



## Investigation of the Relationship between Neutrophil/ Lymphocyte Ratio and Analgesic Consumption in Bimaxillary Orthognathic Surgery Patients<sup>#</sup>

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### Research Article

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### ABSTRACT

**Objectives:** Neutrophil to lymphocyte ratio; as an inexpensive, easily measurable, and repeatable laboratory parameter is an indicator of subclinical inflammation and is also a parameter that gives an idea about the systemic inflammatory response and cellular immune response. In general, lymphopenia reflects the weakness of cellular immunity, while neutrophilia is indicative of the response to systemic inflammation. The ratio of these two values to each other seems to be a marker showing the adequacy of the cellular immune response against this situation, despite the magnitude of systemic inflammation. This study aimed to investigate the relationship between preoperative neutrophil-lymphocyte ratio (NLR) and postoperative analgesic drug consumption.

**Materials and Methods:** Within the scope of the study, the files of 50 patients who underwent bimaxillary orthognathic surgery were retrospectively analysed. The preoperative NLR values of the patients and the need for the analgesic drugs in the first 24 hours and after 24 hours were recorded and correlated.

**Results:** 24% of the patients were girls, and 76% were boys. The average age was 20.54, and the average weight was 65.28 kg. There was a positive, strong, and significant correlation between the preoperative neutrophil count and preoperative NLR value and variables of analgesic drug consumption in the first 24 hours. There was a negative, strong and significant correlation between the preoperative lymphocyte count and the first 24-hour analgesic drug consumption variables.

**Conclusions:** It was concluded that patients with a preoperative NLR value of 2.11 and above might require four or more analgesics in the first 24 hours. Therefore, the NLR value can give preliminary information about the need for postoperative analgesia, and these values could be taken into account when developing a strategy for postoperative analgesia.

**Keywords:** Neutrophil-Lymphocyte Ratio, Orthognathic Surgery, Post-Operative Analgesic Drug Consumption.

## Bimaksiller Ortognatik Cerrahi Hastalarında NLO ve Analjezik Tüketimi Arasındaki İlişki<sup>#</sup>

#### Bilgi

#Bu çalışma 23-25 Kasım 2021 tarihleri arasında düzenlenen 'Sivas Cumhuriyet Üniversitesi 1. Uluslararası Diş Hekimliği Kongresi'nde sözlü bildiri olarak sunulmuştur.

\*Sorumlu yazar

#### Süreç

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#### Öz

**Amaç:** Nötrofil/lenfosit oranı; ucuz, kolay ölçülebilir ve tekrarlanabilir bir laboratuvar parametresi olarak subklinik inflamasyonun bir göstergesi ve aynı zamanda sistemik inflamatuvar yanıt ve hücrel immün yanıt hakkında fikir veren bir parametredir. Genel olarak, lenfopeni, hücrel bağışıklığın zayıflığını yansıtırken, nötrofil, sistemik inflamasyona yanıtın göstergesidir. Bu iki değer birbirine oranı, sistemik inflamasyonun büyüklüğüne karşın hücrel immün yanıtın bu duruma karşı yeterliliğini gösteren bir belirteç gibi görünmektedir. Bu çalışmada ameliyat öncesi nötrofil-lenfosit oranı (NLO) ile ameliyat sonrası analjezik tüketimi arasındaki ilişkiyi araştırmayı amaçladık. Gereç ve Yöntemler: Çalışma bimaksiller ortognatik cerrahi uygulanan 50 hastanın dosyalarının retrospektif olarak taranması yolu ile gerçekleştirildi. Hastaların ameliyat öncesi NLO değerleri ile ilk 24 saat ve 24 saat sonra analjezik ilaç ihtiyacı sayıları kaydedildi ve ilişkilendirildi. Bulgular: Hastaların %24'ü kız, %76'sı erkekti. Yaş ortalaması 20,54 ve ortalama ağırlık 65,28 kg idi. Preoperatif nötrofil sayısı ve NLO değeri ile ilk 24 saatte analjezik ilaç tüketimi değişkenleri arasında pozitif, güçlü ve anlamlı bir ilişki. Preoperatif lenfosit sayısı ile ilk 24 saatlik analjezik ilaç tüketimi değişkenleri arasında negatif, güçlü ve anlamlı bir korelasyon vardı. Sonuçlar: Preoperatif NLO değeri 2.11 ve üzerinde olan hastaların ilk 24 saat içinde 4 veya daha fazla analjezik ihtiyacı olabileceği, bu nedenle NLO değerinin postoperatif analjezi ihtiyacı hakkında ön bilgi verebileceği ve postoperatif analjezi için strateji geliştirilirken bu değerlerin dikkate alınabileceği sonucuna varıldı.

