

OMT effect on length of COVID hospitalization Case Report

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Introduction

COVID-19 has become a burden to society with the multiple hospitalizations of millions of people to the long lasting effects it has created for those infected. Most of the treatments we currently have are still undergoing research to see the effectiveness of those treatments such as immunotherapy and use of steroids. Part of the reason we use steroids is due to the cytokine storm effect that this virus inflicts so our goal is to reduce the inflammatory process. SARS-CoV-2 acts on the ACE-2 enzyme which then leads to a block of the production of Ang-(1-7) and overproduction of Ang II leading to increased inflammation, fibrosis, and vasoconstriction. The effect of this cytokine storm leads to acute respiratory failure, tachycardia, and fibrosis of the muscles both involuntary and voluntary.¹

Another area of research that has been up and coming, is the use of osteopathic manipulative medicine (OMM) when it comes to treatment of the lymphatics, respiratory, and musculoskeletal systems. OMM modalities commonly used from research on its effect for COPD respiratory failure or pneumonia has involved doming of the diaphragm, lymphatic pumps, and myofascial release (MFR). These studies show that OMM helps the body heal from improving circulation and allowing immunological function balance. Part of the main tenets of OMM are that the "body possesses self-regulatory mechanisms. The body has inherent capacity to defend and repair itself. When normal adaptability is disrupted, or when environmental changes overcome the body's capacity for self-maintenance, disease may ensue."² So the thought process is that OMM will help with returning the body to a state in which its inherent abilities may take over to heal itself.

OMM Techniques



Doming the diaphragm¹²



High-Velocity Low-Amplitude Cervical¹³



Pectoral Traction¹³



Images adapted from Atlas of osteopathic techniques Nicholas and Nicholas

Discussion

In addition to standard treatment, OMM can be used as an adjuvant to help reduce length of stay. This has been seen in other studies of using OMM on patients with pneumonia by reducing LOS by 2 days.³ The result of OMM being used on COPD patient's lead to improved lung functionality which was seen by improvement of blood gasses as well as increased total lung capacity. A multicenter double-blind controlled trial for respiratory failure completed in 2016 showed that OMT reduced the hospital mortality rates by 6% in adults as well as led to a significant reduced length of stay in the hospital.^{4,5} As seen in the patient, besides a hold up due to anxiety driven respiratory failure, the patient made the quickest progression in her oxygen requirements being weaned once OMM was implemented. During the first 10 days, there was barely any progress. Once OMM was implemented, there was a 10 % reduction of FiO2 requirement. Then once the patient returned from her stay in the ICU, there was a more rapid progression of both weaning O2 requirements as well as a sharper decrease in tachycardia to normal heart rate with the implementation of HVLA.

Doming of the diaphragm- touch below the ribs on each side with thumbs directly beside the xiphoid process then apply a firm pressure inwards into the area of restriction (direct). This technique a muscle whose primary function is involved in breathing and blood flow as well as lymphatic flow.⁶ For our patient, their diaphragm was severely restricted and once it released, the patient had a drop in respiratory rate as well as physically appeared to take in deeper longer breaths.

Myofascial release of the ribs- touch below the ribs on each side and will apply gentle pressure and move the tissue from side to side into an area of ease (indirect) or directly into the restriction. Like with doming of the diaphragm, our patient exhibited a change in their breathing pattern. Also, the patient noted that they felt better with each following breath.

Rib raising- patient in either supine or seated position. Find the costotransverse articulation of the ribs. Use finger pads as a fulcrum then using the body, pull back (lateral movement) while exerting an anterior pressure for about 2-3 seconds before moving to another position along the patient's rib cage. Rib raising is helpful in increasing lymphatic flow as well as reducing excessive sympathetic tone that can hinder lymphatic drainage.⁶ Along with this, the technique allows for increased chest wall mobility by targeting rib cage hypertonicity. In the 1918 influenza epidemic, there was a noted difference in mortality rate from influenza of 0.25% in those that received OMM vs 30-40% mortality in those with just conventional medical care.⁷

Pectoral traction- Grasp under each side of the armpit with finger pads then slowly pull with a bilateral force in a cephalad direction.⁸ This technique did well to work on the psychosomatic aspect of the patient's condition as during anxiety the pectorals become tight which leads to the difficulty of the patient getting in a full deep breath.

Discussion Cont.

