"My earache is getting worse!"

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Mike's case

A 36-year-old male presents to the ED with complaints of right-sided pain that started out with earache that spread across the right side of his head. It had worsened progressively over the past week, to the extent that he was unable to work, had difficulty sleeping and began experiencing nausea and vomiting. The patient explained that although the pain was constant, it intensified intermittently. OTC analgesics had not provided pain relief and he had found that the only relief he could obtain was by holding his head in unusual positions. He also noticed a "popping" sensation on the side of his head that aggravated the pain, especially when it occurred during mastication. The pain was severe—quantified at 9/10 at its peak intensity and 3-4/10 at baseline.

The patient had experienced the problem several times over the previous 6 months. Two months prior to his ED visit, he had been diagnosed with "migraine headaches" and prescribed sumatriptan, which had not provided any relief.

Medical history

Medications

- Sumatriptan
- Ibuprofen

Examination

- Temperature: 36.7°C
- BP: 124/84
- Heart rate: 74
- Respiratory rate: 14
- O_2 saturation: 99%

To find out more about Mike, turn to page 4.

Questions & Answers

1. What is going on?

Ear pain or otalgia can result from conditions within the ear (primary otalgia), or may be referred from conditions outside the ear. Primary otalgia most commonly results from otitis externa, otitis media, mastoiditis, auricular infection or Eustachian tube dysfunction. These diagnoses are often easily made, so in cases where examination of the ear appears normal (although this by no means definitively rules out primary causes), consideration of referred otalgia is indicated.

Because the ear shares innervation with a number of anatomic sites, there are many anatomically separate conditions that may cause ear pain (examples of cases of referred otalgia are listed in Table 1).

This patient was diagnosed with temporomandibular joint dysfunction (TMJD), the most common cause of referred ear pain. Internal derangements of the TMJ can result in pain via the third division of the trigeminal nerve and the auriculotemporal nerve which is commonly perceived deep within the ear.

2. What is the etiology of TMJD?

TMJD can be subclassified as extracapsular and intracapsular disorders. Extracapsular TMJ disorders (group 1) are more common and include myofacial pain of the muscles of mastication. Intracapsular disorders (joint problems) are further subdivided into Group II (articular disc displacement) and Group III (arthralgia and osteoarthritis). Most patients

Table 1

Examples of conditions that may cause referred pain to the ear

Anatomical area	Examples
TMJ	TMJ dysfunction/arthralgia
Intracranial lesions	Tumour/infection
Sinuses	Tumour/infection
Dental	Infection, trauma
Facial nerves	- Trigeminal neuralgia (auriculotemporal neuralgia) - Bell's palsy/Ramsay Hunt syndrome
Skull	Eagle's syndrome
Oral, tonsillar lesions	Tumour/infection
Nasopharynx/larynx	Tumour/infection
Cervical spine	Arthritis
Infratemporal fossa lesions	Tumour/infection
Thyroid	Tumour
Heart	Angina pectoris
Salivary glands	Parotid tumour/inflammation
Arteries	Temporal arteritis

TMJ: Temporomandibular joint

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with TMJD report clenching, and evidence of nocturnal bruxism is found in almost 80% of patients. While these events alone can cause TMJD, they are also associated with increased stress and anxiety.

3. *What do we need to remember about TMJD in the ED?*

Due to the broad differential diagnosis and often uncharacteristic symptoms, the condition is frequently misdiagnosed. The differential diagnosis includes many of the conditions listed in Table 1. TMJD typically presents as a chronic headache or facial pain, often unilateral and may include pain in the masticatory muscles. Most patients describe the pain as dull and achy and find it worsens during mastication. Many also experience radiation of the pain to the ear, neck or jaw although these may be absent. Women are affected more often than men, with the mean age of onset occurring during the 30s and 40s. While not diagnostic, an audible popping or clicking during mastication caused by displacement of the articular disc strengthens the diagnosis. In rare cases, disc displacement may cause the jaw to lock.

Making the diagnosis includes eliciting a focused history, which should reveal some of the symptoms listed above. Inspection of the patient may reveal wasting of the ipsilateral face (Figure 1). Deviation of the mandible may also be noted when the mouth is opened and closed. The TMJ should be palpated while the patient opens and closes their mouth and pain should be elicited when anteriorly directed pressure is placed behind the tragus of the ear. Movement of the jaw may be restricted due to pain, but typically no joint swelling is detected. Physical examination should also include palpation of the muscles of mastication bilaterally. Commonly, minor to extreme tenderness to touch will be present on the affected side. Each muscle group (masseter, temporalis and pterygoid) should be palpated individually, as allodynia may be present in

Mike's case cont'd

On examination, the patient was sitting upright in obvious discomfort. There was a visible, recurrent muscle twitch in the patient's cheek on the affected side and slight wasting of the masseter muscle was noted ipsilaterally. The patient's right ear was sensitive to touch, especially when pressure was applied to the ear canal and when otoscopy was performed. Asymmetry of his masseter muscle bulk was evident with wasting on the right (Figure 1).

Figure 1. Anteroposterior view of the face showing wasting of the masseter muscle on the right.

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only one muscle. Although radiologic examination of the TMJ may detect osteoarthritic changes in the joint or intraarticular disc displacement, it is seldom of use for diagnosis and does not impact the treatment or outcome. Plain film radiography can be used to look for dental problems. CT scans similarly have limited utility, as they provide excellent detail of the bony anatomy but have poor resolution of disc cartilage. CT is usually restricted to targeted search for alternate causes of pain in equivocal cases. MRI provides the best image and may be used to examine disc, joint and bone problems. It is, however, generally reserved for cases of extreme pain or when the jaw locks.

4. *What can be done for patients with TMJD?*

TMJ may be difficult to treat because many cases are either chronic or recurrent. Despite the complex nature of this problem, the most successful therapies are conservative treatments. While some cases will resolve spontaneously, many will benefit from NSAIDs alone. Other successful treatment methods include combining NSAIDs with stress reduction, jaw exercises and the prevention of nocturnal grinding with the use of a bite plate. For persistent pain, tricyclic antidepressants or muscle relaxants may be prescribed. In cases that are refractory to treatment, local injections of corticosteroids or botulinum toxin may provide relief.

In patients who do not respond to medical treatment, surgical intervention may be considered. In cases of joint degeneration or deformity, arthroscopy may be helpful, but is usually reserved as a last line of treatment. Unfortunately, not all therapies are successful and the majority of patients (65%) will experience either chronic or relapsing pain.

Back to our patient

Mike was counselled about the nature of his problem. He was recommended to discontinue sumatriptan and ibuprofen, as they had provided no pain relief. The patient was offered corticosteroid injection but declined this therapy and opted to begin oral amitriptyline. The patient was given hydromorphone to use as required until the amitriptyline began working and was referred to a maxillofacial surgery for follow-up. Dx