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Challenges in the Management of a Known Trigeminal Neuralgia Patient Presenting for A Fixed Dental Restoration-A Case Report

Adedapo Olanrewaju Afolabi, Regina Ifeolu Arobieke, Enoch Abiodun Idowu, Ayodeji Joseph Adegbulu, Olatunbosun Sunday Salami, and Ahmeed Abiodun Durodola

ABSTRACT

***Background*: Although many studies approved the use of local anesthetics in controlling Dental Procedural Pain (DPP), patient with Trigeminal Neuralgia (TN) may continue to suffer DPP in spite of being in pain remission phase for TN. This report provided information on the challenges encountered in controlling DPP with Local Anaesthesia (LA) while carrying out a fixed prosthodontic procedure in a known classical TN patient.**

Case *Presentation*: Patient had been under the care of oral medicine specialist for 9-years with history of pain remission over the last two years and had since been on routine 200mg/day carbamazepine (CBZ). Examination showed tooth 37 was clinically healthy; tooth 35 and tooth 36 were missing; and tooth 34 was mesiolingually rotated, all with negative pulp test. A diagnosis of Kennedy's class III lower edentulous space in a classic TN patient was made. Consecutive injection of three to five doses of LA (1.8ml lidocaine with 1:100,000 epinephrine) failed to control DPP during crown preparation procedure for fixed prosthodontics. This resulted in the postponement of the procedures for three different appointment visits in this case report. Upward review of CBZ dosage from 200mg/day to 800mg/day 72 hours prior to a dental procedure under LA produced a satisfactory DPP control. Combination of CBZ with Baclofen resulted in abolition of post procedural pain which rebounded patient to the pain remission phase.

***Conclusion*: Team management approach involving the oral medicine specialist right from the pre-procedural assessment stage is hereby advocated.**

Keywords: Case report, neurons, pain, prosthodontics, trigeminal.

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I. Introduction

Dental procedures such as extraction of teeth, root canal therapy and fixed prosthodontic procedures; or trauma from injection needles could stimulate the trigeminal nerve and thus trigger or worsen the pain of TN [1]. It is not clear whether this will in turn render Local Anaesthesia (LA) ineffective or reduce the duration of action of LA or worsen Dental Procedural Pain (DPP) control.

DPP control with LA during crown preparation of an abutment teeth for a fixed prosthodontics in this known classic TN patient (despite being in pain remission phase and 200mg/day carbamazepine) posed a great challenge with resultant rescheduling of procedures at weekly intervals. Although some studies [2], [3] approved the use of LA in controlling DPP, patient with background of Trigeminal neuralgia (TN) may continue to suffer DPP in spite of being in pain remission phase for TN. Inferior alveolar nerve block using 3 to 5 doses of 1.8 ml alphacaine (lidocaine with 1:100,000 epinephrine) at the appointment visits failed to control DPP in our patient. In this regard, the number of appointment visits for crown preparation procedure rose beyond the required one visit for this procedure. This is about the first time a report will be documented regarding challenges of DPP control in patients with TN undergoing fixed prosthodontics.

We hereby report the challenges encountered in a known classic TN patient who requested for a fixed prosthodontics to replace the missing teeth in the lower left quadrant of the jaw while in pain remission phase for TN. This case was successfully managed at a tertiary oral health facility in South West, Nigeria through a multidisciplinary approach.

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II. Patient Information

A 50-year old male Nigerian health worker was diagnosed with classical TN and followed up by the oral medicine specialist for 9-years prior to presentation for a fixed prosthodontics to replace missing teeth in the lower left quadrant of the jaw. He neither uses alcohol nor tobacco in any form. The patient had experienced pain remission from TN over the last two years and has since been placed on routine 200mg/day carbamazepine (CBZ).

III. Clinical Findings

Neurological examination was normal with no sensory deficit. Intraoral examination revealed a clinically healthy lower left 2nd molar teeth (37); missing lower left second premolar (35) and lower left 1st molar (36); and mesiolingually rotated lower left first molar (34).

IV. Diagnostic Assessment and Treatment Plan

Pulp vitality test showed positive result for teeth 34 and 37 with no obvious pathology seen on their periapical x-ray. Visual Analogue Scale (VAS) of 7 to 10 indicated severe pain with subsequent rescheduling of procedures; and this involves patients' rating of his pain experience on a scale of 0 (no pain) to 10 (worst pain).

