

Uses of plasma in medicine

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Abstract

Plasma is the liquid portion of whole blood, It is composed largely of water and proteins, and it provides a medium for red blood cells, white blood cells and platelets to circulate through the body. The plasma contains an important amount of antibiotics capable of strengthening the patient's immunity in the face of the threat of the virus. When plasma is injected into the scalp, it renews cells and stimulates the production of collagen and protein, two substances that make up the second middle layer of the skin, which give the skin freshness and vitality. One of the most important benefits of plasma for the face is that it uses platelets to inject the face and it plays several roles inside the skin once it is injected under it. Plasma can be used as a local injection as well to treat tissue ruptures such as knee ligament tears. platelet-rich plasma (PRP) can improve wound-healing processes in orthopedic surgery, dermatology, ophthalmology, gynecology and plastic surgeon.

Keywords: Plasma; Platelet; Hair Recovery; Covid-19; Medicine

1. Introduction

1.1. Plasma and Platelets

In recent years, doctors have learned that the body has the ability to heal itself. Platelet-rich plasma therapy is a form of regenerative medicine that can take advantage of these capabilities and amplify the natural growth factors your body uses to heal tissues (1).

Plasma is the liquid portion of whole blood. It is composed largely of water and proteins, and it provides a medium for red blood cells, white blood cells and platelets to circulate through the body. Platelets, also called thrombocytes, are blood cells that cause blood clots and other necessary growth healing functions (2).

Platelet-rich plasma (PRP) therapy uses injections of a concentration of a patient's own platelets to accelerate the healing of injured tendons, ligaments, muscles and joints. In this way, PRP injections use each individual patient's own healing system to improve musculoskeletal problems (3).

PRP injections are prepared by taking anywhere from one to a few tubes of your own blood and running it through a centrifuge to concentrate the platelets. These activated platelets are then injected directly into your injured or diseased body tissue. This releases growth factors that stimulate and increase the number of reparative cells your body produces. Ultrasound imaging is sometimes used to guide the injection (4).

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Platelet-rich plasma (PRP) occurs when blood is drawn from the same patient and placed in a special tube called a centrifuge. Its main contents are platelets (the main blood component responsible for clotting) and groups of mononuclear cells. In addition, it contains many factors present in the blood and tissues necessary for regeneration. PRP is used in many fields in the medical field and is used to aid in cell regeneration as well as tissue repair (skin rejuvenation, wound healing acceleration, orthopedic applications, dental applications, etc...). There have been more recent and promising studies on the use of platelet-rich plasma in IVF that show evidence of its therapeutic and beneficial effects (5).

2. Use of plasma in treating covid 19

Since late December 2019, an outbreak of novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection first appeared in Wuhan, China (6) and rapidly spread to 171 countries. As of March 24, 2020, the virus has been responsible for 379,661 confirmed cases and 16,428 deaths worldwide. To date, no specific treatment was recommended for SARS-CoV-2 infection except for meticulous supportive care (7).

Numerous therapeutics were explored or developed during the outbreak. A recent trial showed lopinavir-ritonavir has no treatment benefit for severe illness caused by SARS-CoV-2 (8). Immunotherapy with virus-specific antibodies in convalescent plasma had been used as a last resort to improve survival rate of patients with serious infectious diseases, such as SARS, middle east respiratory syndrome coronavirus, Ebola virus disease, pandemic influenza A, and avian-origin influenza A (9). Previous reports showed treatment with convalescent plasma collated from recovered patients could reduce the hospital stay and mortality of patients. However, the efficacy of convalescent plasma in critically ill patients with SARS-CoV-2 infection remains unclear. Herein, we reported the disease course on four critically ill SARS-CoV-2-infected patients treated with supportive care and convalescent plasma (10).

There is increasing talk about treating cases of infection with the emerging coronavirus “Covid-19” using plasma, which is a treatment method that relies on extracting antibodies from the blood of people recovering from the virus, and contributes to developing immunity, not exacerbating the disease situation, and may completely eliminate the virus according to the results modern (11).

Plasma from people who have recovered from covid-19 may contain antibodies to the virus that causes the disease and might be effective against the infection, the FDA said. Convalescent plasma has been studied in outbreaks of other respiratory infections, such as H1N1 influenza, SARS, and MERS. “Although promising, convalescent plasma has not been shown to be effective in every disease studied” and therefore clinical. The plasma must be collected from recovered patients who can donate blood, have had no symptoms for 14 days, and have had negative results on covid-19 tests (12).

