Cracking the pain dilemma

Pain is a protective mechanism and a warning sign that damage has occurred so it’s important that a general practitioner has the ability to recognise a patient’s threshold. Dr Daniel Flynn explains

The busy general practitioner is often faced with a difficult diagnostic dilemma when a patient presents with pain of pulpal origin that is not localised to a specific tooth. The pain can be generalised or sometimes even radiate to another quadrant. A systematic approach is essential in these cases so that the correct diagnosis is attained, thereby allowing the appropriate treatment to be executed. This avoids the embarrassment of providing treatment, but without alleviation of the symptoms.

The art and science of diagnosing a patient’s pain is an essential tool in the armamentarium of the general practitioner. A good understanding of the underlying biological processes is essential. Following a thorough history, the diagnosis can be made in a majority of cases. The clinical examination and special tests are then used to ascertain which tooth fits the diagnosis.

What is pain?

Pain is a protective mechanism to warn us when damage occurs in the tissues. A-delta fibre activation results in short sharp pain and may be activated in healthy and inflamed pulps. These fibres are peripherally placed and are the first activated. The deeper C-fibres are generally dormant and are only activated during health when a prolonged and intense stimulus is applied to a tooth. Stimulation of these fibres are associated with dull throbbing pain, but once inflammation has spread deep into the pulpal tissue, these fibres become sensitised to the point where pulse pressure or even body temperature can activate them. This is why occasionally a patient will present with severe pulpitis pain, which is relieved by holding ice against the tooth. The ice decreases the temperature below the required threshold and prevents the apparent spontaneous firing of the fibres.

The patient has never been aware of symptoms this phenomenon becomes more apparent. The pulpal tissue has regressed from vitality through the inflammatory stages and has become necrosed and infected without the warning signs of pain. The exact reason for this is not fully understood, but recent research suggests there are local opioid systems present in the pulp, which could modulate the pain. There are also likely to be central mechanisms that prevent the pain registering in the cerebral cortex.

### Diagnosis of a cracked tooth can be very difficult

<table>
<thead>
<tr>
<th>TTP</th>
<th>Bite test with Tooth Slooth*</th>
<th>Palpation of associated soft tissues</th>
<th>Cold Endo-ice</th>
<th>Cold Air</th>
<th>Heated Warm GP</th>
<th>Hot water</th>
<th>EPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UL6</td>
<td>-</td>
<td>-</td>
<td>++</td>
<td>+</td>
<td>?</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>UL7</td>
<td>-</td>
<td>++</td>
<td>?</td>
<td>+</td>
<td>?</td>
<td>+</td>
<td>10</td>
</tr>
</tbody>
</table>

Making sense of tests

The limitations of the clinical tests need to be understood. Thermal and electrical tests stimulate the root canal treatment was discussed

It may come as a surprise, however to learn that a large proportion of pulpitis cases are asymptomatic. However, when one considers the number of cases of apical periodontitis found on routine radiography where
The sharp pain, which did not linger, was exacerbated when tea or other hot liquids contacted the area around LL7. The intensity of pain the patient had adapted by covering the area of greatest innervation on hot stimulation and occasionally on eating. The following tests were conducted with the outcomes shown:

Avoiding the pitfalls

A 47-year-old female presented with the history of short sharp pain from the LL7 on hot stimulation or occasionally on eating. The patient was asymptomatic on the day of the appointment. The patient reported root canal treatment of LL7 was initiated around six months previously, which did not alleviate the symptoms. The sharp pain, which did not linger, was exacerbated when tea or other hot liquids contacted the area around LL7. The patient had adapted by covering the teeth on the left hand side with her tongue when drinking hot liquids. The intensity of pain following sensitivity testing with cold and the electric pulp tester.

A diagnosis of Cracked-tooth syndrome with development of irreversible pulpitis and acute apical periodontitis associated with the LL7 was made.

When the patient was given hot water to drink the symptoms were reproduced. The upper and lower teeth were individually isolated with rubber dam, and hot water was syringed onto each tooth in order to identify the source of the symptoms. In this instance there was no pain from the LL7 however the LL7 exhibited painful symptoms on contact with the hot water. This was confirmed by giving a bucal infiltration of 2.2ml two per cent lignospan and adrenaline 1:80,000 around the UL7 and re-eugonol filling and an orthodontic band were placed which alleviated the symptoms.

However, two months later the patient reported spontaneous short sharp pain on the LL7. Pain on hot stimulation had also returned now localised to the LL7. The LL7 was tender to percussion and had lingering pain following sensitivity testing with cold and the electric pulp tester.

Carrying out treatment

Consent was obtained and root canal treatment was initiated on UL7. The extent of the crack was investigated. As a general rule of thumb, if the crack extends on the floor of the pulp chamber the long-term prognosis of the tooth is considered guarded/poor and this information is relayed to the patient so they can make an informed decision.

In this case, a large pulp stone was encountered in the pulp chamber and a pulpotomy was performed. A pulpotomy alone will relieve over 90 per cent of the symptoms of irreversible pulpitis. This is because the vast majority of inflammatory mediators and pulp tissue is located in the coronal portion of the tooth. If one is not confident that all the pulp tissue can be removed and the canals completely chemo-mechanically prepared, it is better to not place a file into the canals but just to remove coronal pulp tissue and place a dressing. In this case all symptoms resolved following the pulpotomy and the root canal treatment was subsequently completed on UL7 at the next visit, as all four canals were identified, chemo-mechanically debrided and obturated with a thermoplastic technique. It may be prudent to use a higher concentration of NaOCl in vital cases as this increases its ability to dissolve pulp tissue. Increasing the concentration doesn’t increase the antinociceptive potential.

Some clinicians elect to place composite restorations following the pulpotomy and the root canal treatment was subsequently completed on UL7 at the next visit, as all four canals were identified, chemo-mechanically debrided and obturated with a thermoplastic technique. It may be prudent to use a higher concentration of NaOCl in vital cases as this increases its ability to dissolve pulp tissue. Increasing the concentration doesn’t increase the antinociceptive potential.

- It is vital to reproduce the symptoms prior to undertaking treatment to ensure that the correct tooth is being treated

The reason for an exaggerated response to pulp testing when there is pulp inflammation is that the threshold for firing of the nociceptors has been reduced by inflammatory mediators and there is nerve sprouting which increases the number and distribution of fibres that may be activated.

In the above case a conservative treatment approach was initially taken. Some clinicians elect to place composite restorations, others place temporary/permanent cuspal coverage restorations and some electively digitalise the pulp. Thus it can be seen that not only is it difficult to detect and correctly diagnose cracks but the treatment can also pose difficulties.

The sharp pain, which did not linger, was exacerbated when tea or other hot liquids contacted the area around LL7.

About the author

Dr Daniel Flynn BDeSc MFDS RCSI

MCI Clin Dent MRD RCS ED

qualified from the Dublin Dental Hospital, Trinity College, Dublin in 2002. Daniel has recently joined the EndoCare team headed by Dr Michael Sultan. Daniel lectures and provides hands-on courses for general practitioners. He also teaches endodontics at the Eastman Dental Institute for Oral Healthcare Sciences. For referrals or to book an appointment call EndoCare on 020 7224 9999, email reception@endocare.co.uk or visit www.endocare.co.uk.