Neck phlegmon in COVID-19 patients

Ropowica szyi u chorych z COVID-19

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Słowa kluczowe: ropowica, szyja, SARS-CoV-2, COVID-19.

Abstract

Reports on patients hospitalised due to inflammatory diseases of the soft tissues in the head suggest worsening of the course of the underlying disease in the case of coexisting infection with the SARS-CoV-2 virus. The cases of 2 patients with neck phlegmon in the course of Coronavirus disease 19 (COVID-19) hospitalised at our Otorhinolaryngological Unit have been presented in the paper. Despite intensive treatment, the disease was fatal in both cases. COVID-19 probably has a significant impact on the course of disease and treatment results in the cases of patients with neck phlegmon. Coexisting diseases may seriously worsen the prognosis in patients with neck phlegmon and COVID-19. Further research is required to explain the mechanism of the impact of SARS-CoV-2 infection on the course of phlegmon in the head and neck region.

Streszczenie

Doniesienia na temat chorych hospitalizowanych z powodu chorób zapalnych w obrębie głowy i szyi sugerują pogorszenie przebiegu choroby podstawowej w przypadku współistniejącego zakażenia wirusem SARS-CoV-2. W pracy przedstawiono przypadki dwóch chorych z ropowicą szyi w przebiegu choroby koronawirusowej (COVID-19) hospitalizowanych na naszym oddziale otorynolaryngologicznym. Pomimo intensywnego leczenia w obu przypadkach choroba zakończyła się zgonem. COVID-19 prawdopodobnie istotnie wpływa na przebieg choroby i wyniki leczenia u chorych z ropowicą szyi. Choroby współistniejące mogą poważnie pogarszać rokowanie u pacjentów z ropowicą szyi i COVID-19. Konieczne są dalsze badania w celu wyjaśnienia mechanizmu wpływu zakażenia SARS-CoV-2 na przebieg ropowicy w obrębie głowy i szyi.

Introduction

COVID-19 is mild or uncomplicated in the majority of cases. Nevertheless, the course of the disease is severe in approximately 14% of patients, who require hospitalisation, while 5% require admittance to the intensive care unit. In severe cases of COVID-19, complications may occur in the form of acute respiratory distress syndrome (ARDS), sepsis and septic shock, and multi-organ failure, including renal and heart failure [1]. Older age and coexisting diseases are indicated as risk factors of death [2, 3].

Phlegmon of the soft tissues in the neck are at high risk of serious complications [4]. Tran Ban Huy *et al.* reported that the mortality in cases of neck phlegmon is about 7%, and is most often associated with the inflammatory process of chest structures, including the mediastinum, cardiovascular or respiratory failure, and the need for intubation and/or tracheotomy, as well as complications related to these procedures. At the same time, these authors point out the dangers of too late inpatient treatment, which may result in an increased number of complications and a higher risk of death [5]. Reports on patients hospitalised due to inflammatory diseases of the soft tissues in the head suggest worsening of the course of the underlying disease in the case of coexisting infection with the SARS-CoV-2 virus [6]. In the available literature, there is no description concerning inflammation of the soft tissues in the neck among patients with COVID-19.

Aim

The aim of the study was to describe and analyse 2 cases of patients with neck phlegmon in the course of COVID-19, hospitalised at our Otorhinolaryngological Unit.

Case reports

Case 1

A 79-year-old, male patient with coexisting coronary artery disease, type-2 diabetes, arterial hypertension, chronic kidney disease, and 1st-degree obesity: body mass index (BMI) 34.6 kg/m^2 was admitted to the unit due to suspicion of phlegmon in the left lateral region of the neck. He did not have an elevated body temperature at the time of admittance. The patient reported neither olfactory nor taste disturbances. Computed tomography (CT) scans of the neck and chest were performed, which confirmed the phlegmon in the lateral area of the neck on the left side and the spread of inflammatory lesions to the mediastinum. The lungs presented increased interstitial pattern without focal changes or parenchymal densities. The patient was treated with incision and drainage of the phlegmon in the left submandibular region. Initial broad-vision antibiotic therapy (Cefuroxime) and symptomatic treatment were also implemented. On the second day of his stay at the Clinic, due to respiratory disorders, the patient underwent a tracheostomy. As a result of examining the culture of purulent content, *Streptococcus viridans* was grown. There was no visible growth of anaerobic bacteria.

