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ORIGINAL RESEARCH

THE EFFECT OF ORAL CLONIDINE ADMINISTRATION ON POSTOPERATIVE PAIN CONTROL IN RHINOPLASTY PATIENTS

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Abstract

Background and Aim: Postoperative pain control is very important. Postsurgical pain lasts for hours and days and causes the patient to take systemic-analgesic. Overuse and frequent use of these analgesics cause side effects such as nausea, vomiting, gastrointestinal bleeding, mental affliction and ataxia. The purpose of this study was to investigate the effect of oral administration of clonidine on pain control in patients undergoing Rhinoplasty. In case of reduction of the need for analgesics, clonidine can be used before surgery to prevent complications of analgesics.

Materials and Methods: This double blinded study was performed on 40 patients with Rhinoplasty referring to Imam Khomeini Hospital of Ahvaz Hospital in two groups of 20 patients randomly divided into two groups. The first group received oral administration of 0.2 mg of clonidine to 60 to 90 minutes before surgery. The second group, as the control group, received no medication except placebo. At the end of the procedure, using the Visual Analogue Scale (VAS) test, the patients' pain was measured for up to 24 hours every four hours, and the first application was recorded for the first dose of the substance. Also, the blood pressure of the patients was evaluated for the first 24 hours and the amount of ecchymosis was assessed on the first, third and seventh day after the operation.

Results: The age range of patients was 20-35 years old with an average of 25.9 years in the clonidine group and 26.7 years in the control group. The 28 patients were female and 12 were male. Mean blood pressure was significantly lower in the clonidine group without any significant difference with the control group ($P>0.05$). Pain score in clonidine recipients (3.35±0.23) was significantly lower than those in the control group (5.80±0.17) ($P<0.05$). The amount of ecchymosis in the first and third day was less in the clonidine group than in the control group, but on the seventh day, the ecchymosis of clonidine recipients (1.15±0.31) with ecchymosis in control patients (1.20±0.26) was not significantly different ($P>0.05$).

Conclusion: Considering the reduction of blood pressure and relaxation in the patient along with the reduction of pain and ecchymosis in the practice of rhinoplasty, the use of this drug in head and neck surgery can be further studied and used.

Keywords: Clonidine, Pain, Rhinoplasty.

INTRODUCTION

Effective pain management after surgery is crucial. Postoperative pain generally lasts 8–12 hours and often requires systemic analgesics, including narcotics and NSAIDs. Excessive or repeated use of these medications can cause side effects such as nausea, vomiting, gastrointestinal bleeding, psychological dependence, and ataxia. Clonidine, an alpha-adrenergic agonist, is primarily used as an antihypertensive with a central mechanism of action. Recent research indicates that clonidine also has sedative and anxiolytic properties, making it effective in postoperative pain management. Systemic administration of clonidine in patients with blood

pressure above 80 mmHg and heart rate above 40 beats per minute provides effective pain relief after surgery and reduces opioid requirements [1,2].

When used as an adjunct in peripheral nerve block anesthesia, clonidine prolongs the duration of anesthesia and analgesia, and doses below 150 micrograms have not been associated with adverse effects [3]. Clonidine has a stronger effect on C fibers, which are associated with pain transmission, than on A fibers, which are primarily motor fibers [4]. The maximum recommended daily dose of clonidine is 2.4 mg [5]. The present study aims to evaluate the effect of oral clonidine on postoperative pain in rhinoplasty patients. If shown to reduce analgesic requirements, clonidine could be administered preoperatively to minimize complications associated with postoperative pain medications [6].

MATERIALS AND METHODS

This was a double-blind study, in which both patients and physicians were unaware of the treatment administered. Forty patients scheduled for rhinoplasty at the Oral and Maxillofacial Surgery Department of Imam Khomeini Hospital, Ahvaz, classified as ASA I–III according to the American Society of Anesthesiologists' physical status score, were randomly assigned to two groups of 20 each to reduce potential confounding factors. Exclusion criteria included: 1) allergy or sensitivity to clonidine, 2) patients with liver disease or a history of kidney injury, 3) history of myocardial infarction, 4) arrhythmias, 5) bradycardia, and 6) sinus node dysfunction.

