

Role of Nitrous Oxide Inhalation Sedation in Minor Periodontal Surgery – A Pilot study

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Received - 09 April 2019

Initial Review – 17 April 2019

Accepted – 25 April 2020

ABSTRACT

Background and objective: Alleviation of patient's anxiety and pain during periodontal surgical procedures is a major concern in the field. Amongst the various modalities used till date, inhalation sedation has gained attention in recent times. Thus the present study evaluates the effectiveness of inhalation sedation for better acceptance of minor periodontal surgical procedures. **Methods:** In this split mouth study, patients with chronic periodontitis were divided into two groups. Gingival curettage was performed under Local Anaesthesia (LA) in group 1, while in group 2 gingival curettage was performed on contra-lateral site under LA as well as inhalation sedation. Saturation of Peripheral Oxygen (SpO₂) and pulse rate were recorded at baseline, during procedure and after procedure from both the groups. Visual Analogue Scale (VAS) for pain during procedure was also recorded. **Results:** Pulse rate values decreased and improved SpO₂ values were observed in group 2 compared to group 1 thereby indicating decreased anxiety levels in the former. Further The VAS scores for pain experienced during the procedure were better in group 2. **Conclusion:** In anxious patients undergoing minor periodontal surgical procedures Nitrous oxide inhalation sedation can be used for better management of pain perception and decreasing anxiety levels.

Key words: Nitrous Oxide, inhalation sedation, periodontal surgery

Dental anxieties combined with pain associated with surgical periodontal therapy are the foremost reasons patients avoid invasive periodontal procedures. This not only acts as a hindrance to successful completion of overall treatment plan but also is a concern for overall well-being of the patient. Dentists worldwide are finding out means to lessen anxiety in patients using pharmacological approach. Amongst the various pharmacological practices used in dentistry conscious sedation using nitrous oxide inhalation is attaining significance owing to its ease of use, efficacy and titre ability [1, 2]. Nitrous Oxide Inhalation Sedation (NOIS) is widely used in pediatric dental practice and is accepted as one of the safest form of sedation [3, 4] but

there is not much evidence in the literature investigating hemodynamic changes following its use for adult dental procedures. Alleviation of Patient's anxiety and pain using conscious sedation during periodontal procedures has gained attention in recent times [5, 6]. Thus the present study aims at evaluating the effectiveness of inhalation sedation for better acceptance of minor periodontal surgical procedure as well as associated hemodynamic changes.

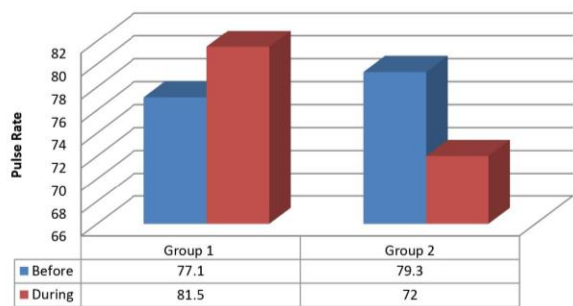
MATERIAL AND METHODS

The study was conducted in Department of Periodontics, ITS-CDSR, Muradnagar. A total 10 patients diagnosed as

chronic periodontitis having periodontal pockets on contra lateral site with probing depth ≥ 5 mm, with moderate to high anxious levels based on Modified Dental Anxiety Score (MDAS) were selected from the outpatient Department [7]. The study was approved by institutional ethical committee and written informed consent was obtained from patients. In this split-mouth trial, Group 1 constituted of those sites where gingival curettage was performed under local anaesthesia. Group 2 included those sites in which gingival curettage was performed under local anaesthesia along with NOIS. Saturation of Peripheral Oxygen (SpO_2) and Pulse rate were recorded at baseline and during procedure for both the groups using the pulse oximeter attached to the patient's finger. Patient was asked to mark on Visual analogue scale (VAS) of 0-10 rating to record pain during procedure. Further, patients were also asked to give feedback about the procedure (if any). Data so obtained was entered on excel sheet and statistically analysed using SPSS 16.0 software.

RESULTS

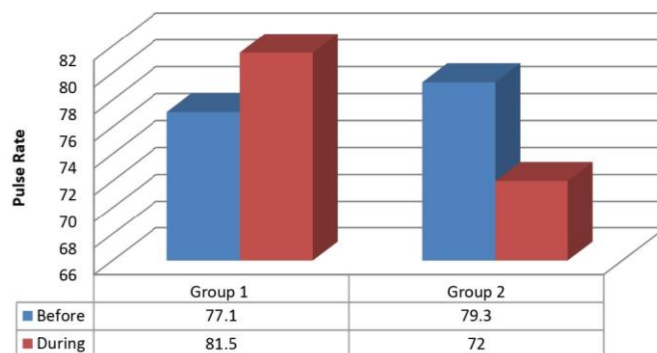
In our study, on intragroup comparison of pulse rates before and during procedure Group 1 showed significantly increased pulse rate ($P=0.0317$) during the surgery whereas Group 2 depicted normal pulse rate during surgery which significantly reduced ($P=0.0002$) from before treatment levels. On inter group comparison of pulse rate there was no statistical significance before surgery, however during surgery pulse rate significantly increased for Group 1 compared to Group 2 ($P= 0.0001$) as seen in Graph 1.



