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Modified Muncie Technique: Osteopathic Manipulation for Eustachian Tube Dysfunction and Illustrative Report of Case

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In eustachian tube dysfunction, the eustachian tube fails to open sufficiently, resulting in a difference between the air pressure inside and outside the middle ear. This condition can cause pain and hearing loss and may lead to barotitis media, otitis media, tinnitus, and vertigo. Although several treatment options are available, from antibiotics to surgery, little documentation of osteopathic manipulative techniques exists. The current report discusses various treatment options, including the modified Muncie technique—a type of myofascial release administered inside the patient's mouth—for patients with eustachian tube dysfunction and its symptoms. An illustrative case of a 37-year-old woman who complained of intermittent vertigo and who was treated with this technique is included.

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Eustachian tube dysfunction is defined as the failure of the eustachian tube to open sufficiently during swallowing or yawning, causing a difference in air pressure inside and outside the middle ear. Allergies, upper respiratory infections, rapid altitude changes (eg, airplane ascent and descent, scuba diving), a narrow eustachian tube, tumors in the nasopharynx, and large adenoids can all contribute to eustachian tube dysfunction.[1-4]

Several symptoms and conditions can occur as a result of eustachian tube dysfunction, including barotitis media, serous and suppurative otitis media, otalgia, temporary hearing problems, tinnitus, and vertigo.[1-5] Treatment options range from antibiotics to surgery, but simple solutions exist in little-documented osteopathic manipulative techniques,[4,6] one of which was used in the illustrative case that appears later in the present report. However, before exploring treatment options, it is important for physicians to have a clear understanding of the anatomy of the eustachian tube.

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Anatomy

The eustachian tube has three physiologic functions:

- ventilation and pressure regulation of the middle ear
- protection of the middle ear from nasopharyngeal secretions and sound pressures
- clearance and drainage of middle ear secretions into the nasopharynx

The adult eustachian tube is approximately 3.5 cm in length. It is directed inferiorly, anteriorly, and medially from the middle ear (*Figure 1*). It consists of a lateral bony portion, which arises from the anterior wall of the tympanic cavity, and a medial portion, which is fibrocartilaginous and enters the nasopharynx. The tube opens posterior to, and slightly inferior to, the posterior end of the inferior nasal concha. The muscles of the eustachian tube system (ie, salpingopharyngeus, levator veli palatini, tensor veli palatini, and tensor tympani) help open and close the tube.[2,3,7] A functional and patent eustachian tube is necessary for ideal middle-ear sound mechanics. However, a fully patent eustachian tube may not necessarily have perfect functioning, as is the case with the patulous eustachian tube or with mucociliary abnormalities.[3]

The ascending pharyngeal and middle meningeal arteries are the arterial supply of the eustachian tube. The venous drainage is carried to the pharyngeal and pterygoid plexus, while the lymphatics drain into the retropharyngeal lymph nodes.[2,3,7,8] Drainage of secretions and occasional foreign material from the middle ear is achieved by the mucociliary system of the eustachian tube as well as the mucous membrane of the middle ear, the muscular clearance of the eustachian tube, and surface tension within the tube lumen.

The pharyngeal branch of the maxillary nerve supplies information to the pharyngeal ostium. The nervus spinosus derived from the mandibular nerve supplies the cartilaginous part, and the tympanic plexus derived from the glossopharyngeal nerve supplies the bony portion of the eustachian tube.[2,3,7]

Bluestone[9] proposed the flask model to better explain the role and anatomic configuration of the eustachian tube in the protection and drainage of the middle ear. According to this model, the middle ear system is similar to a flask with a long and narrow neck. The mouth of the flask represents the nasopharyngeal end, the neck represents the isthmus, and the

