



CLINICAL PRACTICE ARTICLE

REVISED **A case series analysing patients with dental anxiety: a patient-centered model based on psychological profiling**
[version 2; peer review: 2 approved]

Riccardo Tizzoni ¹, Laura Veneroni², Alfonso D'Aloia³, Marta Tizzoni¹, Carlo Alfredo Clerici^{4,5}

¹Independent Researcher, Milano, Italy

²Paediatric Oncology Unit, Fondazione IRCCS Istituto Nazionale Tumori, Milano, Italy

³Department of Anesthesiology, Intensive Care and Pain Therapy Dept, ASST G. Pini-CTO Hospital, Milano, Italy

⁴Department of Oncology and Haematology-Oncology, University of Milano, Milano, Italy

⁵Clinical Psychology Unit, Fondazione IRCCS Istituto Nazionale Tumori, Milano, Italy

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Abstract

Anxiety and distress can jeopardize dental care experience of patients and may affect the clinical result. Although a wide range of sedation and analgesia techniques are currently available to relieve distress and pain during dental procedures, operative models to choose the most effective sedation-analgesic strategies are still insufficient. This case series proposes a patient-centered model to optimize patients' cooperation during dental care delivery. We describe how to achieve correct anaesthesia by using the least sedative procedure, accounting for the dental procedure needed and patient's psychological profile.

Five patients were considered as paradigmatic to show the balance between patients' subjective experiences and the clinical procedures: a patient with low stress, good compliance (case 1); a patient with moderate stress and reduction in compliance (case 2); anxious patient (case 3); a patient with acute anxiety and emotional distress (case 4); anguished patient (case 5).

A multimodal treatment of emotional and behavioural condition and a patient-centered model approach contributed to achieve the best patient satisfaction in the five cases detailed here.

Keywords

dental anxiety, sedation, analgesia, compliance, patient-centered model

Open Peer Review

Reviewer Status

Invited Reviewers

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- Mawlood Kowash** , Mohammed Bin Rashid University of Medicine & Health Sciences, Dubai, United Arab Emirates
- Juma Alkhabuli** , RAK Medical and Health Sciences University, Ras Al-Khaimah, United Arab Emirates
- Senem Yildirimturk** , Istanbul University, Istanbul, Turkey

Any reports and responses or comments on the article can be found at the end of the article.

Corresponding author: Riccardo Tizzoni (dottori.tizzoni@gmail.com)

Author roles: **Tizzoni R:** Conceptualization, Data Curation, Investigation, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing; **Veneroni L:** Conceptualization, Data Curation, Investigation, Writing – Review & Editing; **D'Aloia A:** Conceptualization, Data Curation, Investigation, Methodology, Supervision, Writing – Review & Editing; **Tizzoni M:** Conceptualization, Data Curation, Validation, Writing – Review & Editing; **Clerici CA:** Conceptualization, Data Curation, Formal Analysis, Methodology, Validation, Writing – Review & Editing

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REVISED Amendments from Version 1

1. English language editing of the paper
2. "Centred" has been changed to "centered" in the Title and throughout.
3. "Enough" has been changed to "sufficient" throughout.
4. "For" has been changed to "from"
5. We explained "venipuncture"
6. "House hygiene maintenance" has been changed to "oral hygiene maintenance"
7. "Anaesthesia" has been changed to "analgesia", when appropriated, (also in Table 1)
8. We defined the meaning of "per os"
9. "Fillings" has been changed to the term "restorations"
10. We defined "agoraphobia"
11. We modified "we decided to supply her...."
12. "Association" has been changed to "combination"
13. "Reabsorption" has been changed to "resorption" (Case 5, line 8)
14. New list of References

Case 1

- We started with patient complaint or the reason for attending and not by diagnosis
- Stress level was evaluated by anamnesis, clinical observation and counselling (also refer to "Discussion")

Case 2

- Consultation with patient's psychologist was done before the patient underwent treatments
- We introduced the word "sometimes" and deleted "generally"

Case 3

- We revised the first paragraph
- Proper treatment planning was carried out on the basis of clinical history and medical record. We elucidated that LA injection was supplemented with inhalation sedation and/or oral sedation
- We deleted the "indicated" sentence and we emphasized patient inability to withstand the surgical steps

Case 4

- We modified the "inappropriate" statement
- We explained treatment planning in simple language with empathy
- We changed "disturbance" to "consciousness" of time..."

