.
5. **Centers for Disease Control and Prevention.** Infection control precautions for aerosol-generating procedures on patients who have suspected Severe Acute Respiratory Syndrome. www.cdc.gov/ncidod/sars/aerosolinfectioncontrol.htm.
6. **National Institute for Occupational Safety and Health.** TB respiratory protection program in health care facilities. Administrator's guide. www.cdc.gov/niosh/99-143.html. September, 1999.