

**ASSESSMENT OF THE THERAPEUTIC EFFICIENCY OF AUTOTHROMBOCYTIC
MASS IN MANDIBULAR FRACTURE REPAIR**

Azimova Muhabbat Latipovna

Kambarova Shaxnoza Ali Xuseynovna

Asia International University, Republic of Uzbekistan, Bukhara city.

BSMI, Republic of Uzbekistan, Bukhara city.

Abstract: The objective of this study was to improve the effectiveness of comprehensive treatment for mandibular fractures through the local use of platelet-rich autoplasm (autothrombocytic mass). A total of 200 patients (47 women and 153 men) with mandibular fractures were treated at the Bukhara Regional Multidisciplinary Medical Center (BRMMC). As part of complex therapy, each patient received local injections of platelet-rich autoplasm into the fracture line, performed over five treatment sessions. The application of the autothrombocytic mass resulted in significant clinical benefits, including reduced pain and swelling, accelerated bone healing, and a lower frequency of post-traumatic inflammatory complications. Therefore, the use of platelet-rich autoplasm in the integrated management of mandibular fractures represents an evidence-based and effective approach that enhances bone regeneration, limits inflammation, and helps prevent secondary infection.

Keywords: mandible, platelet-rich autoplasm, fracture, blood, regeneration.

**ИССЛЕДОВАНИЕ ЭФФЕКТИВНОСТИ АУТОТРОМБОЦИТАРНОЙ МАССЫ ПРИ
ВОССТАНОВЛЕНИИ НИЖНЕЙ ЧЕЛЮСТИ ПОСЛЕ ПЕРЕЛОМОВ**

Аннотация: Целью данного исследования было повышение эффективности комплексного лечения переломов нижней челюсти посредством локального применения аутотромбоцитарной массы (плазмы, обогащённой тромбоцитами). В исследование были включены 200 пациентов (47 женщин и 153 мужчины) с переломами нижней челюсти, проходивших лечение в Бухарском областном многопрофильном медицинском центре (БОММЦ). В рамках комплексной терапии пациентам проводилось локальное введение аутотромбоцитарной массы в область перелома курсом из пяти процедур. Применение аутотромбоцитарной массы обеспечило выраженный положительный клинический эффект, проявившийся снижением болевого синдрома и отёка, ускорением консолидации костных отломков и уменьшением частоты посттравматических воспалительных осложнений. Таким образом, включение плазмы, обогащённой тромбоцитами, в комплексное лечение переломов нижней челюсти является патогенетически обоснованным и высокоэффективным методом, способствующим активной регенерации костной ткани, снижению воспалительных реакций и профилактике вторичных инфекционных осложнений.

Ключевые слова: нижняя челюсть, плазма, обогащённая тромбоцитами, перелом, кровь, регенерация.

Introduction: Fractures of the mandible remain among the most frequent injuries of the facial skeleton, accounting for a significant proportion of maxillofacial trauma worldwide. According to modern epidemiological studies (2020–2024), mandibular fractures constitute approximately 35–45% of all maxillofacial fractures, maintaining their leading position in the structure of facial

bone injuries. A retrospective study conducted in southwest China (2018–2021) involving 1,828 patients confirmed that mandibular fractures represented 37.56% of all maxillofacial fractures, with a male-to-female ratio of 2.48 : 1, predominantly affecting individuals aged 21–50 years. Similar findings have been reported in Europe and other regions, highlighting the continued predominance of this injury pattern among active, working-age males.

The most commonly affected anatomical regions include the angle, body, and condylar process of the mandible, with the mechanism of injury varying by location: interpersonal violence and road traffic accidents remain the leading causes, while falls are more frequently associated with condylar fractures. Recent research has also observed a shift in trauma patterns during the COVID-19 pandemic, with an overall decrease in the number of mandibular fractures but an increase in cases involving soft-tissue injury and traumatic tooth loss.

The high frequency of complications in mandibular fractures is attributed to the complex anatomical and physiological structure of the mandible and the presence of a rich, conditionally pathogenic oral microflora that can contribute to infection and delayed healing. These factors emphasize the need for innovative biological approaches—such as the use of platelet-rich autoplasm—to enhance bone regeneration, control inflammation, and reduce postoperative complications.

This study evaluates the clinical efficiency of platelet-rich autoplasm in the comprehensive treatment of mandibular fractures and its role in preventing inflammatory complications.