WE ADDED:

1. **INTRODUCTION:** definition and assessment of dental anxiety; 2) definition of conscious sedation, patient's assessment, and monitoring (4 References).
2. We revised Table 2; in **DISCUSSION** we added a paragraph to emphasize the importance of communication and of utilizing different behavioural, analgesic and sedation techniques to manage patient anxiety.
3. A paragraph at the end of the **DISCUSSION**
4. We improved the **CONCLUSION**

Any further responses from the reviewers can be found at the end of the article

Introduction

An increasing number of patients are undergoing day-case dental procedures or surgeries, and in some cases they may experience significant emotional upset from either consultation or dental therapy. Patients are often required to cooperate for a long time and stay in a constrained position: this may affect their psychological state and induce discomfort, fear, anxiety, and pain¹.

The term Dental Anxiety (DA) includes anxiety, fear and phobia which are used interchangeably². DA is a reaction to unknown perceived dental danger especially when the treatment proposed was never experienced before. Dental fear is a reaction to a known perceived danger which involves a flight-or-fight response when provoked with the frightening stimulus, while dental phobia is an extreme, marked, and persistent fear of clearly visible defined objects or situations.

Understanding the level of patient anxiety allows its appropriate management. However, anxiety is difficult to measure. There are several methods available for dentist to score patients dental anxiety for example the Modified Child Dental Anxiety Scale (MCDAS)³.

When patients can arduously cooperate during treatments, an appropriate analgesia should be achieved and a satisfactory anxiolysis should be accomplished. To this aim, a range of techniques, from the tell-show-do approach to conscious sedation and general anaesthesia, is currently available^{4,5}.

Conscious sedation is a drug-induced depression of consciousness where the patient purposefully responds to verbal commands, either alone or by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Patient's cardiovascular function is usually maintained⁶.

Meticulous pre-sedation evaluation with respect to patient's general health status, airway, fasting, and understanding about the pharmacodynamics and pharmacokinetics of the drugs must be recognized. Availability of airway management equipment, sedative drugs' antidote, venous access, suitable intraoperative monitoring such as pulse oximetry and well-trained staff must be ensured⁷.

Conscious sedation can be administered through various routes such as oral, intramuscular, intravenous, and inhalational.

When fearful patients cannot be reassured by explanation and comforting professional behaviour, the clinician should consider a well-tolerated and effective sedative agent, associated with the use of topical analgesia and/or local analgesia (LA) injection.

The plurality of strategies available enables the team to safely provide a comprehensive care to minimize patient discomfort.

Treatments include the use of topical analgesia on the gingivae prior to LA injection, anxiolysis with oral benzodiazepines, conscious sedation with nitrous oxide, intravenous conscious sedation with benzodiazepines (in these cases lidocaine and/or prilocaine creams are applied on the skin as an aid for venipuncture), and general anaesthesia⁸⁻¹².

These techniques should be tailored based on specific individual needs and safety, to minimize anxiety, pain and memory of the dental procedure. To date, in the scientific literature, there is a lack of evidence based procedures to ensure patient's compliance, considering both safety and cost-to-benefit ratio.

In this case series, five clinical cases (2 men and 3 women) and the procedures adopted to manage pain, behaviour and discomfort are analysed. We applied a patient-centered model to maintain patient's cooperation and manage patient's response to distress according to his/her psychological profile and the planned dental therapies.

Case 1: a patient with low stress, good compliance

A 38-year-old woman with spontaneous bleeding during the night and during dental hygiene, halitosis, and difficulty in hygiene maintenance, came to our private practice. She was diagnosed as suffering long-term periodontal disease. At the first visit, the patient was relaxed and confident with the environment and the dental team. After a comprehensive periodontal visit, the patient received all the information about her disease and oral hygiene maintenance, and two dental chair appointments for dental hygiene were scheduled. We discussed the available procedures for pain and distress control; however, she refused any medication as she exhibited very low stress and good compliance (evaluated by anamnesis, counselling and clinical observation). She only accepted the use of topical analgesia on the gums (Lidocaine 15% spray). Both cleaning procedures were performed without distress and the patient was successfully treated for a form of periodontitis. Afterwards, the patient was included in a six month-recall programme for dental hygiene. The patient reported in each follow-up visit satisfaction for the previous treatment.

For patients with low stress and good compliance, undergoing dental treatments or procedures, such as dental hygiene, X-ray examinations, impression taking, simple stages of prosthetic rehabilitation and restorative dentistry, dentist behaviour and the use of topical analgesia (paste or liquid) is sufficient to control pain and manage the patient.

Case 2: a patient with moderate stress and reduced compliance

A 34-year-old woman was referred to our private practice by a psychologist: she had suffered panic attacks and agoraphobia (extreme or irrational fear of entering open or crowded places, of leaving one's own home, or of being in places from which escape is difficult) and had been in psychological therapy for about five years. The patient needed professional dental hygiene and some restorations.

The treatment planning was exhaustively explained to the patient.