The results of researches indicated convalescent plasma might be a potential therapy for critically ill patients infected with SARS-CoV-2. and observed no serious adverse reactions associated with the transfusion of convalescent plasma. However, the relative contributions of supportive care, investigational therapies, and patient’s immune-response on survival could not be determined. Whether convalescent plasma and/or supportive care provide any clinical benefit is unknown (13).

Chinese researchers conducted experiments on 245 patients who received plasma treatment from recovered patients, 91 of them improved, and symptoms were controlled.

The Chinese researchers indicated that a number of patients were among the critical cases, and a remarkably good percentage of them recovered, and their full recovery from the virus was announced (14).

The first fact to know about this type of treatment is that it is an old method and not a recent medical innovation or invention, as many countries around the world used plasma treatment previously in the face of measles and mumps pandemics, before developing vaccines against it. Scientific evidence confirms that the plasma of the recovered decreased the risk of death among the infected during the influenza epidemic that swept the world in 1918 (15).

The plasma of the recovered was also used against the SARS and MERS viruses, which also belong to the family of coronaviruses such as the “Covid-19” virus. In light of the promising results; Many countries of the world have announced the adoption of plasma therapy technology as one of the options applied in treating people infected with the Corona virus “Covid-19”.

The list of Arab countries that have begun to adopt the treatment includes the UAE and Kuwait, and at the global level, China and Italy are among the first countries to adopt this technology, along with the United States of America, Russia, Japan, and other countries.

The World Health Organization had made it clear that the use of plasma is a "very valid" approach to testing, but it is important to get the right timing to further enhance the patient's immunity, and said that the union plasma has proven to be "effective and life-saving" against other infectious diseases (16).

The plasma contains an important amount of antibiotics capable of strengthening the patient's immunity in the face of the threat of the virus, and there is one of these antibiotics known as "EGG", which is found in the blood of the infected and the patients who were able to overcome it.

In addition to EGG, which remains in the blood for years; Other antibiotics called EGM are available in the human body, and their survival in the human body does not exceed 6 months.

But these antibiotics have the ability to counteract viruses that attack the human body, but they "decrease in the elderly", which explains that elderly people are more at risk if they contract "Covid-19" (17).

2.1. Plasma uses in aesthetic medicine

Plasma injections for hair are one of the areas of advanced aesthetic medicine in hair transplantation operations that eliminate hair problems permanently, such as; Baldness in men and hair loss in women and gives a sense of confidence in the beauty and vitality of hair (18).

3. The mechanism of plasma injection for hair

When plasma is injected into the scalp, it renews cells and stimulates the production of collagen and protein, two substances that make up the second middle layer of the skin, which give the skin freshness and vitality. Therefore, this technique makes the scalp strong and healthy and has the ability to grow new hair and nourish it properly, in addition to the plasma that contributes to the inhibition of the hormone that causes hair loss (19).

3.1. Benefits of plasma injection for hair

There are several benefits to be had from the hair injection process, which include:

- These injections treat hair loss as they stimulate the secretion of collagen, which helps stimulate the growth of new hair follicles.
- It treats hair breakage as it transports food to different areas of the body.
- Strengthen hair follicles and fix them in the scalp.
- Scalp treatment and regeneration.
- Hair plasma injections help fill in the spaces in the scalp, caused by scars that hinder hair growth (18).

3.2. Tips to be followed after the hair plasma injection process

- Not washing the head until 24 hours have passed since the plasma injection procedure.
- Refrain from applying any kind of chemical hair preparations, such as; Creatine and dye for two weeks after the treatment procedure.
- In the event of irritation, redness or swelling of the scalp, an ice cube should be placed on the skin, and any cream or lotion should be avoided without consulting a doctor.
- Avoid exposure to direct sunlight until a week has passed since the injection procedure.
- Make sure to drink plenty of water, to stimulate the growth of scalp cells and rid them of toxins.
- Eating foods that contain high levels of vitamins and minerals, to support the results of plasma injections and obtain desirable results.
- One of the priorities of the plasma operation is to pay attention to sterilization and hygiene during the operation (20).

3.3. Plasma injections for the face

The use of plasma injections for the face has not been proven to cause serious and serious harm so far, but it is only minor and potential effects that disappear quickly with some important precautions.

