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General Classification and Modern Approaches to the Process of Reparative Regeneration After Surgical Treatment of Diaphyseal Fractures of The Tibia

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Abstract: *Fractures of the diaphyseal femur are the most common (30.3–61%) and occupy an important place among all fractures. Most patients in this group are people of working age. Despite the optimization of surgical treatment of diaphyseal comminuted fractures of the femur, unsatisfactory treatment results (up to 25%) and the use of various surgical methods and methods of stimulating reparative regeneration in this type of fracture cause disability (up to 30%). Minimally invasive endoscopic surgical techniques have significantly reduced the costs and complications of treatment. There are many types of surgical treatment for diaphyseal comminuted fractures of the tibia. Currently, many authors prefer blocking intramedullary osteosynthesis (BIOS) over surgical treatment.*

Keywords: Diaphyseal fractures, Tibia, Reparative regeneration, Osteosynthesis, Platelet-rich plasma (PRP), Bone healing, Ilizarov apparatus.

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Introduction

Fractures of the diaphyseal femur are the most common (30.3–61%) and occupy an important place among all fractures. Most patients in this group are people of working age. Despite the optimization of surgical treatment of diaphyseal comminuted fractures of the femur, unsatisfactory treatment results (up to 25%) and the use of various surgical methods and methods of stimulating reparative regeneration in this type of fracture cause disability (up to 30%). Minimally invasive endoscopic surgical techniques have significantly reduced the costs and complications of treatment. There are many types of surgical treatment for diaphyseal comminuted fractures of the tibia. Currently, many authors prefer blocking intramedullary osteosynthesis (BIOS) over surgical treatment.

Today, the use of innovative technological modern implants such as BIOS and Ilizarov apparatus is considered insufficient for the complete restoration of bone tissue in fracture defects. At different times, various authors have proposed their own methods for filling bone tissue defects. All of the above types of trauma lead to high-level damage to tissues and organs, which leads to complications such as slow consolidation of fractures, bone defects, and pseudoarthrosis. Severe injuries of this type are manifested by prolonged healing time and various traumatic diseases. The combined use of minimally invasive endoscopic surgical methods with osteogenesis-stimulating methods has significantly reduced the rate of complications, treatment costs, and problems [2.4.6.8.10].

In recent years, blocking intramedullary osteosynthesis has been increasingly used in diaphyseal comminuted fractures of the tibia. This method is preferable for many injuries due to the small trauma and minimal blood loss during the procedure. This ensures the normal course of the osteogenesis process. Unfortunately, despite the fact that this method is also a minimally invasive and improved method, the rate of complications remains high. For this reason, after surgical treatment, the main attention is paid to the fact that in comminuted fractures, the blood circulation between the bone fragments is disturbed, which leads to the proliferation of dead cells due to the lack of oxygen and nutrients, and the use of improved methods to rehabilitate these cells, improve local blood circulation, and stimulate reparative regeneration.

Today, despite the use of innovative technological modern implants, modern surgical methods BIOS and Ilizarov devices, it confirmed the relevance of the problem of osteogenesis in the complete restoration of bone tissue in fracture defects and served as a necessary condition for this work, defined the goals and objectives of the research.

Classical surgeons consider chondro- and osteoregeneration to be the most important part of the physiological process, and blood supply to the fracture site is also essential for osteoregeneration.

However, the development of medical and biological sciences and the use of sophisticated experimental technologies have led to the direct discovery of the essence of the events and processes occurring in bone cells during osteogenesis. Scientists from the University of California have for the first time established that the substance that stimulates osteogenesis in fracture defects is platelet-rich plasma, and that the factors contained in it (BMP — bones morphogenetic protein) contribute to an increase in the amount of bone morphogenetic protein [1.3.5.7.9].

It has been proven that this platelet-rich plasma contains factors that affect PDGF - platelet-derived growth factor, tissue growth factor, VEGF - endothelial growth factor, as well as epidermal growth factor and insulin.