At the first visit, the patient revealed slightly uneasiness and was unsettled and tense: she disclosed her discomfort while being subjected to dental procedures and enduring dental chair appointments and she was worried about potential pain. After we had a consultation with patient's psychologist and after we had also explained to him the planned dental treatment, in agreement with him, we used topical analgesia prior to LA injection (Topical analgesia: Lidocaine 15% spray; LA injection: Mepicain 2%, 1.8 ml, 1:100.000 adrenaline, or Mepicain 3%, 1.8 ml, without adrenaline) and a benzodiazepine by oral route (*per os*) (10 drops of bromazepam were administered, 30 minutes before each dental procedure). All dental procedures were performed within a reasonable length of time with the patient remaining comfortable throughout the dental chair appointments. The patient reported satisfaction to her psychologist for the received treatments and, thus, the same regimen of anxiolysis was maintained during the following dental chair appointments.

Restorative dentistry, endodontic therapies, scaling and root-planning therapies are sometimes well tolerated since they have a low intensity of physical discomfort and low grade of psychological effort. However, for certain patients, the use of *per os* benzodiazepines is advisable in addition to local analgesia.

Case 3: an anxious patient

A 54-year-old male needed the extraction of an upper wisdom tooth; the patient complained of pain, posteriorly, on the upper left side of the maxilla. After clinical and radiographic examinations, the upper left wisdom tooth was found with deeply a carious lesion with pulpal involvement, causing the pain.

The patient seemed to be cooperative, compliant and confident with the dental team and the surgery, even though the clinical history and medical record showed previous episodes of moderate anxiety related to dental procedures. Before the surgical intervention, topical analgesia (Lidocaine 15% spray) was used prior to LA injection. LA injection was administered on the vestibular and palatal aspects, for both pain control and vasoconstriction (Ecocain, 2x 20 mg/ml, 1,8 ml, 1:50:000 adrenaline). However, due to pulpal involvement and the presence of an infection, good pain control was not achievable¹³. The patient showed distinct and comprehensible signs and symptoms of distress and an inability to withstand that surgical situation and the surgical steps. Thus, he rapidly became nervous and agitated. Not to lose the confidence and trust of the patient, we administered a benzodiazepine (bromazepam 15 drops *per os*) and nitrous oxide (Inhalation; Start: 10% nitrous oxide and 90% oxygen, progressively reaching 40% nitrous oxide and 60% oxygen). After 20 minutes of relaxation, we could perform the extraction with the perfect compliance of the patient and a better control of the intraoperative pain. At the end of the procedure, we administered 100% oxygen for 10 minutes for patient recovery. The patient reported satisfaction for the previous treatment at the suture removal visit.

When facing a patient with special needs (anxiety and reduced compliance), especially before procedures such as a planned minor surgery, or an extraction or a mucogingival surgery or

an osseous periodontal surgery or a simple case of implantology, the dental team should preserve patient confidence, reduce anxiety and obtain compliance. In addition to local analgesia, the dentist should be prepared to supplement LA infiltration with inhalation sedation and/or oral sedation, even in the absence of the specialist anaesthesiologist.

The combination of benzodiazepines and nitrous oxide positively affects both the patient and the dental professional: in fact, a good consciousness of time and space perception and deep conscious sedation are achievable by adjusting nitrous oxide titration; the dentist is more relaxed and concentrated on the procedure. Analgesia is then well controlled by means of local analgesia.

Case 4: a patient with acute anxiety and emotional distress

A 58-year-old female in good general health status required some restorative dentistry and complex implant-prosthetic rehabilitations on both arches.

She suffered from acute anxiety and emotional distress; she repeatedly asked for explanations before and after each planned dental treatment. The dental treatment planned for the patient included sinus lift procedures on both sides of the maxilla and concomitant implant placement. Bone harvesting from the malar surface of both maxillary bones by a scraper was also planned. Therefore, the planned procedure was complex and was explained to the patient in simple language with empathy, taking into consideration her acute anxiety and emotional stress. For this reason and accounting for her emotional state, intravenous sedation was planned for the patient (Diazepam: starting dose 7mg; then 0.6 mg every 25 minutes were administered up to 20 minutes before the end of the procedure). A 2-hour observation period followed the surgery to allow the patient sufficient time for full recovery. Administering sedation and post-operative anti-inflammatory drugs intravenously was helpful. Consciousness of time and space perception was obtained, with complete recovery and full patient's satisfaction. The patient maintained a good compliance and reported satisfaction during the next dental chair appointment. During the following appointments, to complete the prosthetic phases, the patient was managed by means of *per os* benzodiazepines (bromazepam 15 drops 30 minutes before each dental procedure) and topical analgesia prior to LA injection, when requested by the procedure (topical analgesia: Lidocaine 15% spray; injected local analgesia: Mepicain 2%, 1.8 ml, 1:100.000 adrenaline).

