

Chapter 53

Differential Diagnosis of Temporomandibular Joint and Masticatory Muscle Disorders in Patients with Tinnitus

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Keypoints

1. This chapter aims at providing non-dental healthcare specialists engaged in tinnitus treatment with a description of a short screening of individuals with tinnitus to clarify the involvement of temporomandibular disorders (TMD) in such patients. A screening test for TMD seems to be reasonable for all tinnitus patients. Patients with a positive TMD screening should be referred to an experienced TMD specialist.
2. TMD short screening consists of an anamnesis, an examination of the temporomandibular joint (TMJ) (jaw motion and TMJ sounds), and an examination of the masticatory muscles (palpation, isometric contraction, and parafunction).
3. Individuals with TMD-related tinnitus suffer more frequently from masticatory muscle pain than from joint syndromes, whereby the majority of individuals with TMD-related tinnitus – in contrast to patients with tinnitus only – describe their tinnitus as fluctuating.

Keywords TMD • Tinnitus • Short screening

Abbreviations

N	Newton
TMD	Temporomandibular disorder(s)
TMJ	Temporomandibular joint

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Introduction

Diagnosis of temporomandibular disorders (TMD) should be made on the basis of the medical history and clinical examination of a patient. It is the opinion of this author that diagnosis of TMD requires a detailed evaluation by a dentist or physician with advanced experience in treating temporomandibular joint (TMJ) and masticatory muscle disorders. This chapter, however, cannot provide a detailed and comprehensive tutorial, neither for diagnosing TMJ and masticatory muscle disorders nor for differentiating between the various forms of TMD; such information can only be obtained from textbooks such as “Temporomandibular Joint and Masticatory Muscle Disorders” by Zarb et al. [1]. The present chapter aims at providing health care specialists of different fields who are engaged in tinnitus treatment a brief guide regarding how to best clarify possible TMD involvement in patients. Patients who have tested positive for TMD and tinnitus should be referred to an experienced TMD specialist for further diagnosis and therapy. The differential diagnosis should rule out pain resulting from other causes but with similar symptoms, such as trigeminal neuralgia and atypical facial pain [2].

It is well documented that individuals with both tinnitus and TMD have more pain and higher dysfunction index scores than individuals with only TMD [3–7]. Therefore, screenings of patients with tinnitus for related TMD can be brief. Patients with a suspicion of having TMD and those without a clear diagnosis may be referred to a TMD specialist for further diagnosis. A short screening can be conducted in approximately 5 min, because it is known that TMD is often accompanied by tinnitus; it may therefore be reasonable to screen all patients with tinnitus for TMD complaints.

TMJ Short Screening Procedure

Often, patients with tinnitus will not relate their “ear symptoms” to possible stomatognathic¹ or TMD. Furthermore, many patients with chronic TMD, such as joint clicking or grinding of their teeth, hesitate to consult a dentist or report their symptoms to an otorhinolaryngologist because they regard them (mostly free of pain) as “normal” and not pathogenic. Therefore, screening for TMD should be generally included in examinations of patients with tinnitus [1, 5]. Short screenings to evaluate the incidence of TMD in patients with tinnitus have been described in the literature [8, 9]. The screening described below is adapted to the specific conditions in TMD-related tinnitus. When TMJ involvement is found (positive screening), the patient should be referred to an experienced dentist or TMD specialist for a more detailed diagnosis and TMD therapy [10].

Anamnesis

Ask the patients about pain in the face, jaw, temple, in front of the ear, in the neck, or in the shoulders in the past month and let them point to the area the pain is felt. All patients with tinnitus should be asked if they have had treatments for TMD in the past (such as splint therapy, physiotherapy, medications, etc.), if they have had pain in their temple and tinnitus from mental pressure or medication [2, 11–13].

Patients who have pain in the TMJ or the masticatory muscles (myofascial pain) should have detailed diagnostic tests for TMD.

Jaw Motion

The vertical range and opening pattern of the mandible [10, 14] should be tested (Fig. 53.1). Ask the patient to close their mouth with teeth lightly touching and then slowly open their mouth as wide as possible, even if it is painful.

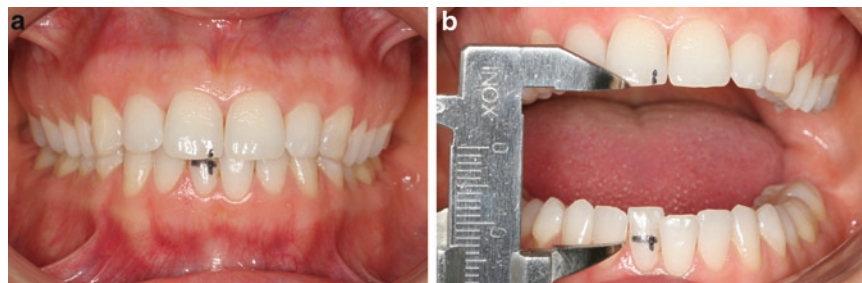
1. Note if the patient has an initial deviation to one side but corrects to the midline before reaching the maximum mandibular opening or an uncorrected deviation of the jaw to one side.
2. Measure the maximum unassisted opening from the incisal edge of the maxillary central incisor to the opposing mandibular incisor.
3. Ask the patient to do largest possible movements of the mandible: left lateral excursion and right lateral excursion, protrusion, and retrusion.

