# Abdominal Pedicle Flaps To The Hand And Forearm

John C. Kelleher
M.D., F.A.C.S.

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**Chapter Three:**
**PRINCIPLES OF THE ABDOMINAL FLAP - The alpha and omega flap**

The interval from 1946 to 1995 was the time from my alpha flap or my first flap until the time of my final flap or my omega flap.

1946 was the time that I completed my obligation for military service and began the struggle to obtain training in general surgery as well as plastic surgery. At that time, there were vast numbers of individuals competing to obtain the necessary required training in general surgery and then the even greater struggle to get the opportunity for training in the small surgical specialty of plastic surgery. I was fortunate to be appointed to the program at King's County Hospital in Brooklyn, New York, under the direction of Dr. Walter Coakley.

Dr. Leonard Rubin, who was on the staff at that time and since, implanted in me the precepts he absorbed from Dr. Brandon Macomber. I remember most vividly the teaching to keep all the fat on the flap or "it will die." The alpha flap shown in photo 3.A is the end result of these principles.

**Photo 3.A**

This is characterized as a fat biscuit flap with straight-line perimeter border scars. The function of the reconstructed hand was adequate but somewhat impeded by the bulging fat and straight-line scars. The omega flap or the last flap that I completed in 1995 was on a 28 year old white male in a motor vehicle accident with a fourth degree avulsion injury to the left hand as well as facial and ear trauma.

The principles that are enumerated below have evolved over a period of nearly 50 years. The application of these techniques makes the difference between skin coverage that looks like a "rising biscuit" on the hand that restricts function and coverage that meets the recipient site dimensions and preserves function.

The key points to consider and execute are listed below in chronological order and should be included in every flap. In the first stage of surgery the principles noted below should be carefully followed.

1. Debridement of dirt and other foreign bodies.
2. Debridement of severely traumatized and non-viable tissue.
3. Revision of the recipient site to avoid linear scars. Straight lines are broken up with V's and W's to prevent contracture.
4. Accurate flap planning to exactly match the size and shape of the recipient site.

5. The flap length to width ratio approximately 1:1 because the thinned pedicle becomes a random flap.
6. Axial vessels are incorporated in the base of the flap (superficial inferior epigastric, circumflex iliac and/or superior epigastric vessels).
7. The flap is raised on the plane of the abdominal aponeurosis.
8. The flap base or pedicle can be tubed when beneficial or necessary.
9. The flap is thinned to match the recipient site skin thickness. This is usually just deep to the subdermal plexus.
10. The flap thinning is done just prior to attachment to prevent desiccation and trauma to the subdermal plexus.
11. The donor site closed by advancement and split thickness skin graft, which is also used to line the raw surface of the pedicle.
12. The flap is attached with attention to matching the pattern of the flap to the recipient site. This prevents uneven tension and consequent loss of blood supply.
13. Position is maintained with balanced skeletal traction, with internal and external fixation as indicated.
14. The flap is inspected frequently in the early postoperative period.

Principles of the second stage of surgery are as follows.

1. Approximately three weeks later the pedicle to the flap can safely be divided. No "delays" are required unless extra tissue is being carried with the flap.
2. The pedicle is divided, trimmed to incorporate V's and W's and closed, inserting small Penrose drains at the edges.
3. The donor site can frequently be completely closed with the skin from the pedicle. The previously placed split thickness skin graft can frequently be removed and replaced with tissue remaining from the pedicle.
4. Early hand therapy should be incorporated to promote active and passive motion.

CPM is frequently useful. Additional stages of surgery may be required for a variety of reasons.

1. “Delays” may be required in extra tissue is been carried with the flap.
2. Reconstruction involving tendons, nerves, and/or bone may require extra stages of surgery.

The above principles are not technically difficult, but they do require experience and teaching to master. The material that follows will tend to demonstrate with case examples and color photos of proper execution of the abdominal flap. The flap that I termed “the Omega Flap" was the final flap that I performed in 1994 prior to retirement. I believe that it incorporates and demonstrates most of the principles outlined above.

