CLINICAL ASPECTS

Inhalation of Alcohol Vapor Driven by Oxygen is a Useful Therapeutic Method for Postoperative Alcohol Withdrawal Syndrome in a Patient with Esophageal Cancer: a Case Report

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Abstract — A 65-year-old man suffering from esophageal cancer presented with postoperative alcohol withdrawal syndrome. Diazepam was used intravenously, but his condition did not improve. With inhalation of alcohol vapor driven by oxygen, the abnormal symptoms subsided and vital signs began to return to normal rapidly. This method is also beneficial for expectoration and redressing hypoxemia.

INTRODUCTION

Alcohol, which is consumed widely in the world, has attracted more attention as a potent risk factor with a clear dose–response relationship for esophageal cancer (Vioque et al., 2008), particularly for esophageal squamous carcinoma. Some patients who suffer from esophageal cancers are alcohol dependent. With the dietary prohibition for a few days after the operation, alcohol withdrawal syndrome (AWS) may occur. AWS is a significant cause of perioperative morbidity and mortality (Tonnesen and Kehlet, 1999). So the treatment and prevention of AWS is very important. Benzodiazepines such as diazepam are considered a cornerstone of therapy (Sarff and Gold, 2010). Intravenous alcohol (Dissanaike et al., 2006) and oral alcohol (Fisher, 2009) are also alternative methods for the treatment of ASW. The case presented here shows that inhalation of alcohol vapor driven by oxygen is a useful method to treat postoperative AWS in a patient with esophageal cancer.

CASE REPORT

A 65-year-old man presented to our hospital for progressively increasing dysphagia over a 2-month period. There was an alcohol (white spirit) intake history of 40 years, three times per day and ~200 ml each time. There was no history of mental illness, hypertension, heart disease or other drug abuse. Squamous carcinoma was diagnosed by endoscopic biopsy, the lesion located in the middle segment of the esophagus, ~31–35 cm to the incisor and distal metastasis was not found. Drinking of alcohol was discontinued 1 day after his admission to hospital. The operation of esophagectomy was performed through the left thoracotomy 2 days later, then the patient was transferred to the surgical intensive care unit (ICU) with clear consciousness and a little chest pain. Oxygen inhalation via nasal catheter, total parenteral nutrition, antibiotics, expectorant and proton pump inhibitor were administered daily. Multifunctional monitoring equipment showed that vital signs (respiratory rate, heart rate, blood pressure and saturation of oxygen) were stable. But the patient presented with nausea, diaphoresis, tremor, headache and anxiety the day after the operation. Chest auscultation revealed diffuse coarse crepitations over the left hemithorax with few crepitations on the right side. His vital signs were as follows: temperature 38.0°C, blood pressure 165/95 mmHg, heart rate 110 b.p.m., respiratory rate 22 b.p.m., and saturation of oxygen 90%. Electrocardiogram showed sinus tachycardia but no ectopy or dysrhythmia. Chest X ray showed heterogeneous opacity in the left lower zone with clear right lung fields. AWS was diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders, 4th edition. The Alcohol Withdrawal Assessment Scoring Guidelines (CIWA-Ar) (Sullivan et al., 1989) score was 12 points. A dose of diazepam 10 mg was used intravenously. One hour later, his condition was not improved, and the patient presented with visual hallucination, auditory hallucination and extreme agitation. Blood pressure decreased rapidly to 95/60 mmHg and heart rate increased to 130 b.p.m. Administration of vasoactive drugs had no effect. Concurrently, there was a rapid increase of the CIWA-Ar score to 20 points. Because diazepam should not be administered again in a short time, and it was forbidden to take alcohol orally, 100 ml of 60% alcohol was added to an oxygen humidification bottle, instead of distilled water, driven by moderate flow oxygen. The patient calmed down, and a smile appeared upon his face as soon as he inhaled the alcohol–oxygen vapor. Three hours after alcohol inhalation, the abnormal symptoms subsided and vital signs began to return to normal rapidly. The patient could answer questions with clear consciousness, and without the hallucinations. The CIWA-Ar score decreased to 5 points (mild nausea with no vomiting, mild tremor, palms moist, mild headache and a little anxious). He could cough up white sputum easily. When 100 ml of 30% alcohol was used twice a day for 2 days, the CIWA-Ar score fell to 2 points (palms moist and mild anxious). Then the dose was changed to 100 ml 15% alcohol driven by low-flow oxygen for another 3 days. From Day 6, the CIWA-Ar score was 0, and AWS did not recur. Chest auscultation was normal. After 14 days, the patient had fully recovered and was discharged.