On day 8 of hospitalization sudden cardiac arrest occurred in the patient. Resuscitation activities were implemented. After unsuccessful resuscitation, the patient was pronounced dead (Figure 1).

Case 2

A 22-year-old, female patient with Down syndrome and obesity (BMI: 30.08 kg/m^2) was admitted to the clinic due to redness, swelling, and soreness in the lateral area of the neck on the left side. The patient's mother negated other chronic diseases, permanent medications, addictions, or allergies. In the interview, 6 days before admission to the Clinic, the patient was treated by a dentist due to mandibular gangrene of the tooth on the left side with its extraction.

At admission to the Clinic, a smear for COVID-19 was also taken for evaluation via the RT-PCR method. The test result was positive. The patient reported neither dyspnoea, olfactory or taste disturbances, nor cough.

CT scans of the neck and chest were performed, which confirmed the subcutaneous phlegmon in the left submandibular region, excluding inflammatory changes typical of COVID-19 in the lungs or the mediastinum. Urgently, an incision was made of the left submandibular phlegmon. Purulent material was also collected for microbiological testing. Broad-vision antibiotic (Ceftriaxone) therapy was introduced. Symptomatic treatment was also implemented.

The results regarding culture testing of the purulent content from the neck phlegmon indicated *Streptococcus constellatus* and *Prevotella* species infections. Treatment with Clindamycin and Metronidazole was also implemented. Despite parenteral and local treatment, the progression of skin and subcutaneous tissue inflammation could not be halted.

On day 12 of hospitalisation, septic shock with deep acidosis and urgent anaesthetic intervention occurred. The patient was intubated and connected to a respirator. The patient was then transferred to the emergency unit. Sudden cardiac arrest occurred on the same day. Due to the lack of response to resuscitation activities, death of the patient was pronounced (Figure 2).

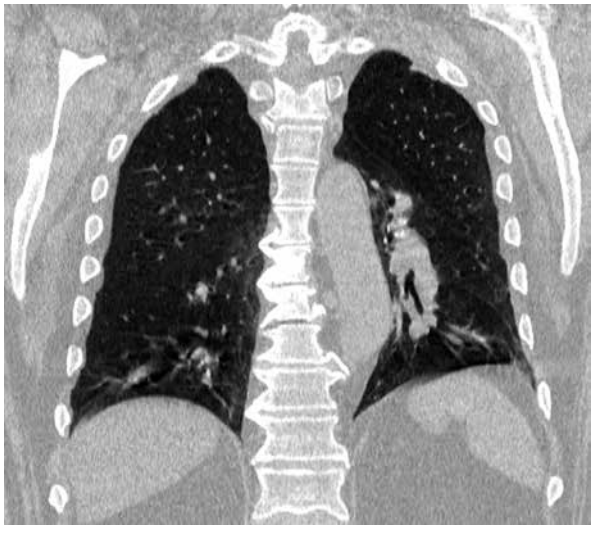

Figure 1. A 79-year-old male patient with neck phlegmon on the left side and COVID-19. Computed tomography of the chest in the frontal plane. Inflammatory changes in the lungs are visible