Another important thing is to check the patient's own blood before injecting it with plasma to ensure that it is free of diseases and viruses, because their presence in it may cause him disease and infection, and instead of treating the facial skin, the injection will make it worse and a new problem will appear in it. In some cases, the plasma injection process alone may not succeed, such as severe sagging in the skin, when the skin needs a facelift with plasma injection. The other effects are very simple, such as swelling or slight redness in the skin at the site of the injection and it disappears by itself after several days and with rest. The slowness in the appearance of the results is one of the disadvantages that annoy its users. The results do not appear until several weeks or a month after the injection process, and it takes several consecutive sessions about 3 sessions Each session is separated by two months, but after that, you will not need to do any sessions again (21).

3.4. Benefits of plasma for the face

One of the most important benefits of plasma for the face is that it uses platelets to inject the face and it plays several roles inside the skin once it is injected under it. The benefits of plasma for the face come from the platelets whose main function is to treat and stimulate the affected tissues to treat and produce new cells, while the plasma contains Proteins, vitamins and various minerals are based on stimulating the skin and what is below it to produce collagen, helping the skin and stimulating it to return to its first state, restore its freshness and texture, and fill the hollows caused by wrinkles in it, so their appearance and impact on the general appearance of the skin is reduced (22).

Plasma gives amazing results over time, so the skin appears bright and fresh again, and the color differences in it and the pallor that appear on parts of it disappear, and the wrinkles of the face are reduced, and the skin regains its soft texture and rich texture that looks healthy. But here her strength and strength return to her again (21).

3.5. Reasons for plasma injections for the face

There are many reasons and cases in which plasma injections are used, including:

- Effects that appear on the face with age, such as sagging and weakening of the skin and losing its freshness and soft texture.
- Various scars in the facial skin, such as those that remain after acne treatment, for example, annoy many with their bad appearance, which leaves furrows, pits and scars in the skin.
- Uneven skin texture and color, such as the presence of dark or dark circles around the eyes, plasma helps to get rid of them, and it also helps to get rid of pockets that form in the skin either as a result of age, fatigue, exhaustion, disease or whatever.
- It has other local cosmetic uses such as the process of supplying, highlighting and beautifying the lips, and plasma has proven its effective ability to help hair grow, so some may use it in the process of hair transplantation and others use it in beard transplantation.

You will not find an immediate magic solution after injecting the plasma to the face, and you will not come out of the injection process and look in the mirror and find yourself getting rid of all the flaws that you just entered into it thirty minutes ago, that is far from logical! Plasma needs time to complete the treatment, so if you want to see its effective results, you have to be patient and compare over the long term every period, so you will feel the change that occurred at that time (24).

3.6. Other uses for plasma

Plasma was not confined to the cosmetic world only. As we said, plasma injection treatment finds a large field for itself in various aspects of medical life. Plasma can be used by injection into the blood directly in some cases, such as liver diseases or open heart operations and liver transplantation, especially because it contains clotting aids and stimulating vitamins. It also compensates for blood loss during bleeding (25).

It can be used as a local injection as well to treat tissue ruptures such as knee ligament tears, and it is one of the most famous cases in which platelet-rich plasma is used to help tissues fuse and treat and restore their strength and functions quickly. Dentistry, neurology, heart treatment and even veterinary medicine (26).

Platelet-rich plasma has been found to significantly enhance the healing process, and using a PRP injection for shoulder pain caused by rotator cuff tears, for Achilles tendon ruptures and for other soft-tissue injuries is becoming more common. PRP has also been demonstrated to improve function and reduce pain in people who have tendonitis or chronic tendinosis conditions such as tennis elbow or golfer's elbow. the authors of this study recommend the use of PRP therapy for adhesive capsulitis and rotator cuff repair of medium to large tears (27).

Some of the key advantages of PRP injections are that they can reduce the need for anti-inflammatories or stronger medications like opioids. In addition, the side effects of PRP injections are very limited because, since the injections are created from your own blood, your body will not reject or react negatively to them.

Studies have already shown that the application of platelet-rich plasma (PRP) can improve wound-healing processes in orthopedic surgery (28), dermatology (23), ophthalmology (29), gynecology and plastic surgery (30). Positive results could not only be shown in management of complex wounds but also in conservative PRP treatments of joints (31).

4. Conclusion

Platelet-rich plasma injections can be used to treat degenerative conditions. Most active areas of plasma technology applications are in wound treatment; tissue regeneration; inactivation of pathogens, including biofilms; treating skin diseases; and sterilization.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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