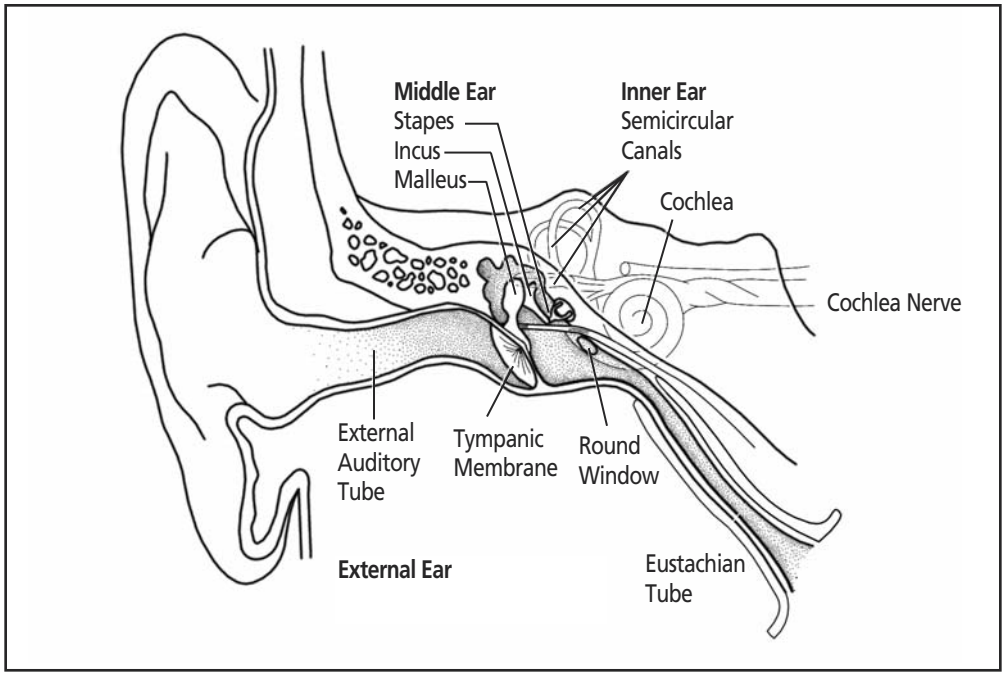

Figure 1. *Anatomy of the ear. Printed with permission from the University of Medicine and Dentistry of New Jersey-School of Osteopathic Medicine.*

main body of the flask represents the middle ear and mastoid gas cell system. Fluid flow through the neck depends on the radius and length of the neck, the pressure at either end of the neck, and the viscosity of the liquid. When a small amount of liquid is instilled into the mouth of the flask, the flow of liquid stops somewhere in the neck because of its narrow diameter and the relative positive air pressure in the chamber of the flask. The limitation of this model, however, is that unlike a flask, the eustachian tube is compliant. This model also does not take into consideration the role of the tensor veli palatini muscle, which actively opens the nasopharyngeal orifice of the eustachian tube.

Treatment Options

Several symptoms and diseases may arise as a result of eustachian tube dysfunction. However, the resulting pathology is often treated rather than the eustachian tube itself. For example, suppurative otitis media is traditionally treated with antibiotics (2004 pediatric guidelines[10] recommend postponing antibiotic use for 48 to 72 hours unless the patient is febrile or younger than 2 months). However, the use of antibiotics to treat patients whose conditions result from a structural rather than infectious (serous otitis media) cause or from a viral rather than bacterial source has led to some antibiotic resistance.[10] Although antihistamines, decongestants, and vasoconstrictors are often administered for pain, fever, or hearing loss, there is no evidence of the efficacy of these treatment modalities.[2] Treatment options for patients with tinnitus include antidepressants, anxiolytics, biofeedback, cognitive therapy, hearing aids, and treatment of temporomandibular joint dysfunction.[4] Subjective vertigo may be treated with antibiotics, antihistamines, meclizine, and steroids.[1,5]

Surgical intervention is often a last resort for chronic or recurrent otitis media and may include adenoidectomy, tympanocentesis, or myringotomy with tube placement.[2,11] However, surgical intervention can require general anesthesia and therefore has some risk. In contrast to these various treatment options and their respective risks, osteopathic manipulation can be readily and easily performed to help improve eustachian tube function.[7,12,13]

Galbreath Technique

The Galbreath technique is a lymphatic drainage technique that may be used to treat a patient of any age. As described elsewhere,[12] the physician turns the patient's head so that the affected ear faces away. With the other hand, the physician applies an inferior and medial force across the mandible of the affected side. This technique may be used in conjunction with the Muncie technique.

Muncie Technique

Curtis H. Muncie, DO, is credited with developing a manipulative technique to relieve eustachian tube dysfunction.[12] As Ruddy[6] and Heatherington[7] describe the procedure for treating a patient's right eustachian tube orifice, the osteopathic physician should insert a gloved right index finger into the patient's