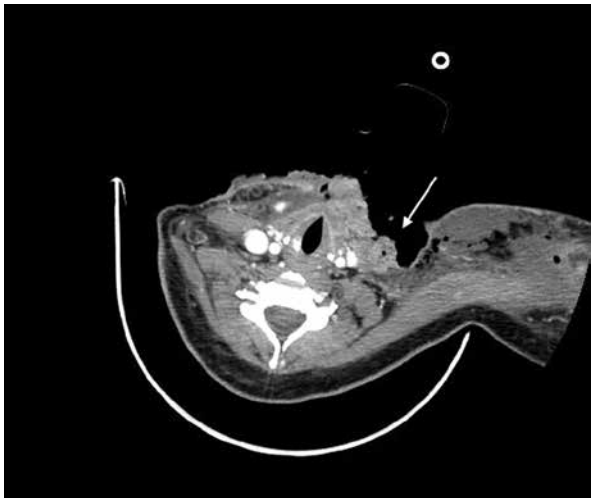

Figure 2. A 22-year-old female patient with neck phlegmon on the left side and COVID-19. Computed tomography of the neck in the coronary plane. Subcutaneous tissue inflammation and necrosis in the lateral neck region on the left side are visible

Discussion

In the study by Yonas *et al*., it is suggested that SARS-CoV-2 infection, with the development of COVID-19 disease, may result in multi-organ pathology, the most important of which are inflammatory changes in the lungs, kidneys, and the central nervous system (micro-clots, ischemic necrosis, acute haemorrhagic infarction, hyperaemia and vascular oedema), lymph nodes (haemophagocytosis and histiocytosis), bone marrow (haemophagocytosis), and the cardiovascular system (deep vein thrombosis) [7].

There are several reports on the course of purulent infections during COVID-19. Talamonti points out 6 people with confirmed SARS-CoV-2 who developed a rare disease (primary epidural abscess) in a short period of time [8]. Ajeigbe described a serious case of a patient with COVID-19 who developed perivertebral abscess, which was surgically decompressed, and who then developed mediastinitis 3 weeks after discharge from the hospital, requiring re-hospitalisation [9]. Maan described the case of an 11-year-old boy who, as a result of restrictions in access to health care during the COVID-19 pandemic, had progressed inflammation of the atrium and nasal septum and sinusitis, leading to orbital and intracranial complications [10].

Some authors indicate worsening in the course of insulin-dependent diabetes during the course of COVID-19. They also believe that hypertension, diabetes, cardiovascular disease, and chronic obstructive pulmonary disease are the most common comorbidities in COVID-19 patients. In addition, they point out that hypertension, diabetes, and cardiovascular disease are significant risk factors of the progression and adverse outcome in the course of infection among patients with COVID-19. To date, there are no studies in which an independent predictive value of diabetes on mortality in COVID-19 patients would be shown; however, there are reports in which greater susceptibility to SARS-CoV-2 virus infection in patients with diabetes, as well as the impact of diabetes on the course of infection and worse prognosis in the course of COVID-19, are suggested [11]. Singh *et al*. believe that older age, diabetes, and other diseases have significant impact on morbidity and higher mortality rate due to COVID-19. Chronic inflammation, increased blood clotting, impaired immune response, and potential direct damage to the pancreas by SARS-CoV-2 may be some of the primary mechanisms concerning the relationship between diabetes and COVID-19 [12]. Diabetes predisposes to a particularly severe course of the disease and doubles the risk of dying from COVID-19 due to complications from the respiratory and cardiovascular systems. Furthermore, people with diabetes often suffer from comorbidities that further worsen clinical outcomes. It is also believed that COVID-19 can make complications worse in people with diabetes. These patients may be prone to an unfavourable course of COVID-19, leading to coagulopathy and exacerbating diabetic vasculopathy [13]. The results of research conducted by Kumar *et al*. allow us to suggest that diabetes is a risk factor and contributes to the severity and mortality of patients with COVID-19 [14]. Diabetes mellitus in patients with COVID-19 is associated with a significant increase in the mortality and severity of COVID-19 [15]. Peterson *et al*. believe that patients with COVID-19 and coronary artery disease are at a much higher risk of death, which is mainly due to the burden of comorbidities and not a direct consequence of coronary artery disease [16].

