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THE USE OF PLATELET-RICH PLASMA AND THEIR ROLE IN SURGICAL DENTISTRY

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Abstract: Currently, among the causes of death and disability in Uzbekistan, injuries have come in second place, second only to cardiovascular diseases. Injuries to the maxillofacial region account for up to 8% of all traumatic human diseases. Various osteosuppressive materials are widely used in modern reconstructive surgery of the maxillofacial region and dental implantology. These materials are used to replace bone defects, reconstruct the facial skeleton, etc. All osteosuppressive materials are used to repair a bone defect by regeneration, but not by repair. The efficiency of regeneration directly depends on the type of material used. The review examines the latest literature data on the use of plasmogel in the treatment of injuries and fractures of the mandible. The presented literature review shows the possibilities of using platelet-enriched plasmogel in fractures of the mandible to stimulate osteogenesis, which is a modern additional tool in the doctor's arsenal that positively affects osteogenesis and additionally stimulates the regenerative abilities of tissues.

Key words: plasma, osteogenesis, platelet-rich plasmogel, (PRP-factors)

Injuries to the facial skeleton with fractures of the lower jaw range from 70 to 85% according to domestic and foreign literature (Magradze T.N. et al., 2013; Solodkiy V., Ovechkina M.; Lee J, Jang N., Park 8,2019).The incidence of post-traumatic complications varies, according to the literature, from 7% to 36% (Eshiev A.M., 2013).The treatment of fractures of the mandible is in the field of study of maxillofacial surgeons from around the world, since this problem involves restoring the lost shape and function of the maxillofacial region as soon as possible. This situation encourages researchers to continue studying the processes of reparative regeneration, develop new methods of osteosynthesis, and look for new ways of drug and non-drug effects to optimize bone repair. The use of platelet autologous plasma in the practice of surgical dentistry in the treatment of mandibular fractures is considered as a method of targeted stimulation of regenerative processes, providing both the possibility of intervention only on soft tissues, and intervention simultaneously on soft and hard tissues, given that the possibilities of operations on hard tissues are bone structures, without disruption of soft tissue structures. The reason for the use of auto plasma with platelets was the discovery that platelets contain protein factors (PRP-factors) that initialize the cellular regenerative process. In the treatment of fractures of the mandible with a bone defect and their complications, some (R.R. Akhmerov(2014)) The authors used platelet-rich plasma (BoTP) in its pure form or in combination with osteoplastic materials to fill in the defect, which reduces the likelihood of inflammatory complications (by 3-4%), reduces treatment and rehabilitation time (by 7-8 days) by creating optimal conditions for fracture healing. In the work of the authors (Solodky V., Ovechkina M. 2016) describes the method of obtaining and using native plasma, as well as recommendations on approximate regimens for the administration of platelet autologous plasma in dentistry. Several typical clinical cases of using the technique in the treatment of patients in surgical practice to achieve the predicted result-wound healing and graft engraftment are presented. The technology was developed by R.R. Akhmerov (2014) at the beginning of the XXI century on the basis of autologous plasma. And if native plasma is