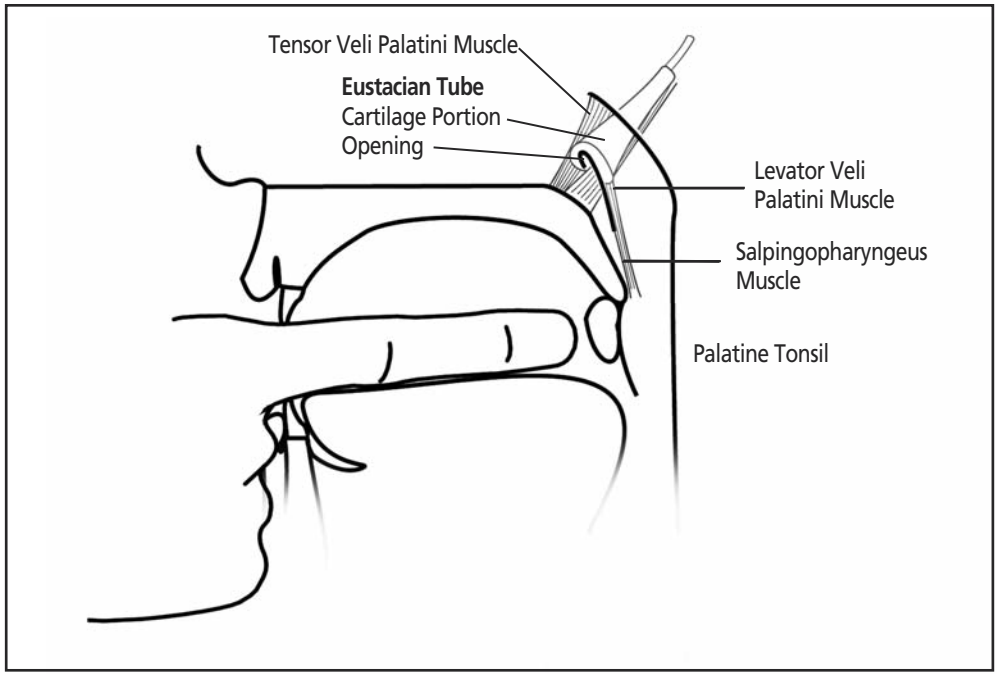

Figure 2. *In the modified Muncie technique, as described by Millicent King Channell, DO, the gloved finger should be placed over the palatine tonsil. The osteopathic physician applies a circular traction while applying a force laterally. This traction breaks adhesions of the eustachian tube, which opens superior to the tonsil and the soft palate. Printed with permission from the University of Medicine and Dentistry of New Jersey-School of Osteopathic Medicine.*

mouth, placing the finger against the inferior part of the posterior pillar of the palatine tonsil. Moving the finger tip cephalad and slightly lateral to the Rosenmüller fossa, posterior to the opening of the eustachian tube, the osteopathic physician should apply a pumping motion with the finger pad to lyse any adhesions and, ultimately, restore the eustachian tube opening. However, this technique may cause gagging and can be traumatic for children. Heatherington[7] suggests advising patients to pant through the mouth to avoid gagging.

Modified Muncie Technique

The use of a modified Muncie technique, which has been used by osteopathic specialists but has not been previously described in the literature, can improve patient tolerance. It is better to do this technique with the patient in a supine or reclined position for head stabilization, but it may be done with the patient seated as well. To treat the right eustachian tube, insert the right index finger, gloved, into the patient's mouth. Place the finger against the posterior pillar of the palatine tonsil (*Figure 2*). Apply lateral pressure while making a circular motion into the soft tissue.

This motion exerts traction on the superior soft tissue and the opening of the eustachian tube, which is directly superior to this point above the soft palate. This technique helps break the vacuum, normalize pressure on both sides of the tympanic membrane, and allow fluid drainage. Because of its indirect nature, the modified Muncie technique may require several applications. However, it is less likely to induce gagging and therefore may be preferred by patients.

Illustrative Report of Case

A 37-year-old woman presented to the physician's office complaining of intermittent subjective vertigo for the past week. She stated that the symptoms occurred when she turned her head, sat up, or stood up. Although each episode lasted only a couple of minutes, it made the patient feel unsteady and was disruptive to her day. She denied any falls, headaches, or visual changes but admitted that her hearing felt "muffled" on the right side. She had seasonal allergies but stated that they were "under control," and she denied any current cough, congestion, or postnasal drip.

On physical examination, her blood pressure was 132/74 mm Hg; heart rate, 74 beats per minute; respirations, 16 breaths per minute; and body temperature, 98.6°F. The patient's nasal conchae were slightly boggy, and her throat was clear. Her right tympanic membrane was mildly retracted and serous fluid was present. A tympanometer was unavailable for use at the time of the examination; however, the Rinne and Weber tests revealed mild conductive hearing loss on the right. Results of a biomechanical examination revealed that the

atlanto-occipital joint was extended sidebent right, rotated left; cervical vertebrae 2 through 4 were rotated left, sidebent left; and thoracic vertebrae 1 through 4 were rotated right, sidebent left.

The patient's condition was diagnosed as serous otitis media secondary to recent seasonal allergies. Her cervical and thoracic dysfunctions were treated with muscle energy, facilitated positional release, and high-velocity, low-amplitude, all of which she tolerated well. The modified Muncie technique was applied to the right side and was also well tolerated. The patient was discharged after treatment but returned 2 weeks later, stating that her symptoms returned 1 week after treatment. She was treated a second time with the modified Muncie technique, and her symptoms completely resolved.

Comments

Eustachian tube dysfunction can lead to a multitude of problems, including both serous and suppurative otitis media, tinnitus, and vertigo.[1-5] In the case of suppurative otitis media, the standard of care is continually changing. While the overprescription of antibiotics is leading to antibiotic resistance, delayed antibiotic treatment can leave both patients and physicians frustrated. Tinnitus and vertigo, though they can have potentially lethal etiologies, may simply be a result of eustachian tube dysfunction. Using the modified Muncie technique to treat patients with these conditions—when they derive from eustachian tube dysfunction—is safe, fast, easy, and rapidly effective. In addition, it can be an adjunctive treatment to medications or a stand-alone treatment, which can save patients time, money, and the potential adverse effects of medications. The simplicity of this technique allows its use in any physician's office and encourages its inclusion in future research protocols.

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