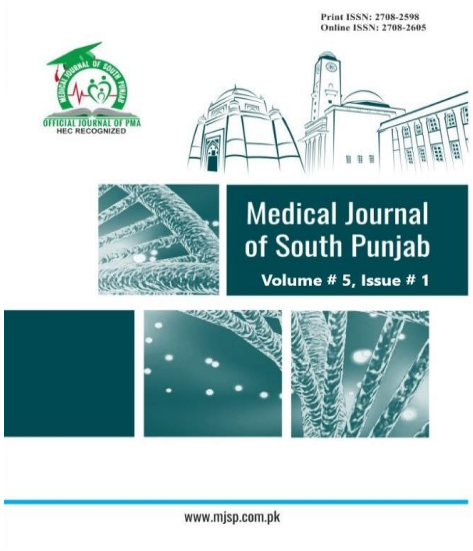
ISSN (E): 2708-2601
ISSN (P): 2708-2598

Medical Journal of South Punjab
Article DOI:10.61581/MJSP.VOL05/02/12
Volume 5, Issue 2, 2024



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Publication History

Received: Jan, 27, 2024 Revised: May 20, 2024
Accepted: June 01, 2024 Published: June 30, 2024

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Conflict of Interest:
Author(s) declared no conflict of interest.

Acknowledgment:
No Funding received.

Citation: Siddiqui MA, Shah A, Mehmood H, Mangherio SA, Khan MJ, Bukhari SF. Fentanyl nasal packing for management of postoperative pain control in patients of nasal bone fracture reduction. Medical Journal of South Punjab. 2024 June 30; 5(2):55-60.

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An official publication of
Medteach Private Limited, Multan, Pakistan.
Email: farman@mjsp.com.pk, Website: https://mjsp.com.pk/index.php/mjsp

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Original Article

Fentanyl nasal packing for management of postoperative pain control in patients of nasal bone fracture reduction

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ABSTRACT

Objective: *To evaluate of effect of fentanyl nasal packing in management of postoperative pain in patients of post reduction of nasal bone fracture.*

Methods: *This randomized controlled trial was conducted at Ghulam Muhammad Mahar Medical College/Hospital, Sukkur, Pakistan from January 2022 to December 2022. Total 60 consecutive patients aged 18–65 years with nasal bone fracture admitted for reduction of fracture were included. Patients were rated according to Numeric Rating Scale at interval of one, six, twelve and twenty-four hours postoperatively, while a blinded anesthesiology resident gathered these responses.*

Results: *The mean postoperative NRS score at 1 hour in Control Group and Fentanyl Group was 8.23±0.72 and 6.60±1.98, respectively. The average postoperative NRS score at 6 hours in Control Group and Fentanyl Group was 5.60±0.47 and 4.46±1.25, respectively. The average postoperative NRS score at 12 hours in Control Group and Fentanyl Group was 4.00±0.94 and 3.33±0.88, respectively. The average postoperative NRS score at 24 hours in Control Group and Fentanyl Group was 3.03±0.82 and 2.40±0.62, respectively. ($p<0.001$).*

Conclusion: *The study suggests that topical fentanyl administration could be an effective method for managing acute nasal pain, particularly in controlling postoperative nasal pain.*

Keywords: *Nasal bone fracture, Reduction, Fentanyl; Nasal packing; Postoperative pain*

1. INTRODUCTION

Reduction of nasal bone fracture is worldwide accepted surgical intervention for treating traumatic nasal bone injury, but postoperative bleeding is common, and while absorbable packing materials reduce pain associated with removal compared to nonabsorbable packs, patients still frequently experience headaches and facial pain in the early postoperative period[1,2].

Postoperative pain control, particularly relevant to anesthesiologists, pharmacologists, and physical therapists, is evolving with the intranasal administration of analgesics such as fentanyl, which, due to its lipophilic properties[3], offers fast and effective pain relief with minimal systemic side effects and enhanced patient tolerance compared to traditional routes like oral, IV, or IM administration[4].

Intranasal administration is a convenient route for delivering analgesics and can be utilized for various opioids[5]. Notably, intranasal packing with fentanyl, a highly step 3 lipophilic opioid on the ladder of WHO, has recently demonstrated a very rapid analgesic effect in managing postoperative pain, acute pain in emergency departments, procedural wound care pain, premedication in children, and cancer-related breakthrough pain[6]. Due to its lipophilic nature, fentanyl can be applied topically and absorbed through mucous membranes, resulting in prolonged effect duration, reduced dosage requirements, and minimal adverse effects compared to intravenous administration[7].

