

Oxygen Therapy and Aerosolized Morphine to Treat Symptomatic Dyspnea during Palliative and Hospice Comfort Care

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Abstract

Background: Oxygen therapy has been a first line treatment for the management of dyspnea associated with palliative care for decades. Morphine is the gold standard treatment for cancer comfort care related pain and dyspnea. The prolonged use of the opioid morphine can have unwanted side effects that include; sleepiness, hallucinations, constipation and fear of addiction; Dyspnea associated with comfort care is difficult to manage with routine oxygen therapy and conventional bronchodilator (β_2 -agonist) treatment in patients with pre morbid pulmonary disease. Observation of dyspnea is associated with distress, discomfort and suffering. Over-time as many diseases advance (cancer), it may spread to the pulmonary system and evolve into malignant pleural effusions or chest wall neoplasm, which has a profound negative effect on work of breathing and alveolar gas exchange that may cause hypoxemia respiratory failure. This type of airflow limitation - obstruction maybe life threatening that is not reversible. Therefore, palliative care should be a consideration for comfort care. Oral morphine is the opioid of choice for controlling pain and dyspnea in the outpatient setting and has an overall systemic effect, but has a slower onset of action. The dyspnea associated with palliative comfort care may cause abnormal breathing. The use of aerosolized morphine is not for pain control and has a localized affect; this is not considered a cure, but a bridge support for dyspnea related to palliative comfort care. Summary: In this mini review we describe the use of oxygen therapy and aerosolized morphine in the treatment of dyspnea associated palliative - hospice comfort care.

Keywords: Palliative Care; Comfort Care; Dyspnea; Cancer; Aerosolized Morphine; Chest Wall Neoplasm.

Introduction

Morphine is the gold standard for controlling pain and dyspnea along with oxygen therapy for cancer and other pulmonary diseases. Patients are reluctant to take morphine because of the known side effects that include; sleepiness, hallucinations, constipation and fear of addiction. Studies have

demonstrated an improvement of symptomatic dyspnea with aerosolized nebulized morphine during comfort care treatment [1-3]

Dyspnea associated with pre morbid pulmonary disease is difficult to manage. This subset of patients often requires repeat hospitalizations for treatment of advanced pulmonary morbidities that makes breathing difficult [1,3 and 4]. Over-time, as lung function declines for patients with advanced lung disease; malignant pleural effusion, chest wall neoplasm, COPD, metastatic cancer, interstitial lung disease, and pulmonary fibrosis, relief from oxygen, bronchodilator and steroid therapy is ineffective, as their disease process has advanced beyond conventional therapy to alleviate the dyspnea [3,4].

Their lungs have reached the limits of compensation. They have less inspiratory force and/or coordination to use inhalers properly. Using nebulized bronchodilators is usually the best and most effective route of administration. Most patients are started on a PRN basis. As their lung condition worsens; patients go from PRN to a scheduled dosing. Over time, the dose administration interval is adjusted to accommodate for the shortness of breath. Some patients find themselves watching the clock barely able to reach the next treatment scheduled time interval for aerosolized β -agonist.

The decision to withdraw care for someone not responding to medical intervention is difficult. Healthcare is so focused on saving lives and curing diseases that discussing withdrawing aggressive care and changing to Palliative Comfort Care (PCC) can be emotionally charged [3,5]. The goal of Comfort Care (CC) is to provide quality care that is congruent with the patient's priorities, along with family and spiritual values. Withdrawal of medical therapy should be based on evidenced-based practice, disease-specific data, and prognostic indices, all of which should be reviewed in full detail with the patient and family. If

the prognosis is considered grave and after all avenues (chemotherapy, radiation and surgical) are exhausted, with ample time to alter the situation, and if there is no chance for recovery, then Comfort Care (CC) should be considered as an option. Do Not Resuscitate (DNR) and Do Not Intubate (DNI) orders should be signed by the authorizing parties and placed in the patients' chart [5]. The family should be informed that life support (mechanical ventilation) will be withheld for life sustaining medical treatment [1, 5].

