

Hand amputations proximal but close to the wrist joint: Prime candidates for reattachment (long-term functional results)

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Although not a life-threatening event, the loss of a whole hand is extremely tragic. When the famous German expressionist Ernst Ludwig Kirchner was called for military service during World War I, he expressed his fears and anxiety in a self-portrait in which he is portrayed as a soldier who had suffered an amputation of his right hand. Obviously, it was more the possible loss of a hand, the most important extension of human intellect, rather than death that frightened him the most. Fortunately, this horrifying injury is a relatively rare incident.

A retrospective analysis of patients who had replantation after they sustained complete severance at various levels of the hand and upper limb was gathered from the replantation centers of Shanghai (No. 6 People's Hospital), Louisville, and Zurich and was published in 1981.¹ This series included 129 cases of replantation proximal to the carpometacarpal joint: 100 cases from the No. 6 People's Hospital in Shanghai, 16 from the Louisville replantation center, and 13 from Zurich (Table I).

All three centers used the same system for evaluation of the functional results as proposed by Chen et al.¹ This system recognizes four grades of functional recovery on the basis of the following four parameters:

Grade I (Excellent)

- A. Ability to resume original work with a critical contribution from the reattached parts
- B. Collective range of joint motion exceeds 60% of normal, including the joint immediately proximal to the reattached part
- C. Recovery of sensibility to a high grade without excessive intolerance of cold
- D. Muscular power of 4 to 5 on a scale of 1 to 5

Grade II (Good)

- A. Ability to resume some gainful work but not original employment
- B. Range of joint motion exceeds 40% of normal
- C. Recovery of near normal sensibility in the median and ulnar nerve distributions without severe intolerance of cold
- D. Muscular power of grade 3 to 4

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Table I. Results of upper limb replantations (minimum of 2 years' follow-up) from Shanghai, Louisville, and Zurich

Level of amputation	No. of cases	Grades I and II (%)	Grade III (%)	Grade IV (%)
Shoulder	3	0	33.3	66.6
Arm	26	35	65	0
Proximal forearm	20	40	35	25
Distal forearm	49	80	20	0
Wrist (carpus)	<u>31</u>	<u>81</u>	<u>19</u>	<u>0</u>
Total	129	63	32	5

Grade III (Fair)

- A. Independence in activities of daily living
- B. Range of motion of joints exceeds 30% of normal
- C. Poor but useful recovery of sensibility (e.g., only median or ulnar recovery is good or quality is only protective in both median and ulnar areas)
- D. Muscular power of grade 3

Grade IV (Poor)

- A. Tissue survival with no recovery of useful function

Despite the obvious and important variations in these studies, it became evident that the independent experience of replantation centers in three different continents is remarkably similar.¹ The results are summarized in Table I.

Amputations proximal but close to the wrist

In the reported series, there were 49 cases of amputations proximal to the wrist but close to the joint (distal forearm), including 40 cases from Shanghai, four from Louisville, and five from Zurich. One patient in our series of five cases has been added after the 1981 publication.¹

Replantation for amputations through the carpus showed results similar to those with distal forearm amputations. The latter amputation level is emphasized because in cases of amputation through the wrist joint, special problems of skeletal management are introduced; these include primary arthrodesis of the wrist, eventual proximal row carpectomy, or some type of primary arthroplasty. A minimum follow-up of 2 years is too short to assess the final result of transcarpal replantations. Therefore, patients with amputations proximal but close to the wrist joint are considered to be the most favorable candidates for replantation at this time. As shown in Table I, 80% of these patients achieved a grade I or II