

Chinese Flap: Plastic Surgery Team Experience For Reconstruction Of Skin Loss In The Hand

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Abstract

The radial flap, or Chinese flap, has been a great tool in reconstructive surgery since its inception. Its validity has been maintained over time and, 30 years after its creation, it remains one of the most multifaceted coverage alternatives available. 64-year-old male patient with right hand injury caused by a cane cutting machine. A wide exposed wound was observed with lesion of the first fingers and tendon exposure. At his admission, the injury was treated (first stage) and he was scheduled for graft placement and tenorrhaphy (second stage) 72 hours after his admission, in order to allow granulation of the wound. The consideration of the radial graft to repair hand injury promises successful results, since it provides enough tissue with adequate thickness and size, and allows the filling of the cavity with sufficient coverage of the external surface. This flap offers a wide variety of alternatives for reconstruction not only of proximal or distal arm defects, but it is also possible to use it as a free flap in head and neck defects.

Keywords: Radial flap • Fasciocutaneous flap • Chinese flap

Introduction

Aristotle defined the hand as "the instrument of instruments", a marvelous tool capable of performing great functions. The skeleton, articulations, tendons, vessels and soft tissues must be properly evaluated and treated under the knowledge and experience of alternative surgical techniques, beginning with simple directed healing to microsurgical transfer in the management of soft tissues [1]. The radial flap was performed for the first time on March 29, 1979 as a free flap for hand coverage, at the Department of Surgery, Shenyang General Hospital in China. The first publication about this flap appeared in the "National Medical Journal of China" in 1981 [2]. This situation kept the flap isolated from the western world for almost 16 years, until it achieved its "translated" publication in the British Journal of Plastic Surgery in 1997 [3]. Currently, the radial flap is widely known as the "chinese flap" and since its introduction, it has proven to be an extremely versatile tool. This tool allows us to incorporate skin, bone, tendons, nerve and muscle to repair complex lesions, with direct, retrograde or free flow, depending on the defect to be covered [2].

Case Report

64-year-old male patient admitted to the emergency room and referred to the plastic surgery department. He presented with a right hand injury caused by a cane cutting machine, which left the wound widely exposed, with injury to the first fingers and exposed tendons. The patient denies personal pathological history of significance.

The wound was initially repaired in order to allow granulation of the lesion and was scheduled for graft placement and tenorrhaphy 72 hours after admission.

Surgical technique

Part I

Under a complete surgical protocol, incisions were made on the second metacarpal of the right hand, the tissues were dissected until the fracture line was found, and finding multiple fragments, which were aligned to subsequently perform a wire cerclage. Fixation of the proximal and distal fragment of the fracture to the third metacarpal was performed using Kirschner pins, achieving adequate stabilization. Asepsis was performed at the area of skin loss corresponding to the dorsum of the right hand, where ligamentary structures were exposed and covered with a white sponge.

Part II

The corresponding marking was made (Figure 1), measuring the defect to be covered, then a similar measurement was extrapolated to the proximal third of the forearm, in the region supplied by the ulnar nerve. An Allen test was performed to ensure that the ulnar artery supplied the rest of the hand. Subsequently, the path of the radial artery was drawn to plan the rotation of the flap.



Figure 1. Corresponding marking of the area belonging to the radial pathway (Marked by color code: red=artery, blue=nerve, green=tendons).

Under regional interscalene block and sedation, tissue asepsis, antisepsis and placement of sterile fields were performed. Ischemia controlled by analog sphygmomanometer was started and the anterior region of the middle third of the right forearm was incised, to identify the distal pedicle on the skin and subcutaneous tissue. The radial artery was identified between the brachioradialis muscle and the flexor carpi radialis, the integrity of the palmar arch was verified and dissection was performed along the pedicle in its proximal portion. The skin island was marked, lifting it from ulnar to radial direction in a suprafascial plane (Figure 2).



Figure 2. Identification of the radial artery and the radial flexor of the carpal muscle.

Three to four direct perforators of the radial artery were identified, the ischemia was removed and the vitality of the skin island was corroborated by clamping the pedicle in its distal portion, after sectioning it for 5 min (Figure 3).



Figure 3. Dissection of the skin island.

The radial artery was ligated at both ends, well secured, and the island was dissected and detached up to the pivot point of the flap, at the distal radius level. A tunnel was opened over the wrist on the radial side to subsequently rotate the skin island design by 90°. The entire edge of the defect was sutured to the dorsum of the hand with nylon stitches, and the trajectory and non-twisting of the pedicle was corroborated with an adequate pulse, with no data of compression or capillary delay. The flap was carved on both sides of the tunnel to release tension on a pivot point and the skin was closed with nylon stitches. A graft was taken from the left groin, and under local anesthesia and sterile technique to cover the forearm defect, the donor site was closed without problem. The graft was fixed to the recipient site anchored with nylon and sterile disposable surgical tie over fabric and cotton fixed to the skin (Figure 4).



Figure 4. Right hand grafted Chinese flap.

