Hand Finger Replantation in Dr. Soetomo Hospital

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ABSTRACT: Nine cases of hand replantation have been claimed at our centre since 1982. According to the level of amputation seven were to the fingers, three at the level of the metacarpal bone, metacarpophalangeal joints and two at the wrist.

The results of our series: six survived, one partially survived and five failures. Our experience showed survival rate of replantations since 1982 to 1986 have been increased.

Hopfner's experimental work in 1903 on the successful replantation of three provided amputated dog's legs, the stimulus and six decades later, in 1963, Chen Zhong Wei, was successful in the replantation of a totally amputated hand for the first time with useful functional recovery.[4]

Since then, there has been a much of improvement in technique increasing the survival and usefulness of the reattached part.

Our small experience in hand replantation surgery since 1982, will serve to illustrate the procedure of hand replantation in our centre. An analysis of the first nine cases of hand replantation performed at Dr. Soetomo General Hospital is presented, and an attempt is made to correlate case selection and management with survival and functional result.

Our unit consists of two orthopaedic surgeons who serve in many services and two nurses who are experienced in microsurgical operations. We have two orthopaedic operation theatres without a special microsurgical operation room. We have one surgical microscope with a minimum standard of microsurgical instruments.

MATERIALS AND METHODS

From September 1982 to May 1986, twelve amputated part were replanted in nine patients aged 9 to 35 years. All of our cases were clean cut or sharp crush.

The patients were evaluated retrospectively according to the following variables: age, mode of injury, level of amputation, anoxic time and functional result. All cases were performed by both authors, who have used the same indication and surgical technique.

RESULTS

Sex, Age and Modes of Injury

Sharp crush by machine were in six of our series, three others were clean cut by sickle (Table 1).

It's interesting to observe that there were no differences between amputation injury in the male or female. There was a correlation between sharp crush by machine and average worker age. Since most of them were new workers who were not capable enough in operating mechinary.

Level of Amputation

Six of the amputation were total around the fingers and one other was subtotal.

When detachment was with level of metacarpal the bone or metacapophalangeal joint, two were total and one was subtotal. At the wrist level one was total and one patient was subtotal (Table 2).

TABLE 1
Profile of Sex, Age and Modes of Injury

Patient No.	Sex	Age (year)	Mode of Injury
1	M	9	Cut by sickle
2	M	13	Cut by sickle
3	F	16	Cut by machine
4	F	17	Cut by machine
5	M	18	Cut by machine
6	M	19	Cut by machine
7	F	20	Cut by machine
8	F	20	Cut by sickle
9	M	35	Cut by machine

TABLE 2
Site of Detachment

	Total	Subtotal	
Around Finger	6	1	7
Around MC, MPJ	2	1	3
Around Wrist	1	1	2
Total	9	3	12

MC = metacarpal bone
MPJ = metacarpophalangeal joint

TABLE 3
Profile of Replantation Results

	Reattached	Survival	Partial survive	Failure
September 1982	1	1	–	–
1983	3	–	–	3
1984	1	–	–	1
1985	4	3	–	1
May 1986	3	2	1	–

TABLE 4
Relation of Survival to Duration of Anoxia

Duration of anoxia (hour)	Number of reattached part	Survived	Partial survived	Failure
6	5	4	1	–
6 – 10	3	2	–	1
11 – 15	4	–	–	4

Prifile of Replantation Results

Survival in the replanted part has been imporved with increased experience.

Duration of Anoxia

The relation of survival to duration of anoxia can be seen in our series (Table 4). Anoxia in the amputated part of less than six hours will increase likelihood of survival, but longer ischemic time will give worse results.

DISCUSSION

Out of twelve hands replanted on varied level five failed. All of them were due to vascular complication. They were not revised.

From the point of view of survival, there is a relationship between survival and duration of anoxia (Table 4). Analysis of these results showed that long ischemic time reduce the success rate in replantation.

Anoxia resulting from disruption of circulation cause progressive tissue degeneration to the point of irreversible damage. Muscle is the tissue most succeptable to anoxic damage, repidly irreversible damage occures after six hours on exposure to average room temperature (approximately 20° to 25°C).[4] In the tropical country this time will be shortened. Continuous cooling of the tissue is the only means of extending the period of anoxic time before irreversible cellular damage.[4,5,9,10]

In our present practice, cooling of the amputated part must be commenced promptly after amputation injury. The amputated part ideally should be placed in plastic bag surrounded with ice. This is the simple method not expensive and the public, para medical personal, and refering doctors should be warned. Like wise, splinting of partially separate part will prevent any residual blood vessels kinking that would lead to thrombosis and to preserve any residual attachment, especially skin bridges.

Our experience in four years of hand replantation, suggest that the sequence of repair is an important concept in reattachment surgery. The sturctures must be repaired in general working form anatomically deep structures to the more accessible superficial ones.[9] After our successful first experience in 1982, we considered to reduce ischemic time during operation by reanastomosing divided blood vessels after skeletal stabilization and the other anatomical part will be repaired few days after the replanted part had survived. Thus, the aim of viability of the reimplantation is to secure initial reanastomotic circulatory channels.

After reattachment, early mobilisation will produced a pumping mechanism that improves tissue perfusion and possible prevents thrombosis. The post operative mobilisation must be started as soon as possible with active and gentle passive range of motion of the joint. After two weeks, progressive active motion is encouraged. Usually by the fourth to sixth weeks bony union is well advanced and active exercises are vigorously encouraged.

In caring for our amputation or replantation patient, we must remember, *"To regain normal function is rarely achieved, to regain good function is often, and to rehabilitate to maximum possible function is always".*[2]

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