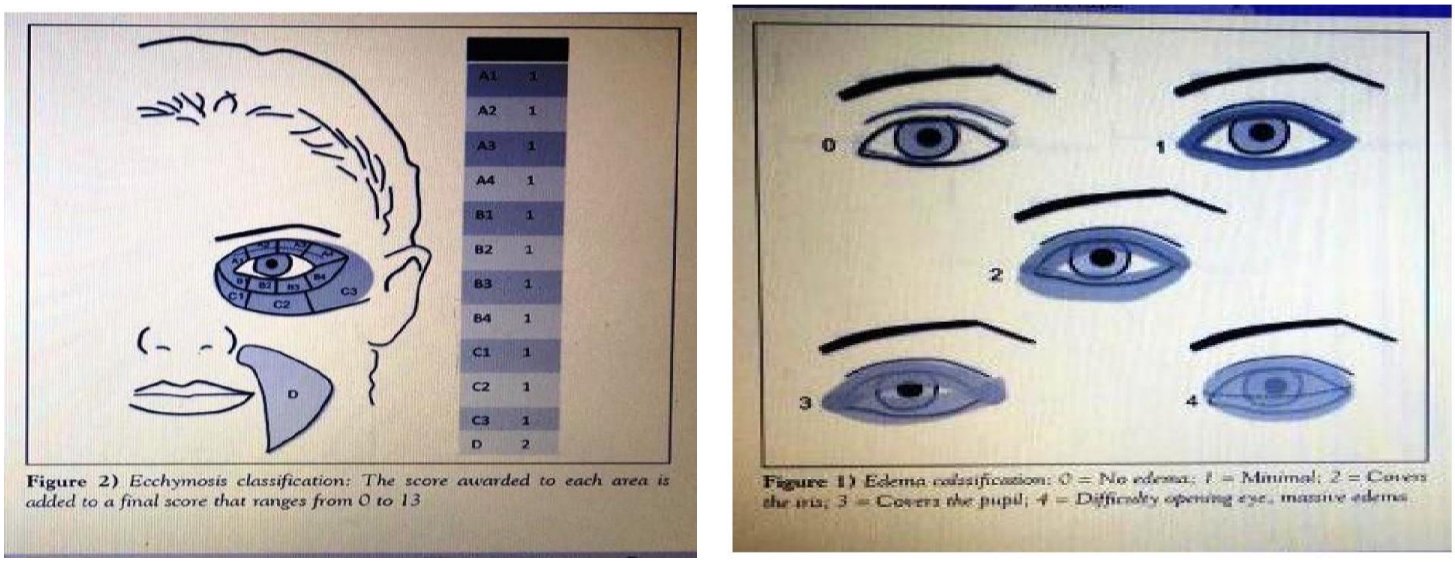

Figure 2) *Ecchymosis classification: The score awarded to each area is added to a final score that ranges from 0 to 13*

Figure 1) *Edema classification: 0 = No edema; 1 = Minimal; 2 = Covers the iris; 3 = Covers the pupil; 4 = Difficulty opening eye, massive edema*

Figure 1. Ecchymosis Classification

The first group received 0.2 mg of oral clonidine 60–90 minutes before surgery. The second group served as the control group and did not receive any medication other than a placebo. Postoperatively, patient pain levels were assessed every four hours for 24 hours using the Visual Analogue Scale (VAS), and the time of their first request for analgesics was recorded. Additionally, patients' blood pressure was monitored during the first 24 hours, and the degree of ecchymosis was evaluated on the first, third, and seventh postoperative days.