The integrity and adequate characteristics of the entire surgical region were corroborated and no eventualities were found. A kerosene dressing and a padded bandage were placed on the flap site and on the entire right upper extremity, with a window in the central region of the flap, for monitoring. After her discharge, she was followed up for 1 month after surgery, without complications, both in the recipient and donor sites (Figure 5).



Figure 5. Follow-up one week after surgery.

Discussion

The radial artery, a segmental extension of the brachial artery, runs lateral to the intermuscular septum, below the brachioradialis and radial flexor carpi radialis muscles, separating the flexor and extensor muscles compartments of the forearm. From its origin at the level of the arm crease and up to 1 cm-3 cm proximal to the styloid process, it emits a series of perforating branches that, through deep, septal and septocutaneous fasciae, irrigate the muscles, bones and $\frac{3}{4}$ of the skin of the forearm [4]. The radial flap has been a great aid in reconstructive surgery since its inception, and 30 years after its creation, it continues being one of the most multifaceted coverage alternatives available. In this case report, we have been able to learn from its strengths and improve its weaknesses. Among the most important advantages is the fact that it allows us to use skin, muscle, tendons, adipose tissue, bone and nerve as we needed. Andrades et al, presented their experience with 10 patients operated on at the Hospital Clínico de la Universidad de Chile, where 100% of the cases evolved were successful. In some of these cases, their patients had to receive dermo-epidermal grafts in a second stage, without any other procedure after discharge [5]. Caracheo & Zetina, like Krastinova, also report their successful experience using the radial antebrachial flap for reconstruction of the anophthalmic orbit [6,7]. Reconstruction of an anophthalmic orbit is a challenging process due to the combination of deformities, including a small orbital cavity with a contracted orbit that is not able to retain a prosthesis. In the face, this flap can be useful in the reconstruction of large skin defects, with acceptable aesthetic results, especially when a local pedicled flap is not possible. Another remarkable case is when there is a history of previous radiation of the tissue, since the transplantation of fresh tissue improves healing by providing an area of skin and well vascularized soft tissues that serve to cover both internal and external defects. We have mentioned the absence of complications, as well as the satisfactory result in relation to esthetics. Bolado et al, mention that, in spite of the numerous modifications that have been made, both in the dissection of the flap and in the closure of the defect, none of the procedures used up to now have been shown completely to alleviate the sequelae in the donor area. In our experience, there was no requirement for any additional intervention after patient release. However, it is worth considering this possible complication and the proposal of Bolado et al, with the use of a fasciocutaneous V-Y rotation-advancement flap based on the perforating vessels of the ulnar artery for the treatment of the defect resulting from the free transfer of the radial antebrachial flap [8].

Conclusion

We can conclude that, in our experience, the results of using the Chinese flap are favorable, in addition, to offering a wide variety of alternatives for reconstruction, not only of proximal or distal arm defects, but it is also for head and neck defects.

Compliance With Ethical Standards

- The authors declare that they have no conflicts of interest to disclose.
- This article does not contain any studies with human participants or animals performed by any of the authors. This is a retrospective study with a careful review of one single file.

Declarations

- Ethics approval and consent to participate: Autograph consent was obtained from the patient for the presentation and publication of her case.
- Consent for publication: Written informed consent was obtained from the patient for publication of this case report and any accompanying images.
- A copy of the written consent is available for review by the Editor-in-Chief of this journal.
- Availability of data and materials: All data provided are available in the medical file located within the "Hospital Valentín Gómez Farías del Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado", in Zapopan Jalisco, Mexico.
- Competing interests: The authors have no conflicts of interest relevant to this article.

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References

1. Apa, S. & Rodríguez, J. "Radial flap design for reconstruction of defects of the hand and study of its component perforator flaps". *Cir Plas Iberolatinoam*. 44.3 (2018): 319-328.
2. Sandoval, J., et al. "RADIAL FLAP TO DISTAL PEDICLE". *Cir Parag*. 43.1 (2019): 35-37.
3. Yang, G., et al. "Forearm free skin flap transplantation: a report of 56 cases". *Br J Plast Surg*. 50 (1997): 162-165.
4. Megerle, K. "The Evolution of the Pedicled Radial Forearm Flap". *Hand*. 5 (2010): 37-42.
5. Andrades, P., et al. "Colgajo radial: experiencia del equipo de Cirugía Plástica de la Universidad de Chile". *Rev. Chilena de Cirugía*. 63.5 (2011): 459-467.
6. Caracheo, R. & Zetina, C. "Colgajo libre antebraquial radial para la reconstrucción de la órbita anoftálmica". *Reporte de un caso. Cirugía Plástica*. 19.3 (2009): 61-67.
7. Krastinova, D., et al. "Surgical management of the anophthalmic orbit Part 2: Post-tumoral". *Plast Reconstr sUrg*. 108.4(2001): 827-837.
8. Bolado, P., et al. "Closure of radial forearm flap donor site using a rotation-advancement flap based on ulnar perforators". *Cir.plást. iberolatinoam*. 39.3 (2013): 241-246.