Intravenous sedation is an effective therapy for patients suffering acute anxiety and distress while undergoing dental procedures. It offers several advantages: the patient may become completely relaxed, depending on the deepness of sedation obtained by drug titration, compliant and with a good consciousness of time and space perception. In this condition, even major surgery can be accomplished, with a reduced duration of the dental procedure and lower stress for the dental practitioner. Intravenous sedation has been successfully administered in patients undergoing complex surgical procedures, such as bilateral sinus lifting and bone grafts and implants or bilateral vertical and lateral augmentation procedures with bone harvesting.

Through the same vein utilised to administer conscious sedation drugs, it is advisable to administer also anti-inflammatory drugs for the immediate postoperative phase. The patient should be in good health and it is desirable to give the patient postoperative time for recovery and to have someone accompanying him/her back home. The dental office should have a good professional relationship with a specialist anaesthesiologist and higher costs should be expected for the patient.

Case 5: an anguished patient

A 50-year-old male in excellent general health condition needed to undergo fixed implant-supported dental rehabilitation. Despite the strong motivation to be rehabilitated and the awareness of the related surgeries, at the first visit the patient was stressed about the dental therapies, exhibiting distress and anguish.

From an oral point of view, the patient was afflicted by severe periodontal disease. He had lost all the teeth of the left side of the maxilla, except the central incisor; bone resorption of the area was massive with the tongue interposing between the arches laterally. The periodontal disease was progressively well controlled by proper therapies and a bone grafting of the left side of the maxilla was planned. According to the literature, autogenous bone is considered the gold standard for bone grafting procedures¹⁴; therefore, calvaria was selected as donor site, to harvest bone blocks to perform vertical and horizontal bone augmentation in the large area for proper dental implants insertion and stabilization. Sinus lifting was planned concomitantly with bone augmentation. In this case, the unique appropriate sedation technique was general anaesthesia (Propofol; Starting dose: 144 mg; then 640 mg per hour of continuous venous infusion up to 15 minutes before the end of the surgical procedure; then 320 mg per hour of continuous venous infusion up to 5 minutes before the end of the surgical procedure; then the infusion was stopped). Local analgesia injection was also administered in the mouth and in the parietal bone area of the patient, to obtain vasoconstriction (Ecocain, 6 × 20 mg/ml, 1.8 ml, 1:50:000 adrenaline). After 5 months, five endo-osseous dental implants were placed. During the previous appointments for dental care procedures, the dental team gradually gained patient's confidence, so that the surgical stage of implant placement and the other prosthetic phases were performed with local analgesia (Topical analgesia: Lidocaine 15% spray; injected local analgesia: Mepicain 2%, 1.8 mm, 1:100.000 adrenaline) or, rarely, with benzodiazepines *per os* (bromazepam 15 drops, 30 minutes before each treatment). All the implants were prosthetically rehabilitated four months after implant placement.

General anaesthesia is of paramount importance for the anguished patient while undergoing dental treatment. It may also represent the only chance to treat children under 4 years of age or to accomplish particular surgical procedures, such as bone harvesting from hip or calvaria for successive implant stabilisation or interventions in the extreme proximity to vascular or nervous anatomical structures.

The patient should be in good general health, hospitalisation is essential for the patient as well as the presence of a specialist anaesthesiologist. Generally, it is advisable to guarantee at least 24 hours for full recovery. Costs may eventually increase.

Discussion

This case series describes five scenarios that frequently occur in clinical practice, with the evident limit of showing only few of the main typology of distress and pain management during dental procedures. Facing a wide range of patients, from the relaxed and collaborative to the anguished ones, the dental team should optimize and tailor the approach, considering both patients' psychological profiles and the planned procedures.

The applicability and, at the same time, the limit of the described approach is that the evaluation and treatment of anxiety and distress was made by clinical observation and counselling and patient self-report, and was not based upon a mental health specialist evaluation and treatment (questionnaire of rating scale, psychotherapy or psychiatric consultation), since they are not routinely available in clinical dental practice.

During the treatments, patients are required to cooperate to achieve a degree of relaxation sufficient to maintain the necessary constrained position. Therefore, in patients with a pre-existing psychiatric history, psychosocial maladjustment or psychological problems such as anxiety and previous traumatic experiences related to dental therapies, behavioural manifestations can hinder the correct delivery of dental therapies, jeopardizing safety and clinical outcomes¹⁵.

Before choosing the type of behavioural-sedative-analgesic approach, preoperative diagnosis, patient psychological profile, and the planned dental procedure should be carefully evaluated. The final aim is to perform the therapies with relaxed and cooperating patients and in an uneventful and smooth induction of analgesia and sedation, if needed. If well-balanced, sedation can convert the behaviour of an uncooperative patient, getting him/her suitable to undergo dental treatment.