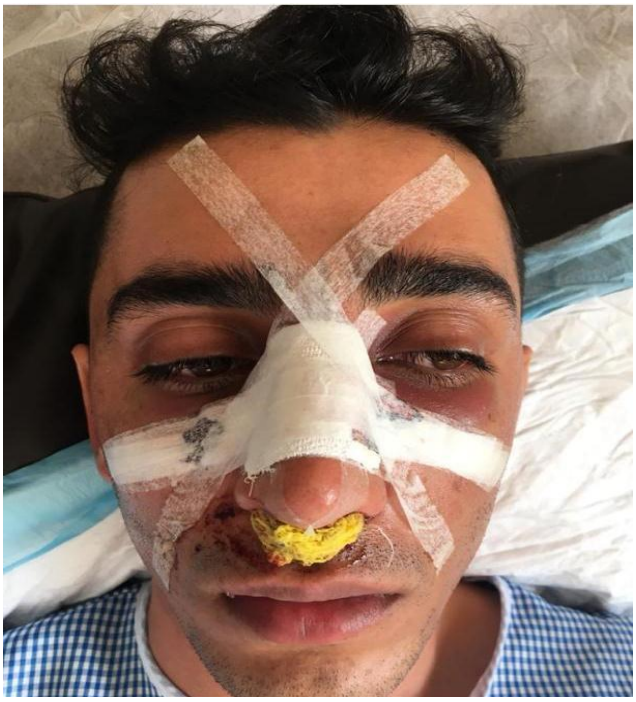

Figure 2. Evaluation of Ecchymosis in Patients

Data normality was assessed using the Kruskal-Wallis test. Independent t-tests were used to compare mean values between the control and experimental groups. The study included 40 patients, with 20 assigned to the clonidine group and 20 to the control group. Patients' ages ranged from 20 to 35 years, with mean ages of 25.9 years in the clonidine group and 26.7 years in the control group. Of the participants, 28 were female and 12 were male.

RESULTS

This study investigated the effect of oral clonidine on postoperative pain control in patients undergoing rhinoplasty, comparing those who received clonidine with a control group who did not. Each group consisted of 20 patients. Blood pressure measurements taken at four time points (8:00 AM, 3:30 PM, 4:00 PM, and 10:00 PM) showed no significant differences between the two groups ($P > 0.05$).

Pain scores measured using the Visual Analogue Scale (VAS) were significantly lower in the clonidine group (3.35 ± 0.23) compared with the control group (5.80 ± 0.17) ($P < 0.05$). Facial ecchymosis was assessed on postoperative days one, three, and seven. On days one and three, the control group exhibited greater ecchymosis than the clonidine group. By day seven, there was no statistically significant difference between the two groups ($P > 0.05$). Furthermore, the number of analgesic doses requested was lower, and the duration of pain-free periods was longer in the clonidine group compared with the control group ($P < 0.05$).

Table 1. Comparison of Mean Parameters Between Clonidine and Control Groups

Parameter		Patients Receiving Clonidine	Control Patients
Blood pressure (mm Hg)	8:00 AM	107.70±1.82[a]	108.90±0.90[a]
	3:30 PM	106.70±2.19[a]	108.55±1.61[a]
	4:00 PM	106.40±1.74[a]	111.45±2.33[a]
	10:00 PM	109.25±1.54[a]	112.80±1.12[a]
Pain score (out of 10)		3.35±0.23[a]	5.80±0.17[b]
Ecchymosis score (out of 13)	Day 1	4.90±0.51[a]	6.70±0.31[b]
	Day 3	2.90±0.47[a]	3.60±0.32[b]
	Day 7	1.15±0.31[a]	1.20±0.26[a]
Number of analgesic doses requested		7±0.12[a]	15±0.25[b]
Pain-free duration (minutes)		700±2.98[a]	689±3.14[b]

Non-matching letters indicate a statistically significant difference between the two groups ($P < 0.05$).

The trend of blood pressure changes in patients receiving clonidine and in control group is shown in figure 3. In both groups, blood pressure increased after a decrease observed at 3:30 PM. Patients in the clonidine group had lower blood pressure compared with the control group, although the difference was not statistically significant ($P > 0.05$).