Whenever considering withdrawing care, the family should be assured that their loved one will be made as comfortable as possible and dignity will be maintained. In some cases, patients will receive in-patient comfort care, other times; the patient may be moved to an outside facility or home. The patient will receive pain medication at doses sufficient to reduce signs of discomfort. The delivery methods for outpatient pain management are an oral administration for home and outpatient facilities. Dyspnea is associated with distress; an abnormal breathing pattern is associated with stress and discomfort. There are few treatment options for treatment during comfort care. For many years aerosolized morphine has been used to treat symptomatic dyspnea for PCC [1, 2, 4 and 6-9].

Aerosolized morphine is of no benefit for pain relief, but studies have demonstrated that it provides some relief for abnormal breathing during comfort care [6-9]. given the often sparse and conflicting evidence of utility; it is not surprising that aerosolized morphine has not achieved wider application for comfort care.

Inpatient palliative care was provided at the Vitas In Patient Unit at St. James Hospital, Chicago Heights, Illinois. Patients were given aerosolized morphine to treat symptomatic dyspnea as part of quality improvement. Patients with abnormal breathing were assessed at the bedside by Registered Nursing (RN) staff. The in-house physician would prescribe; 10 mg of morphine solution = 0.5 mL of 20mg/1mL solution in 3 mL NaCl delivered by face mask or mouth-piece via standard small volume hand held nebulizer; administration schedule of Q4 or as needed. B2-agonist was also prescribed as needed.

Nebulized morphine was administered when conventional methods for treating dyspnea were exhausted or ineffective. Aerosolized morphine is more advantageous in relieving symptomatic dyspnea, as it has a localized effect with fewer side effects.

Pre-treatment assessment and post-treatment assessments were performed by the nurse providers. The data was obtained pre and post and recorded.

- Modified Borg Scale (MBS)
- Numerical Rating Scale for Dyspnea NRS-D
- Vertical Visual Analog for Dyspnea (VVAS-D)
- The Modified Medical Research Council Dyspnea Score

The above rating scales were valuated and were not desired suitable.

- 0 = No dyspnea
- 10 = Maximum

The modified Borg scale measures dyspnea intensity associated with exercise. It rates severity of dyspnea, before, during and after exercise 0 – 10 scales: [10 – 12]

- 0 = None
- 1 – 4 = Mild
- 5 – 6 = Moderate
- 7 – 10 = Severe

The numeric rating scale asks the patient to rate dyspnea on a scale of 1 to 10z with 10 being most severe: [14]

The VVAS was designed for measuring the intensity of dyspnea in asthmatic patients; this requires peak expiratory flow rate measurements [13, 14].

The modified medical research council dyspnea scale; 0 – 4 as the person perceives it. This is mainly geared toward COPD

patients with exercise induced dyspnea [14].

We modified the dyspnea scoring method based off of respiratory rate and breathing patterns (Normal or Abnormal). The modified breathing index we developed is below;

- Very Mild Dyspnea = 16 – 20 breaths/min
- Mild = 21 – 24 breaths/min
- Moderate = 24 – 28 breaths/min
- Severe = 27 – 32 breaths/min
- Severe Acute = > 32 breaths/min

During this period, there were 110 morphine nebulizer treatments administered. The percentage of patient's diagnosis is listed below:

- Lung cancer – 32%,
- COPD – 19%,
- Other cancers – 17%,
- Cancer related respiratory failure – 16%,
- Pulmonary fibrosis – 8%,
- End stage congestive heart failure – 8%

No major adverse reactions noted

- Respiratory depression
- Nausea
- Vomiting
- Bronchospasm

Respiratory Rate Decrease of 10% was important

- 71% of the patients out of 110 had a decrease in respiratory rate
- 29% had no change

Heart Rate Measurements (10% increase or decrease)

- 63% of the patients had a decreased heart rate
- 37% no change

Oxygen Saturation (SpO₂) Data

- 64% had an increased SpO₂
- 36% no change in SpO₂

Oxygen Appliances

- 83 patients or 75.5% were on low flow nasal cannulas 3 – 6 L/min
- 22 patients or 4.5% were on high flow systems (HFS) with FIO₂ ≤ 0.60 and gas L/min ≤ 40.
- 5 patients or 4.5% were on HFS with FIO₂ > 0.6. and > 40 L/min maximum flow settings.

Although this review did not have an objective breathing evaluation scale, patients, relatives and caregivers made comments that were recorded by the staff giving the treatments.