Appropriate responses to Verbal Subjective Test (VST), Tactile Subjective Test (TST) and Objective Test (OT) were used to confirm the achievement of adequate anaesthesia following administration of LA [4]. For example, VST was conducted by asking the patient if any change was observed in the lower lip on the side of the LA injection; TST involved patient being instructed to run the fore-finger over the lower lip from the left commissure through the middle third to the midline of the lip on the side of injection, and to stop the finger at any place along the lower lip where a change in sensation was observed; and Objective Test (OT) for inferior alveolar nerve anaesthesia was conducted on the patient by applying a probe to the buccal gingiva related to the apex of 34 with no facial expression of painful discomfort observed in the patient and he did not also attest to feeling of any sharpness during probing'.

V. Diagnosis

A diagnosis of Kennedy's class III lower edentulous space in a classic TN patient in pain remission phase. This diagnosis was based on the presentation of a unilateral edentulous area of the jaw with natural teeth remaining both anterior and posterior to it. The diagnosis of classic TN (characterised by vascular compression with absence of a neurological deficit) was based on the International Classification for Headache Disorders, ICHD-3 [5].

A 4-unit fixed prosthodontic (Zirconia bridge) which involves abutment teeth's crown preparation (CP) under LA, taking of impression, Zirconia bridge casting/fabrication and cementation was planned for the replacement of the missing teeth, 35 and 36.

VI. Pharmacotherapy and Dental Procedural Intervention

At 1st visit for crown preparation, injection of 3 to 5 doses of alphacaine (1.8ml lidocaine with 1:100,000 epinephrine) using dental needle and syringe was given to block the inferior alveolar nerve. Five minutes after the injection, VST and TST did not indicate achievement of anaesthesia. Patient was re-injected with four consecutive doses of LA without achieving anaesthesia. Treatment was put on hold and patient was asked to continue 200mg/day CBZ till another appointment slated for a week.
At 2nd visit for crown preparation, with administration of 3 to 5 consecutive doses of alphacaine, VST, TST and OT shows evidence of adequate anaesthesia but this was after a waiting period of about 30 minutes. The vital abutment teeth (34 and 37) were adequately isolated and buccal, lingual, approximal and occlusal reductions were done successfully on tooth 37 using tooth preparation guidelines for posterior zirconia crown. GIC build up was done on mesiolingually rotated tooth 34 before the commencement of crown preparation to achieve parallel walls for the distal end of 34 and mesial end of 37 and to eliminate undercuts.

Even though a repeat VST, TST and OT results confirmed to us that anaesthesia was still working, occlusal reduction on tooth 34 could not be completed as patient complained of sharp, stabbing pain whenever the cutting instrument touched a particular point located between the mesial wall and middle third on the occlusal surface of tooth 34. Further crown preparation was suspended. (Fig.1).

Fig. 1. Preparation of a 4-unit Zirconia bridge showing unresponsive to Local Anaesthesia.

However, it was observed that sufficient clearance had been created on 34, therefore, impression of the prepared teeth (37 and 34) and the opposing jaws were taken using rubber base impression material and sent for casting and fabrication of the fixed prosthodontic (zirconia bridge). The prepared teeth, 37 and 34 were temporarily restored using acrylic crowns with zinc oxide eugenol cement as luting material. Patient was advised to continue with 200 mg/day CBZ till the next appointment slated for a week.

At 3rd appointment visit planned for completion of occlusal reduction on tooth 34 and cementation of fabricated posterior zirconia bridge, 3 to 5 consecutive doses of alphacaine injection were given but results of VST and TST

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indicate no evidence of anaesthesia despite waiting for more than 30 minutes. The completion of occlusal reduction on tooth 34 was again put on hold and the challenge of DPP control encountered in all three appointment visits was discussed with the oral medicine specialist team managing patient for classic TN. The team advised on the need to increase the dose of CBZ from the current 200 mg/day to 800 mg/day in divided doses 72 hours prior to another appointment.

A major breakthrough was achieved in the control of DPP at the appointment visit which followed the upward review of the dosage of CBZ. VST, TST and OT results indicate achievement of adequate anaesthesia within 5 minutes of injection of only one dose of alphacaine. Occlusal reduction was successfully completed on tooth 34 without any experience of DPP from the patient throughout the procedure. The fabricated zirconia bridge was successfully cemented using glass ionomer cement as luting agent and patient was discharged for subsequent review at restorative dentistry and oral medicine clinics (Fig. 2 and 3).

