Am J Transl Res 2022;14(7):4736-4742
www.ajtr.org /ISSN:1943-8141/AJTR0140793

Original Article

Positive psychological suggestions improve the self-efficacy, social functioning and mood of patients undergoing replantation

Qiaoli Mo[1], Risheng Qiu[1], Songhe Cheng[2], Xiaomin Chen[1], Aiping Peng[1]

[1]*Department of Hand Surgery, Affiliated Xiaolan Hospital, Southern Medical University, Zhongshan 528415, Guangdong Province, China;* [2]*Department of Pain Management, Affiliated Xiaolan Hospital, Southern Medical University, Zhongshan 528415, Guangdong Province, China*

Received November 26, 2021; Accepted May 23, 2022; Epub July 15, 2022; Published July 30, 2022

Abstract: Objectives: This study aimed to investigate the effect of positive psychological suggestions on self-efficacy and social functioning of patients undergoing replantation. Methods: The clinical data of 80 patients treated with replantation in our hospital were retrospectively selected and divided into two groups according to the different intervention methods. The control group (n=40) received conventional healthcare interventions, and the study group (n=40) received additionally positive psychological suggestions. The changes of self-efficacy, quality of life and moods were compared between the two groups before intervention, as well as at 7 d, 15 d, 30 d and 60 d after intervention. The effect of positive psychological suggestions on the incidence of complications and satisfaction rate of nursing intervention was also analyzed. Results: At 15 d, 30 d and 60 d after intervention, patients in the study group had higher self-efficacy scores, lower scores of the Social Functioning Deficit Scale as well as lower scores of Self-Rating Anxiety Scale and Self-Rating Depression Scale than those in the control group (P<0.05). The total scores of social support in the study group were higher than those in the control group 60 d after intervention (P<0.05). In addition, the SL-90 scale scores in the study group were lower than those in the control group 60 d after intervention (P<0.05). Conclusions: Positive psychological suggestions could improve the self-efficacy, social functioning and mood of patients undergoing replantation.

Keywords: Positive psychological suggestions, replantation, self-efficacy, social functioning, social support

Introduction

With the continuous development of infrastructure construction, industrialization, and transportation in China, the number of patients with amputations due to accidental injuries has been increasing [1]. In the early 1960s, the success rate of replantation was less than 50%, and patients had a high risk of postoperative vascular embolism [2]. The recent development of microscopy has greatly improved the success rate of replantation. However, new challenges have emerged. It has been revealed that some patients who underwent replantation of amputated part have postoperative anxiety, depression, and low social functioning and self-efficacy. A clinical analysis of 90 patients underwent replantation of amputated part found that more than 50% of the patients had significant anxiety and depression, and most of the patients were not confident in the treatment of replantation and worried about their future limb functions, also, the negative emotions affected their quality of life to a certain extent [3, 4].

Positive psychological suggestion is a common psychological intervention, which originated from Pavlov's principle of conditioned reflexes [5], and is a subjective confirmation of the hypothesis, helping the subject accept the pattern set better. Psychological suggestions have been widely applied in clinical practice [6]. Studies have confirmed that positive psychological suggestions are more effective in improving maternal anxiety and depression during delivery, and also significantly reduce the perioperative psychological stress response in

patients [7]. However, there are few analyses on the intervention value of positive suggestions in patients undergoing replantation of amputated part, which to some extent affects the emotional improvement of these patients. In this study, we proposed to apply positive psychological suggestions as an innovative intervention to patients undergoing replantation of amputated part by adopting grouping and comparison methods, and to quantify the intervention value of positive psychological suggestions on these patients by quantitative data analysis. Such practice may provide a clinical reference for improving psychological state of patients undergoing replantation of amputated part.