Our experience indicates that it is necessary to adopt the most appropriate combination of resources (Table 1), according to patient's characteristics and needs. Therefore, we propose a

decision-making strategy for the dental clinician, as a tool to maintain an acceptable level of collaboration and, therefore, of patient comfort during dental procedures. Clinical management strategy, analgesic agent and sedation therapy should be driven by the subjective perception of the patient. Besides generally utilized medications for pain control, the dental clinician can discuss with the patient to determine the best approach to reduce distress and anxiety and properly manage the clinical scenario, considering all the available techniques of sedation.

Therefore, in this patient-centered model, the clinical decision of the behavioural support and of the proper analgesia and/or sedation is guided by patient complexity.

Therefore we modulated and balanced our behaviour and/or analgesia and/or sedation in response to a rising level of anxiety and distress, as in clinical cases of increasing complexity and/or length of the procedure (e.g. in cases of adverse events) (Table 2). Moreover, a patient with strong anxiety, even if undergoing a generally tolerable procedure, may still require highly complex anxiolytic and analgesic procedures (as in cases 3 and 4). Additionally, if a level of analgesia is not feasible (e.g. in cases of local analgesia failures due to the presence of an infection), the next level of behavioural approach and anxiolysis should be considered. As another example, when the maximum dosage of analgesia or sedation has been achieved for a specific patient, it is convenient to use all the available behavioural techniques and as much empathy as possible to complete complex procedures with difficult patients.

Along specific goals of sedation, the safety and prompt recovery to a state of consciousness must be considered. Furthermore, dentist's preparation, expertise and experience can decrease the duration of the procedure, thereby limiting the need for sedation and analgesia^{16,17}.

Nevertheless, on the basis of our experience we learnt that it is still a subjective process and each clinician must always be

Table 1. Basic resources for the patient-centered model.

Resource	
Behaviour	The patient should be reassured and entertained before and during the dental procedure intended to be accomplished. Explanations must be given before each treatment.
Local analgesia	Topical and/or injectable analgesics and, if needed, sedatives can be chosen to both achieve pain relief and gain patient's compliance and cooperation. Failure to achieve complete local analgesia is not uncommon in the management of orofacial infections ¹³ : a shift to a deeper sedation may be required.
Anxiolytics	Use of anxiolytic drugs may be indicated to manage some disorders that cannot be addressed only with psychological and relational tools but need psychopharmacological therapy; the use of low-dose benzodiazepines to reduce anxiety can be very helpful. Patients' responses to medications and doses can vary dramatically (i.e. from a moderate sedation to unintended deep sedation).
Procedural sedation	A complex of techniques to manage patient's pain and anxiety in a safe, effective and human fashion ¹¹ by maintaining spontaneous breathing and airway-protective reflexes ¹² . The patient should be carefully evaluated and prepared before sedation and monitored during the procedure and recovery. Sedation could be titrated and reduced in future treatments, based on the patient's response. This technique is specially indicated for those individuals who are terrified of dental treatment.
General anaesthesia	It requires an accurate evaluation of costs and benefits, the presence of good general conditions, hospitalisation, and the presence of an anaesthesiologist.

Table 2.

Procedure	Behaviour	Analgesia	Sedation
From degree 0 to +++	+	+	+
	++	+	0
	++	0	+
	+	++	0
	0	++	+
	+	0	++
	0	+	++
	+++	0	0
	0	+++	0
	0	0	+++

0: no increment of behaviour, analgesia or sedation; +: small increment of behaviour, analgesia or sedation; ++: medium increment of behaviour, analgesia or sedation; +++: high increment of behaviour, analgesia or sedation.

aware of patient's response to sedatives. The more complex the procedure and/or as the length of the procedure increases, the more the dentist's behaviour and/or analgesia and/or sedation need to match the new situation. The patient-centered approach still needs more studies to validate operative models to choose

behavioural, sedative and analgesic strategies to achieve the best patient satisfaction.

Most anxious patients can be managed by proper communication and utilizing different behaviour management techniques (e.g. Tell-Show-Do, Distraction, Modelling, etc.) tailored to the patient psychological state. The clinician should strive to perform dental treatment using proper communication, behaviour management and local analgesia with or without oral and inhalational conscious sedation. Intravenous sedation and general anaesthesia should be reserved to complex cases to avoid potential morbidities and mortalities and additional treatment costs.

In conclusion, a patient-centered approach considering both clinical characteristics and psychological profile can help to achieve high quality dental care through a tailored management of pain and anxiety in patients with emotional and behavioural problems.

This can be achieved by proper behavior management and local analgesia with or without conscious sedation or in complex cases using intravenous sedation or general anaesthesia.

Consent

All patients gave their written informed consent to publish the data presented in this case series.

Data availability

All data underlying the results are available as part of the article and no additional source data are required.

