

Ludwig's Angina in a Centenarian Patient

Kristina L. Koch, D.O., Sara Powell, D.O., Sukruta Pradhan, M.D.,
Felecia Newton, Ph.D.

University of Kansas School of Medicine-Wichita, Wichita, KS
Department of Anesthesiology

Received Oct. 27, 2021; Accepted for publication Nov. 29, 2021; Published online March 15, 2022
<https://doi.org/10.17161/kjm.voll5.15986>

INTRODUCTION

Ludwig's angina was described first by physician Wilhem Friedrich von Ludwig in 1836 as a rapidly progressive, potentially fatal spread of bilateral cellulitis of the submandibular space associated with elevation and posterior displacement of the tongue.¹ The most frequent source of infection are the molars, particularly the second and third mandibular molars.^{2,3} It is important for medical providers to recognize this condition promptly and initiate proper treatment before the cellulitis progresses to airway obstruction. Before the era of antibiotics, especially penicillin, this disease had a mortality rate greater than 50%. Following the advent of antibiotics, improved dental care, and aggressive surgical treatment, the mortality rate was estimated to be approximately 8%.^{1,4} Ludwig's angina is most seen between ages 20 and 60 years, but has been reported in patients as young as 12 days and as old as 84 years.^{5,6} The incidence in males is three to four times that in females.³

This case study presents a novel report of a centenarian who presented for surgical drainage of Ludwig's angina. Older patients with peritonsillar and parapharyngeal abscesses present in a subtle fashion with few of the classic symptoms such as fever, in addition to a delayed presentation.⁷ This tendency made diagnosis challenging. Whether these results can be extrapolated to a patient with Ludwig's angina remains to be seen.

Managing older patients can be difficult due to multiple comorbidities, as seen in our patient, and because of poorer functional status and frailty. A multi-disciplinary team approach was necessary for this complex case, as it presented the dual challenges of an anticipated difficult airway and perioperative considerations of a centenarian.

CASE REPORT

Informed and written consent was obtained from the patient prior to the preparation of this case report. A 100-year-old male was referred to the emergency department by an ear, nose, and throat physician with a chief complaint of anterior neck swelling, dysphagia, and muffled voice. Two weeks prior, the patient had presented to the emergency department with similar symptoms and was given an oral steroid for presumed lymphadenitis; his symptoms, however, did not abate with the steroids. Most of his history was obtained from his family because the patient had muffled speech secondary to extensive soft tissue edema. The patient was unable to wear his dentures for two weeks and only could swallow liquids at the time of presentation. His past medical history included hyperlipidemia, benign prostatic hyperplasia, and hypertension. He had no history of alcohol, tobacco, or illicit drug use.

On the physical exam, the patient did not exhibit respiratory distress but expressed discomfort secondary to pain. His heart rate was 89 beats/min, blood pressure was 131/81 mmHg, oxygen saturation was 94% on room air, and the respiratory rate was 18 breaths/min. His

airway exam revealed a severely limited mouth-opening with an inter-incisor gap of 1 cm. The patient could not extend his neck with effort, which likely was due to both diffuse neck swelling and pain.

Laboratory evaluation revealed the white blood count at 28,000/ μ L, hemoglobin at 12.1 g/dL, and platelet count at 225,000/ μ L. A computerized tomography neck scan with contrast was obtained which revealed a large, peripherally enhanced loculated fluid collection at the base of the tongue with surrounding soft tissue edema and resilient mass effect with narrowing of oropharynx. No significant lymphadenopathy was noted, but dental caries in the remaining three mandibular teeth with lucency suggested a dental abscess was prominent.

An oral and maxillofacial surgeon was notified of the above findings and the patient subsequently was scheduled for surgical drainage of his abscess. Secondary to the patient's physical exam findings, his airway was secured with awake fiberoptic intubation.

The patient was denitrogenated with 100% oxygen and administered glycopyrrolate (0.2 mg) via intramuscular injection to dry secretions. Nasal decongestant oxymetazoline 0.05% was administered as well as topical lidocaine to anesthetize the nasal mucosa.

The patient was positioned in the seated position to improve ventilation and ketamine was administered for light sedation to advance the fiberoptic scope through the patient's nares. Some difficulty was noted with visualization of the patient's vocal cords secondary to edema and fogging of the scope; however, tracheal intubation was successful with placement of a 7.5 mm cuffed endotracheal tube. Following confirmation of endotracheal intubation with direct visualization, fentanyl (50 mcg) and propofol (50 mg) were administered through injection. Muscle relaxant was not administered, and the patient's breathing was spontaneous on the ventilator, with sevoflurane as the anesthetic gas for maintenance. Additionally, dexamethasone (10 mg) was administered by injection. The surgical procedure was completed with successful incision and drainage of abscess, and collection of cultures. The patient was shifted to the intensive care unit on an endotracheal tube for elective postoperative ventilation and was extubated successfully the following day.