Patients who have reproducible opening deviations or limited vertical range (<40 mm) or with painful mandible movements should have detailed diagnostic tests for TMD.

TMJ Sounds

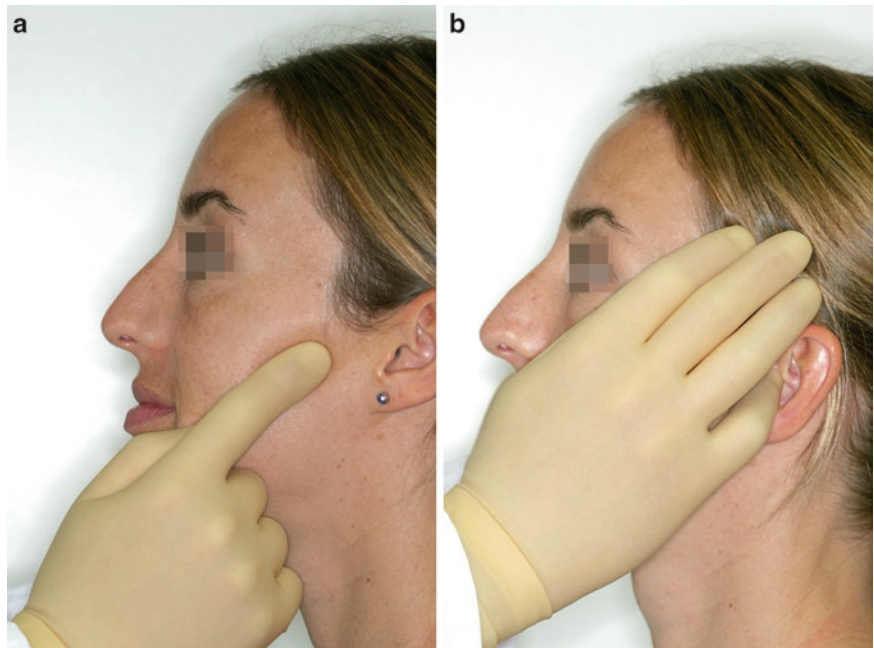
Ask the patient if they hear any sounds when opening and closing their mouth. Place left index finger over the patient’s right TMJ and the right index finger over the left TMJ; ask the patient to slowly open the mouth as wide as possible, even if it is painful (Fig. 53.2). Palpation has to be done bilaterally.

Fig. 53.1 Estimation of the maximum mandibular opening and deviations. (a) Orientation lines on mandibular and maxillary central incisor. (b) Measurement of maximum mandibular opening with sliding caliper



¹Stomatognathic system: mouth and jaws and closely associated structures.

Fig. 53.2 Palpation of the temporomandibular joint (TMJ) for the evaluation of joint sounds. (a) Lateral, preauricular palpation with index finger. (b) Dorsal, intraauricular palpation with little finger



Record clicking (short) or continuous sounds, like a stone grinding against another stone (crepitus). Ask the patient if the palpation was painful.

More detailed diagnostic tests for TMD are needed in patients who have reproducible TMJ sounds or joint pain during palpation.

In addition to the lateral palpation (preauricular), the TMJ palpation may also be performed from dorsal (intraauricular) direction, with the examiner's fingers in the right and left acoustic meatus, finger pads orientated forward.

Masticatory Muscle Tenderness

Palpation and isometric contraction of the muscles of mastication (Fig. 53.3) may be useful for detecting muscle tenderness. Ask the patient to open their mouth and take the cheek between index finger and thumb. Have the patient lightly clench to identify the *masseter muscle* and then palpate the whole muscle in a passive state (approximately 2 lb/10 N of pressure). Ask the patient to lightly clench and move the mandible forward and backward to identify the *Temporalis muscle*

and palpate the entire muscle in a passive state (approximately 2 lb/10 N of pressure).

The examiner holds up the mandible with both hands below the chin while asking the patient to open their mouth and hold the position for 1 min (*abduction isometric contraction*).

Deposit two cotton rolls or swabs between the upper and lower jaw in the region of the premolars and ask the patient to clench and hold with constant pressure for 1 min (*adduction isometric contraction*).

More detailed diagnostic tests for TMD are needed in patients with masticatory muscle palpation pain or muscle pain during isometric contraction.

Palpation of the remaining masticatory muscles (medial pterygoid, lateral pterygoid, stylohyoid, suprahyoid, and digastricus) may also be done, but localizing these muscles may be difficult even for experienced TMD specialists. Myogelosis and hypertrophies should also be noticed. Movements of the head or cervical spine can cause changes in tinnitus perception [15] (see Chap. 9). Disorders of the neck or cervical spine may influence TMD-related tinnitus and should therefore –if existent – be further examined by a specialist.