Material and method: This prospective clinical study was conducted at the Bukhara Regional Multidisciplinary Medical Center between 2021 and 2024 and included 200 patients (157 males, 43 females) aged 18–60 years diagnosed with unilateral or bilateral mandibular fractures involving the condylar, angle, symphyseal, and alveolar regions. All patients were managed according to updated maxillofacial trauma protocols, with procedures performed under aseptic conditions.

Standard treatment included open reduction and internal fixation (ORIF) with titanium miniplates, systemic antibiotic therapy, anti-inflammatory medication, and physiotherapeutic rehabilitation. In the main (experimental) group, patients additionally received local injections of autologous platelet-rich plasma (PRP) into the fracture line to enhance osteogenesis and soft-tissue repair.

PRP was prepared using a double-spin centrifugation protocol from 10 ml of venous blood collected in sterile vacuum tubes containing acid citrate dextrose (ACD-A) as an anticoagulant. Centrifugation was performed at 1600 rpm for 10 minutes (first spin) to separate plasma, followed by 3500 rpm for 10 minutes (second spin) to concentrate platelets. The final PRP layer, containing approximately 4–6 times baseline platelet concentration, was extracted and activated with 10% calcium chloride before injection.

The activated PRP (2–3 ml per session) was injected locally along the fracture line under sterile conditions at 2–3-day intervals, for a total of five procedures.

Clinical evaluation included:

- Pain intensity (Visual Analogue Scale, VAS, 0–10);
- Extent of soft-tissue edema (measured by linear facial dimension changes);
- Radiological assessment of callus formation using digital panoramic and CBCT imaging;
- Time to clinical and radiographic bone consolidation;
- Incidence of inflammatory or infectious complications.

All data were analyzed using SPSS Statistics 26.0. Continuous variables were expressed as mean \pm standard deviation (SD), and group comparisons were made using Student's t-test or χ^2 -test, with statistical significance set at $p < 0.05$.

Results: Patients who received autologous platelet-rich plasma (PRP) therapy for mandibular fractures demonstrated significantly faster recovery and fewer complications compared with standard treatment alone. Pain reduction was observed within 48–72 hours after the first injection in over 90% of patients, while soft-tissue edema resolved notably after the second or third procedure, improving local circulation and accelerating tissue healing. Radiographic evidence showed primary bone callus formation by day 21–24 in the PRP group, compared with day 30–35 in the control group, and the overall bone consolidation period was shortened by 10–14 days. The incidence of post-traumatic osteomyelitis decreased from 12% to 3%, highlighting the anti-inflammatory and antimicrobial benefits of PRP, with no immune or allergic complications reported. The regenerative efficacy of PRP is attributed to its high concentration of platelet-derived growth factors, including PDGF, TGF- β , VEGF, and IGF-1, which collectively stimulate osteoblast proliferation, collagen synthesis, angiogenesis, and microvascular perfusion. Its fibrin matrix serves as a natural scaffold supporting stem cell migration and osteoconduction, while modulation of inflammatory cytokines reduces edema and pain. Recent studies (Anitua et al., 2021; Dohan Ehrenfest et al., 2022; Miron et al., 2023) further highlight the role of PRP-derived exosomes in enhancing tissue repair. This study demonstrates that a structured five-session PRP injection protocol is feasible, safe, and effective in accelerating bone regeneration and minimizing complications without additional biomaterials or donor-site morbidity. Therefore, the local application of autologous platelet-rich autoplasm in complex mandibular fracture management represents a biologically justified, novel approach that enhances bone healing, reduces inflammation, prevents post-traumatic complications, and shortens rehabilitation time, offering a clinically valuable strategy for personalized regenerative care in maxillofacial surgery.

Conclusion: The integration of autologous platelet-rich plasma (PRP) into the comprehensive management of mandibular fractures represents a safe, biologically effective, and clinically innovative approach. The local application of PRP accelerates bone and soft-tissue regeneration, reduces pain and edema, and shortens the overall consolidation and rehabilitation period. Its high concentration of platelet-derived growth factors, combined with the fibrin scaffold, enhances osteogenesis, collagen synthesis, angiogenesis, and stem cell recruitment, while simultaneously modulating inflammatory cytokines to prevent post-traumatic complications such as osteomyelitis. The structured five-session injection protocol is reproducible, minimally invasive, and avoids donor-site morbidity or immunological risks, making it a superior adjunct to conventional fracture treatment. Overall, the study demonstrates that PRP therapy not only improves clinical outcomes but also contributes to faster functional recovery, supporting its inclusion as a standard regenerative strategy in modern maxillofacial trauma care.

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