Materials and methods

General data

The clinical data of 80 patients who were treated with replantation in our hospital were retrospectively selected as the study subjects. Among them, 40 patients who underwent conventional healthcare interventions were set as the control group, and 40 patients who were received positive psychological suggestions were set as the study group. This study was approved by ethics committee of Affiliated Xiaolan Hospital, Southern Medical University (approval number zsx12022051). All the patients or their families signed and provided the informed consent.

Inclusion criteria: (1) patients who underwent replantation for damaged limbs due to violent trauma; (2) patients obtained successful replantation of amputated limbs.

Exclusion criteria: (1) patients with incomplete clinical data that affected the investigation results; (2) patients with mental disorders; (3) patients with malignant tumors; (4) patients failed the surgery due to other reasons.

Interventions

Patients in both groups received routine preoperative interventions at admission, including emergency hemostasis, vital signs monitoring, and establishment of fluid access. The wound was covered with sterile dressings. The residual limb was sterilized and refrigerated by the nurses, and X-rays of the residual limb and the isolated limb were taken to facilitate the determination of the subsequent surgical procedure. Preoperatively, venous access was established, blood volume was appropriately supplemented, and trauma was carefully examined before patients were sent to the operating room. Blood flow to the severed limb was restored within 8 h.

Patients in the control group received routine psychological interventions after surgery, including interviews with patients to understand their psychological states, implementing psychological comfort and social support for patients with anxiety and depression, seeking assistance from psychologists for patients with adverse emotions, and encouraging patients to actively cope with the challenge.

Patients in the study group received positive psychological suggestions on the basis of routine interventions in the control group. (1) A positive psychological suggestion group consisting of a head nurse, operating room nurses, peer supporters and families of patients was established. The group members studied materials about positive psychological suggestions and replantation, and mastered the theoretical basis. (2) Pre-intervention assessments were conducted about patients' psychological and physiological stress reactions and coping styles to develop corresponding positive psychological strategies. (3) Positive psychological suggestions were implemented. (i) Environmental suggestions were giving by guiding the patients to visit the operation rooms, introducing surgeons and equipment and writing letter of thanks to the patients, etc., so that the patients were able to initially establish confidence in the operation. (ii) Expression suggestions were giving from nurses by keeping calm expression, treating patients as friends and enhancing patients' confidence in treatment with body language and firm expression. (iii) Verbal suggestions were given according to patients' situations to encourage and comfort them, and health knowledge education was performed for patients to have a positive attitude, and that they can understand the efficacy of surgery. (iv) Role models of successful surgery cases were used to enable patients to affirm the effectiveness of surgical intervention. (v) Family members used positive implied words when communicating with patients to provide more emotional support.

Table 1. Comparison of baseline data (mean ± SD)/[n (%)]

General data		Study group (n=40)	Control group (n=40)	t/χ^2	*P*
Sex	Male	30	32	0.287	0.592
	Female	10	8		
Mean age (years)		40.29±2.11	40.34±1.98	0.109	0.913
Mean weight (kg)		70.19±2.39	69.98±3.01	0.346	0.731
Mean BMI (kg/m^2)		22.08±2.10	22.03±1.98	0.110	0.913
Dissection site	Upper limb	21	20	1.130	0.568
	Lower extremity	18	20		
	Other	1	0		
With or without medical insurance	Yes	35	36	0.125	0.723
	No	5	4		

Outcome measurement

Primary indicators: (1) The self-efficacy scale [8] was used to assess the patients' self-efficacy before and after intervention. The scale consisted of 10 items on a scale of 1-4 points, with <11 points for extremely low efficacy, 11-20 points for low efficacy, 21-30 points for high efficacy, and 31 points or more for very high efficacy. (2) The social functioning score [9] was used to assess the patients' social functioning before and after intervention. The scale consisted of 10 items on a scale of 1-2 points, with 0 point as normal, 2 points as severe dysfunction, and score ≥2 points as social dysfunction.