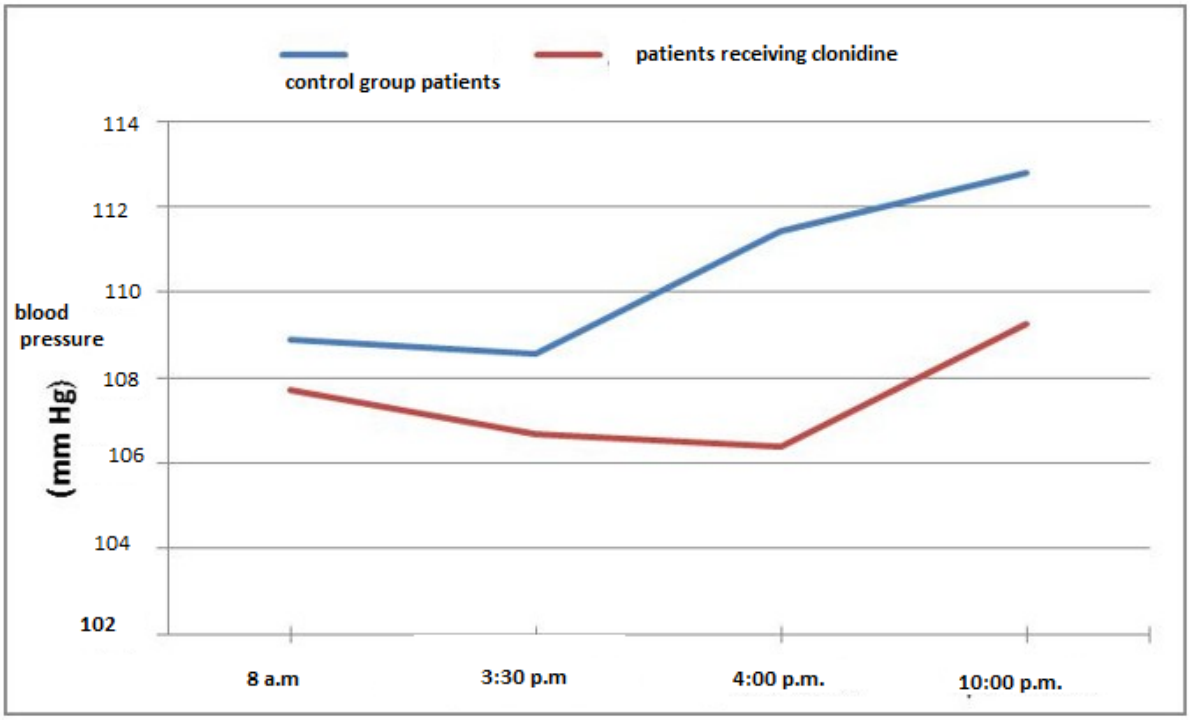

Figure 3. Comparison of Mean Blood Pressure Between Clonidine and Control Groups

The trend of ecchymosis reduction in both groups over seven days is shown in figure 4. Ecchymosis gradually decreased in both groups, reaching its lowest level on day seven.