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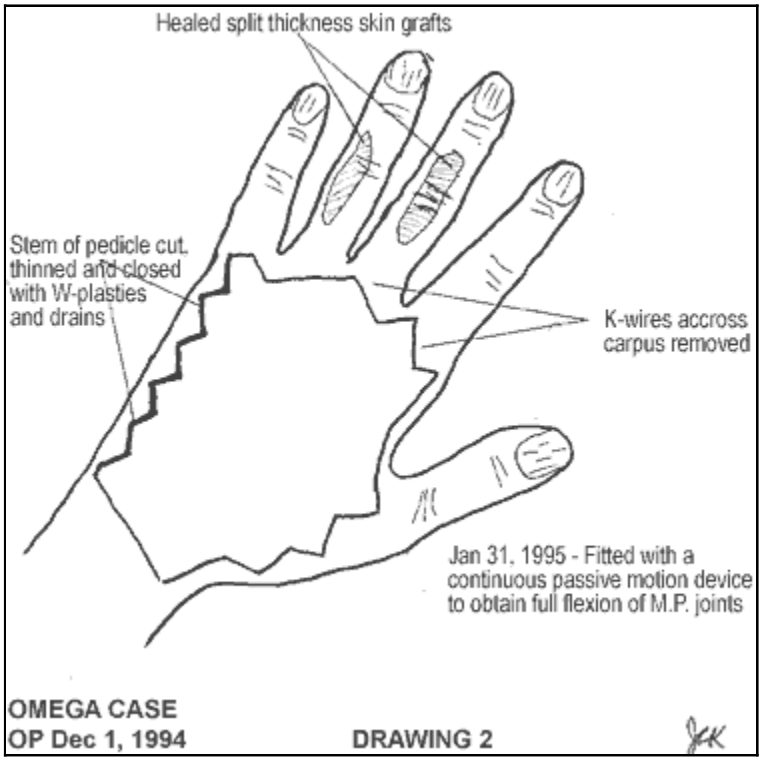
**Operation December 1, 1994 Stage II**: (See Photo 3.E) The pedicle was divided from the dorsum of the left hand. The base of the pedicle measured approximately 11 cm. in linear length. The distal border with its W's was approximately 42 cm. of linear length to allow for capillary inflow. The ulnar side of the flap was thinned of fat. The recipient area was W'd, and the ulnar edge of the flap was inset and drained with half cut Penrose drains. (See drawing 2)

**Photo 3.E**




On January 31, 1995, he was started on continuous passive motion (CPM) to the left hand and had almost immediate good motion of the metacarpal phalangeal joints. (See photo 3.F) The motion continued to improve until his next surgical procedure. I have found CPM to be quite effective in these types of cases.

**Photo 3.F**

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An outline of the details of the Omega flap is as follows:

**Operation November 7, 1994**: Irrigation and debridement with V-darts incised along the radial border of the hand and along the line of the metacarpal phalangeal joints.

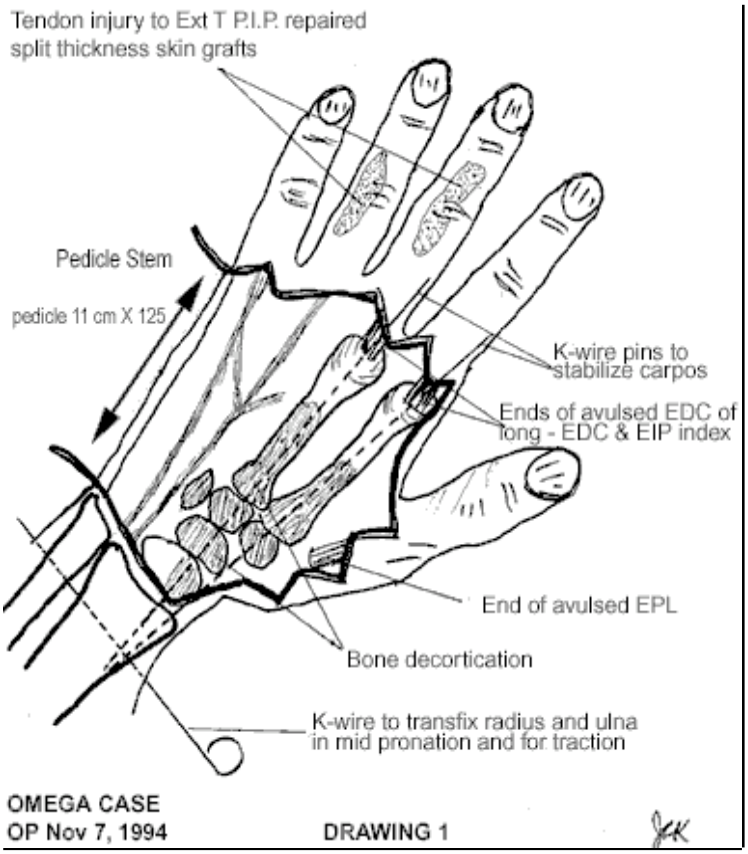
A 12 X 11 cm. Avulsion of the skin of the left hand dorsum and wrist is seen in photo 3.B.