Secondary indicators: (1) Self-Rating Anxiety Scale (SAS) [10] and Self-rating Depression Scale (SDS) were used to assess anxiety and depression before and after intervention [11], respectively. The SAS scale consists of 20 items, with higher scores representing severer anxiety, and the SDS scale also consists of 20 questions, with higher scores representing severer depression. (2) The social support [12] of the two groups was evaluated before and after intervention. The scale consists of 3 dimensions: objective support, subjective support and support utilization. The total score was the sum of the score of each dimension. Higher score represented better social support. (3) The symptom self-rating scale (SL-90) [13] was used to compare the mental health of the two groups before and after intervention. The SL-90 scale consists of 90 items, which can assess the mental health status of the subject from the aspects of feeling, emotion, thinking, consciousness and behavior.

Statistical analysis

The data were analyzed using statistical software SPSS 24.0. The normality of quantitative data was tested by Kolmogorov-Smimov test. For quantitative data conforming to normal distribution, the results were described as mean ± standard deviation (mean ± SD), and independent sample t-test was used for comparison between two groups. Repeated measure analysis of variance was used for comparison of SAS, SDS, self-efficacy scores and social functioning scores, and SNK test and multivariate analysis were used for post hoc comparison. Chi-square test was used for intergroup comparison of qualitative data, and the results were described as n (%). $P<0.05$ indicated significant difference, and figures were plotting using GraphPad Prism 8.0.

Results

Comparison of baseline data

Baseline data in terms of sex, age, weight, body mass index (BMI), and dissection site were compared between the two groups, and the results showed that the differences between two groups were not statistically significant ($P>0.05$), suggesting that the two groups were comparable (**Table 1**).

The self-efficacy scores before and after intervention

The self-efficacy scores did not differ significantly between the two groups before intervention ($P>0.05$) and showed an increase trend over time ($P<0.05$). At 15 d, 30 d and 60 d after

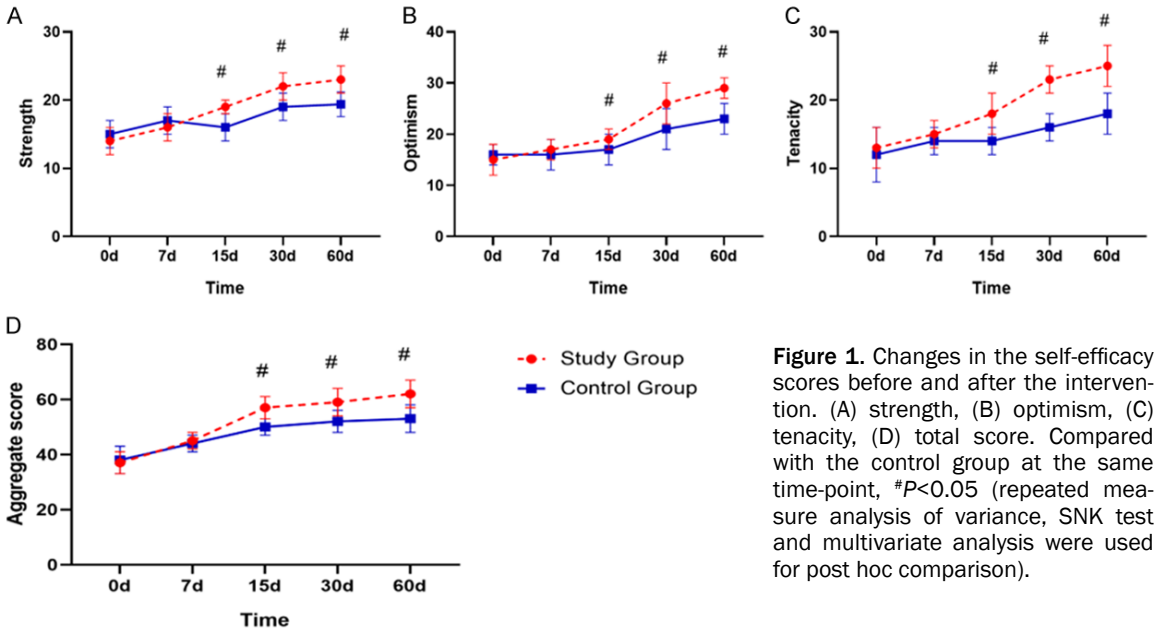

Figure 1. Changes in the self-efficacy scores before and after the intervention. (A) strength, (B) optimism, (C) tenacity, (D) total score. Compared with the control group at the same time-point, #*P*<0.05 (repeated measure analysis of variance, SNK test and multivariate analysis were used for post hoc comparison).

