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Recovery from Bell Palsy after Transplantation of Peripheral Blood Mononuclear Cells and Platelet-Rich Plasma

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Summary: Peripheral blood mononuclear cells (PBMCs) are multipotent, and plasma contains growth factors involving tissue regeneration. We hypothesized that transplantation of PBMC-plasma will promote the recovery of paralyzed facial muscles in Bell palsy. This case report describes the effects of PBMC-plasma transplantations in a 27-year-old female patient with right side Bell palsy. On the affected side of the face, the treatment resulted in both morphological and functional recovery including voluntary facial movements. These findings suggest that PBMC-plasma has the capacity of facial muscle regeneration and provides a promising treatment strategy for patients suffering from Bell palsy or other neuromuscular disorders. *(Plast Reconstr Surg Glob Open 2017;5:e1376; doi: 10.1097/GOX.0000000000001376; Published online 29 June 2017.)*

CASE REPORT

A 27-year-old female patient presented with a 26-year history of right-sided Bell palsy of uncertain etiology. The signs of facial paresis were first observed at the age of 6 months. Between ages of 2 and 5 months, she received the following immunizations according to normal birth immunization schedule: Bacillus Calmette-Guérin, diphtheria and tetanus toxoids and pertussis vaccine, smallpox, and polio. She was additionally immunized 2 times with polio vaccine. Soon after this immunization, deviations indicating Bell palsy were observed.[1] Following physical examination, her physician revealed facial asymmetry due to a right side deviation of the mouth, consequent obliteration of nasolabial fold, and drooping of the angle of the mouth. Furthermore, it was documented that she was unable to completely close her eyelid on the right side and only partially on the left side with maximum effort. Also, reduced voluntary movements of the facial muscles were observed, including a limited smile without showing teeth and the loss of ability to raise the eyebrow. The patient was still able to taste, feel pain in or behind her ear, and there was no numbness on her face.

Between ages of 10 and 15 years, she underwent complete neurological examinations. MRI examination revealed no intracranial space-occupying lesion.

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However, an expanded latency of the early monosynaptic (R1) of the blink reflex by right-sided stimulation of the face was recorded, whereas the latency of the late reflex response (R2) was normal at both sides. By left-sided stimulation, latency of R1 and R2 was normal ipsilaterally, but R2 was found to be expanded contralaterally.

Brainstem auditory evoked potential revealed normal peak and interpeak latencies without pathological signs. Based on these findings, abnormalities in trigemino-facial reflex at the right side were diagnosed.

From the age of 11 years, she was treated with therapeutic stimulus current treatments using periodical transcutaneous electric nerve stimulation (Corposano, KS-1/A1)[2] and therapeutic active face exercises. These, however, did not improve her conditions.

At the age of 15 years, otorhinolaryngology examination was performed revealing intact outer ears and tympanic membranes at both sides. To assess cerebellar function, Barany test, Romberg test, Babinski-Weil test, finger-to-nose test, rebound test, and dysdiadochokinesia test[3–7] were performed. These tests confirmed normal cerebellar functions.

Audiology examination did not detect reduction in hearing. In addition, audiometry revealed intact hearing at both sides. Electronystagmography test revealed no nystagmus. Further examinations confirmed abnormalities in central vestibular function and intact peripheral vestibular function.

In December 2013, the patient was admitted and examined in our clinic with symptoms as previously documented. Thus, with the permission of the patient,

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Table 1. Treatment Characteristics

No. Treatments	Treatments (wk)	PBMC Count/mL	PLT Count/mL	Total Cell Count/mL	Total Cell Count/Injection	Total Cell Count/Treatment
1	1st	6.00×10^5	4.50×10^7	4.56×10^7	5.64×10^7	4.51×10^8
2	4th	1.20×10^6	1.26×10^8	1.27×10^8	1.57×10^8	1.26×10^9
3	8th	7.00×10^5	1.06×10^8	1.07×10^8	1.32×10^8	1.06×10^9
4	25th	2.60×10^6	1.63×10^8	1.66×10^8	2.05×10^8	1.64×10^9
5	29th	5.00×10^5	8.30×10^7	8.35×10^7	1.03×10^8	8.27×10^8
6	31st	5.00×10^5	8.30×10^7	8.35×10^7	1.03×10^8	8.27×10^8
7	50th	1.20×10^6	1.58×10^8	1.59×10^8	1.97×10^8	1.58×10^9
8	55th	1.34×10^6	1.50×10^8	1.51×10^8	1.87×10^8	1.50×10^9
9	63rd	6.00×10^5	1.36×10^8	1.37×10^8	1.69×10^8	1.35×10^9
Mean	—	1.03×10^6	1.17×10^8	1.18×10^8	1.45×10^8	1.1×10^9
SEM	—	2.25×10^5	1.34×10^7	1.36×10^7	1.68×10^7	1.21×10^8

PBMC, peripheral blood mononuclear cell; SEM, standard error of mean.

autologous blood cell transplantation therapy was applied.[8] The local Ethical Committee approved this therapy, and written informed consent was obtained before the therapy. Following that, she received repeated autologous suspension of peripheral blood mononuclear cell (PBMC)-platelet (PLT)-plasma transplantation 9 times in 1 year (Table 1).