Platelet-rich plasma increased reparative regeneration in bone defects by 2-2.5 times, which reduced the duration of treatment and naturally reduced the cost of treatment. The current shortcomings in the treatment

of bone defects are the solution of the surgical problem by applying an operative method depending on the type of fracture and stimulating reparative regeneration. The problem of osteoregeneration of bone fracture defects is not new and at first glance it seems very simple from a pathophysiological point of view. The process of reparative regeneration in the healing of broken bones has become increasingly relevant since the beginning of the second half of the 20th century with the active development of surgical techniques in the field of reconstructive surgery, as a result of which a number of authors are conducting various works on stimulating reparative regeneration. To date, 4 pathogenesis of bone tissue defects have been identified. The main ones are impaired blood circulation in the area of damage and impaired innervation in this area, as well as the general condition of the body and its hemostasis. According to the authors, the development of the ischemia zone in the field of bone defects is observed in cases of direct interruption of the main vessels, and therefore, taking into account the presence of damaged tissue as a result of mechanical injuries, it is significantly optimized by stimulating reparative regeneration using platelet-rich plasma.

It has been mentioned that any method of osteosynthesis should be aimed at preserving blood supply and nerve innervation in the fracture area to ensure mechanical stability . In some constructions, BIOS and Ilizarov hardware, this inconvenience provides practically complete stability. According to clinical observations and the opinion of a number of authors, one of the best osteosynthesis methods for stable fixation of bone fragments in comminuted fractures is BIOS and Ilizarov apparatus osteosynthesis [11.13.15.17].

In case of impaired blood supply, active local processes at the edges of the bone tissue in the fracture area, a lack of oxygen and nutrients, this mechanism naturally serves to disintegrate, where perifocal edema has a negative biomechanical effect, which begins to expand its boundaries, thereby increasing the volume of the bone defect. With improved blood supply, this leads to the formation of mechanically scar tissue and the proliferation of mature osteoid cell. Peripheral nerve damage causes a disruption of the processes of inhibition and excitation in the cerebral cortex, which leads to a decrease in regeneration. The characteristics of bone tissue repair require special conditions and cause a number of complications after injury. The slightest movement of bone springs leads to the displacement of damaged bone fragments. These movements constantly affect the process of bone repair, as vessels and nerves get caught between the bone fragments. Even slight mobility of the edges makes it difficult to treat these bone defects and can lead to the formation of a functionally defective bone structure. Therefore, in comminuted fractures, it is necessary to use methods that improve blood circulation simultaneously with the method of complete osteosynthesis [12.14.15.16].

Thus, osteosynthesis using modern fixation devices such as BIOS and the Ilizarov apparatus is one of the methods that stimulate cells. Using these methods, the use of biologically active substances, platelet-rich plasma, to stimulate osteogenesis, normalizes blood circulation in bone fragments. A deep study of the biochemistry of bone tissues will greatly contribute to the transition to a new stage of reconstructive surgery. The issue of stimulating the restoration of regenerative repair processes in bone tissue is one of the major problems of modern medicine. Several methods of influencing the fracture zone of damaged bones have been developed, including massage, various forms of thermal exposure, and methods of influencing with low-frequency electric current. The methods they have developed are one of the factors that lead to the enhancement of local blood circulation, which in turn leads to the successful consolidation of fractures [15.16.17].

Conclusion. Factors that have a direct biomechanical effect on the defect in the bone fracture zone include osteosynthesis, autograft, physiotherapeutic treatments, biological stimulants such as ozone and TBP. Without reliable fixation of fractures, the reparative regeneration process will be ineffective. Therefore, if

the reparative regeneration process is not stimulated in a short time, it can slow down for months and years. It often depends on the type of surgical procedure. One of the methods of stimulating osteoregeneration is the use of biologically active substances, i.e. TBP, which can significantly accelerate the slowdown to the level of biological norm..