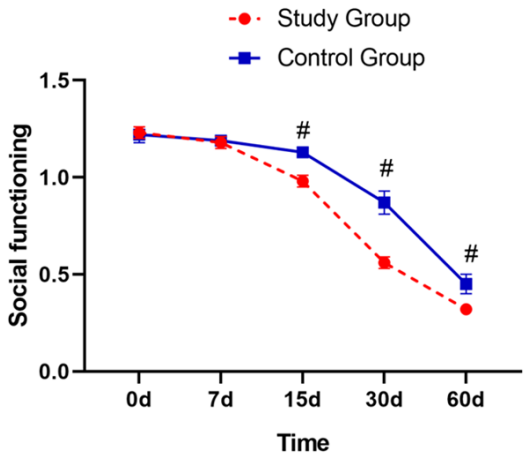

Figure 2. Social functioning scores before and after intervention. Compared with the control group, #*P*<0.05 (repeated measure analysis of variance, SNK test and multivariate analysis were used for post hoc comparison).

intervention, the dimension scores and total scores of self-efficacy in the study group were higher than those in the control group. Comparison before and after intervention showed that the self-efficacy of both groups was increased significantly (*P*<0.05) from 15 d to 60 d after intervention compared with before intervention (**Figure 1**).

Social functioning scores before and after intervention

No statistically significant difference was found in social functioning scores between the two groups before intervention (*P*>0.05). At 15 d, 30 d, and 60 d after intervention, the social functioning scores of the study group were lower than those of the control group (*P*<0.05) (**Figure 2**).

The anxiety and depression before and after intervention

No statistically significant difference was found in SAS and SDS scores of the patients between the two groups before and at 7 d after intervention (*P*>0.05), and SAS and SDS scores of the study group at 15 d, 30 d and 60 d after intervention were lower than those of the control group (*P*<0.05) (**Tables 2** and **3**).

Comparison of social support before and after intervention

No statistically significant difference was found in social support scores between the two groups before intervention (*P*>0.05). At 60 d after intervention, the scores of the above scores in the study group were significantly higher than those in the control group (*P*<0.05) (**Figure 3**).

The symptom self-assessment scale scores before and after intervention

No statistically significant difference was found in SL-90 scale scores between the two groups before intervention (*P*>0.05). At 60 d after intervention, the SL-90 scale scores of the

Table 2. SAS scores before and after intervention in the two groups (mean ± SD)

Group	SAS				
	Pre-intervention	7 d	15 d	30 d	60 d
Study group (n=40)	60.43±5.66	56.11±5.44[a]	46.18±4.20[a,b]	40.11±4.22[a,b]	31.29±3.33[a,b]
Control group (n=40)	59.98±6.01	57.19±4.98	52.39±3.71[a]	49.11±3.93[a]	39.98±3.63[a]
F	*F*=103.318	F_{time}=295.215		$F_{group*time}$=14.820	
P	<0.001	<0.001		<0.001	

Note: compared with before intervention, [a]*P*<0.05, compared with control group, [b]*P*<0.05 (repeated measure analysis of variance, SNK test and multivariate analysis were used for post hoc comparison). SAS, Self-Rating Anxiety Scale.