TECHNIQUE DESCRIPTION

A total of 25 mL peripheral blood was harvested from the median cubital vein into 50 mL heparinized vacutainer tubes. Plasma of 20 mL blood was separated by centrifugation (10 minutes at 630 ×g). PBMCs of 5 mL blood were isolated using density gradient centrifugation as previously described by Nilsson et al.[9] Briefly, 1:1 dilution of blood with Dulbecco's Phosphate-Buffered Saline (Gibco, Invitrogen, Budapest, Hungary) was pelleted (20 minutes at 1,020 ×g) with Ficoll-Paque PREMIUM 1.077 g/mL density gradient media (GE Healthcare, CTS, Life Sciences, Budapest, Hungary). The interphase consisting of PBMCs was collected and washed 2 times with Dulbecco's Phosphate-Buffered Saline. The resulting pellet was resuspended with 9.0 ± 0.1 mL of autologous plasma.

A total of 9.9 ± 0.1 mL of PBMC-PLT-plasma was locally injected in even proportions on the right side of the face in the areas of facial nerve (FN, CN VII) innervations. Injections were given subcutaneously and muscularly approximately 1.2 mL to each region (temporal, orbicularis oculi, buccinator, levator anguli oris, orbicularis oris, zygomaticus major and minor, risorius, and levator labii superioris) using 3 mL syringes connected to 0.30 × 1/2 needle. This treatment was repeated 9 times within a year (Table 1).

TREATMENT RESULTS

Posttreatment anamnesis revealed significant improvement in the voluntary motion of the facial muscles. There was a remarkable improvement in facial contouring, and the facial asymmetry was significantly reduced (Fig. 1). Nasolabial fold and tear trough were noticeably developed on the right side (Fig. 1). Cheek augmentation was slightly reduced on the left side, whereas it emerged on the right side (Fig. 1). Contours of the asymmetrically drooping corner of left lips were slightly improved (Fig. 1). Following treatments, the patient was able to close her eyelid completely on left and by 80.7% on the right side (Figs. 2, 3). The drooping of angle of the mouth was remarkably reduced (42.2%) on the right side as compared with that of before treatment (Fig. 4). Taste sensation was maintained, and there was no pain in or behind the ear, and no numbness in the affected side of her face.

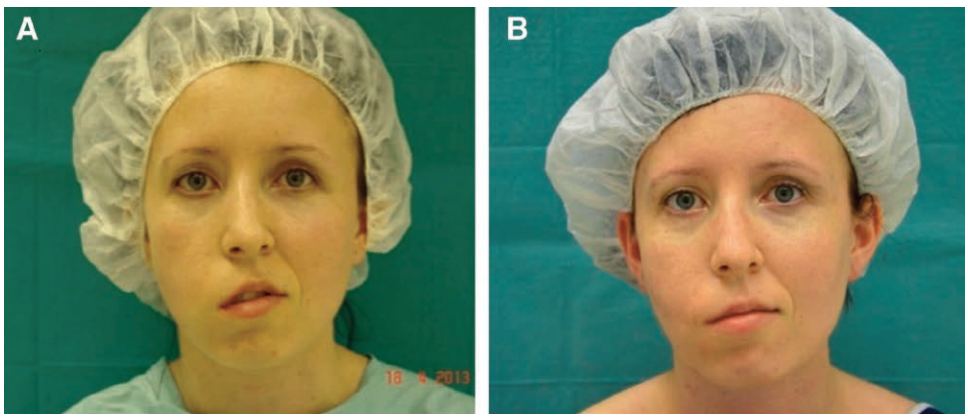

Fig. 1. Development of asymmetry of the face after PBMCs and PLT-plasma therapy. Before treatment (A), after treatment (B). After treatment, symmetry of the face remarkably improved, the atrophied areas were significantly reduced, the right corner of the lips was significantly elevated, and a nasolabial fold appeared on the right side of the face.