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Senem Yildirimturk 

Department of Oral and Maxillofacial Surgery, Istanbul University, Istanbul, Turkey

Thanks to the authors.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Oral surgery, sedation, dental fear, dental anxiety, oral radiology, cbct, dental implantology, facial fractures, oral and maxillofacial surgery

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 30 Sep 2020

Riccardo Tizzoni, Independent Researcher, Milano, Italy

Dear Professor Senem Yildirimturk,

W thank you very much for your process of reviewing our article and we are glad you appreciated our effort of amending. Your previous comments had been very helpful for us, so we could propose the revised version of the article.

Again, thank you,

Best regards
Riccardo Tizzoni

Competing Interests: No competing interests were disclosed.

Reviewer Report 07 September 2020

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Mawlood Kowash 

Hamdan Bin Mohammed College of Dental Medicine, Mohammed Bin Rashid University of Medicine & Health Sciences, Dubai, United Arab Emirates

Juma Alkhabuli 

RAK Medical and Health Sciences University, Ras Al-Khaimah, United Arab Emirates

The authors have satisfactorily addressed the concerns we raised in our previous peer review report. We have no further comments to make.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Dental management of patients with special needs and behavioural problems.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 07 Sep 2020

Riccardo Tizzoni, Independent Researcher, Milano, Italy

Dear Doctors Mawlood Kowash and Juma Alkhabuli we thank you very much for the entire, precious process of reviewing our article.

Thank you very much.

I send you my Best Regards

Riccardo Tizzoni

Competing Interests: No competing interests were disclosed.

Version 1

Reviewer Report 13 July 2020

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Senem Yildirimturk 

Department of Oral and Maxillofacial Surgery, Istanbul University, Istanbul, Turkey

Here are my comments to the authors of 'A case series analysing patients with dental anxiety: a patient-centred model based on psychological profiling [version 1; peer review: 1 approved with reservations]':

1. If this study is an original research/research article, then what is the null hypothesis of the study? If it is a review, the authors should better enhance the discussion and strongly support it with literature conducting dental anxiety, MDAS, sedation, etc. The examples given in the study (one in each type) are not enough to make a review!
2. The introduction and discussion parts are too short.
3. The authors should better use valid scales or questionnaires to avoid subjectivity. The dental history of the patient mostly affects the current state/mood on the day or even before the day of dental appointment regardless of operation type.
4. The grammar is poor.
5. The aim and methodology of the study should be revised and planned in detail.

Is the background of the cases' history and progression described in sufficient detail?

No

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

No

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

No

Is the conclusion balanced and justified on the basis of the findings?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Oral surgery, sedation, dental fear, dental anxiety, oral radiology, cbct, dental implantology, facial fractures, oral and maxillofacial surgery

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for

reasons outlined above.

Reviewer Report 07 July 2020

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Mawlood Kowash

Hamdan Bin Mohammed College of Dental Medicine, Mohammed Bin Rashid University of Medicine & Health Sciences, Dubai, United Arab Emirates

Juma Alkhabuli

RAK Medical and Health Sciences University, Ras Al-Khaimah, United Arab Emirates

The five-case series of adult patients with varying degrees of anxiety and dental treatment proposes a patient-centred model to optimize patients' cooperation during dental care delivery. Dental treatment of the five patients was achieved with behaviour management and local analgesia alone or with oral and inhalation conscious sedation, intravenous sedation, or general anaesthesia.

The reviewers suggest the following corrections to make the paper scientifically sound: English language revision, revising the introduction by adding: 1) a paragraph on definition and assessment of dental anxiety; 2) a paragraph on conscious sedation, patient's assessment, and monitoring. The discussion may be improved by revising Table 2 and adding a paragraph to emphasize the importance of communication and utilizing the different behaviour management techniques to manage patient dental anxiety. Finally, revision of the conclusion is suggested.

English Language Revision: the whole paper needs English language editing. The authors should use the commonly used words/terms in academic writing.

- In the introduction: 1st paragraph: change the word "for" to "from" either consultation or dental therapy. 3rd paragraph: use of topical analgesia prior to Local analgesia (LA) injection- and not "venipuncture" which means intra-venous access.
- In Case 1, line 7: "House hygiene maintenance" to be changed in to "oral hygiene maintenance".
- The authors used the term (analgesia) in the abstract which is the correct term for dental local analgesia (LA). However, they also used (anaesthesia) throughout the paper to describe dental LA. Analgesia means the absence of pain sensation, while anesthesia means loss of all sensation including pressure and proprioception. Therefore, we suggest changing the term "anaesthesia" with 'analgesia' for dental LA.
- The abbreviations should be defined when first used in the paper: e.g. Benzodiazepine per os: is OS mean by oral route?
- Use the word "restorations" instead of "fillings"
- In case 2: First paragraph: define "agoraphobia": extreme or irrational fear of entering

- open or crowded places, of leaving one's own home, or of being in places from which escape is difficult.
- In 2nd paragraph, line 5 "we decided to supply her...should be changed to "The local analgesia is applied
 - Case 3: In the last paragraph: change the word "association" to "combination" of benzodiazepine and nitrous oxide positively affects
 - Case 5: line 8: change "reabsorption" to "resorption".