used mainly when working only on soft tissues and for prevention purposes both once and in courses, then when working on hard tissues, in addition to the above, extempore derivatives of platelet autologous plasma (TAL) are used - having osteoconductive properties of plasmogels and plasmomembranes. During the manufacture of plasmogel and plasmomembranes, the clinical situation is taken into account. Depending on the need, the plasmogel can be made of a thicker consistency and a certain amount of auto-, allo-, xeno- or synthetic bone plastic materials-additives can be added to it. Plasma membranes can also be manufactured with different properties and sizes - thin and thick, with and without the addition of plasmogel, as well as with the inclusion of various additives in the form of bone-plastic materials. Using Plasmolifting™ technology, a variety of materials are used that contribute not only to the speedy healing of the wound, but also to the restoration of tissue volumes. In order to enhance the regeneration of periodontal tissues, a wide range of therapeutic and surgical treatment methods have been used over the past decades using various drugs and biocompatible osteoinductive materials. Efficiency, safety and minimally invasive are the main requirements for modern technologies in surgical dentistry. A special place in the treatment of patients with fractures of the mandible is occupied by intraosseous osteosynthesis. The unsatisfactory results of intraosseous osteosynthesis are characterized by loosening of osteofixer implants in the bone, a decrease in the stability of osteosynthesis in external fixation devices, the absence of bioinert electrochemical properties in fixators, which leads to a change in deformation-dynamic electropotentials, a violation of optimal osteogenesis at the bone-fixator boundary and bone destruction. One of the first to use human blood plasma was Robert Marx and co-authors in the late 80s (18). The technology of making platelet gel from plasma has been proposed mainly for dentists. Robert Marks notes that in order to release platelets from native blood, the centrifuge must work in two stages. At the first stage, red blood cells are separated from plasma and white blood cells with platelets. At the second stage, the final separation of plasma, leukocytes and platelets with a small number of red blood cells into BOTP plasma with bad platelets takes place.

With one-step blood separation, no real BoTP is formed. Instead, a mixture of platelet-rich and platelet-poor plasma with a very low platelet concentration is formed. Regardless of the rotation speed of the centrifuge and the centrifugation of erythrocytes, platelet separation at one stage is impossible. The authors evaluated the effectiveness of platelet-containing plasma in eliminating mandibular defects with a length of 5 cm or more after tumor resection. As a result of the study, scientists have proven accelerated bone formation and its better structural organization when using plasma containing platelets. Other authors (Gulyaeva O. A., 2017) used platelet autoplasm in the area of the wells of the extracted teeth. It was found that in those wells that were filled with plasma, there was an early epithelialization of the wound and a larger volume of better organized bone. Italian scientists (Simonpieri A., DelCorso M., Vervelle A., Jimbo R., 2012) consider platelet concentrations for surgical use in regenerative medicine, including maxillofacial surgery. The authors describe and discuss the currently published knowledge on the use of various forms of platelet-rich plasma (PRP) in bone transplantation, implants and reconstructive surgery - Pure platelet-rich plasma (P-PRP) or platelet-rich and leukocyte-rich blood plasma (L-PRP), platelet-rich fibrin (PRF) with subspecies. PRP and PRF are used during implant placement (in particular, as a surface treatment to stimulate osseointegration), in the treatment of periimplant bone defects, sinus lifting procedures and various complex implants. Other potential applications of platelet concentrates using bisphosphonates, anticoagulants are also used in maxillofacial reconstructive surgery, including fractures of the mandible. The authors show the prospect of using L-PRF (leukocytes and platelets rich in fibrin) clots and membranes during regeneration of periimplant bone defects, during the procedure of sinus lift and subcutaneous implants. Zhou J., Li X, Sun X (2018) consider the problems associated with simultaneous placement of implants in the molar region. Platelet-rich fibrin (PRF), a second-generation platelet concentrate, is an autologous fibrin matrix and contains platelets, growth factors and leukocytes. It is used for tissue healing and regeneration in periodontal, oral and maxillofacial surgery. Scientists report two cases of

