Case Report

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Management of Hot Irreversible Pulpitis with Radix Entomolaris: An Uphill Battle fora Pediatric Dentist: A Case Report.

Abstract:

Background: Hot tooth with Radix Entomolaris anomaly is rarely occurring condition. To achieve anesthesia satisfactorily in patients with a Hot tooth, especially in pediatric cases, can be seriously challenging for the pediatric dentist. Hot Irreversible pulpitis is most commonly found in permanent mandibular first molars, where the patient may experience severe or intense acute pain during the access opening procedure, even after the anesthetic block. The present case report describes the hot tooth, causes for anesthetic failure and some of its management techniques with a case report.

Keynote: To the best of our knowledge, this Case report is the first report of Hot tooth Syndrome with Radix Entomolaris treated under multiple Pain and Anxiety control methods.

Key-words: Hot tooth, Radix Entomolaris, N2O sedation, Behaviour Pain Scale, Opiod Analgesic, Local Anesthesia.

Introduction:

A tooth which is diagnosed with irreversible pulpitis, with intensity of pain increasing spontaneously from moderate to severe, partially relieves on drinking chilled water, may be defined as Hot Tooth Syndrome.[1] In deep carious lesions, inflammatory changes get eventually worsen within the pulp. Chronic inflammation results into an acute exacerbation with accumulation of neutrophils and the release of inflammatory mediators (such as prostaglandins and interleukins) and proinflammatory neuropeptides.[2] This further develops and leads to a Hot tooth. Local anestheticshave been found significantly beneficial in producing sufficientanesthesia in normal irreversible pulpitis, yetthey commonly fail in endodontic patients with Hot tooth.[3] Most common sites of occurrences are primary and permanent teeth, sites of recent or defective restorations, Sites of recent trauma, mandibular molars.[4] For instance, the inferior alveolar nerve (IAN) block is associated with a lapse rate of 15% in patients with normal tissue, whereas IAN fails 44-81% of the time in patients with irreversible pulpitis[4]. Inability to achieve anesthesia in a Hot tooth is a serious condition where a patient suffers severe pain during access opening procedure, making the patient and dentist more anxious. Although the use of an electric pulp tester (EPT) has been shown to accurately determine pulpal anesthesia clinically in teeth with a normal pulp.[1]

This manuscript reports a case of management of Hot tooth syndrome along with Radix Entomolaris (RE) in respect to permanent mandibular left first molarirt 36 under N2O sedation, short acting Amide Local Anestheticagent and oral opioid analgesic.

Case Report:

A sixteen years old male patient reported to the Department of Pediatric and Preventive dentistry, in Institute of Dental Sciences, Bareilly, with the chief complain of pain in his mandibular posterior tooth (irt 36) for one month.History of

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nocturnal pain since last few nights was also present. There was no significant previous medical or dental history as told by the patient.

Intraoral examination revealed deep occlusal caries irt 36 and crowding in mandibular arch.Intraoral periapical radiograph revealed deep occlusal caries approaching pulp and an additional root was present confirming the diagnosis of Irreversible pulpitis with Radix Entomolarisirt 36. Based on clinical and radiographical findings, root canal treatment was planned irt 36. (Figures: 1a, 1b).

Figure 1a: Intraoral picture showing deep occlusal caries irt 36

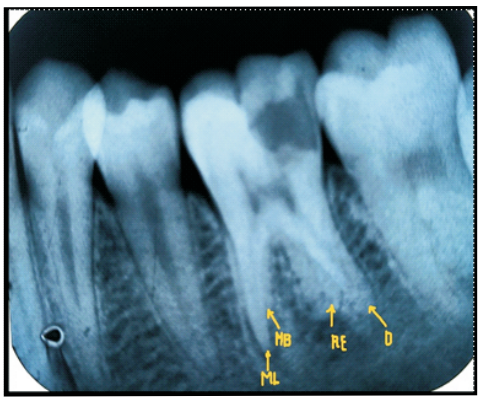

Figure 1b: IOPAR showing caries envolving pulp and Radix Entomolarisirt 36

Clinical Procedure:

All the treatment procedures were explained to patient and parents prior to treatment and written informed consent was obtained. On the initial visit prophylactic regime was given to patient for five days.

First appointment: Before Starting the treatment intensity of pain was recorded using Behavioural Pain scale (figure 2). Scores were recorded (=4) which revealed mild pain before initiating the treatment. Patient experienced sharp pain while carrying out access opening procedure even after administering Local Anesthesia (2% lignocaine with adrenaline, 1:10000, Indoco Remedies ltd, Mumbai, India), so procedure was terminated for that day. Intensity of pain was recorded to be moderate (=7). Patient became highly anxious to the treatment about the drilling procedure.