Thoracic pumps- place hands over the pectoral region with patient supine and physician at head of the bed. Patient inhales and exhales while physician provides a compressive force in a posterior direction to the patient's chest in a rhythmic fashion. This is done for about a minute. Then on the final inhalation, rapidly move hands off the patient chest. Thoracic pump technique is useful in increasing lymph flow especially at the thoracic duct.⁶ Allowing more lymph flow which can suppress inflammation by decreasing the amount of monocytes and macrophage activity (which normally increases inflammation).¹ This being said there are other areas such as the femoral triangle and pedal lymphatic pumps that are incorporated in similar fashions. The most important aspect being to work from a proximal to distal area to ensure no overload of lymph fluid.

Chapman's points- Small nerve ganglion formed contractures located in the fascia at free nerve endings which represent dysfunction of an organ (viscerosomatic). Anterior points a primarily diagnostic while posterior points focus on treatment. Painful when dysfunction is present as a small smooth/firm palpable area. Treatment lasts about 10-30 seconds by applying a firm, gentle pressure to the point until it softens.⁹ Change of organ function is not normally noticed until about 24 hours later. For our patient, we focused on the points reflective of the heart at the 2nd right ICS at the midclavicular line and the posterior 2-3rd transverse process as this reflects cardiac arrhythmias.

High-velocity low amplitude (HVLA) is a thrusting technique that in simple terms is cracking of a joint or spine. First, the dysfunction of the spinal level has to be determined. The spinal process's facet orientation is determined in either a neutral position or flexion/extension. From there the rotational and side-bending aspect of the level is determined. Using Freyette's principals, it is known a type 2 dysfunction is a singular spinal process is in flexion or extension with the rotational and side-bending components in the same direction left/right. Whereas a type 1 dysfunction is a group of 3 or more vertebrae in a neutral position with the rotational and side-bending components in opposite directions.¹⁰ From these diagnosis, the patient is positioned to place that segment into the restriction (the way it does not wish to go) before a force is applied into that barrier. The goal in this patient was to take the vertebral segments that affect the parasympathetics and sympathetics of the heart and lungs out of a restriction that inhibited the natural course of those organs. With our patient, the idea was that by working on the cervical spine dysfunction then we would improve heart rate while also working on the patient's anxiety. Which the patient went from being in the low 100s to the high 80s after one treatment.¹¹

Case Presentation

An 18 year old female with history of endometriosis and second hand smoking exposure was admitted to the hospital for COVID pneumonia. Prior to admission, patient had already been treated with dexamethasone and supportive care at a prior hospitalization a few days prior. In the ED, she was given one dose of Dexamethasone 6mg and Casirivimab/Imdevimab. Due to worsening hypoxia, patient was admitted to the hospital.

She was placed on a non-rebreather mask (NRB) before transitioning to high-flow nasal cannula (HFNC). From there patient was titrated down from FiO2 of 100% to 75% slowly over the course 10 days with most of her progress occurring on day 10 when osteopathic manipulative medicine (OMM) was applied. Patient had been having worsening back pain and trouble getting in a deep breath. The OMM applied was doming the diaphragm, rib raising, and myofascial release (MFR) of the rib cage. The patient began to have greater relief in pain as well as able to take deeper breaths. On the first day of OMM, she went from 85% FiO2 to 75% which was the largest drop in FiO2 to date. On day 12, patient was able to transition from HFNC to mini-flow NC at 10 liters. However, due to anxiety driven worsening of breathing, patient transitioned back to HFNC by day 14. With the help of daily OMM by day 14, the patient was able to be titrated from 70% to 57.5% FiO2. However on September 1st, the patient underwent an anxiety driven worsening of respiratory status requiring to be placed on a bipap with sedation. Once the patient returned from a few days of the ICU, she had more OMM performed that was directed to the barriers of restriction as well as targeting autonomic nervous system to help with recover. This was done using high velocity-low amplitude (HVLA) directed at her cervical, thoracic, and lumbar spine as well as pelvic bones. Within 6 days (9/4-9/10), the patient was successfully weaned from a high-flow nasal cannula at 35L with FiO2 80% to nasal cannula 2L at rest with 3-4L needed for activity.

Conclusion

OMM can be used to target the secondary effects of COVID that can prevent the body from working effectively. These secondary effects being restriction of the secondary muscles of breathing or the sympathetic restrictions that develop due to hypertonic muscles. This case illustrates the potential that OMM can play in reducing hospitalization stays in COVID-19 patients that were in acute respiratory failure with hypoxia. However, more research needs to continue to be done as this was an observation noted while practicing philosophies installed by A.T. Still to help the body heal itself.

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