Fentanyl administered subcutaneously has a terminal half-life of over 10 hours, which is longer than the 3-hour half-life of intravenous (IV) fentanyl[8]. Additionally, using fentanyl for topical nasal pain control offers rare adverse effects like lack of tolerance and decreased plasma concentration[9]. This efficacy of this drug is due to agonists effect of fentanyl on opioid receptors in maxillary and ethmoid nerves and on tissues in nasal cavity. In this way fentanyl provide more specified analgesic effects[10].

The proposed study aims to evaluate the effectiveness and safety of fentanyl-impregnated nasal packing compared to standard nasal packing without analgesics for postoperative pain control in patients undergoing nasal bone fracture reduction. By assessing pain levels, opioid consumption, and patient satisfaction, this study seeks to provide evidence for a potentially improved method of pain management that enhances patient outcomes and comfort.

2. METHODOLOGY

This randomized controlled trial was conducted at Ghulam Muhammad Mahar Medical College/Hospital, Sukkur, Pakistan from January 2022 to December 2022. Total 60 consecutive patients aged 18–65 years with nasal bone fracture admitted for reduction of fracture were included. Patients admitted for other nasal surgeries, allergic to study drugs, history of any cardiac, renal, hematological illness, and having history of alcohol or fentanyl abuse were excluded.

Patients included in this study were characterized on basis of nasal surgery type. Control group included 30 patients who were treated 0.9% normal saline and labelled as control group. Other group include 30 patients who were treated with 50mg fentanyl nasal packing.

To minimize side effects, the fentanyl dosage was capped at 50 mg, equivalent to the average dose given for pain relief in the recovery room. Nasal packing was removed 24 hours' post-surgery unless complications like bleeding occurred. All procedures were done by same surgeon to avoid operator-dependent outcomes. Double-blind randomization was achieved using a computer-generated allocation. The soaking agents were prepared blindly by the responsible researcher, and a nurse not involved in anesthesia induction. General anesthesia

was given by and anesthesiologist having minimum 5 years' experience.

To measure postoperative pain, all patients rated their pain at 1, 6, 12, and 24 hours after surgery using an 11-point Numeric Rating Scale (NRS), while a blinded anesthesiology resident gathered these responses.

To maintain blindness, an anesthesiologist unaware of the surgery types and packing materials assessed pain severity, while cardiopulmonary values (systolic and diastolic arterial pressure and heart rate) were monitored before surgery and at 1, 6, 12, and 24, hours postoperatively to detect any effects of fentanyl on vital signs; adverse effects were tracked during these intervals, all values were consistently recorded by the same medical staff, and supplemental analgesics were administered upon patient request, with both patients and surgeons blinded to the packing type used.

SPSS version 27.1 was used for data analysis. After calculation of mean SD test of significance (t-test for numeric and chi square test for categorical) was applied. P value below or equal to 0.05 was considered as significance.

3. RESULTS

Out of 60 patients, 30 (50.0%) were included in Control Group and 30 (50.0%) in Fentanyl Group. The distribution of gender, age, body mass index, and ASA status in Control and Fentanyl Group was statistically insignificant, (p>0.050). (Table. 1).

There were 8 (26.7%) patients had hypertension, and 12 (40.0%) had diabetes mellitus in Control Group. While there were 10 (33.3%) patients had hypertension, and 8 (26.7%) had diabetes mellitus in Fentanyl Group, (p>0.050). (p>0.050). (Figure. 1). Fentanyl injection was given to 9 (30.0%) control patients and 17 (56.7%) to Fentanyl Group. NSAID was given to 26 (86.7%) control patients and 24 (80.0%) to Fentanyl Group, (p>0.050). (Figure. 2).

The mean postoperative NRS score at 1 hour in Control Group and Fentanyl Group was 8.23±0.72 and 6.60±1.98, respectively. The average postoperative NRS score at 6 hours in Control Group and Fentanyl Group was 5.60±0.47 and 4.46±1.25, respectively. The average postoperative NRS score at 12 hours in Control Group and Fentanyl Group was 4.00±0.94 and 3.33±0.88, respectively. The average postoperative NRS score at 24 hours in Control Group and Fentanyl Group was 3.03±0.82 and 2.40±0.62, respectively. (p<0.001). (Table. 2).