Revision of Cases

Case 1

- Start with the patient complaint or the reason for attending (e.g. referred by..) and not by diagnosis.
- It is not clear how the stress level was evaluated or based on which criteria?

Case 2

- Consultation with the patient's psychologist should have been done prior to subjecting the patient to complex dental treatment.
- The following statement needs revision because the mentioned dental procedures are anxiety and pain-provoking procedures and generally are not tolerated by anxious patients: "Restorative dentistry, endodontic therapies, scaling and root planning therapies are generally well tolerated since they have a low intensity of physical discomfort and low grade of psychological effort. However, for certain patients, the use of per os benzodiazepine is advisable in addition to local anaesthesia."

Case 3

- Needs language revision as shown:

A 54-year-old male needed the extraction of an upper wisdom tooth; the patient complained of pain posteriorly, to (on) the upper left side of the maxilla. After X-ray clinical and radiographic examinations, the upper left wisdom tooth was found diagnosed with deeply a carious lesion with pulpal involvement, causing the pain.

- As mentioned in case 2, for the patient presented in Case 3 proper treatment planning should have been carried out because "clinical history and medical record showed previous episodes of moderate anxiety related to dental procedures". In addition, he required extraction of pulpally involved upper third molar. The infiltration LA should have been supplemented with inhalation sedation and/or benzocaine oral sedation.

- In the second paragraph, line 11: following sentence needs revision:

"immediately at the beginning of the procedure, the use of periosteals to break and cut gingival fibres and the use of forceps to move luxate the tooth for dislocation caused intense"

Case 4

- The following statement is inappropriate:

"She suffered from acute anxiety and emotional distress; she constantly asked for explanations before and after each planned dental treatment, with an extreme waste of time during dental chair appointments".

The procedures should have been explained to the patient in simple language with empathy,

taking into consideration her acute anxiety and emotional stress. Treatment under IV sedation should have been planned because she was diagnosed with acute anxiety and emotional stress.

- A good “disturbance” to be changed to “consciousness” of time and space perception...”

Introduction- Add the following:

Definition and assessment of dental anxiety

The term Dental Anxiety (DA) includes anxiety, fear and phobia which are used interchangeably (McDonnell-Boudra et al. 2014). DA is a reaction to unknown perceived dental danger especially when the treatment proposed was never experienced before. Dental fear is a reaction to a known perceived danger which involves a flight-or-fight response when provoked with the frightening stimulus, while dental phobia is an extreme, marked, and persistent fear of clearly visible defined objects or situations.

Understanding the level of patient anxiety allows its appropriate management. However, anxiety is difficult to measure. There are several methods available for dentist to score patients dental anxiety for example the *Modified Child Dental Anxiety Scale (MCDAS)* (Wong et al. 1998).

Definition of conscious sedation, patient’s assessment, and monitoring

Conscious sedation is a drug-induced depression of consciousness where the patient purposefully responds to verbal commands, either alone or by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Patient’s cardiovascular function is usually maintained (Galeotti et al. 2016).

Meticulous pre-sedation evaluation with respect to patient’s general health status, airway, fasting, and understanding about the pharmacodynamics and pharmacokinetics of the drugs must be recognized. Availability of airway management equipment, sedative drugs’ antidote, venous access, suitable intraoperative monitoring such as pulse oximetry and well-trained staff must be ensured (Attri et al. 2017). Conscious sedation can be administered through various routes such as oral, intramuscular, intravenous, and inhalational.

- McDonnell-Boudra D, Martin A, Hussein I. In vivo exposure therapy for the treatment of an adult needle phobic. *Dent Update*. 2014;41(6):533–40.
- Wong HM, Humphris GM, Lee GTR. Preliminary validation and reliability of the modified child dental anxiety scale. *Psychol Rep*. 1998; 83:1179–86.
- Galeotti A, Garret Bernardin A, D’Antò V, Ferrazzano GF, Gentile T, Viarani V, et al. Inhalation conscious sedation with nitrous oxide and oxygen as alternative to general anesthesia in preoperative, fearful, and disabled pediatric dental patients: A large survey on 688 working sessions. *Biomed Res Int* 2016. 2016:7289310.
- Attri JP, Sharan R, Makkar V, Gupta KK, Khetarpal R, Kataria AP, et al. Conscious sedation: Emerging trends in pediatric dentistry. *Anesth Essays Res*. 2017; 11:277–81.