simultaneous implantation of molars with autologous PRF to improve and accelerate tissue healing. In the first case, the patient was a 38-year-old woman with mastitis discomfort. The second patient is a 43-year-old man with a requirement to restore the left lower molar. During the clinical and radiographic examination, the patient in the first case was diagnosed with a vertical fracture of the crown of the right first molar. In the second case, the remaining root of 36 teeth was determined using cone-beam computed tomography and clinical examination. These two patients underwent dental extraction with simultaneous implant replacement and with the introduction of autologous fibrin PRF.In the first case, the gap between the implant surface and the walls of the well of the removed tooth was filled with PRF mixed with osteoplastic material and closed with two PRF coverage membranes for protection. In the second case, PRF was used as the only bone substitute for the material placed by the implant and the wall of the hole just removed from the tooth. As a result, both patients had successful osseointegration and restoration of the gum with optimal shape and function.The results showed that PRF can serve as a bone defect replacement, or can be combined with a xenograft when bone defects are immediately placed on implants, while excellent biocompatibility and good healing of soft and hard tissues are demonstrated. Samara scientists Samutkina M.G., Savelyev A.L. (2011) (15) proposed a set of measures aimed at forming an individual approach to the treatment of patients with fractures of the mandible, including osteosynthesis of the mandible with titanium individual miniplates, ozone therapy and various methods of physiotherapy in complex treatment. The authors have developed a set of measures aimed at forming an individual approach to the treatment of patients with fractures of the mandible using platelet-rich plasma to increase the osseointegration of the jaw bones. Castillo-Cardiel G., Medina-Quintana V.M. (2017) (18) share their experience of successful treatment of 20 patients with mandibular fractures. Patients of the experimental group (n = 10) were injected with platelet-rich plasma to reduce the time for fracture treatment, and patients of the control group (n = 10) were treated surgically without plasma. Radiological evaluation was performed before treatment

and one and 3 months after surgery. X-rays were digitized to analyze the intensity and density of bone regeneration. The bone regeneration time was 3.7 ± 0.48 and 4.5 ± 0.52 weeks, respectively ($p<0.002$). There were no complications in patients. When using platelet-rich plasma, the intensity and density of bone tissue at the fracture site significantly increased, and the timing of bone regeneration accelerated. The technology of gel production from platelet-enriched plasma was proposed mainly for dentists (Harvest Company, USA). Other researchers have used platelet-rich plasma (gel form) in the area of the wells of extracted teeth. After analyzing the data, it was found that the wells that were filled with gel-shaped autoplasm, the growth of the formed bone was better and in a shorter time, the epithelization of the wound also proceeded faster. When using autoplasm in the form of a gel after replacement of a bone defect, the bone was 2 times more mature than in the control group when observing patients for 2, 4, 6 months. The use of platelet autoplasm today represents one of the few opportunities to launch and accelerate natural regeneration mechanisms due to the growth factors contained in platelets. In addition, it is non-toxic and non-immunoreactive. The production of autoplasm involves the separation of plasma and platelets from erythrocytes both by density gradient and using specialized laboratory filters (Miklyaev S.V. et al., 2018). In Daif E.T. (2013) (17), the aim of the study was to evaluate the effect of autologous platelet-rich plasma (PRP) on bone regeneration in mandibular fractures using cone beam computed tomography. In the study of Yarovaya S., and co-authors (2013) (14), an analysis of the results of surgical treatment of defects in the alveolar processes of the upper jaw and the bottom of the nasal cavity after cheilo- and uranoplasty operations using platelet-enriched auto plasma is presented. This biological material was used in the form of a platelet clot and a biological platelet membrane to create an element of mechanical protection of the graft and the introduction of additional osteoinductive material. The basis for the use of platelet-enriched blood plasma was the influence of platelet growth factors and plasma clot formation products on the healing and hemostasis processes. It has been established that the use of this biotechnological technique stimulates

rapid and complete wound healing in the immediate postoperative period, mechanically protects the body of the autograft, helps to preserve the volume of the transplanted bone and ensures a stable end result of bone grafting. Trifanenko S.I., Prodan M.P. (2012) (12) BoTP was used in the treatment of mandibular fractures with a complicated course. An anti-vibration centrifuge "Hettig" (Germany) is used to manufacture the BoTP. Blood was taken from the peripheral vein in a volume of 20-40 ml. The first centrifugation was carried out for 10 minutes at a speed of 1000 rpm (95D). Using a syringe and a 65 mm long needle, a straw-yellow layer was selected, which was transferred to a clean test 300 without anticoagulant. The plasma separation was completed, reaching the level of red blood cells. In addition, the plasma tubes were re-centrifuged for 10 minutes at 1500 rpm (145 D). Activation was due to the mixing of BoTPs with a calcium-thrombin complex. As a result, the BoTP was inserted into the fracture line. The appearance of fracture stabilization was observed at the level of 23.7± 1.7 days, while in the control group this indicator was 27.3±1.9 days. Platelet-rich blood plasma is an effective drug, both in its pure form and in combination with other synthetic or biological drugs, which can also be used to accelerate the epithelialization of soft tissue wounds.