Table-1: Demographics and baseline characteristics of the study groups

Variable	Group		p-value
	Control	**Fentanyl**	
Gender			
Male	14 (46.7)	19 (63.3)	0.194
Female	16 (53.3)	11 (36.7)	
Age (years)	46.60±11.86	48.90±5.58	0.042
BMI (kg/m^2)	24.38±3.73	26.83±2.09	0.063
ASA			
I	13 (43.3)	21 (70.0)	0.067
II	17 (56.7)	9 (30.0)	
Mean±S.D, N (%)			

Figure. 1

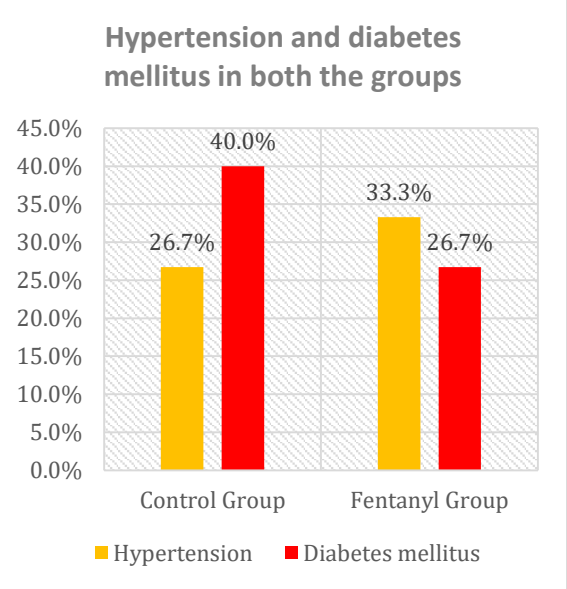

Figure. 2

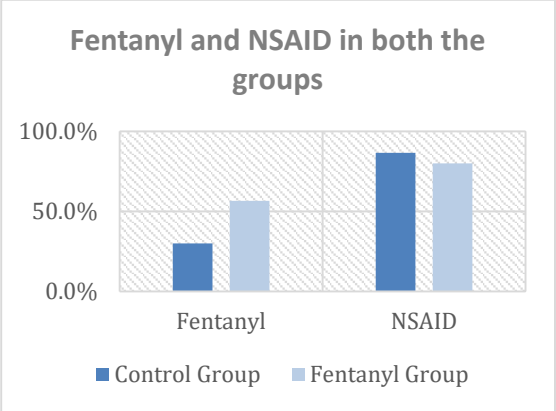

Table-2: Postoperative NRS score at different time intervals of the study groups

Postoperative NRS score	Group		p-value
	Control	**Fentanyl**	
At 1 hour	8.23±0.72	6.60±1.98	<0.001
At 6 hours	5.60±0.47	4.46±1.25	<0.001
At 12 hours	4.00±0.94	3.33±0.88	<0.001
At 24 hours	3.03±0.82	2.40±0.62	<0.001
Mean±S.D			

4. DISCUSSION

Nasal packing is commonly used after nasal bone fracture reductiion to prevent postoperative bleeding and complications, but while nonabsorbable packs have been traditionally used to control bleeding and prevent adhesion formation, they cause significant discomfort and pain, leading to the development of absorbable materials; however, even these absorbable packs can still cause considerable pain and discomfort compared to nonabsorbable packs[11].

Von Schoenberg et al[12] found that patients undergoing endonasal surgery often regard the removal of nasal packing as un-favorite event after surgery. Consequently, many absorbable and non-absorbable materials were introduced to reduce the disadvantages of nasal packing.

Patients treated with fentanyl had a statistically significant lower rate of adverse events ($p < 0.05$) compared to controls, with rare gastrointestinal disturbances and no additional side effects from nasal packing rehydration. In a study Kim et al[13] reported similar finding that fentanyl soaked packing reduce post-operative pain significantly without any side effects. Zeppetella et al[14] reported that patients treated with fentanyl experienced a statistically significant reduction in the rate of adverse events ($p < .05$), highlighting the benefits of using fentanyl for nasal packing.

While fentanyl's use in nasal surgery is generally safe with fewer systemic effects compared to IV administration and no observed respiratory depression, close monitoring is still essential for patients at risk of respiratory issues or decreased blood pressure; despite concerns that fentanyl may be excessive for nasal pain, its effective postoperative pain control can enhance patient satisfaction and prevent complications, making local administration a promising alternative to IV administration for adequate analgesia, though several limitations in our study should be noted[15,16].

Effective postoperative pain control is important as it enhances patient satisfaction, reduces the risk of complications related to postoperative pain, shortens hospital stays, and ultimately improves patients' quality of life[17-19]. Although opioids remain a cornerstone of postoperative pain management, concerns about opioid-related complications can sometimes lead to inadequate pain relief[20].

5. CONCLUSION

The study suggests that topical fentanyl administration could be an effective method for managing acute nasal

pain, particularly in controlling postoperative nasal pain.

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