Loss of smell and taste are commonly reported following head and/or nasal trauma in and the ENT specialist is often asked to provide an assessment of whole person impairment. This involves taking a thorough history and carrying out a complete ENT examination before proceeding to clinical testing of these senses. It is clear therefore that the assessor ideally should have available a reliable and relatively objective method of quantifying partial or total loss of these senses.

Relationship between taste, smell, and flavour

Although loss of smell and taste can occur as separate injuries most individuals report a joint loss of these two related senses because of the common confusion of loss of taste with loss of flavour (1).

The sensation of flavour involves the appreciation of gustatory, olfactory, tactile, and thermal sensations, and when smell loss is severe or total the flavour of food and drink often becomes bland and uninteresting, and is usually reported as a loss of taste. In such cases the individual has not lost taste because clinical testing will show that the ability to detect and identify the basic tastes of salt, sour, sweet, and bitter remains intact.

True loss of taste is rare following trauma because this sense is mediated by three cranial nerves (the facial, glossopharyngeal, and the vagus), often with bilateral innervation, so that each nerve on one side will innervate taste buds on both sides of the body. In addition to this complex innervation taste buds are scattered widely throughout the oral cavity, tongue, pharynx, palate, and larynx, so that it is almost impossible for a single neural injury to cause significant peripheral loss of taste.

The two main nerves that mediate taste are the chorda tympani branch of the facial nerve that supplies the taste buds of the anterior two thirds of the dorsum of the tongue, and the glossopharyngeal nerve that supplies the posterior third of the tongue surface. Unilateral chorda tympani injury sustained as part of a facial nerve injury sometimes causes clinically significant taste loss, but this is not common because of bilateral innervation. Severe brain injury can also cause loss or distortion of the sense of taste (ageusia, dysgeusia), but this also is uncommon.

Assessment of loss of taste

The four basic tastes of salt, sour, sweet, and bitter are traditionally tested by the application of salt, lemon juice, sugar, and quinine solutions placed onto the dorsum of the tongue, usually with a dropper. If unilateral loss is suspected both sides of the tongue can be tested separately. It is important to test the anterior

and posterior tongue separately because of the different innervation of these two areas.

If an individual who has lost smell also complains of loss of taste and is found to have an intact ability to detect the four basic tastes on clinical testing then the assessment of taste impairment is rated at 0% WPI because the reported loss is not a true loss of taste but a loss of flavour that has occurred secondary to a loss of smell.

Assessment of loss of smell

Unlike loss of taste the sense of smell is mediated by its own cranial nerve, the olfactory nerve, that terminates in the olfactory neuro-epithelium located in the roof of the nose beneath the cribriform plate. The olfactory neurones are very susceptible to trauma, and partial or total loss of the sense of smell is a common occurrence following closed head trauma, brain injury, or brain surgery.

Loss of smell following olfactory nerve injury is usually immediate, but clinical awareness is often delayed for weeks or months because of concern with other more serious injuries. On occasions some return of loss of smell can occur, but this is not common, and rarely occurs after 12 months.

Clinical testing of the sense of smell in Australia has until recently consisted of a qualitative subjective assessment of the individual's ability to detect and identify various common odorants such as coffee, menthol, eucalyptus, cloves, and peppermint from bottles placed beneath the nostrils. Another favourite test substance still used from time to time is asafoetida, that smells like rotten eggs. The qualitative nature of this type of test renders it unsatisfactory in medico-legal assessments because it cannot be used to quantify loss of smell. Another limitation is that some pungent odorants used to assess smell stimulate the trigeminal as well as the olfactory nerves, often leading to misdiagnosis.

The Sensonics Smell Identification Test

More sophisticated and standardised tests of olfactory function have been used overseas for many years, and one such test that is becoming increasingly popular in the medico-legal assessment of loss of smell in Australia is the Sensonics Smell Identification Test, previously known as the UPSIT Test (University of Pennsylvania Smell Identification Test). The Sensonics Test is currently used extensively in the US, Europe, and Asia and has been shown in many studies to be reliable, effective, and to have a very high test-retest reliability in detecting partial and total loss of smell, as well as malingerers.

The test uses a “scratch and sniff” technique of 40 test odorants contained in four booklets of 10 tests. The individual being tested is requested to “scratch” each test strip with a sharp pencil and then to make a forced choice out of four possible multiple choice questions, eg, “This odour smells like (a) banana (b) chocolate (c) onion (d) fruit punch”. The correct test score out of 40 is compared to normative data matched for age and gender, and the results are then graded using the appropriate Table of norms.

One of the greatest advantages of the Sensonics Test is that it gives a reliable measure of quantification of smell function, ranging from normosmia (normal sense of smell), microsmia (partial loss of the sense of smell) that can be classified as mild, moderate, or severe, anosmia (total loss of the sense of smell), and probable malingering (functional loss). Malingerers are detected on the basis that an individual with genuine anosmia should identify one of four test odorants on the basis of chance, so that a typical anosmic should score an average of 10 correct responses out of 40 presentations. The Sensonics Test is also useful in assessing unilateral loss of smell.

A criticism that is often made of the Sensonics Test is that it is unsuitable for use outside the USA because several of the test odorants used in the North American version of the test such as “skunk” and “pumpkin pie” are not well known to non-American residents.

To overcome this drawback special variations of the test have been designed for use in China, Japan, and many European countries. An Australian version is not yet available, but a study has been published that found that Australian subjects scored an average of 2 tests lower than their North American matched counterparts, and the authors recommend that a correction factor of 2 should be applied to the diagnostic criterion score to take into account local cultural factors in Australia when the North American Sensonics Test is used (2). This correction factor however should not be applied where the initial score is consistent with a functional loss as this may result in converting a malingerer score into an anosmic score.

Conclusion

In summary true loss of taste is rare following head trauma, and its reporting is almost always not a true taste loss but a loss of flavour that is secondary to loss of smell. Clinical testing in such cases will usually show that the ability to detect and identify the basic tastes of salt, sour, sweet, and bitter remains intact.

On the other hand true loss of smell occurs commonly following head trauma, and in the Sensonics Test we now have available a reliable and objective method of quantifying the amount of smell loss as well as a reliable method of detecting malingerers. Sensonics Test kits can be ordered through the Sensonics website (3)

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