References:

1. Douketis J.D., Berger P.B., Dunn A.S. et al. The perioperative management of antithrombotic therapy // American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition). Chest. 2008. Vol. 133(6). P. 299S—339S.
2. Jimenez Y., Poveda R., Gavalda C. et al. An update on the management of anticoagulated patients programmed for dental extractions and surgery // Med. Oral Patol. Oral Cir. Bucal. 2008. Vol. 13(3). P. E176—179.

3. Johnson-Leong C., Rada R.E. The use of low-molecular-weight heparins in outpatient oral surgery for patients receiving anticoagulation therapy // J Am Dent Assoc. 2002. Vol. 133. P. 1083—1087.

4. Morimoto Y., Niwa H., Minematsu K. Risk factors affecting postoperative hemorrhage after tooth extraction in patients receiving oral antithrombotic therapy // J Oral Maxillofac Surg. 2011. Vol. 69. P. 1550—1556.

5. Rada R.E. Management of the dental patient on anticoagulant medication // Dent. Today. 2006. Vol. 25(8). P. 58—63.

6. Frank CS, Sweta BS, Meetu RK, Bekir K, Syngcuk K. Outcome of endodontic surgery: a meta analysis of the literature – part I: comparison of traditional root end surgery and endodontic microsurgery. JOE. 2010 Nov;36(11):1757–65.

7. Guerini VA. History of dentistry. Philadelphia: Lea and Febiger; 1909. p. 117.

8. Franco PB, Karlis V. In: Kademani D, Tiwana PS, editors. Apicoectomy in atlas of oral and maxillofacial surgery. St. Louis, MO: Elsevier; 2016.

9. Gutmann JL, Harrison JW. Surgical endodontics. St. Louis, MO: Ishiyaku euro America; 1994. 5. Quality assurance guidelines. Chicago: American Association of Endodontists; 1987, p. 1–27.

10. Simsek-Kaya G, Saruhan N, Yapia-Yavuz G, Ertas U. A decision analysis for periapical surgery: retrospective study. J Clin Exp Dent. 2018 Sep;10(9):e914–20.

11. El-Swiah JM, Walker RT. Reasons for apicoectomies: a retrospective study. Endod Dent Trauma. 1996;12:185–91

12. Фуркатов, Ш., Хайдаркулов, И., Нарзиев, И., & Аъзамкулов, А. (2024). ВЛИЯНИЕ КУРЕНИЯ НА ЗДОРОВЬЕ ПАРОДОНТА: ОСВЕДОМЛЕННОСТЬ ПАЦИЕНТОВ МЕДИЦИНСКОГО КОЛЛЕДЖА АБУ АЛИ ИБН СИНО. *SAMARALI TA'LIM VA BARQAROR INNOVATSIYALAR JURNALI*, *1*(6), 574-581.

13. Akmal o'g'li J. E., Umar o'g'li B. X. The Use of a Composite Synthetic Osteoplastic Substitute to Increase the Volume of the Alveolar Bone of the Jaws Before Dental Implantation //Research Journal of Trauma and Disability Studies. – 2024. – Т. 3. – №. 2. – С. 358-362.