Postoperatively, the patient did well throughout the remainder of his hospital course. Surgical cultures revealed *Streptococcus viridans* and *Streptococcus intermedius*.

DISCUSSION

Ludwig's angina is a potentially life-threatening emergency that requires a rapid diagnosis and aggressive treatment plan that is characterized by airway soft tissue swelling and edema.⁸ While the most common patient population is adult males between the ages of 20 and 60 years old,¹ there have been case series where deep neck space infections have been noted in patients from 11 months to 91 years old.⁹ However, these case series have not specified the type of deep neck space infection by age group. The confirmed oldest reported case of Ludwig's angina was in a 76-year-old man.⁶ Predisposing factors included poor dental hygiene, recent dental extractions, trauma

including mandibular fractures and oral lacerations, smoking, alcoholism, and systemic illnesses including diabetes mellitus, hypertension, and certain autoimmune conditions such as systemic lupus erythematosus and HIV.^{1,10}

Analysis of the microbiology showed the organisms were usually polymicrobial and generally characteristic of oral mucosa flora.¹¹ The most common organisms included *Streptococcus* and *Peptostreptococcus* species, particularly *Streptococcus viridans*, *Bacteroides* species, and other anaerobes. Treatment options included an antibiotic regimen of penicillin G with metronidazole, ampicillin-sulbactam, clindamycin, or cefoxitin.³ The definitive management with abscess formation was with incision and drainage.

Several airway management options can be utilized to secure the airway, with three of the most common techniques being elective tracheostomy, awake blind nasal intubation, and flexible fiberoptic nasal (oral) intubation.¹² While the “gold standard” is a surgical airway, the less invasive methods can be attempted depending on the individual patient and according to their surgical plan, medical comorbidities, and clinical exam.¹³ The risk-benefit ratio of each method, with the formation of an airway management plan, should be discussed in detail with the patient and a multi-disciplinary team.

After careful consideration, awake fiberoptic intubation was used on the patient. One major advantage to performing this procedure was the decreased risk of airway collapse from loss of muscle tone from general anesthesia.^{2,14} The patient was seated upright with the head in the sniffing position for intubation, as it allowed for maximal opening of the pharyngeal airway for passage of the nasal endotracheal tube. It also allowed for a more accurate assessment of the airway when planning for extubation. Some of the other benefits over direct laryngoscopy included immediate confirmation of placement of the tube following procedure, less sympathetic stimulation, and less risk for airway trauma.²

In a case of Ludwig's angina, one of the most important anesthetic concerns while securing the airway is the risk for abscess rupture into the hypopharynx with the potential for aspiration pneumonia.² Neff et al.¹⁵ reported an abscess rupture while trying to manipulate an oropharyngeal airway, resulting in the oral cavity filling with pus, consequently causing difficulty when securing the airway. Additional life-threatening complications that have been discussed in the literature include necrotizing fasciitis, descending mediastinitis, pleural effusion, and complications of sepsis resulting in death.¹¹

While a traditionally described technique was used to secure the patient's airway successfully, it is worthwhile to note that the patient was a centenarian. According to projections, the population of elderly patients is expected to double from 8% to 16% between 2010 and 2050,¹⁶ with Irwin et al.¹⁷ listing some of the important age-related changes in the geriatric population. In the cardiovascular system of older adults, these changes could include undiagnosed diastolic heart failure, impaired heart rate response and myocardial contractility, and

an increased level and activity of inflammatory mediators. The respiratory system is affected by decreased muscle strength and impaired cough mechanism, decreased ventilatory response to hypoxia and hypercarbia, and decreased pulmonary reserve. An increased autonomic dysfunction, impaired autoregulation, and malnutrition also are seen commonly.

There are numerous anatomic changes that occur and should be considered for airway management in the geriatric population. There is a tendency for the airway to collapse and obstruct, increased difficulty to form a proper seal with a bag-valve-mask device due to edentulousness, decreased compliance of the submandibular space, and decreased neck mobility.¹⁸ All these changes lead to increased difficulty in ventilation and intubation in an elderly patient.