In a retrospective study, Mehra *et al*. demonstrated that patients with coronary artery disease and COVID-19 have a higher rate of comorbidities, hospital mortality, and the need for renal replacement therapy compared to patients without coronary artery disease. Coronary artery disease itself is not associated with mortality when considering various covariates, suggesting that other factors may play a greater role in increased mortality and poorer treatment outcomes among COVID-19 patients [17]. However, in the research by Inciardi *et al*., observations suggesting that cardiovascular disease is associated with an increased risk of in-hospital death among patients treated due to COVID-19 have been confirmed [18]. In the group of patients with comorbid coronary heart disease and COVID-19, a higher mortality rate was also found, as well as thromboembolism and septic shock also being more frequent [19].

Systemic diseases such as diabetes, hypertension, and CAD/CVD have been reported more often than chronic lung disease in COVID-19 patients, but in every reported case, COVID-19 worsened the course of the systemic disease. However, with active treatment of the systemic disease, the risk of death in patients with COVID-19 decreased [20].

De Cauwer described cases of COVID-19 in patients with Down's syndrome. In all the studied cases, the course of the disease was severe, all of them requiring hospital care, and one of them it was fatal [21]. It is also believed that the course of COVID-19 in patients with Down's syndrome (DS) is more severe than in patients with COVID-19 without genetic defects. This may be related, *inter alia*, to disorders of the immune system, including deficiencies of innate and acquired immunity, including abnormalities of B and T cells [22]. Espinosa *et al*. proved that autoimmune disorders frequently occur in patients with Down's syndrome, both at molecular and cellular levels. They considered patients with trisomy 21 as a population at risk of severe COVID-19, with an increased possibility of inpatient treatment and higher mortality due to pneumonia and sepsis [23]. Callea *et al*. are of a similar opinion [24]. It is also believed that cytokine storm and cardiac muscle damage are the main factors contributing to higher mortality in patients with Down syndrome and COVID-19. Trisomy 21 is also associat-

ed with the development of congenital heart disease, sleep apnoea, obesity, diabetes, premature aging, and increased sensitivity to upper respiratory tract infections. Mental retardation, residing at multi-person institutions or with older parents, may also make it difficult to introduce the principles of preventing the transmission of the virus [25, 26]. The incidence of cardiovascular diseases in people with DS is 40–50%, changes in the respiratory tract facilitate infection with the virus, and in addition, increased susceptibility to overweight and obesity may exacerbate the effects of COVID-19. Malle believes that COVID-19 infection in a person with DS and a heart defect may become the leading cause of the increased risk of death. Patients with Down's syndrome, compared to the control group (without DS), were also characterised by a more severe course of the disease, an increased incidence of sepsis and mechanical ventilation, and hospitalisation of younger patients [27]. In his work, Hüls showed that although the main symptoms of COVID-19 and risk factors for severe disease are similar in those with DS to the general population, mortality in patients with trisomy 21 is much higher, especially after the age of 40 years [28]. Bertapelli *et al*. showed that worldwide, the prevalence of overweight in children with trisomy 21 is 23–70%, while obesity ranges from 0% to 63% [22]. It is believed that increased body mass leads to obstruction of the upper respiratory tract and obstructive sleep apnoea in patients with Down's syndrome. Obesity may also result in a chronic inflammatory state that can weaken a patient's antiviral response [22]. Cammarata-Scalisi *et al*., concluded that other factors worsening the course of COVID-19 in people with Down's syndrome include: hypothyroidism, craniofacial dysmorphism, abnormalities in the nervous system, respiratory system, gastrointestinal tract, genitourinary and musculoskeletal systems, generalised hypotension and problems with swallowing, and disorders of the immune system (innate and acquired immune-deficiencies, abnormalities of B and T cells) [29].

Obesity is also an independent factor contributing to the deterioration of prognosis and higher mortality in COVID-19 patients [30]. According to Zhang *et al*., this also applies to the younger population with COVID-19 [31].

Conclusions

COVID-19 probably has a significant impact on the course of disease and treatment results in the case of patients with neck phlegmon. Coexisting diseases may seriously worsen the prognosis in patients with neck phlegmon and COVID-19. Further research is required to explain the mechanism of the impact of SARS-CoV-2 infection on the course of phlegmon in the head and neck region.

Conflict of interest

The authors declare no conflict of interest.

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