

## Assessment of Pain and Anxiety in Placement of Dental Implants

Irfanul Huda<sup>1</sup> Aaysha Tabinda Nabi<sup>2</sup> Aasia Ahsan<sup>3</sup> Kumar Anand<sup>4</sup> Rohit Singh<sup>5</sup>

<sup>1</sup>Reader, Department of Prosthodontics, Patna Dental College and Hospital, Patna, Bihar, India.

<sup>2</sup>Reader, Department of Periodontology, Buddha Institute of Dental Sciences and Hospital, Patna, Bihar, India.

<sup>3</sup>Senior Lecturer, Department of Periodontology, Buddha Institute of Dental Sciences and Hospital, Patna, Bihar, India.

<sup>4</sup>Reader, Department of Oral Medicine and Radiology, Buddha Institute of Dental Sciences and Hospital, Patna, Bihar, India.

<sup>5</sup>Senior Lecturer, Department of Prosthodontics, Patna Dental College and Hospital, Patna, Bihar, India.

### ABSTRACT

**Background:** To assess the pain and anxiety following implant surgery and to evaluate the correlation among anxiety, pain, and influencing factors.

**Materials and Methods:** 25 patients were included in this study. Subjective factors influencing pain perception included anxiety from the overall dental treatment (scored on the Dental Anxiety Scale [DAS]) and anxiety relative to the time from implant surgery.

**Results:** The average pain perception was highest at T2, followed by T1 and T3. Pain perception at T1 was significantly higher in women and for a larger number of implant placements. Pain perception at T2 was significantly higher in women and when DAS and anxiety scores were high. The pain score at T3 was significantly higher in women and when anxiety scores were high. The results from multiple linear regression analysis showed that pain perception was significantly higher at T1 in women and for a larger number of implant placements, and at T3 when the dental anxiety score was high.

**Conclusion:** Within the limitations of this study, a patient's anxiety represented by dental anxiety score and state of anxiety scores affected pain intensity 1 day after implant surgery. Sex and the number of implants affected pain intensity immediately after implant surgery. Patients who have high pain intensity 1 week after implant surgery showed high pain intensity at each time point.

**Keywords:** Dental anxiety, implant placement, pain, state anxiety.

### INTRODUCTION

For a satisfactory treatment outcome, pain after implant placement is of concern for both the dentist and the patient. Implant placement is known to be a mild to moderately painful procedure.<sup>1</sup> However, the perception of pain varies among individuals because it is a multifaceted emotional and sensory experience that is associated and exaggerated with previous experience, expected stress, clinical situation, and anxiety.<sup>2</sup> Fear of this pain, represented by anxiety, is one of the most common factors related with dental fear, and 40% of the adult population has been reported to suffer from

it.<sup>3</sup> Dental anxiety can be a barrier to satisfactory dental treatment and should be managed properly.<sup>1</sup> It is usually recorded by the Dental Anxiety Scale (DAS), which ranges from 5 to 20.<sup>4</sup> Pain experienced in the clinic is usually recorded by the visual analog scale (VAS), ranging from 0 (no pain) to 100 (worst pain). This scale has been used in previous studies to evaluate factors that affect pain perception in dental situations.<sup>5</sup> Postoperative pain following dental implant placement decreased with time. The surgeon's experience, female sex, surgical difficulty, and pain at earlier time points were associated

Received: Nov. 23, 2019; Accepted: Jan. 2, 2020

\*Correspondence Dr. Irfanul Huda.

Department of Prosthodontics, Patna Dental College and Hospital, Patna, Bihar, India.

Email: Not Disclosed

significantly with self-reported pain.<sup>1</sup> Pain experienced during and after implant placement is known to be best predicted by anxiety measured immediately before, immediately after, and 4 weeks after surgery.<sup>2</sup> This anxiety can also be recorded in the clinic by a VAS ranging from 0 (not afraid at all) to 100 (terrified).<sup>6</sup> Anxiety regarding dental treatment is attributable to complicated factors such as behavioral, psychologic, and environmental factors.<sup>4</sup> This anxiety is most often related to the possibility of pain during the procedure.<sup>7</sup>

Dental treatment influences patients by causing stress and reminding them of unpleasant memories, which often leads to the postponement of dental treatment.<sup>2</sup> Investigating the level of pain after implant placement and the factors influencing pain could provide information that would help patients to have more harmonious communication with dentists and to have realistic expectations about the dental procedure. Therefore, the purpose of this study was to investigate the change in 25 patients' pain and anxiety following implant surgery and to evaluate the correlation among anxiety, pain, and influencing factors.

## MATERIALS AND METHODS

Twenty five patients were included in this study. Subjective factors influencing pain perception included anxiety from the overall dental treatment (scored on the Dental Anxiety Scale [DAS]) and anxiety relative to the time from implant surgery.