Irwin et al.¹⁷ has recommended that every institution have a protocol in place that targets patients undergoing surgery at extreme ages, as well as including perioperative neurocognitive dysfunction as a part of informed consent in elderly patients that require anesthesia. Some of the recommendations include a robust assessment of comorbidities, risk stratification for each person, identification of modifiable factors for preoperative optimization, rehabilitation, and discharge planning. Models such as the anesthesiologist-led “high risk” clinics with an appropriately trained specialist and the geriatric-led “comprehensive geriatric assessment” have both shown a positive impact on postoperative outcomes for elderly patients.¹⁷

Vigilant management of Ludwig's angina should be employed with rapid diagnosis and aggressive treatment, with airway management and surgical methods if applicable, and appropriate antibiotic treatment. For elderly patients, special consideration for the approach to anesthesia and intubation techniques should be discussed with a multi-disciplinary team. The patient, due to his age, presented an anatomically and physiologically difficult airway that was considered when choosing the procedure plan. In conclusion, life-threatening complications, such as necrotizing fasciitis, mediastinitis, and sepsis should be monitored rigorously, with action plans implemented through multi-disciplinary teams to meet the needs of the patient.

REFERENCES

- 1 Costain N, Marrie TJ. Ludwig's Angina. *Am J Med* 2011; 124(2):115-117. PMID: 20961522.
- 2 Miller RD, Cohen NH. *Miller's Anesthesia*. Eighth edition. Philadelphia: Saunders, 2014. ISBN: 9780702052835
- 3 Bennett JE, Dolin R, Blaser MJ. *Mandell, Douglas, and Bennett's Principles and Practices of Infectious Diseases*. Eighth edition. Philadelphia: Saunders, 2015. ISBN: 9781455748013.
- 4 Bridwell R, Gottlieb M, Koyfman A, Long B. Diagnosis and management of Ludwig's angina: An evidence-based review. *Am J Emerg Med* 2021; 41:1-5. PMID: 33383265.
- 5 Nguyen VD, Potter JL, Hersh-Schick MR. Ludwig angina: An uncommon and potentially lethal neck infection. *AJNR Am J Neuroradiol* 1992; 13(1):215-219. PMID: 1595447.
- 6 Juang YC, Cheng DL, Wang LS, Liu CY, Duh RW, Chang CS. Ludwig's angina: An analysis of 14 cases. *Scand J Infect Dis* 1989; 21(2):121-125. PMID: 2727632.
- 7 Franzese CB, Isaacson JE. Peritonsillar and parapharyngeal space abscess in the older adult. *Am J Otolaryngol* 2019; 32(6):776-782. PMID: 12761704.
- 8 Hasan W, Leonard D, Russell J. Ludwig's angina - A controversial surgical emergency: How we do it. *Int J Otolaryngol* 2011; 2011:231816. PMID: 21760800.
- 9 Karkos PD, Leong SC, Beer H, Apostolidou MT, Panarese A. Challenging airways in deep neck space infections. *Am J Otolaryngol* 2007; 28(6): 415-418. PMID: 17980775.

¹⁰ Finch RG, Snider GE, Sprinkle PM. Ludwig's angina. JAMA 1980; 243(11):1171-1173. PMID: 7359670.

¹¹ Botha A, Jacobs F, Postma C. Retrospective analysis of etiology and comorbid diseases associated with Ludwig's angina. Ann Maxillofac Surg 2015; 5(2):168-173. PMID: 26981465.

¹² Dowdy RAE, Emam HA, Cornelius BW. Ludwig's angina: Anesthetic management. Anesth Prog 2019; 66(2):103-110. PMID: 31184944.

¹³ Caccamese JF, Coletti DP. Deep neck infections: Clinical considerations in aggressive disease. Oral Maxillofac Surg Clin North Am 2008; 20(3):367-380. PMID: 18603197.

¹⁴ Pardo M, Miller RD. Basics of Anesthesia. Seventh edition. Amsterdam: Elsevier, 2017. ISBN: 9780323401159.

¹⁵ Neff SP, Mery AF, Anderson B. Airway management in Ludwig's angina. Anesth Intensive Care 1999; 27(6):659-661. PMID: 10631426.

¹⁶ World Health Organization. Ageing and Health. 2018. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>. Accessed: August 23, 2021.

¹⁷ Irwin MG, Ip KY, Hui YM. Anaesthetic considerations in nonagenarians and centenarians. Curr Opin Anaesthesiol 2019; 32(6):776-782. PMID: 3146496.

¹⁸ Khoujah D, Martinelli AN, Winters ME. Resuscitating the critically ill geriatric emergency department patient. Emerg Med Clin North Am 2019; 37(3):569-581. PMID: 31262422.

Keywords: Ludwig's angina, centenarians, abscess, drainage, airway obstruction