14. Furkatov S. F., Khazratov A. I. THE CONSEQUENCES OF THE DILIGENCE OF THE SLAVIC EMOLLIENT FOR REPARATION PROSTHESES ASEPT PARODONTAL //Молодежный инновационный вестник. – 2023. – Т. 12. – №. S2. – С. 467-470.

15. Исматов Ф. А., Мустафоев А. А., Фуркатов Ш. Ф. АНАЛИЗ ЭФФЕКТИВНОСТИ НЕСТЕРОИДНЫХ АНТИВОСПОЛИТЕЛЬНЫХ ПРЕПАРАТОВ ПРИ ИЗЛЕЧЕНЬЕ ВЕРХНЕЧЕЛЮСТНОГО АЛЬВЕОЛИТА //THEORY AND ANALYTICAL ASPECTS OF RECENT RESEARCH. – 2023. – Т. 1. – №. 12. – С. 49-57.

16. Rizaev, J. A., Khazratov, A. I., Furkatov Sh, F., Muxtorov, A. A., & Ziyadullaeva, M. S. (2023). Clinical and radiological characteristics of periodontic interweaves in patients with chew recessional. *European Journal of Interdisciplinary Research and Development*, *11*, 36-41.

17. Фуркатов Ш. Ф., Хатамова М. А. ПРИМЕНЕНИЯ ВРЕМЕННЫХ НЕСЪЕМНЫХ ЗУБНЫХ ПРОТЕЗОВ ПРИ ДЕНТАЛЬНОЙ ИМПЛАНТАЦИИ //АКТУАЛЬНЫЕ ВОПРОСЫ СТОМАТОЛОГИИ. – 2023. – С. 814-820.

18. Rizaev, J. A., Rustamova, D. A., Khazratov, A. I., & Furkatov, S. F. (2022). The need of patients with systemic vasculitis and coronavirus infection in the treatment of periodontal diseases. *Applied Information Aspects of Medicine (Prikladnye informacionnye aspekty mediciny)*, *25*(4), 40-45.

19. Bekmuratov L. R. et al. Cardiovascular diseases in patients with diabetes mellitus //Ta'lim va rivojlanish tahlili onlayn ilmiy jurnali. – 2023. – Т. 3. – №. 1. – С. 193-198.

20. Akmal o'g'li J. E., Umar o'g'li B. X. Radiation Research Methods as a Criterion For Assessing the Quality of Osteoregenerative After Sinus Lift //Best Journal of Innovation in Science, Research and Development. – 2024. – Т. 3. – №. 2. – С. 920-923.

21. Исхакова, З. Ш., Исхакова, Ф. Ш., Нарзиева, Д. Б., Абдуллаев, Т. З., & Фуркатов, Ш. Ф. (2023). Использование остеогенного материала для замещения полостных дефектов челюстей. *Formation of psychology and pedagogy as interdisciplinary sciences*, *2*(15), 43-48.

22. Ризаев Э. А., Даврон Б. Ж. DENTAL IMPLANTATSIYADAGI MORFOLOGIK TASVIRNI O'RGANISH //ЖУРНАЛ СТОМАТОЛОГИИ И КРАНИОФАЦИАЛЬНЫХ ИССЛЕДОВАНИЙ. – 2023. – Т. 4. – №. 2.

23. Даврон, Б. Ж., & Ризаев, Э. А. (2023). JAG 'LAR SUYAK TO 'QIMASINING ATROFIYASI SHAROITIDA SUYAKNING YO 'NALTIRILGAN REGENERATSIYASINI OPTIMALLASHTIRISH. *ЖУРНАЛ СТОМАТОЛОГИИ И КРАНИОФАЦИАЛЬНЫХ ИССЛЕДОВАНИЙ*, *4*(4).

24. Бузрукзода, Ж. Д., Кубаев, А. С., Абдуллаев, А. С., & Шавкатов, П. Х. (2021). Устранение перфорации дна верхнечелюстного синуса с применением остеопластического материала. *Интернаука*, (7-1), 25-27.