**Anahtar Kelimeler:** Anahtar Kelimeler: Nötrofil-Lenfosit Oranı, Ortognatik Cerrahi, Postoperatif Analjezik İlaç Tüketimi.

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## Introduction

The cells that make up the immune system consist of granulocyte-agranulocytes and lymphocytes, gathered under the common name of "leukocyte." While granulocyte-agranulocytes are classified within the "natural immune system"; Lymphocytes are included in the "acquired immune system" because they must first recognize the target molecule or pathogen and synthesize some molecules specialized for this target to fulfill their duties. Granulocyte-agranulocyte cells; includes neutrophils, eosinophils, basophils, mast cells, dendritic cells, monocyte-macrophages, and phagocytes. On the other hand, Lymphocytes consist of natural killer cells and specialized cells under "T" and "B" lymphocyte groups.

Neutrophil/lymphocyte ratio (NLR) is an indicator calculated using the neutrophil and lymphocyte values in the whole blood test, and its popularity is increasing day by day. NLR value; As an inexpensive, easily measurable, and reproducible laboratory parameter, it is an indicator of subclinical inflammation and a parameter that gives an idea about the systemic inflammatory response and cellular immune response. In general, lymphopenia reflects the weakness of cellular immunity, while neutrophilia indicates the response to systemic inflammation. The ratio of these two values to each other seems to indicate the adequacy of the cellular immune response despite the magnitude of systemic inflammation.<sup>1-4</sup> In some recent studies, it has been found that NLR can be used to calculate the morbidity and mortality that may occur in some medical interventions such as angiography or appendectomy and to predict the prognosis in some cancer types.<sup>5,6</sup>

Orthognathic surgery is used to correct facial skeletal anomalies and relieve cosmetic concerns.<sup>7</sup> Orthognathic surgery has many advantages, including improved chewing performance and facial aesthetics and reduced temporomandibular joint symptoms.<sup>8-10</sup> Despite the benefits of orthognathic surgery, bimaxillary surgery produces strong pain stimuli.<sup>11</sup> During LeFort I osteotomy and sagittal split ramus osteotomies, the use of electric cautery, saws, drills, milling cutters, chisels, and separators are the leading causes of strong pain signals. Bimaxillary surgery has the highest postoperative pain score compared with other oral and maxillofacial operations.<sup>12</sup>

This study aimed to investigate the relationship between preoperative Neutrophil-lymphocyte ratio (NLR) and postoperative analgesic consumption.

## Materials and Methods

The study, which was designed retrospectively, was carried out after obtaining approval from Erciyes University Faculty of Dentistry (2018/316). The study was carried out by retrospectively scanning the files of 50 patients who underwent bimaxillary surgery in the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Erciyes University. Preoperative Neutrophil

and lymphocyte values of the patients and NLR values obtained were recorded together with demographic data. In addition, the analgesic needs of the patients in the first 24 hours and after the 24 hours and the number of analgesic drugs administered accordingly were recorded. Analyses were conducted using TURCOSA (Turcosa Analytics Ltd. Co., Turkey, www.turcosa.com.tr). A p-value of less than 0.05% was considered statistically significant.