Fig. 2. Cementation of Zirconia Bridge after increasing the dose of Carbamazepine.

Fig. 3. 4-unit Zirconia Bridge replacing 35 and 36 in final occlusion.

VII. Follow Up and Outcomes

Follow up by the oral medicine team reveals that our case has enjoyed pain remission from TN for two years prior to presentation for a fixed prosthodontic to replace missing teeth. A week after the cementation of the fixed prosthodontic (zirconia bridge), patient complains of dull, short and transient ache on 34 triggered by peppery food, warm or cold water. The patient was placed on 20 mg/day baclofen in combination with 800mg/day CBZ. Pain was abolished within two weeks of commencement of these therapies; baclofen was discontinued, while CBZ was tailed down to 400 mg/day and 200 mg/day at one month and 3 month follow up reviews respectively. Patient is currently in stable clinical state having undergone 6 months follow up review and presently rebounded to the remission phase dosage of 200mg/day CBZ with no fresh complaints.

VIII. Discussion

Classic TN, characterized by vascular compression with absence of a neurological deficit is a painful syndrome resulting in a recurrent paroxysmal, almost always unilateral, intense, stabbing or electric shock like facial pain along the distribution of one or more divisions of the fifth cranial nerve (CN5) [5]. Pain usually last from a few seconds up to 2 minutes and it is often elicited by momentary stimulation of trigger zones [2], [3] which may be located at extraoral sites (for example lateral eye brows, ears, alae nose, nasolabial fold, cheeks upper lips, mouth commissure) and/or intraoral sites (e.g. gingival, retromolar area, tongue and teeth). Spontaneous remission of pain could occur with interval ranging from days to years, which could be followed by new episode of pain attack.

A recent guideline for conservative treatment of TN shows that the voltage-gated sodium channels blockers, carbamazepine, CBZ (200 to 1200 mg/day) and oxcarbazepine (600–1800 mg/day) are the first-line medications required for the control of pain of TN [6] Team approach and upward review of the first line medication, CBZ prior to the administration of LA during crown preparation procedure for a fixed prosthodontic significantly improved DPP control outcome in this case. One major limitation is thenon-involvement of the oral medicine team at the onset of pre-procedural assessment stage of this case. This limitation on one hand, caused DPP which created multiple visits that subjected both patient and the fixed prothodontist clinician to the agony of DPP control; and on the other hand, prevented the assessment of the patient's emotional state and stress level which further worsens the DPP experience. Furthermore, anxiety and fear for dental procedure could activate the pituitary-adrenal axis leading to heightened experience of pain [7]. Therefore, lack of assessment for pre-procedural anxiety and fear in this report is a gap for future research.

Although use of behavior modification and or sedatives has caused a great evolution in pain management in the dental setting, LA administration remains the backbone of DPP control. Evidence shows that blocking peripheral nerves with LA agent alone is effective to alleviate the pain of TN when delivered via block injection or by infiltration [2], [3]. Pre-application of topical anesthetics, proper injection technique, slow delivery of the anaesthetic drug, selection of the proper needle size, and the type of anesthetic delivered are important precautions for abolishing DPP. Despite our adherence to these precautionary measures during crown preparation procedure coupled with the proven efficacy of LA in DPP control by the aforementioned evidence, we experienced a major setback in achieving

adequate anaesthesia. Administration of three to five doses of alphacaine (1.8 ml lidocaine with 1:100,000 epinephrine) alone failed to control DPP, leading to incessant postponement of crown preparation procedure.

It has been reported that vibration and pressure of instrumentation (e.g., fast turbine hand piece with a rotating bur) during a fixed prosthodontic dental procedure and trauma from injection needle during the administration of LA could stimulate the trigeminal system to trigger or worsen DPP experience of a TN patient [8]. This could be the reason why there was complaint of unbearable sharp, stabbing pain whenever the the rotating bur of the fast hand piece used for crown preparation comes in contact with a particular point located on occlusal surface of tooth 34 which may represent the trigger zone in this case. Besides, our case had experienced pain of neuralgia for almost a decade and persistence pain longer than 3-months has been found to cause multiple changes in the way the peripheral and central nervous system functions which will on a long run make DPP control difficult [8].