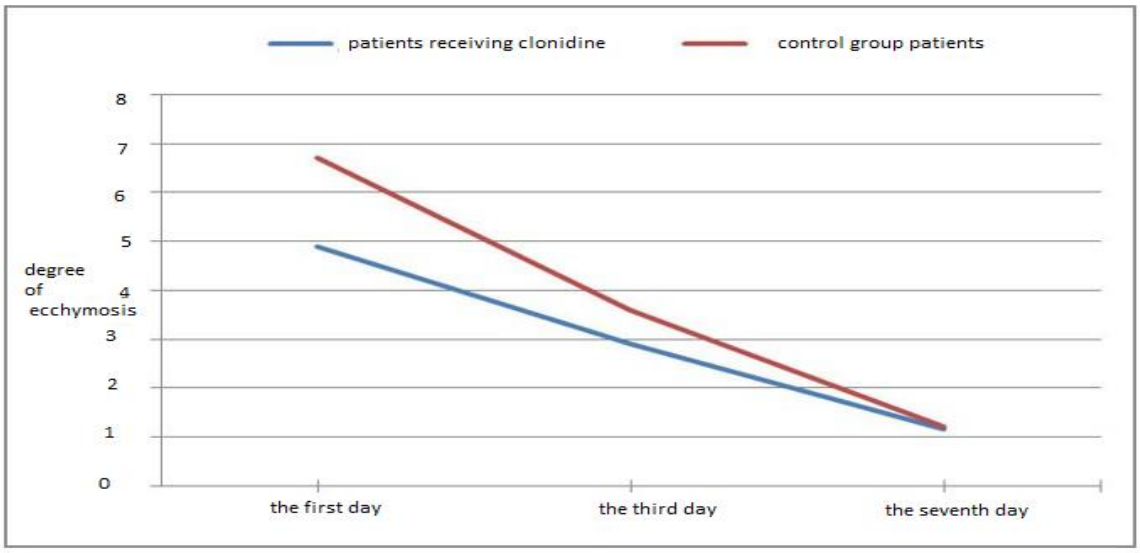

Figure 4. Comparison of Mean Ecchymosis in Clonidine and Control Groups

DISCUSSION

According to the results, there was no statistically significant difference in mean blood pressure between the groups at the measured time points ($P > 0.05$), although patients in the clonidine group tended to have slightly lower blood pressure. Previous studies have reported that clonidine, due to its alpha-2 agonist effects, can reduce blood pressure and prevent tachycardia, promoting patient relaxation and reducing anxiety. These findings are consistent with the trends observed in the present study, even though the differences were not statistically significant. Research in patients with normal blood pressure has shown that premedication with clonidine can prevent intubation-induced tachycardia while producing a greater drop in blood pressure compared to controls [7–

[9], aligning with our observations. Ghorbani et al. reported that oral clonidine reduces blood pressure, bleeding, and postoperative pain [10]. Similar effects on systolic and diastolic blood pressure following clonidine administration have been reported in studies by Hajimohammadi et al. [11], Mohseni et al. [12], and El Shal et al.[13], particularly regarding surgical blood loss.

Clonidine acts as a peripheral vasoconstrictor through its alpha-2 agonist properties [14], which appears to reduce nasal mucosal blood flow in animal models [15], thereby limiting bleeding while helping to modulate blood pressure. Beyond its vasoconstrictive effects, clonidine is recognized for stabilizing patient hemodynamics, whereas other vasoconstrictors, such as phenylephrine or epinephrine, tend to increase blood pressure [16,17]. In the present study, both pain scores and ecchymosis were significantly lower in the clonidine group on postoperative days one and three. This correlates with reduced analgesic requirements and prolonged pain-free periods. Clonidine, an imidazoline compound, has been used since the early 1980s as an adjuvant to local anesthetics and in certain peripheral and central anesthesia techniques [8,18,19], enhancing both sensory and motor block in some cases. It is a selective alpha-2 adrenergic agonist with weak alpha-1 activity, acting on both pre- and postsynaptic receptors [20]. Alpha-2 receptors are located on primary afferent terminals, superficial spinal neurons, and multiple brainstem nuclei; their activation mediates analgesia, indicating clonidine's effects at peripheral, spinal, and central levels.

When added to local anesthetics for peripheral nerve blocks, clonidine stimulates alpha receptors in vascular smooth muscle, causing localized vasoconstriction, reducing systemic drug absorption, prolonging postoperative analgesia, and enhancing block duration[14,15]. Clonidine also blocks conduction in C and A-gamma fibers and increases potassium conductance in isolated neurons, likely by inhibiting norepinephrine release from presynaptic alpha-2 receptors in peripheral tissues [21,22]. Bonisson et al. reported that combining clonidine with bupivacaine in pediatric surgery reduced pain, lowered blood pressure, and increased patient calmness [23]. Similar analgesic effects have been documented by Imani et al. [24], Seyed Hejazi et al.[25], Wawrzyniak et al.[8], and Tofoghi Rad et al.[26].

Postoperative swelling and ecchymosis are common complications after maxillofacial surgery. While no prior studies have directly examined clonidine's effect on ecchymosis, the present study indicates that clonidine reduces ecchymosis. This may result from decreased capillary dilation and permeability, reduced leukocyte adhesion to vessel walls, and diminished edema formation and leukocyte migration, ultimately lowering arachidonic acid derivative production[27,28]. These effects are similar to those of dexamethasone, although further studies are needed to confirm these mechanisms.

CONCLUSION

Considering its effects in lowering blood pressure, promoting patient calmness, and reducing both postoperative pain and ecchymosis in rhinoplasty, clonidine may be considered for further study and use in head and neck surgeries.

DECLARATIONS

Ethics approval and consent to participate
Not applicable
Conflicts Of Interests None

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