## Results

24% of the patients were female, and 76% were male. The mean age was 20.54 years, and the mean weight was 65.28 kg. There was a positive, strong, and statistically significant correlation between the preoperative neutrophil count and preoperative NLR value and the variables of analgesic consumption in the first 24 hours ( $r=0.6814$ ,  $p<0.001$  and  $r=0.6148$ ,  $p<0.001$ , respectively) (Figure 1). There was a negative, strong, and statistically significant correlation between the preoperative lymphocyte count and the variables of analgesic consumption in the first 24 hours ( $r=-0.6773$ ,  $p<0.001$ ).

There was a positive, strong, and statistically significant correlation between the NLR value and the variables of analgesic consumption in the first 24 hours. ( $r=0.6814$ ,  $p<0.001$  and  $r=0.6148$ ,  $p<0.001$ , respectively)

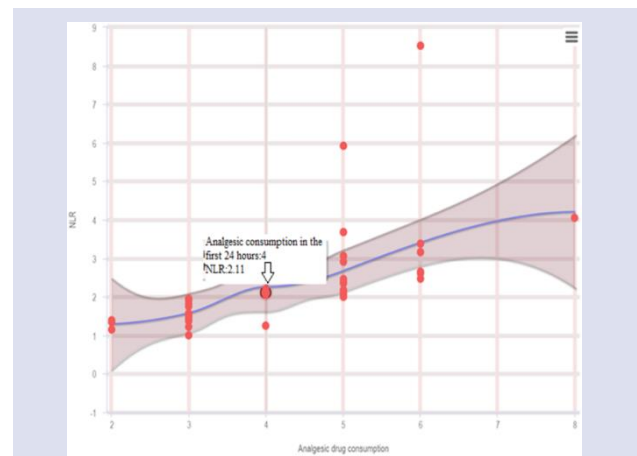


Figure.1 Correlation between the NLR value and the variables of analgesic consumption in the first 24 hours.

## Discussion

Our study found that patients with a preoperative NLR value of 2.11 and above may need analgesics four times or more in the first 24 hours, and NLR values calculated preoperatively can give preliminary information about the need for postoperative analgesia.

The history of studies showing that NLR can be a prognostic marker in many disease groups mainly dates back to about ten years ago.

Especially in the oncological field, many studies have been conducted for prognostic and surveillance. In addition, it has been used as a risk indicator in many

studies such as estimation of pulmonary embolism mortality, estimation of stone size in patients with nephrolithiasis, and risk of subarachnoid hemorrhage development in patients with migraine and headache.<sup>13,14,7</sup>

In the literature, it is noteworthy that the number of studies investigating the relationship between NLR and mortality in the cardiovascular and oncology fields is relatively high. In addition, the number of studies investigating the relationship between NLR and postoperative pain or analgesic consumption is relatively few.

The relationship between NLR and postoperative pain or analgesic consumption was investigated in the studies which were conducted by Öner *et al.*, Daoudia *et al.*, Bozkurt *et al.* The NLR cut-off value found in these studies was found to be approximately 2, similar to our research, and it was concluded that an increase in postoperative pain or analgesic consumption would be expected above this value.<sup>15-17</sup>

In a previous study, researchers investigated the relationship between NLR and postoperative pain in patients who underwent orthognathic surgery. As a result, they reported that postoperative analgesic requirements were higher in patients with preoperative NLR  $\geq 2$ .<sup>18</sup> In our study, it was concluded that patients with a preoperative NLR value of 2.11 and above required more analgesics in the first 24 hours, which was consistent with this previous study. Another study on NLR and analgesic consumption concluded that preoperative NLR values should be calculated because of their simplicity, they should be recorded in clinical practice, and effective regional analgesia methods should be preferred in patients with high NLR.<sup>19</sup>

## Conclusions

It was concluded that patients with a preoperative NLR value of 2.11 and above might need analgesics four times or more in the first 24 hours; therefore, preoperative Neutrophil, lymphocyte, and NLR values can give preliminary information about the postoperative analgesic requirement, and these values can be taken into account when developing a strategy for postoperative analgesia. Further studies with a larger number of patients are needed on the relationship between NLR and analgesic consumption.

## Conflict of Interest

The authors declared no conflict of interests.

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