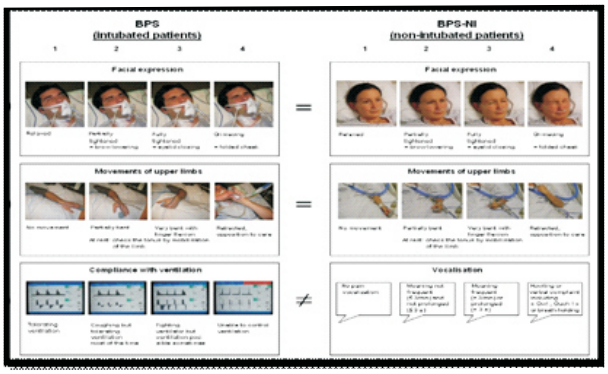

Figure 2: Behaviour Pain Scale

Figure 3: BPS reading recorded (11) at 2nd Visit.

On the second appointment, an anxiolytic drug (Alprax0.5mg,Torrent Pharmaceuticals ltd, Sikkim, India) was asked to be taken one-hourprior starting the procedure. LA injection (2% lignocaine with adrenaline, 1:10000) was administered, and subjective and objective signs for anesthesia were checked, left side of cheeks and left lower vestibule, corner of the mouth, lips and left dorsal and ventral surface of tongue were numb. On starting access opening procedure, patient felt sharp pain, so nerve blocks were repeated, and8 ml LA was injected in total. Even then, patient presented with flexure of arms and moaning in pain. Scores were recorded (=11)(figure 3) which reflected severe pain. Therefore, treatment was terminated once again and tooth was considered as 'Hot tooth.'Treatment strategy was changed for the next visit.

On the third visit, as patient has become highly anxious to the procedure, so consent from parents was obtained for 50-50% N_2 and O_2 sedation. Short acting local anaesthetic i.e., 2% Lignocaine with adrenaline was injected; IANB, and long buccal nerve block. Along with chief nerve blocks, 4% articain (Septodont Healthcare India Pvt. Ltd, Maharashtra India) was injected as lingual & buccal local infiltration. Vitals were checked prior and monitored while performing the 50-50%N_2O_2sedationprocedure. Patient was consciously sedated with no complication (Figure: 4).Electric Pulp Tester was used to confirm the anesthesia. Although patient still had mild pain (=4, as recorded on Behaviour Pain Scale) while access opening procedure but was able to tolerate it. Access opening was done, pulp was extirpated followed by copious irrigation by 2.5% Sodium Hypochlorite (Lizadent Enterprizes Roorkee, India), 1% hydrogen peroxide(National Peroxide Limited, Maharasthra India), and 0.9% normal saline(Kunal remedies, Faizabad India)[5].Working length was determined where a Disto-lingual root confirmed the Radix Entomolaris. After monitoring vitals, patient was discharged with mummifying paste (D-Pulp, Ammdent, Punjab India) in pulp chamber to devitalize any remaining pulp tissue (to avoid chances of pain in further visits)and closed dressing was givenirt 36. Along with antibiotic course, Tramadol hydrochloride and acetaminophen combination was prescribed for three days.

Figure 4: patient under concious sedation.

On the fourth visit, patient was completely asymptomatic. Behaviour Pain Scale showed scores (=3) which reflected painless condition. Biomechanical preparation was done, followed by copious irrigation and closed dressing was done using Interim Restorative Material. Patient was recalled after one week. On the last visit, obturation and restoration was done using composite (3MESPE) (Figure: 5). Follow up visits were made by the patient at 2nd, 3rd and 6thmonth(Figure 6).

Figure 5: Obturation was done with Gutta percha irt 36

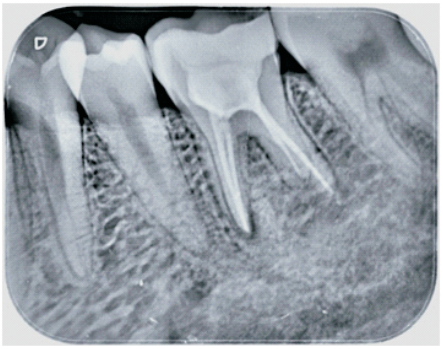

Figure 6: IOPAR 6 months follow up irt 36.

Result:

After 6 months, on follow-up visit, there was no clinical or radiographic evidence of any inflammation or pathology. Behaviour Rating Scale revealed Painless condition. We considered the management of the case as successful.

Discussion:

During acute pulpal infection, blood vessels dilate their permeability, enabling plasma proteins to escape the blood and enter into the connective tissue spaces outside the capillaries. This results in edema and intensified pressure on the nerve fibers. As a result, the discomfort and pain of the affected +area start. There is a special class of sodium channels on C – fibers, known as tetrodotoxin-resistant (TTXr) sodium channels which mainly sensitize C-fiberscreating inflammatory hyperalgesia. These channels are found to be relatively resistant to lidocaine.Failed anesthesia in Hot tooth may be explained by the fact that the TTXr sodium channels have not been adequately blocked by the anesthetic.[2]

The etiology behind the formation of the RE is still unclear. The radix root is located distolingually(entomolaris) or distobuccally (paramolaris), with its coronal third completely or partially fixed to the distal root[6]. As seen in the present report, Radix root was present distolingually so diagnosis of

Radix Entomolar is was made. Although to treat a case with irreversible pulpitis VPT (Vital Pulp Therapy) ie., pulpotomy can also be an option but in the present case there were periapical changes seen as widening of lamina dura irt mesial canals were found, so root canal treatment was decided as treatment option.