Local anaesthetics are pharmacological agents which are locally injected or topically applied to cause reversible loss of pain sensation or sensory perception of a restricted part of the body without loss of consciousness. Notwithstanding using appropriate concentration and correct delivery technique for LA administration, we encountered a major challenge of DPP control caused by failure to achieve adequate anaesthesia. Switching to teamwork involving the oral medicine specialist and increasing the dosage of CBZ from 200 mg/day to 800 mg/day 3-days prior to a re-scheduled appointment visit produced a huge breakthrough. Regardless of structural variability, Local anesthetics and CBZ exert similar pharmacologic action to reduce pain by modulation of voltage gated sodium channels rendering the neuronal membrane impermeable to sodium (Na), thereby preventing an action potential from being initiated or propagated [9]. In this regard, CBZ and LA produce additive effect to inhibit Na currents along the nociceptive pathway [16], [17] which resulted in the satisfactory DPP control recorded in this case report.

There was a complaint of dull, short, and transient ache on tooth 34 triggered by peppery food or warm or cold water at one-week post-procedural review. This is not surprising as tooth 34, apart from been a possible trigger zone for TN in this patient, the cementum and dentinal tubules may suffer exposure with stimuli such as peppery food or warm or cold-water causing activation of the mechanoreceptors located within exposed dentinal tubules to produce pain following a fixed prosthodontic care.

Multimodal drug therapy such as anticonvulsant (e.g., CBZ) combined with smooth muscle relaxant (e.g., baclofen) or tricyclic antidepressants (e.g., Amytriptyline) or opioid (e.g., tramadol) medication has been suggested as helpful in the treatment of persistent orofacial pain [10]. In this case report, complete abolition of post-procedural pain was achieved within two weeks of onset of symptoms in this case report by CBZ prescribed in combination with a GABA receptor agonist, baclofen which acts by depressing excitatory neurotransmission as shown from the case report timeline (Fig. 4) and CARE checklist (Fig. 5).

IX. Patient Perspective

DPP experience and incessant postponement of crown preparation procedure almost caused our patient to abandon this fixed prosthodontic treatment. At all the follow up reviews, there were expressions of satisfaction as regards; (1) pain free procedural experience enjoyed following medications given to relief DPP; and (2) Comfortability and functionality of the Zirconia bridge which appears similar to the natural dentition during mastication.

Informed Consent

Verbal informed consent was obtained before the commencement of the fixed prosthodontic procedure.

Author's Contributions

Adedapo Olanrewaju Afolabi was involved in the treatment of the patient, conceptualization, initial and final write-up Regina Ifeolu Arobieke contributed to the treatment and final write-up Enoch Abiodun Idowu was involved in the proofreading and contributed to the initial write-up Ayodeji Joseph Adegbulu contributed to the literature search and proofreading Olatubosun Sunday Salami and Hameed Abiodun Durodola clerked, reviewed the patient and contributed to the literature search.

Conflict of Interest

Authors declare that they do not have any conflict of interest.

References

[1] Dinan JE, Smith A, Hawkins JM. Trigeminal neuralgia with extraoral trigger zone successfully treated with intraoral injections of botulinum toxin: a case report. *Clin Neuropharmacol*. 2020 Sep/Oct;43(5):162-163. doi: 10.1097/WNF.0000000000000399. PMID: 32947428.

[2] Matthews R, Drum M, Reader A, Nusstein J, Beck M. Articaine for supplemental buccal mandibular infiltration anesthesia in patients with irreversible pulpitis when the inferior alveolar nerve block fails. *J Endod*. 2009 Mar; 35(3):343-6.

[3] Vílchez-Pérez M, Sancho-Puchades M, Valmaseda-Castellón E, Paredes-García J, Berini-Aytés L, Gay-Escoda C. A prospective, randomized, triple-blind comparison of articaine and bupivacaine for maxillary infiltrations. *Medicina Oral Patologia Oral y Cirugia Bucal*. 2011 Dec; 17(2): 325-330.

[4] Obiechina AE and Fasola AO. Appraisal of The Efficacy of Tactile Subjective Test for Anaesthesia of the Inferior Dental and Lingual Nerves after Block Injection. *African Journal of Biomedical Research*. 2001;4(3):115-117.