Fig. 53.3 Masticatory muscle palpation. (a) Digital palpation of masseter muscle between index finger and thumb. (b) Palpation of temporalis muscle in toto. (c) Abduction isometric

contraction during mouth opening. (d) Adduction isometric contraction through clenching two swabs between the upper and lower jaw in the premolar region

Parafunction²

Ask the patient for grinding of their teeth (bruxism), clenching and rocking of teeth. Examine the oral cavity

for hard tissue attritions (not age-based) or soft tissue impressions (of the tongue or inside of the cheek).

Hypertrophies of the masticatory muscles (masseter) and asymmetries of the face should be recorded

²Parafunction: the habitual movements (e.g., bruxism, clenching, and rocking of teeth using teeth for tools) that are normal motions associated with mastication, speech, or respiratory movements and that result in worn facets and other problems

associated with occlusal trauma. Also called *parafunctional habits* or *oral habits*. (From Mosby's Dental Dictionary, 2nd edition. © 2008 Elsevier, Inc. All rights reserved.)

because they are indicators for parafunctions. More detailed diagnostic tests for TMD are needed in patients with signs of parafunction. Patients should be asked if their tinnitus changes during mandible movements or palpation of joint and masticatory muscles.

Special Considerations in Patients with Tinnitus

One of the difficulties in diagnosing patients with both TMD and tinnitus is to distinguish patients who have tinnitus because of TMD from patients who hear tinnitus independently of their TMD. In patients with TMD-related tinnitus, therapy should primarily focus on TMD. Often the tinnitus will abate after successful TMD treatment. In patients whose TMD and tinnitus are independent of each other, TMD therapy is unlikely to affect the tinnitus. Such patients should therefore be referred to a tinnitus specialist. Patients with both symptoms are often classified as having tinnitus or TMD.

Individuals with tinnitus have been described to suffer more frequently from masticatory muscle pain (and especially from myofascial pain) than from joint symptoms [3, 6, 16]. However, Henderson et al. reported that tinnitus does not occur more frequently in patients with TMD involving disc displacement than in patients with physiological disc position [17]. Therefore, TMD diagnosis and related short screenings in patients with tinnitus should particularly focus on examining the masticatory muscle system and muscular disorders. Most individuals with TMD-related tinnitus describe their tinnitus as fluctuating, and TMD occlusal splint therapy has been found significantly more effective in patients with fluctuating tinnitus than in patients with continuous and severe tinnitus [16, 18]. Patients with TMD might be diagnostically separated from patients with tinnitus-related TMD because of the character of their disorder (joint disorder vs. muscle pain) (Fig. 53.4). So far, such unequivocal signs that should allow distinction between the pathology in these two groups have not been described. The quality of the tinnitus might be a predictable indicator for the involvement of the TMJ and masticatory muscle system, which should therefore be examined even more thoroughly in patients with tinnitus of a specific quality (fluctuating tinnitus).

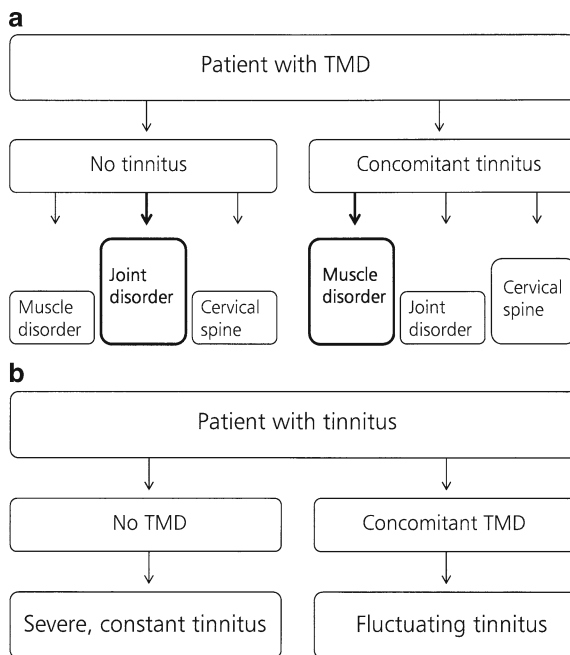


Fig. 53.4 Special considerations in patients with tinnitus, TMD, and TMD-related tinnitus. **(a)** TMD symptoms in patients with or without tinnitus. **(b)** Tinnitus symptoms in patients with or without TMD

Conclusions

There are several reasons why testing for TMD would be beneficial to patients with tinnitus, especially for patients with TMD who do not have a known cause of tinnitus. It is known that patients with tinnitus benefit from efficient treatment of their TMD and, therefore, patients with tinnitus should be screened for TMJ problems, as every patient with TMD should be asked if they have tinnitus [1, 19].

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