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The Physical and Psychological Outcomes of Using PRF as Surgical Method of Reconstruction Inferior Orbital Wall

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Abstract

In our study, blood was obtained from patients intraoperatively and fibrin membranes were prepared for further use as a surgical material. PRF membranes met our scientific expectations, as they proved in our practice that they shortened period and also created comfort while moving the eyeball after surgery, in comparison with a similar classical method for treating injuries of the zygomatico-orbital complex.

Nowadays, there are a number of studies on the healing processes, aimed mainly at identifying the growth factors involved in them, elucidating their mechanism of action, as well as the possibility of using them to improve wound healing. [1] Today, the use of PRF is one of the few methods to modulate and improve tissue healing. [2] However, we have not come across scientific papers on the use of PRF in trauma (PIR). [3] Therefore, the use of fibrin plates in (SOC) has the prospect of scientific research, which gives a positive therapeutic effect.

Although the use of PRF is a studied model, the use of PRF in combination with a titanium plate in restoring the integrity of the inferior wall of the orbit is a breakthrough in the field of medicine. [4]

In our experience, the use of PRF contributed to a reduction in the length of stay of patients in the hospital, we were able to reduce the incidence of postoperative complications and improve the motor ability of the extraocular muscles in the postoperative period, [5] since the installation of titanium plates without fibrin membranes on the lower wall of the orbit often led to the situation when patient felt discomfort when moving the eyes.

Keywords- Surgical Method, PRF, Psychological Outcomes

The purpose of the study:

To develop a clear algorithm of obtaining and use of fibrin membranes in the process of healing of injuries in the zygomatic-orbital complex.

Material and methods

It should be noted that obtaining high-quality PRF in a hospital, and even more intraoperatively, is a rather time-consuming work, since the result depends on multiple factors, such as:

- the quality of the tubes used, they should be vacuum tubes with a clotting activator with a red cap with a volume of 10 ml.

-another important factor is that blood sampling should be carried out directly with a needle (diameter 22G) from a vein, and not through a pre-installed venous catheter. Then the centrifugation step should be immediately started of after blood sampling, because lost seconds can affect the result. More than two fibrin membranes can be made if necessary, in that case it is important to divide the centrifugation stage into 2 or more stages, since long-term blood sampling (more than 20 ml) can reduce the volume of PRFs obtained. [6]

-The next factor is the choice of the optimal speed and time of the centrifugation step. In our practice, after taking blood from a vein, we immediately proceeded to the centrifugation step at 1300 rpm during 8 minutes. The room temperature was 22C

There is a detailed description of the course of the operation to restore the lower wall of the orbit after injuries in the zygomatic-orbital complex, bellow

After intubation of the patient's trachea in the operating room, the temperature is set to 21-22C. [7] Then the surgical field is processed, the surgical incision is made with a disposable surgical scalpel, exposing the fracture lines of the zygomatic bone along the zygomatic-frontal suture and the infraorbital margin through the skin incision, 5 mm away from the edge of the lower eyelash line, then the vessels are coagulated, the upper edge of the surgical wound is fixed with a ligature, after that, the muscle layer of the extraocular muscles is moved apart in layers. [8]

After reaching the bottom of the eye socket, the eyeball is raised with a small parabeth to achieve maximum visibility. Before the anesthesia, venous blood was taken from the ulnar area of the hand. In a volume of 9-10 ml, the immediate start of the centrifugation stage after placing the tubes without anticoagulants at an angle of 450. The centrifugation stage is carried out at 1300 rpm druring 8 minutes.

The next step is to fix the test tubes on a stand, the room temperature should be 23-25C0, to contact the fibrin plate with oxygen in the air, it is necessary to remove the upper part of the resulting material, which is blood plasma, with a syringe. Contact with air - 6 minutes. After that, the fibrin membrane (PRF) with the erythrocyte mass is carefully lifted from the tube, then the PRF is separated from the erythrocyte mass with high precision. The PRF is placed under a compression metal plate for 15 minutes.

1Pic1 (Stages of installation of a titanium plate and fibrin membranes.)