Patient statements: "I feel a little relief" "I have obtained some relief" "Nebulized morphine very effective" "I've improved" "My breathing is easier" "I feel better" "I feel so much better" "It works, I can breathe now" "I am glad that this is available as an option"

Staff observations: "Patient and family pleased with results" "Slight improvement noted" "No longer using accessory muscles for breathing" "Respirations less labored" "There was significant change in breathing pattern post treatment, less abnormal".

Discussion

Aerosolized medication classifications are rapidly expanding beyond the conventional role of bronchodilator, steroid, antiviral, and antibiotics. It has expanded to the treatment of pulmonary hypertension with the discovery of synthetic epoprostenol. The use of aerosolized morphine was first described in the 1980's [6].

Patients presenting with pre-morbid pulmonary involvement often have noticeable abnormal breathing patterns. With a diagnosis of malignant pleural effusion, palliative comfort care should be considered [1-6].

The transition to aerosolized opioids along with high heated humidity oxygen therapy is an improvement for quality of care associated with PCC. The choice of a specific oxygen delivery device is based on device performance and patients' breathing requirements with regard to work of breathing and interface with medication nebulizer. Most oxygen devices have performance limitations; (15 to 20 L/min) and FiO_2 limitations [15]. Patients' with hypoxemic respiratory failure have increased oxygen demands that often exceed oxygen device performance design specifications [15-19].

The clinical sign of dyspnea symptoms is disturbing to witness for families and caregivers. Providers are ethically obligated to recognize, evaluate and consider the best treatment for dyspnea during comfort care. In a study performed at Memorial Sloan Kettering Cancer Center that included a review of 183 medical charts, analyzed the utilization of Humidified High Flow Nasal Cannula (HFNC) in adult oncology patients with dyspnea [6]. In their experience, HFNC significantly improved oxygenation and cough when compared with partial rebreather oxygen therapy via mask in severely hypoxic end-stage patients with interstitial lung disorders and allow for a better interaction with the family and friends. This technique provides acceptable conditions to manage respiratory failure in CC. Spentzas et al, [21] demonstrated that HFNC improved oxygen saturation and patient comfort score [20]. Another report by Boyer and colleagues [22] suggest that heat and humidity can be well tolerated in DNI patients and recommends further study to define the role of HFNC in PCC.

Between 33% and 47% of the adult general population had experienced dyspnea during CC. This number increased to 55% to 70% in those who are at end stage, end of life. As noted in our patients', 71% of our patient's had decreased respiratory rate and decreased heart rates which is used as an indicator of stress, another 64% had a 5 to 10% improvement of SpO_2 .

There have been a number of studies investigating the role of aerosolized morphine for CC related to COPD, pulmonary fibrosis and cystic fibrosis. Many studies indicated that aerosolized morphine was an effective tool for providing some relief during comfort care [4, 6,9 and 25].

Pulmonary opioid receptors are associated with vagal afferent (C-fiber) and juxta-pulmonary capillary receptors (J-receptors) which are located within the alveolar wall. Stimulation of C-fiber in the small airways and J-receptors may be responsible for triggering the sensation of dyspnea. The administration of an opioid such as aerosolized morphine may alter the perception of dyspnea by modifying signals afferent C-fibers [6].

Bruera et al, [24] found that aerosolized morphine sulfate given to patients with metastatic cancer was as effective as subcutaneous administration in reducing dyspnea.

Morgan et al, [25] a 14-year old female diagnosis with osteosarcoma of the left femur, despite chemotherapy followed by a radical resection, the disease progressed to metastatic pleural effusion. Her CC dyspnea was managed with HFNC 40 L/min and FiO_2 -1.0, in-line with adjunctive use of aerosolized morphine

sulfate every 4 h. This therapeutic approach allowed the patient to interact with her family while aerosolized morphine was used as a bridge support for palliative comfort care [15, 16, and 25].

Conclusion

In this current paper there is not enough evidence to suggest that every patient with palliative dyspnea should be treated with aerosolized morphine, but maybe useful in a select group of patients. Aerosolized morphine is not a cure, but used as a bridge support for patients with little options. The ethical decision for aerosolized morphine is based on compassion and comfort. Aerosolized morphine use for comfort care should be considered when conventional treatment does not attenuate dyspnea and other treatment options are not plausible. More prospective study is needed on the subject of aerosolized morphine such as guidelines and improved education for providers who care for patients in Palliative and Hospice comfort care.

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