DISCUSSION

Chronic heavy alcohol consumption is a potent risk factor for esophageal cancer. Especially in the Northeast of China...
(Hu et al., 1994), many people who suffer from esophageal cancer have used large amounts of alcohol for a long period of time. When esophageal cancer is diagnosed and surgery is warranted, cessation of alcohol is necessary during the perioperative period. AWS may occur typically within 24–48 h of consumption of their last drink (McKeon et al., 2008). AWS is a severe complication during postoperative treatment of alcohol-dependent patients. Alcohol withdrawal seizures and delirium tremens are the most severe manifestations of AWS (Hughes, 2009). Alcohol dependence is independently associated with sepsis, septic shock and hospital mortality among ICU patients (O’Brien et al., 2007). At the beginning of the last century, the mortality rate of AWS patients in a general hospital was 6.6%. The factors determining survival after admission to a general hospital for AWS depend on the intensity of clinical manifestations and the presence of associated co-morbidity (Monte et al., 2010). So the treatment and prevention of AWS is very important in avoiding severe postoperative complications, even death.

Benzodiazepines are the recommended first-line therapy for the prevention and treatment of alcohol AWS. Riss et al. (2008) agreed that benzodiazepines are frequently used in alcohol withdrawal seizures. Ritto and Park (2007) concluded that benzodiazepines prevent the development of withdrawal seizures and delirium tremens. Diazepam may have superior efficacy in the prevention of delirium (Ntais et al., 2005). But this case shows that the patient was not sensitive to diazepam. Another dose of benzodiazepines, in the short-time period since his last dose, may have suppressed breathing, especially for this patient of thoracic surgery after trachea cannula under general anesthesia. So another dose of diazepam could not be used in a short time.

When AWS occurs, intake of some alcohol will prove to be very effective (Fisher, 2009). But eating and drinking after an esophagectomy operation is forbidden in order to avoid gastroesophageal anastomosis fistula. The administration of intravenous ethanol as an alternative prophylactic and curative agent persists in many hospitals, but only if done within a strict protocol (Dissanaik et al., 2006). Hansbrough et al. (1984) suggest that the intravenous infusion of ethanol at rates of 0.02–0.06 g/kg per hour provides low but measurable blood alcohol levels (2–8 mg/100 ml), avoids sedation and toxic effects, and prevents the appearance of withdrawal symptoms in severely alcoholic burn patients. But Weinberg et al. (2008) concluded that concerning the prophylaxis for AWS, intravenous ethanol offers no advantage over diazepam with respect to the efficacy or adverse sedative effects. The benefit of intravenous ethanol as a prophylactic agent against AWS was not evident. And Hodges and Mazur (2004) concluded that concerning the prophylaxis for AWS, intravenous ethanol offers no advantage over diazepam with respect to the efficacy or adverse sedative effects. The benefit of intravenous ethanol as a prophylactic agent against AWS was not evident. And Hodges and Mazur (2004) suggested that routine use of this drug is not recommended in critically ill patients who have AWS or are at risk for it, because of the paucity of well-designed clinical trials and intravenous ethanol’s questionable efficacy, inconsistent pharmacokinetic profile and relatively narrow therapeutic index. McLaren and Schwartz (2007) were concerned that the practice of using intravenous ethanol in the treatment of alcohol withdrawal could be a potentially dangerous and unsafe practice, because intravenous alcohol has a narrow therapeutic window and leaves patients at risk for ethanol toxicity.

Inhalation of alcohol vapor driven by oxygen is widely used in acute pulmonary edema. Since alcohol vapor is an anti-foaming agent (Reuben, 1957), the sputum loses its foamy quality, becoming more liquid and more easily expelled (Aldo, 1952). At the same time the oxygen will help improve the postoperative hypoxemia which is caused by chest pain and/or pulmonary edema. When alcohol vapor mixed with oxygen is inhaled, the AWS will be relieved immediately, because the absorption of alcohol by the lung is faster than by the gastrointestinal tract. The amount of alcohol vaporized increases with the flow of oxygen. Alcohol inhalation is easier to control than intravenous ethanol. But whether high concentration alcohol damages the pulmonary bronchial mucosa and the walls of pulmonary alveoli is a concern, and the blood alcohol concentration should be monitored during treatment. An unstable respiratory or circulatory system may appear after thoracotomy with or without AWS. In this case, alcohol-oxygen inhalation improved the alcohol withdrawal symptoms, meanwhile it stabilized the respiratory or circulatory system. The mechanism needs to be discussed.

In conclusion, alcohol inhalation driven by oxygen presents an ideal, effective and feasible application prospect for treatment of postoperative AWS. It is also beneficial in making expectoration easy and redressing hypoxemia. Further randomized studies about the advantages and disadvantages of alcohol inhalation driven by oxygen should be done in detail.

REFERENCES