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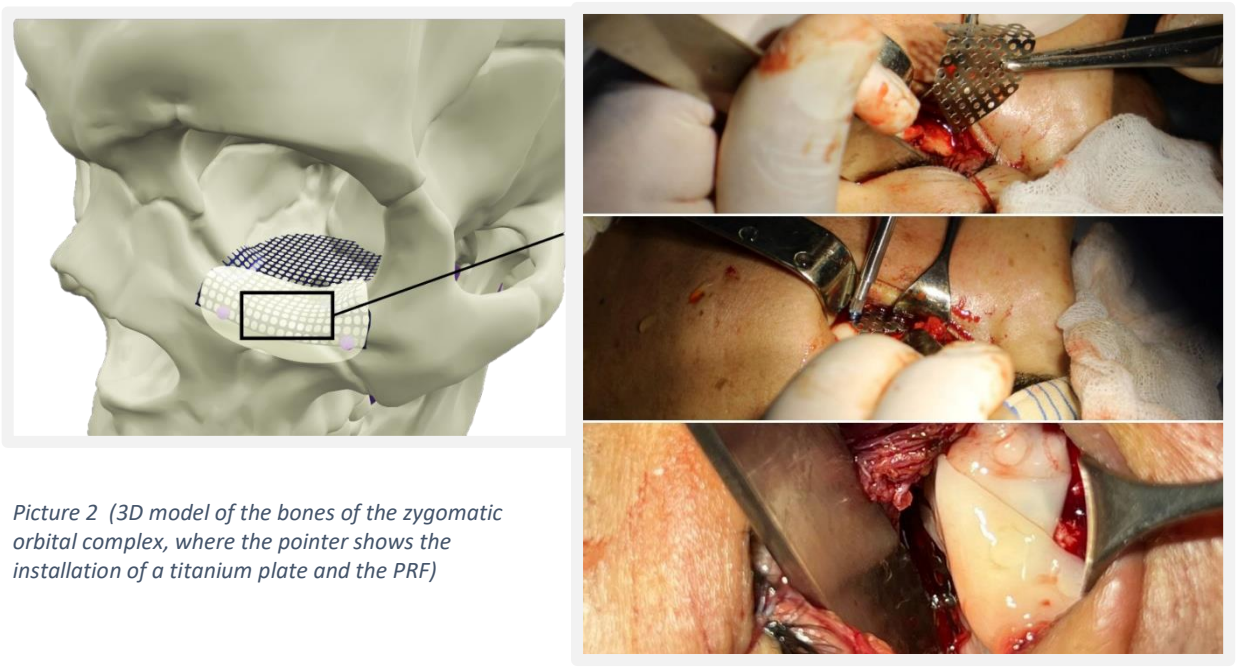
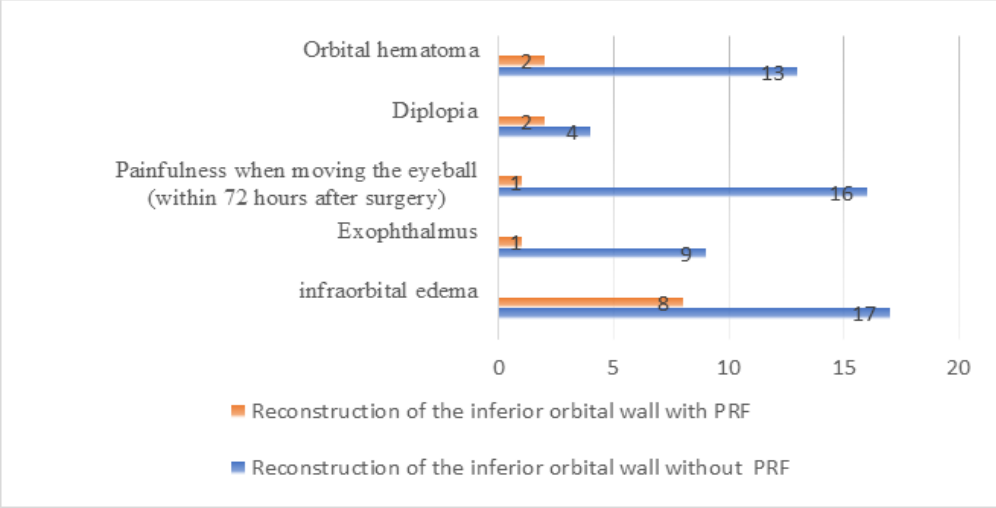


Picture 2 (3D model of the bones of the zygomatic orbital complex, where the pointer shows the installation of a titanium plate and the PRF)

At the same time, revision of fracture lines and reposition of fragments of the zygomatic bone and lower orbital wall, release of the restrained muscles of the eye and orbital fat, [9] osteosynthesis of bone fragments with a titanium plate, which is installed in the periosteum of the lower orbital wall, are carried out. [10] An autologous fibrin membrane is placed above the surface of the titanium plate, from which the erythrocyte and leukocyte components have been removed (Fig. 2). Then the wound is sutured in layers. In 17 cases were carried out using PRF in combination with a titanium plate in restoring the integrity of the lower wall of the orbit. From the results obtained, it should be noted that after the use of fibrin membranes, the number of complaints made by patients in the postoperative period significantly decreased. This is due to the fact that the fibrin film is a kind of soft lining between the eyeball and the titanium film.

Considering, that the titanium plate was in contact with the lower extraocular muscles, patients experienced pain when moving the eyeball. Out of 17 patients operated without using PRF, discomfort during movement occurred in 94% of patients. However, among patients operated by using PRF, discomfort was observed only in 17% of cases. In total, we managed to reduce discomfort during the movement of the eyeball in the postoperative period by 77%.

Comparative table of reconstruction surgical methods the inferior orbital wall



Despite the huge amount of information, obtaining fibrin membranes intraoperatively in our practice turned out to be quite a difficult task, because after intubation of the patient, in order to obtain high-quality PRF, you need to have special skills, as well as the smooth work of the medical staff who are in the operating room. In medical internet resources, we did not find medical articles on our subject. In our practice, we have managed to develop a clear tactic for obtaining a high-quality fibrin membrane, which can help reduce cases of postoperative complaints such as hematoma formation inside the orbit, discomfort when moving the eyeball and exophthalmos.

Conclusion

Summing up our study, we have achieved our goal by developing the most effective method for obtaining a fibrin plate, as well as a special algorithm that makes it possible to effectively perform surgical operations on the zygomatic-orbital complex using PRF in combination with a titanium plate in the reconstruction of the inferior wall of the orbital floor.

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