LITERATURE USED:

1. Гаффоров А.У., Асилова С.У., Тешаев А.А. Болдир суяклари диафизар синишларини даволашда суяк усти остеосинтези // Тиббиётда янги кун.- Бухоро, 2019.- №4 (28).-144-146 б (14.00.00 №22)
2. Gafforov A.U., Asilova S.U. Improvements In Surgical Treatmet For Diaphysealfractures Of The Lower Leg Bones // European Journal of Molecular & Clinical Medicine.- 2020. Volume 07, Issue 03, P.3914-3919. (14.00.00 Scopus №3, IF:8,111)
3. Khegay L.N., Gafforov A.U. Biochemical Parameters of Rabbit Blood Serum in the Treatment of Limb Bone Fracture with Autologous Platelet-rich Plasma // Acta Scientific Medical Sciences, 2021, Volume 5.- Issue 5 May: P.122-128. (14.00.00 Scopus №3 IF:1,403)
4. Gafforov A.U., Asilova S.U., Teshaev A.A. Indicators X-ray Densitometric studies in fractures of long tubular bones with the use of plasma lifting in an experimental study // British Medical Journal, 2021.- Volume-1, №2. – 288-294 б (14.00.00.№ IF:2,067)
5. Хегай Л.Н., Гаффоров А.У. Гематологические показатели крови кроликов при терапии переломов костей конечности обогащенной тромбоцитами плазмой // Неврология. - Тошкент, 2021. -№1(85).- 23-27 б. (14.00.00 №4)
6. Асилова Саодат Убайевна., Гаффоров Азамат Уйгунович. Болдир суякларининг диафизар синишларини ташхислаш ва жаррохлик усулида даволаш тактикасини танлаш учун дастур // DGU № 06478. 23.04.2019.
7. Асилова Саодат Убайевна., Гаффоров Азамат Уйгунович. Болдир суякларининг диафизар синишларида беморларнинг функционал аҳволини бахолаш дастури // DGU 09486 27.10.2020.
8. Хегай Л.Н., Гаффоров А.У., Асилова С.У., Тешаев А.А. Изучение репаративного остеогенеза переломов бедренной кости кроликов при терапии обогащенной тромбоцитами плазмой // Re-health journal. Андижан, 2021, №1(9) 78-86 б. (14.00.00 №)
9. Gafforov A.U., Asilova S.U., Teshaev A.A. Analysis of reparative after surgical treatment of diaphyseal fractures of the shin bones // Art of Medicine 2021, Volume-1, №2- 3-10 б (14.00.00.№)
10. Гаффоров А.У., Акрамов В.Р., ТешаевА.А., Ахмедов Ш.Ш., Хамраев Б.У., Усовершенствование хирургического лечения больных с переломами диафиза костей голени // «Травматология ва ортопедиянинг долзарб муаммолари» Республика илмий–амалий конференсияси матетиаллари. Жиззах, 2019 йил.-51-52 б.
11. Гаффоров А.У., Хегай Л.Н., Тешаев А.А., Асилова С.У. Изучение активности иммуноглобулинов классов IgA и IgE при лечении переломов кости кроликов обогащенной тромбоцитами плазмой // материалы междунар одной научно-практической Конференции «современные технологии в челюстно-лицевой Хирургии» Ташкент. 2021 года.-50-53 б.
12. Gafforov A.U. Asilova S.U. Immunological research methods for fractures of the diaphysis of the tibia bones using plasma-lifting in experiment // International multidisciplinary scientific conferences on the dialogue between science & arts, religion March 25, Canberra, Australia. 2021.- 18-19 б.
13. Gafforov A.U. Asilova S.U. Features of application with the use of plasmolifting for fractures of the diaphysis of the tibia bones in the experiment // International multidisciplinary scientific conferences on the dialogue between science & arts, religion March 25, Canberra, Australia. 2021.-

19-20 б.
14. Гаффоров А.У., Асилова С.У. Особенности применения метода плазмолифтинга при переломах диафиза костей голени в эксперименте. // Международная научно-практическая конференция. «Современные научные решения актуальных проблем». Сборник тезисов научно практической конференции г. Ростов-на-Дану 2021 г. 227-228 б.
15. Гаффоров А.У., Асилова С.У. Оптимизация хирургического лечения при диафизарнқх переломах костей голени // Методические рекомендации. Бухара, 2021.-19 с.
16. Гаффоров А.У., Factors Influencing The Manifestations of Coxarthrosis// Journal of Advanced Zoology. Volume 44 Issue S-7 Year 2023 Page 41:45/
17. Гаффоров А.У., Various Factors of the Internal and External Environment Affecting Coxo arthrosis. AMERICAN Journal of Pediatric Medicine and Health Sciences Volume 01, Issue 10, 2023.208-219 с.