[5] Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. *Cephalalgia*. 2018 Jan;38(1):1-211.

[6] Fröscher W, Maier V, Laage M, Wolfersdorf, M, Straub R, Rothmeier J, et al. Folate deficiency, anticonvulsant drugs, and psychiatric morbidity. *Clin. Neuropharmacol*. 1995;18:165-182.

[7] Dusková M, Vasakova J, DušKová J, Kaiferova J, Broukal Z, Stárka L. (2017). The Role of Stress Hormones in Dental Management Behavior Problems. *Physiological Research*. 66. S317-S322. 10.33549/physiolres.933718.

[8] Grichnik KP, Ferrante FM. The difference between acute and chronic pain. *Mt Sinai J Med*. 1991 May; 58(3):217-20.
Di Stefano G. *et al*. Natural history and outcome of 200 outpatients with classical trigeminal neuralgia treated with carbamazepine or oxcarbazepine in a tertiary centre for neuropathic pain. *The journal of headache and pain*. 2014;15.

[9] Cummins D. Dentin hypersensitivity: from diagnosis to a breakthrough therapy for everyday sensitivity relief. *J Clin Dent*. 2009; 20(1):1-9.
[10] Riley DS, Barber MS, Kienle GS, Aronson JK, von Schoen-Angerer T, Tugwell P, Kiene H, Helfand M, Altman DG, Sox H, Werthmann PG, Moher D, Rison RA, Shamseer L, Koch CA, Sun GH, Hanaway P, Sudak NL, Kaszkin-Bettag M, Carpenter JE, Gagnier JJ. Care guidelines for case reports: explanation and elaboration document. *J Clin Epidemiol.* 2017.

Fig. 4. Case Report Presented According to a Timeline.
CP, Crown preparation; CBZ, Carbamazepine; +ve, present; -ve, absent; DPP, Dental procedural painpain pain.

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CARE case report guidelines

CARE Checklist of information to include when writing a case report

Topic	Item	Checklist item description	Reported on Line
Title	1	The diagnosis or intervention of primary focus followed by the words "case report"	
Key Words	2	2 to 5 key words that identify diagnoses or interventions in this case report, including "case report"	
Abstract (no references)	3a	Introduction: What is unique about this case and what does it add to the scientific literature?	
	3b	Main symptoms and/or important clinical findings	
	3c	The main diagnoses, therapeutic interventions, and outcomes	
	3d	Conclusion—What is the main "take-away" lesson(s) from this case?	
Introduction	4	One or two paragraphs summarizing why this case is unique **(may include references)**	
Patient Information	5a	De-identified patient specific information	
	5b	Primary concerns and symptoms of the patient	
	5c	Medical, family, and psycho-social history including relevant genetic information	
	5d	Relevant past interventions with outcomes	
Clinical Findings	6	Describe significant physical examination (PE) and important clinical findings	
Timeline	7	Historical and current information from this episode of care organized as a timeline	
Diagnostic Assessment	8a	Diagnostic testing (such as PE, laboratory testing, imaging, surveys)	
	8b	Diagnostic challenges (such as access to testing, financial, or cultural)	
	8c	Diagnosis (including other diagnoses considered)	
	8d	Prognosis (such as staging in oncology) where applicable	Not applicable
Therapeutic Intervention	9a	Types of therapeutic intervention (such as pharmacologic, surgical, preventive, self-care)	
	9b	Administration of therapeutic intervention (such as dosage, strength, duration)	
	9c	Changes in therapeutic intervention (with rationale)	
Follow-up and Outcomes	10a	Clinician and patient-assessed outcomes (if available)	Not applicable
	10b	Important follow-up diagnostic and other test results	Not applicable
	10c	Intervention adherence and tolerability (How was this assessed?)	Not applicable
	10d	Adverse and unanticipated events	
Discussion	11a	A scientific discussion of the strengths AND limitations associated with this case report	
	11b	Discussion of the relevant medical literature **with references**	
	11c	The scientific rationale for any conclusions (including assessment of possible causes)	
	11d	The primary "take-away" lessons of this case report (without references) in a one paragraph conclusion	
Patient Perspective	12	The patient should share their perspective in one to two paragraphs on the treatment(s) they received	
Informed Consent	13	Did the patient give informed consent? Please provide if requested	Yes ☑ No ☐

Fig. 5. CARE Checklist.