Table 3. SDS scores before and after intervention in the two groups (mean ± SD)

Group	SDS				
	Pre-intervention	7 d	15 d	30 d	60 d
Study group (n=40)	0.71±0.04	0.68±0.03[b]	0.51±0.03[a,b]	0.44±0.04[a,b]	0.41±0.02[a,b]
Control group (n=40)	0.70±0.03	0.65±0.03[a]	0.61±0.02[a]	0.53±0.03[a]	0.51±0.03[a]
F	*F*=295.814	F_{time}=900.097		$F_{group*time}$=92.557	
P	<0.001	<0.001		0.006	

Note: compared with before intervention, [a]*P*<0.05, compared with control group, [b]*P*<0.05 (repeated measure analysis of variance, SNK test and multivariate analysis were used for post hoc comparison). SDS, Self-rating Depression Scale.

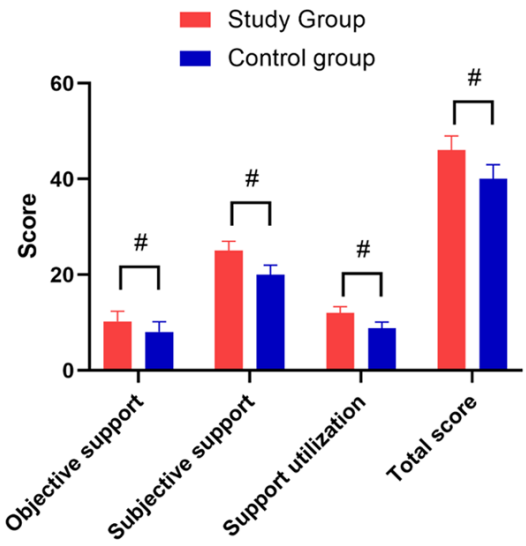

Figure 3. Comparison of social support between the two groups before and after the intervention. Compared with the control group, #*P*<0.05 (independent sample t test).

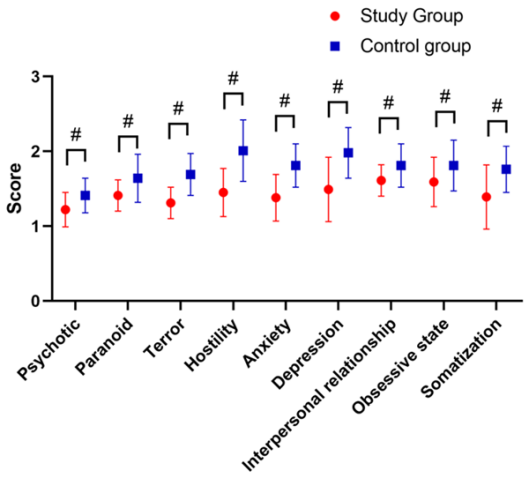

Figure 4. The scores of symptom self-assessment scale before and after the intervention. Compared with the control group, #*P*<0.05 (independent sample t test).

study group were significantly lower than those of the control group (*P*<0.05) (**Figure 4**).

Discussion

With the economics development in China, the number of replantation resulted from accidental injuries has increased significantly, and replantation can substantially improve quality of life of patients [14, 15]. Clinically, amputation caused by accident, injury and surgery, can be classified as complete and incomplete amputation [16]. Recent advances in microscopy have improved the success rate of replantation [17]. However, studies have found that some patients with replantation suffer from trauma, pain and poor postoperative functional recovery, and often have more pro-

nounced dysphoria, which affect the prognosis of patients [18].

In this study, the results showed that the study group received positive psychological suggestions scored higher in self-efficacy compared with patients in the control group who received routine psychological interventions. Kerschhagl et al. conducted a survey on 90 amputees undergoing replantation and found that the patients had prominent negative emotions due to impaired limb function, such as high incidence of anxiety and depression, and low self-efficacy and impaired social functioning, which seriously affected their daily life. Therefore, psychological guidance should be strengthened for such patients [19]. Khan et al. pointed out that patients undergoing replantation would have significant obsessive and hostile emotions, which may be related to patients' insufficient understanding of limb replantation and their concern about the loss of limb function after surgery [20]. The psychological interventions were carried out on patients with replantation from various perspectives, such as environmental suggestions, verbal suggestions, expression suggestions, role model suggestions and family suggestions. The results suggested that the self-efficacy of patients was significantly improved and the degree of social dysfunction was significantly reduced after implementation of the suggested intervention. The reasons may be that positive psychological interventions could mobilize patients' subjective motivation and eliminate their fears towards surgery [21].