**EXCLUSIVE CRITERIA:** 1 patients suffering from any systemic problems

2 Pregnancy. 3 Mentally ill patients

**INCLUSIVE CRITERIA:**

1. Gender (male and female)
2. Age (18-50 years)
3. Implant location and number

Patients completed questionnaires just before surgery (T0), immediately after surgery (T1), 1 day after surgery (T2), and 1 week after surgery (T3).

Patients were asked to fill out three types of questionnaires. First, patients were asked to evaluate their pain using a 100-mm VAS before

surgery (time T0), immediately after surgery (T1), 1 day after surgery (T2), and 1 week after surgery (T3). Patients were instructed that 0 represented no pain, 10 represented the worst pain, and that 1 to 3 were indicative of mild pain, 4 to 6 moderate pain, and 7 to 10 severe pain. Second, they were asked to evaluate anxiety regarding the dental procedure before surgery, using the Dental Anxiety Scale (DAS) and to answer four questions describing the dental clinic environment. Each question had four answer choices, each with its own score. The sum of these scores ranged from 4 to 20, with a larger score sum indicating greater anxiety. Third, patients were asked to evaluate their state of anxiety using the same 100-mm VAS and were instructed that 0 represented no anxiety and 10 represented the worst anxiety that they could ever feel. The VAS can be used to efficiently record changes in subjective state anxiety,<sup>10</sup> which is an emotional status that changes frequently. Repeated-measures analysis of variance was used to examine whether any significant change of pain score or state of anxiety existed. The association between pain score and background variables was examined with the two-sample t test, and correlations between pain scores and continuous parameters were examined using Pearson correlation coefficients.

## RESULTS

In total, 25 patients (11 male and 14 female) were selected for this study (age range, 18 to 50 years). The pain score increased from  $1.03 \pm 0.83$  at T1 to  $4.13 \pm 1.37$  at T2, then decreased to  $0.98 \pm 0.94$  at T3. The pain score at T2 was highest. The pain score at T1 was higher than that at T3. At T1, 31.4% reported no pain and 68.5% reported mild pain during surgery. In contrast, at T2, 33.7% reported mild pain, 62.9% reported moderate pain, and 3.3% reported severe pain. At T3, 39.3% reported no pain and 60.6% reported mild pain. The dental anxiety score measured was  $11.5 \pm 3.0$ . The state of anxiety score decreased from  $5.03 \pm 1.68$  at T0 to  $4.84 \pm 1.65$  at T1, increased to  $5.48 \pm 1.58$  at T2, then decreased to  $4.12 \pm 1.48$  at T3. Factors associated with the pain scores immediately, 1 day, and 1 week after surgery are presented in Table 3. At T1, the pain score was significantly higher in female than in male and higher in patients with multiple implants than in those with a single implant. By T2 and T3, the pain score remained significantly higher in female than in male. The state of anxiety score

among men decreased from  $4.39 \pm 1.52$  at T0 to  $4.23 \pm 1.43$  at T1, increased to  $4.88 \pm 1.40$  at T2, than decreased to  $3.54 \pm 1.23$  at T3. The state of anxiety score among female decreased from  $5.89 \pm 1.52$  at T0 to  $5.65 \pm 1.59$  at T1, increased to  $6.28 \pm 1.46$  at T2, and then decreased to  $4.89 \pm 1.44$  at T3. The state of anxiety score was significantly higher among female than male at all evaluated time points, and changed at the evaluated time points in the same manner as the pain scores. There was a significant correlation between the pain score at T2 and the dental anxiety score ( $r=0.64$ ) between the pain score at T2 and the state anxiety at T0 ( $r = 0.536$ ), and between the pain score at T2 and the state of anxiety at T2 ( $r = 0.505$ ) between the pain score at T3 and the state of anxiety at T0 ( $r = 0.291$ ), (6) between the pain score at T3 and the state of anxiety at T1 ( $r = 0.237$ ), between the pain score at T3 and the state anxiety at T2 ( $r = 0.154$ ), and (8) between the pain score at T3 and the state of anxiety at T3 ( $r = 0.259$ ). Multivariate analysis revealed that the pain score at T1 was significantly associated with sex ( $\beta = -.377$ ;  $P = .025$ ) and the number of implants ( $\beta = .540$ ;  $P = .002$ ). The pain score at T2 was significantly associated with the dental anxiety score ( $\beta = .240$ ;  $P = .0001$ ).

## DISCUSSION

The pain score was obtained immediately, 1 day, and 1 week after surgery, which has been used consistently in other studies.<sup>1</sup> This was designed so that the patients did not need to make visits other than to have the surgery and for dressing and stitch removal. Most of the previous studies have shown that the pain score was maximal 1 day after surgery.<sup>1</sup> Although the pain score was not measured precisely 24 hours after surgery in the present study but rather when the patient visited on the following day, it was nevertheless at maximum at 1 day after surgery. The pain score was relatively low immediately after surgery. Most patients presented with either no pain (31.4%) or mild pain (68.5%). It was expected that patients would not present with pain due to the persisting effect of the local anesthesia. However, most patients (68.5%) presented with mild pain after surgery, probably due to their recollection of the pain felt during local anesthesia and the equipment noise and confusing environment experienced during that period. A limitation of this study is that several factors that

are known to influence pain perception were not completely excluded.