**Photo 3.B**

Multiple extensor tendons (i.e., EPL, ECRL, ECRB, EIP, and EDCII, III) were avulsed. Cortical bone was abraded off the base of the left index and middle finger metacarpals, trapezium, trapezoid, capitate, scaphoid, and radial tubercle. (See drawing 1)

A tendon injury of the left ring extensor tendon over the proximal phalanx was repaired with a 4-0 Surgilon and covered with a splint thickness skin graft. (See drawing 1)

The left wrist was stabilized with two heavy Kirschner wires, one down the shaft of the index and one down the long finger metacarpals into the radius. (See drawing 1)




An abdominal pedicle from the left lower abdominal region based on the superficial inferior epigastric vessels measuring 11 X 12.5 cm. was used to cover the defect. It should be noted that W inserts at the transverse metacarpal border and radial border of the flap were used to break up the potential straight line scar. (See photos 3.C and 3.D) A split thickness skin graft was used to close the two digits and the donor site. (See drawing 1)

**Photo 3.C**

**Photo 3.D**

Balanced skeletal traction suspends the forearm and hand by Kirschner wire pins through the distal radius and ulna and through the olecranon. (See photo 3.D)

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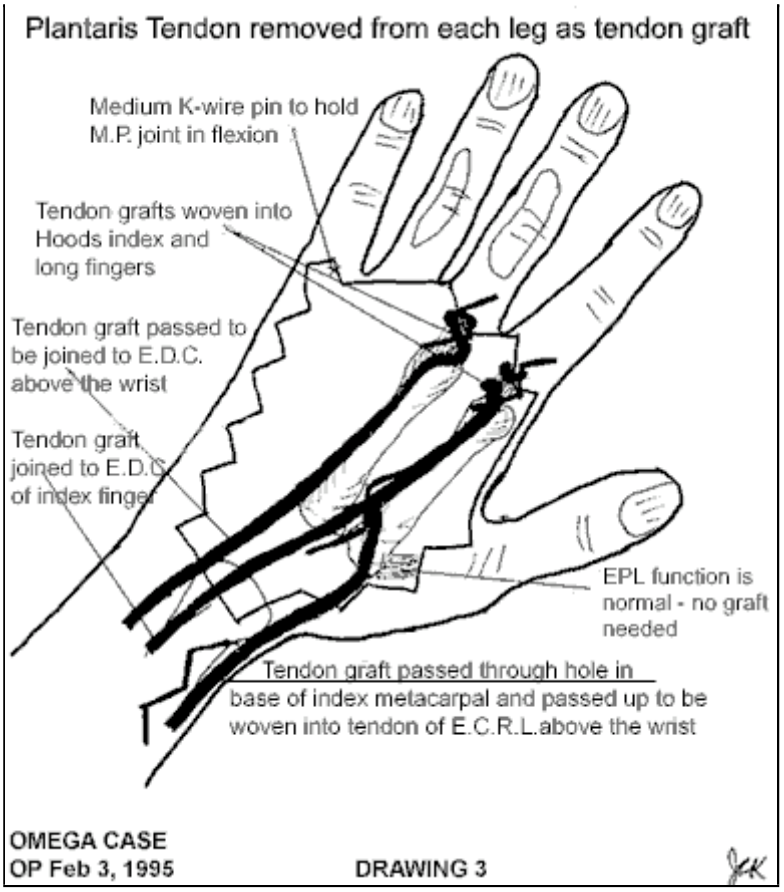
**Operation February 3, 1995 Stage III**: Plantaris tendon grafts were taken from both legs and used as interposition tendon grafts to the extensor carpi radialis longus and the extensor digitorum communis tendons of the index and long fingers. (See drawing 3)




He was referred to traditional hand therapy and the use of CPM after healing of the tendon grafts. (See photo 3.G)

**Photo 3.G**

He regained most of the active and passive motion of the wrist and metacarpal phalangeal joints. The tendon grafts continued to improve and function as shown on December 1, 1996, twenty-five months post injury (See photo 3.H) The total reconstruction required twenty weeks from the time of injury until the completion of therapy.

**Photo 3.H**