The study further analyzed the effect of positive psychological suggestions on anxiety and depression, social support, and symptom self-assessment of patients, and the results showed that patients in the study group had significantly improved anxiety and depression, social support, and self-assessment scale scores after intervention. Ignatiadis et al. conducted a psychological intervention survey on 50 patients undergoing replantation, and the results showed that more positive verbal cues for patients could significantly reduce the incidence of anxiety and depression as well as improve the satisfaction rate of patients with nursing intervention [22]. A questionnaire survey of amputees also revealed their strong need for language reassurance and a desire for support from family and friends [23]. In this study, we analyzed that positive psychological suggestions could provide positive psychological comfort from multiple perspectives, such as medical care, family comfort and patient support, thus patients could achieve significantly higher social support and have more significant improvement of adverse symptoms [24].

In conclusion, positive psychological suggestions can improve self-efficacy and social functioning of patients undergoing replantation and reduce the incidence of adverse emotions, as well as increase patients' social support and improve their symptoms such as compulsion and hostility. The innovation of this study is that positive psychological suggestion is incorporated into the clinical interventions for patients with replantation, and the data are detailed, which can provide theoretical reference for subsequent studies. The limitations of this study include small sample size and single source of patients. Also, the effect of psychological suggestions on patients' limb function is not discussed in detail, which will be improved in future.

Disclosure of conflict of interest

None.

Address correspondence to: Aiping Peng, Department of Hand Surgery, Affiliated Xiaolan Hospital, Southern Medical University, No. 65, Jucheng Avenue Middle, Xiaolan Town, Zhongshan 528415, Guangdong Province, China. Tel: +86-18928101974; E-mail: aipingpeng71@163.com

References

[1] Li XL, Wang W, Liu F, Hu W and Liang DS. Successful lower limb replantation of knee-level amputation in a child: a case report. J Foot Ankle Surg 2020; 59: 427-430.

[2] Ono S and Chung KC. Efficiency in digital and hand replantation. Clin Plast Surg 2019; 46: 359-370.

[3] Tang JB, Wang ZT, Chen J and Wong J. A global view of digital replantation and revascularization. Clin Plast Surg 2020; 47: 437-459.

[4] Ramji M, Steve AK, Premji Z and Yeung J. Functional Outcomes of major upper extremity replantation: a scoping review. Plast Reconstr Surg Glob Open 2020; 8: e3071.

[5] Jiang Q, Huang K, Liu Y and Chi G. Using the Ilizarov technique to treat limb shortening after