Before proceeding with the procedure in irreversible pulpitis, determining proper anesthetic effect of Local anesthtetic is very crucial for painless root canal treatment. To assess the level of pulpal anesthesia subjective and objective sign and symptoms should be checked. Although the use of an electric pulp tester (EPT) has been shown to accurately determine pulpal anesthesia in teeth with a normal pulp. Negative response to electric pulp tester shows adequate anesthesia. However, in case of Hot tooth, failure to respond to the EPT may not necessarily guarantee pulpal anesthesia. One way to define anesthetic success for mandibular anesthesia is by the percentage of subjects who achieve two consecutive EPT readings of 80 within 15 minutes and sustain these readings for 60 minutes[1] which was also seen in the present case.

Clinically, this translates into being able to work on the patient no later than 15 minutes after giving the IANB and having pulpal anesthesia for one hour. When clinicians confront the severe irreversible pulpitis in which 2% lidocaine achieves lip numbness but not pulpal anesthesia, the question arises what strategies can be used to get the patient numb so that the root canal treatment can be done as comfortably as possible.[7]Increasing the volume of the local anesthetic delivered during the IANB has also been found not to increase the incidence of pulpal anesthesia, as seen in the present case also, total of 8ml 2% lignocaine with adrenaline, 1:10000 was injected in the second visit, which only anesthetised soft tissues but the affected tooth remained unanesthetised. According to a survey conducted by R. Preethi Mariona, 68.5% of the respondents said that if IANB fails another IANB will be given and 79.6% insisted that premedication is required for patients.[1]

In case of failed IANB in asymptomatic and symptomatic patients, clinician should have other strategies to attain good pulpal anesthesia, especially when pain is too severe to proceed with treatment, as in case of hot teeth. There are several supplemental injection techniques available to help the dentist like intra-ligamentary, intraosseous injections or mandibular Buccal infiltrations. Recent research has looked at the use of a mandibular buccal infiltration injection of 4% Articaine with 1:100,000 epinephrine as a supplemental injection to increase the success of the IANB injection. Kanna and colleagues reported, 4% Articaine solutions had a probability of achieving anesthetic success superior to that of lidocaine.[1]The present case also support this finding.

In Hot tooth syndrome, patient experiences sharp unbearable pain which cannot be relieved by NSAIDs. In the present case report, we prescribed NSAIDs in the first visit, but it could not relieve the pain. Therefore, an Opiod analgesic was given to the patient which relieved the pain successfully. R A Medvecompared the efficacy to analgesia of a new tramadol/acetaminophen combination tablet to tramadol or acetaminophen (APAP) alone. Pain relief provided by tramadol/ APAP was superior to that of tramadol or APAP alone.[8]Ianiro and colleagues used pre-treatment oral doses of acetaminophen or a combination of acetaminophen and ibuprofen versus placebo. They reported a trend toward higher success ratesof 71% to 76%, respectively, as compared with placebo (46%).[1]

Anxiety is believed to play a role in lowering pain thresholds, and the use of a sedative agent to help increase the success of the IANB injection in patients diagnosed with irreversible pulpitis was studied by Lindemann and colleagues.[1] In the present report, Alprazolam was given as pre-medication. But due to severe pain patient could not tolerate and became more anxious. Hence, 50-50% N_2O_2 was used in next visit to sedate the patient. The American Academy of Pediatric Dentistry (AAPD) recognizes nitrous oxide/oxygen inhalation as a safe and effective technique to reduce anxiety, produce analgesia.[9,10] The anxiolytic effect involves activation of the gamma-aminobutyric acid type A (GABAA) receptor either directly or indirectly through the benzodiazepine binding site.[10]

The severity of pain caused due to a Hot tooth can be better assessed by the BPS which is a valid tool for measuring pain in conscious sedated patients during painful procedures. BPS score of 6 or higher is considered to reflect unacceptable pain.[11]In the present case, BPS was used to assess the variation in intensity of pain by different pain control strategies.

Conclusion:

Irreversible pulpitis in a Hot tooth case causes severe and unbearable pain. Pain and Anxiety developed due to painful dental procedures may disturb patient's as well as clinician's emotional or mental state. Hot tooth Syndrome with an additional root i.e., Radix Entomolaris that too in pediatricpatient can be a very challenging scenario to the Pediatric Dentist. This report presents a successful management of Hot tooth with Radix Endomolaris with the help of multiple treatment modalities and strategies for pain control.

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