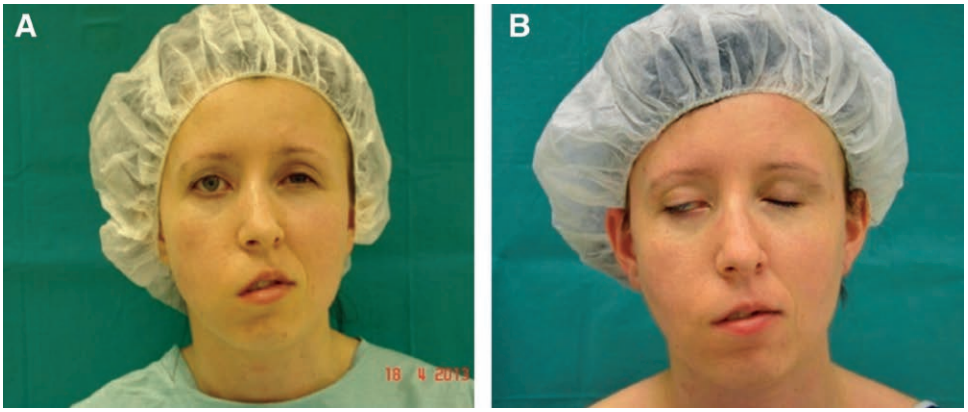

Fig. 2. Ability to voluntarily close eyelids after PBMCs and PLT-plasma therapy. Before treatment (A), after treatment (B). After treatment, the patient was able to close her eyelid completely on the left side and partially on the right side.

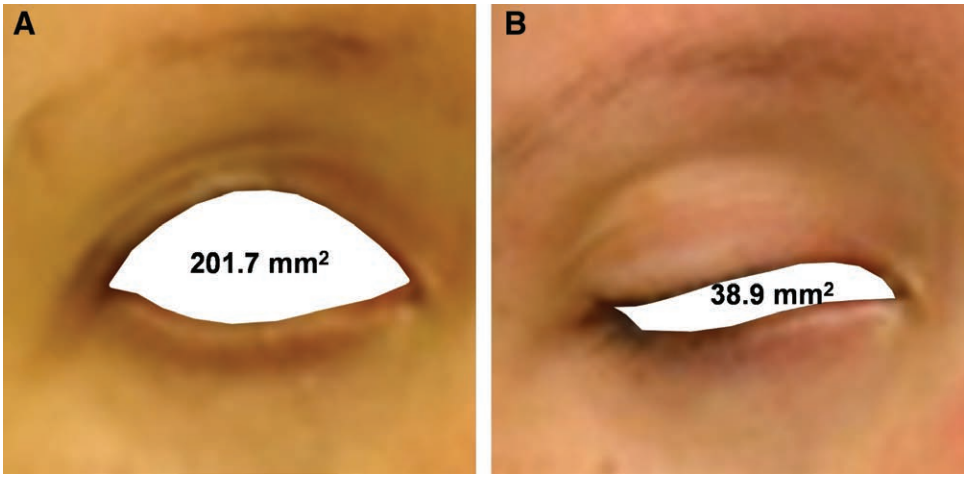

Fig. 3. Area of sclera during eyelid closure after PBMCs and PLT-plasma therapy. Pretreatment (A) and posttreatment (B) periocular regions after forced eyelid closure. Area of sclera on the right side before treatment: 201.7 mm^2; after treatment: 38.9 mm^2.

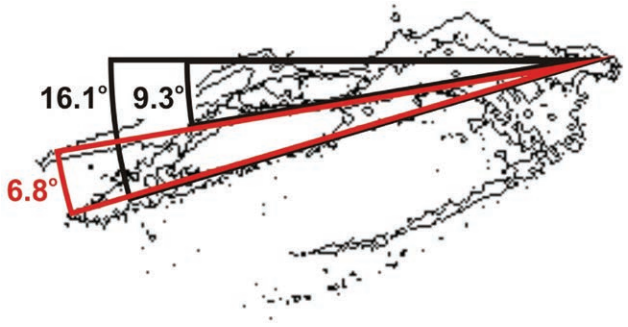

Fig. 4. Development of a reduction in drooping corner of the right lip after PBMCs and PLT-plasma therapy. After treatment, the right corner was significantly elevated as compared with one before treatment. Black angles: pre- and posttreatment angles between horizontal and lower lines representing the pre- and posttreatment contours of the lips. Red angle shows the difference between pre- and posttreatment contours of the drooping of the corners of the lips. Angle of the mouth on the right side as compared with horizontal lip level before treatment: 16.1°; after treatment: 9.3°.

CONCLUSIONS

According to the significant recovery that we observed after transplantation of autologous PBMCs and PLT-plasma therapy,[10] this therapy has the potential to restore neuronal-muscular atrophy and provides a promising future strategy to cure facial atrophy.

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PATIENT CONSENT

The patient provided written consent for the use of her image.

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