replantation of a severed lower limb: a case report. Ann Transl Med 2020; 8: 1025.
[6] He B, Su S, Lu Y, Wen X, Duan J, Liu X, Zhu Z and Liu X. Effects of cryopreservation and replantation on muscles: application scope of limb cryopreservation. Ann Plast Surg 2020; 84: S208-S214.
[7] Kamarul T, Mansor A, Robson N, Albusaidi SH, Suhaeb AM and Samsudin EZ. Replantation and revascularization of amputated upper limb appendages outcome and predicting the factors influencing the success rates of these procedures in a tertiary hospital: an 8-year retrospective, cross-sectional study. J Orthop Surg (Hong Kong) 2018; 26: 2309499017749983.
[8] Patil RK, Malhotra G, Venugopal S, Salah E and Ramadan A. Replantation of nine fingers in a patient: a case report. Sultan Qaboos Univ Med J 2019; 19: e248-e252.
[9] Ozer K. Advances in limb preservation: from replantation to transplantation. J Hand Surg Am 2020; 45: 626-637.e625.
[10] Parashar A, Sharma R, Kaladagi R, Nair S and Shetty H. Major upper limb replantation: an account of patient tenacity. Plast Reconstr Surg Glob Open 2020; 8: e3005.
[11] Bumbaširević M, Lešić A, Palibrk T, Georgescu AV, Matei IR, Tabaković D, Matić S, Glišović Jovanović I, Petrović A and Manojlović R. Lower limb replantation: 27 years follow up. Injury 2020; 51 Suppl 4: S77-S80.
[12] Okumuş A and Cerci Ozkan A. Upper extremity replantation results in our series and review of replantation indications. Ulus Travma Acil Cerrahi Derg 2020; 26: 123-129.
[13] Güntürk Ö B, Kayalar M, Bali U, Özaksar K, Toros T and Gürbüz Y. Clinical outcomes of salvage revision surgery following finger replantation with vascular insufficiency: a retrospective study. Acta Orthop Traumatol Turc 2020; 54: 577-582.
[14] Kwak SH, Lee SH, Rhee SJ, Jang HS, Kim DH and Kim YJ. Multilevel dysvascular injury of the hand: replantation versus revision amputation. Plast Reconstr Surg 2020; 146: 819-829.
[15] Hayashi K, Hattori Y, Chia DSY, Sakamoto S and Doi K. Long-term outcomes of successful fingertip replantation: a follow-up of at least 10 years. Plast Reconstr Surg 2020; 146: 1059-1069.
[16] Retrouvey H, Solaja O and Baltzer HL. The effect of increasing age on outcomes of digital revascularization or replantation. Plast Reconstr Surg 2019; 143: 495-502.
[17] Zhu H, Bao B and Zheng X. A comparison of functional outcomes and therapeutic costs: single-digit replantation versus revision amputation. Plast Reconstr Surg 2018; 141: 244e-249e.
[18] Nishijima A, Yamamoto N, Gosho M, Yanagibayashi S, Yoshida R, Takikawa M, Hayasaka R, Nagano H, Maruyama E and Sekido M. Appropriate use of intravenous unfractionated heparin after digital replantation: a randomized controlled trial involving three groups. Plast Reconstr Surg 2019; 143: 1224e-1232e.
[19] Kerschhagl M, Larcher L, Mattiassich G and Prantl L. Replantation of a circumferentially degloved thumb in an occupational crush injury - a case report and review of the literature. Clin Hemorheol Microcirc 2019; 71: 403-414.
[20] Khan N, Rashid M, Ur Rashid H, Ur Rehman Sarwar S, Khalid Choudry U and Khurshid M. Functional outcomes of secondary procedures in upper extremity replantation and revascularization. Cureus 2019; 11: e5164.
[21] Özkan B, Uysal A and Markal Ertas N. Successful replantation of tamai zone i amputation with delayed vein repair. Handchir Mikrochir Plast Chir 2021; 53: 494-497.
[22] Ignatiadis IA, Mavrogenis AF, Igoumenou VG, Polyzois VD, Tsiampa VA, Arapoglou DK and Spyridonos S. Gunshot and blast injuries of the extremities: a review of 45 cases. Eur J Orthop Surg Traumatol 2019; 29: 295-305.
[23] Retrouvey H, Solaja O and Baltzer HL. Role of postoperative anticoagulation in predicting digit replantation and revascularization failure: a propensity-matched cohort study. Ann Plast Surg 2019; 83: 542-547.
[24] Nakajima Y, Iwasawa M, Mishima Y and Yuzuriha S. Fingertip replantation using artery-only anastomosis with a pulp tissue reduction method: a combination of pulp tissue reduction, bone fixation without gaps, and pinprick testing twice a day. Ann Plast Surg 2020; 85: 266-271.