Discussion

- In table 2 the highlighted sentence needs deletion from the title.

Table 2. Modulating and balancing behaviour and/or analgesia and/or sedation in response to an increasing complexity and/or length of the procedure and increasing level of anxiety and distress. As an example, when it is not possible to use more analgesia or sedation, it is convenient to use all

behavioural techniques to perform a complex procedure with a difficult patient.

- In Table 2: it is not possible to have a profound analgesia (+++) in a patient with (0 increment) behaviour and (0 increment) sedation.
- **Add the following at the end of the discussion:**

Most anxious patients can be managed by proper communication and utilizing different behaviour management techniques (e.g. Tell-Show-Do, Distraction, Modelling, etc.) tailored to the patient psychological status. The clinician should strive to perform dental treatment using proper communication, behaviour management and local analgesia with or without oral and inhalational conscious sedation. Intravenous sedation and general anaesthesia should be reserved to complex cases to avoid potential morbidities and mortalities and additional treatment costs.

Conclusion: May be improved as follows:

In conclusion, a patient-centred approach considering both clinical characteristics and psychological profile can help to achieve high quality dental care through a tailored management of pain and anxiety in patients with emotional and behavioural problems. This can be achieved by proper behavior management and local analgesia with or without conscious sedation or in complex cases using intravenous sedation or general anaesthesia.

Is the background of the cases' history and progression described in sufficient detail?

Partly

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

Partly

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Partly

Is the conclusion balanced and justified on the basis of the findings?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Dental management of patients with special needs and behavioural problems.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Author Response 23 Jul 2020

Riccardo Tizzoni, Independent Researcher, Milano, Italy

Object: revisions to article **A case series analysing patients with dental anxiety: a patient-centred model based on psychological profiling**

Dear Reviewer,

Thank you for reviewing our manuscript. The comments and suggestions indicated by you have been precisely considered and we hope satisfactorily addressed.

Enclosed please find the revised version that incorporates the reviewers' comments as follows:

REVIEWER:

1. The language of the whole article was revised.
2. We changed the word "for" with "from".
3. We have explained the use of topical analgesia for the skin prior to venipuncture.
4. We specified the term "topical analgesia" prior to "local analgesia".
5. We changed "House hygiene maintenance" to "oral hygiene maintenance".
6. We changed the word, when appropriated, "anaesthesia" with "analgesia".
7. We specified the term "per os" (that means "by oral route") when first used in the paper.
8. We changed the word "fillings" with term "restorations" as suggested.
9. We explained the meaning of agoraphobia (*extreme or irrational fear of entering open or crowded places, of leaving one's own home, or of being in places from which escape is difficult*)
10. We modified the sentence "we decided to supply her" with "the local analgesia is applied"
11. We changed the word "association" with "combination" in case 3
12. We changed the word "reabsorption" with "resorption"

REVISION OF CASES

Case 1

- We started with the patient complaint or the reason for attending and not by diagnosis
- The stress level was evaluated by clinical observation and self report of the patient (and we added in Discussion this period: *"The applicability and, at the same time, the limit of the described approach is that the evaluation and treatment of anxiety and distress had been made by clinical observation and counselling and patient self-report, but was not based upon a mental health specialist evaluation and treatment (questionnaire of rating scale, psychotherapy or psychiatric consultation), since they are not available in a routine clinical dental practice"*).

Case 2

- The Consultation with the patient's psychologist has been done prior to subjecting the patient to complex dental treatment.
- We slightly modified the meaning of the sentence as requested.

Case 3

- We revised the first paragraph as indicated.

- For point 2 of case 3, please see point 2 of Case 1.
- For the patient presented in Case 3 also we clarified proper treatment planning with phrase *"supplemental infiltration with inhalation sedation with nitrous oxide administration and / or oral sedation"*.
- In the second paragraph, line 11 we deleted the indicated phrase, and we emphasized patient inability to withstand the surgical situation and surgical steps.

Case 4

- We modified the phrase correctly indicated as inappropriate:
- We changed to "consciousness" of time and space perception..."

We added:

1. a paragraph on definition and assessment of dental anxiety; 2) a paragraph on conscious sedation, patient's assessment, and monitoring.
2. We revised Table 2 and added a paragraph to emphasize the importance of communication and utilizing the different behaviour management techniques to manage patient dental anxiety.
3. We added the suggested paragraph in discussion.
4. We revised the conclusions.

In table 2 we deleted, as requested, the highlighted sentence from the title and explained the same concepts in the text.

- We considered possible to add doses of local analgesia (+++) in patients in whom is not need an increment of behavioural effort and sedation.

We hope that our responses and revisions satisfy your request for revisions.

Best regards

Competing Interests: Non-Financial Competing Interests

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