It was therefore necessary to determine a way of measuring the anxiety associated specifically with implant surgery. State of anxiety was found to be the most reliable predictor in a study about pain perception associated with implant surgery. A DAS score of over 13 is considered to indicate relatively high level of anxiety.<sup>8</sup> In this study, the mean DAS was 11.5, a score that does not represent a high level of anxiety. State of anxiety varied with time, but was greatest at 1 day after surgery and decreased progressively immediately after surgery and 1 week after surgery. It was shown that the pain score for women was statistically significantly higher than that for men within the scheduled time periods. This finding concurred with the results of previous studies. This may be because females are more likely to freely express their emotions and thoughts than male. Perception of pain differed according to the number of implants placed. Pain scores were significantly lower in patients with one implant placed than in those with two implants placed. A previous study found that periodontal surgery with flap elevation and osteoplasty was associated with higher pain perception than periodontal surgery without these procedures. This is attributable to the greater tissue damage that occurs during surgery with additional procedures. Thus, the placement of a larger number of implants will increase tissue damage, which in turn may cause an increase in pain perception as a result of nociceptor stimulation. This illustrates the importance of administering appropriate levels of analgesia and local anesthesia. The pain score also did not differ with implant location. In a previous study, implant placement into the anterior area appeared to cause more pain.<sup>8</sup> However, in the present study, the number of patients and implants were not identical for each location, and so it was not possible to determine whether such a relationship existed. Previous studies found that the pain threshold increases as age increases due to decreased blood flow, fatty changes in bone tissue, and tissue changes.<sup>9,10</sup> Most patients in the present study were 30 to 40 years of age, and no relationship was found between age and pain score. Future studies should include patients covering a wider and evenly spread age range to determine any significant differences in pain perception with

age. Technical procedure and surgical skill have always been considered to be the most important factors underlying successful implant placement. However, there has been a change in that paradigm in that emotional control of the patient is now included as a requirement for success. It is therefore important for dentists to have a thorough understanding of the factors influencing the pain and anxiety experienced by their patients. The value of the present study thus lies in the discovery of the factors influencing pain perception and the demonstration that consideration of such factors will enhance the rapport between the dentist and patient.

## CONCLUSION

Within the limitations of this study, a patient's anxiety represented by Dental Anxiety Score and state of anxiety scores affected pain intensity 1 day after implant surgery. Gender and the number of implants affected pain intensity immediately after implant surgery. Patients who have high pain intensity 1 week after implant surgery showed higher pain intensity at each time point.

## CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

## REFERENCES

1. Al-Khabbaz AK, Griffin TJ, Al-Shammari KF. Assessment of pain associated with the surgical placement of dental implants. *J Periodontol* 2007;78:239–246.
2. Eli I, Schwartz-Arad D, Baht R, Ben-Tuvim H. Effect of anxiety on the experience of pain in

implant insertion. *Clin Oral Implants Res* 2003;14:115–118

3. Kvale G, Berggren U, Milgrom P. Dental fear in adults: A meta- analysis of behavioral interventions. *Community Dent Oral Epidemiol* 2004;32:250–264.
4. Corah NL, Pantera RE. Controlled study of psychologic stress in a dental procedure. *J Dent Res* 1968;47:154–157.
5. Eli I, Uziel N, Baht R, Kleinhaus M. Antecedents of dental anxiety: Learned responses versus personality traits. *Community Dent Oral Epidemiol* 1997;25:233–237.
6. Eli I, Baht R, Kozlovsky A, Simon H. Effect of gender on acute pain prediction and memory in periodontal surgery. *Eur J Oral Sci* 2000; 08:99–103.
7. van Wijk AJ, de Jongh A, Lindeboom JA. Anxiety sensitivity as a predictor of anxiety and pain related to third molar removal. *J Oral Maxillofac Surg* 2010;68:2723–2729.
8. Sabino MA, Honore P, Rogers SD, Mach DB, Luger NM, Mantyh PW. Tooth extraction-induced internalization of the substance P receptor in trigeminal nucleus and spinal cord neurons: Imaging the neurochemistry of dental pain. *Pain* 2002;95:175–186.
9. Guzeldemir E, Toygar HU, Cilasun U. Pain perception and anxiety during scaling in periodontally healthy subjects. *J Periodontol* 2008;79:2247–2255.
10. Canakci CF, Canakci V. Pain experienced by patients undergoing different periodontal therapies. *J Am Dent Assoc* 2007;138:1563–1573.