Graph 1: Intragroup comparison of pulse rates before and during treatment

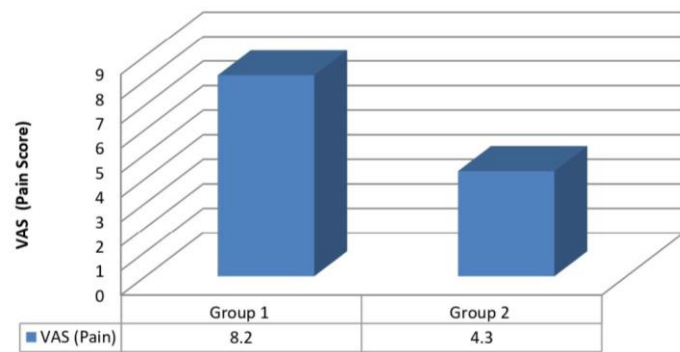
Intragroup comparison of SpO_2 showed significant decrease in the levels ($P=0.0049$) in Group 1 during surgery when compared to increased levels of SpO_2 during surgery in Group 2 ($P=0.0001$). On inter group comparison

SpO_2 levels were slightly higher for Group 1 compared to Group 2 before surgery. However, during surgery there was significant decrease in SpO_2 levels in Group 1 compared to Group 2 ($P=0.0001$) as depicted in Graph 2.



Graph 2: Intragroup comparison of oxygen saturation before and during treatment

We found inter group comparison of VAS for pain in favour of Group 2 with patients experiencing significantly more pain in Group 1 ($P=0.0001$) during the procedure compared to Group 2 as depicted in Graph 3.



Graph 3: Intergroup comparison of VAS score during procedure

DISCUSSION

The present study evaluated the role of NOIS in minor periodontal surgical procedure. Patients with chronic periodontitis having anxiety levels (moderate to high) based on MDAS were selected. MDAS is a simple validated scale used to measure dental anxiety and has an essential fifth question regarding LA. It has been reported that patients with high or moderate anxiety were those who had positive correlations with the hemodynamic changes [8]. Also, the pulse rate and oxygen saturation vary in anxious patients during the course of treatment [9]. Hence

in the present study these parameters were recorded before the start of procedure and 1 minute following administration of LA. The mean pulse rate values in Group 1 increased significantly during the procedure and can be attributed to enhanced anxiety seen during LA administration or surgery. This is confluence with a study on flap surgery by Amoian et al in 2017 [10]. In Group 2, (NOIS) values of mean pulse rate significantly decreased during the treatment compared to Group 1 during treatment, which could be due to anxiolysis effect of NOIS. Similar results were reported by Khiavi et al 2016 who used NOIS during tooth extraction [11].

The mean oxygen saturation (SPO₂) levels for Group 1 decreased significantly during the procedure, similar to those observed by Padma et al 2012 who reported fall in the oxygen saturation levels during non-surgical and surgical periodontal therapy [12]. However, in Group 2 the mean oxygen saturation levels increased significantly during the procedure. In a study Kaviani et al 2006 reported similar results when periodontal surgery was performed under inhalation sedation [6]. On inter group comparison during treatment mean SPO₂ levels increased significantly in Group 2 compared to Group 1, which again could be due to calming effect produced by NOIS. None of the patients in this study had an incidence of diffusion hypoxia. The mean VAS during LA administration was significantly lower in Group 2. This might be due to decrease in anxiety owing to sedation as well as mild analgesic effect of N₂O. Zacny et al 2002 suggested the use of inhalation sedation, to reduce anxiety & pain during minor oral surgery procedures under LA [13]. All the patients in Group 2 expressed their complete satisfaction and better acceptance for the procedure.

The use of moderate sedation modalities during the course of periodontal therapy is within the scope of periodontal practice as per the policy statement by American Academy of Periodontology (AAP) April 2013 [14]. A survey by Onody et al confirms the pharmacological safety of the 50% N₂O/O₂ premix in a range of clinical applications however they emphasized on the need for rational training of medical personnel in its administration [15]. Also, Erguven et al reported that the 40% N₂O/O₂ combination impaired cognitive functions and recovery of most of the cognitive functions occurred 15 min after sedation, so it is crucial to inform patients about avoiding attentive activities soon after NOIS [16]. However, certain limitations of the study cannot be ruled out such as small sample size and also evaluation of subjective response to pain using VAS is variable amongst

individuals. Authors recommend further studies with larger sample size to authenticate the results of the present study.

CONCLUSION

Minor Periodontal procedures in anxious patients can be undertaken under nitrous oxide inhalation sedation reducing patient apprehension, discomfort especially while administering local anaesthesia and thus, time taken for achieving cooperation. Administration of local anaesthetic is considered the most distressing phase for the patient undergoing periodontal intercessions. Use of Nitrous oxide can help reduce patients' discomfort and anxiety levels and hence make the entire treatment procedure comfortable. Within the limitations of this study it can be concluded that NOIS can be effectively used in management of anxious patients undergoing minor periodontal surgery. However, studies including major periodontal surgical procedures with larger sample size should be undertaken to ascertain findings of this preliminary study.

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How to cite this article: Chopra R, Mathur S, Sharma N, et al. Role of Nitrous Oxide Inhalation Sedation in Minor Periodontal Surgery – A Pilot study. J Orofac Res. 2020;9(2):24-27.

Funding: None; Conflict of Interest: None Stated.