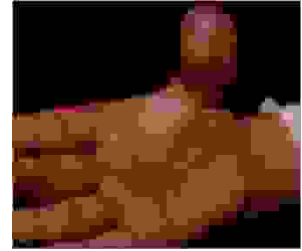


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DIGITAL NEUROVASCULAR ISLAND FLAP (LITTLER FLAP); SOFT TISSUE COVERAGE IN HAND



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ABSTRACT ... dr_basharat6@hotmail.com Provision of stable sensate skin is of great importance in reconstruction of injured thumb. Digital neuro vascular island flap has the potential of transferring sensibility to the functionally significant pulp of the thumb from a less important part of the hand, such as the middle or ring finger. **Objective:** Evaluation of the role of digital neuro vascular island flap for soft tissue coverage in hand. **Design:** Prospective study. **Setting:** Orthopaedic unit Bahawal victoria Hospital, Bahawalpur. **Period:** Oct. 1994 to Dec. 1998. **Material & Methods:** The Littler flap has been used for the reconstruction of soft tissue defect of thumb in six patients. **Results:** All patients were male of age ranging 6- 40 Years. Good results were observed in 5 (83%) patients with 100% survival of the flap. Marginal or superficial necrosis of the flap was seen in one patient but did not require second procedure.. **Conclusion:** Digital neuro vascular island flap (Littler flap) is recommended to cover the soft tissue defects over the hand especially for resurfacing the thumb.

INTRODUCTION

Sensate skin cover for the injured thumb was first provided by the digital neuro vascular island flap described by Littler¹. However, morbidity at the donor site was often unacceptable. Injuries to the hand can occur in all industrial occupations. Lacerations, crushes and burns of the hand are not uncommon in the wool textile industry. There is also a specific hand injury caused by the carding and combing machinery². Although, by law, all machines have to be properly guarded , human fallibility still finds ways of trapping hands in the machines, often during maintenance or cleaning. The injury so caused is instantly recognizable, and is characterized by multiple small lacerations, tissue loss and contamination by wool. There may also be an associated crushing injury. The injury to the dorsum

of the hand is more common and more severe than it looks at the primary surgery^{2,3}.

The best type of skin cover available is normal skin lying over a layer of normal sub- cutaneous tissue , so that the best way of closing any wound is by direct suture. When there has been loss of tissue, the only possibility of obtaining the good quality cover is with some form of flap. However, in many situations, a satisfactory result can be obtained by using a skin graft. Quality of skin graft depends on its thickness; the thicker the graft is, the less it will contract and better sensation it will develop and probably as a combination of those two, the better it will wear.

In the last few years, many new skin flaps have also been developed. Random flaps derive their blood

supply from the small cutaneous vessels in the skin itself. Axial flaps have a named arterial supply. Island flaps based on arterio - venous pedicles can be rotated to the new position or transferred as free flaps. Free flap is transfer of free tissue with its own artery and vein from a donor site to a recipient site where they are micro surgically anatomized .

In replacement of skin loss with a flap in orthopaedic surgery, it is important to select the technique that is simplest, safest and produces consistent and predictable results. Pedicled Island flap should be the first choice. Although a free flap has been shown to have the advantage of being a one stage operation, avoiding problems of prolonged hospitalization, acrobatic immobilization and occasional psychological disturbance in the patient, its application in orthopaedic surgery is still limited and should only be used if flap coverage is required and no satisfactory local flap cover is available.

Littler flap is a local flap, which can be used to cover soft tissue loss over the thumb. Its main advantages are that it provides;

1. Good sensation.
2. Robust padding.
3. Good blood supply.

Its main disadvantage is the difficult dissection.

While dealing with large area of skin loss, one may have to consider the best way of closing that defect as the primary emergency treatment. Second consideration has to be given to whether this cover will be adequate for future re- constructive procedures. It is far better to get definitive cover at the primary operation.

In most parts of our country, there is a shortage of plastic surgeons and many wounds are treated in emergency department by other specialities. At the subsequent surgery, most common problem encountered is the wound infection due to faulty primary wound toilet.

OBJECTIVES

To evaluate the results of digital neuro vascular island flap as a method of reconstruction of hand (thumb).

MATERIALS & METHODS

Digital neuro vascular island flap (Littler flap) was performed in six male patients at Orthopedic unit of B V Hospital, Bahawalpur. General anesthesia and a light rubber tourniquet was used in all cases.

Indications of the flap were;

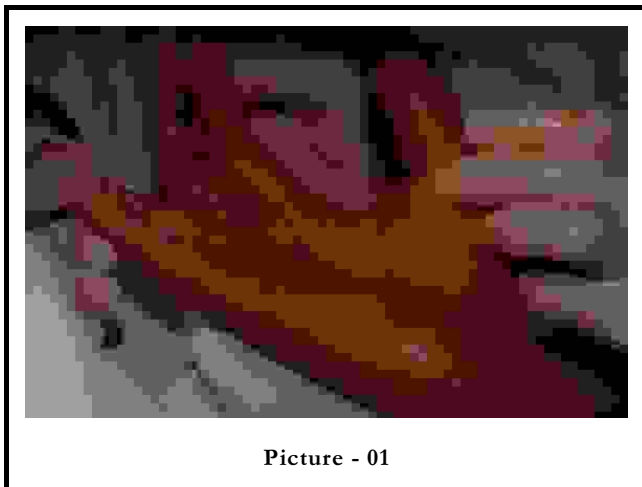
1. To re-inervate re-planted thumb whose pulp nerves were avulsed at the time of injury.
2. To resurface traumatic pulp loss of thumb.
3. To re- inervate the conventional tube pedicle and bone graft thumb reconstruction.
4. Damage to thumb that has caused tender scar, anesthesia and relative ischemia.

The area of sensory loss on the thumb was demarcated and a similar sized skin was out lined on the ulnar side of the ring finger. The skin was then incised and carefully elevated along with subcutaneous tissues and neuro vascular bundle under the skin. The neuro vascular bundle was dissected proximally into the palm. The proper digital artery to the radial side of the little finger was ligated and divided. The neuro vascular island flap was carefully rotated to the recipient site and neuro vascular bundle was buried under neath the skin. The flap was stitched to the recipient site (Fig-1).

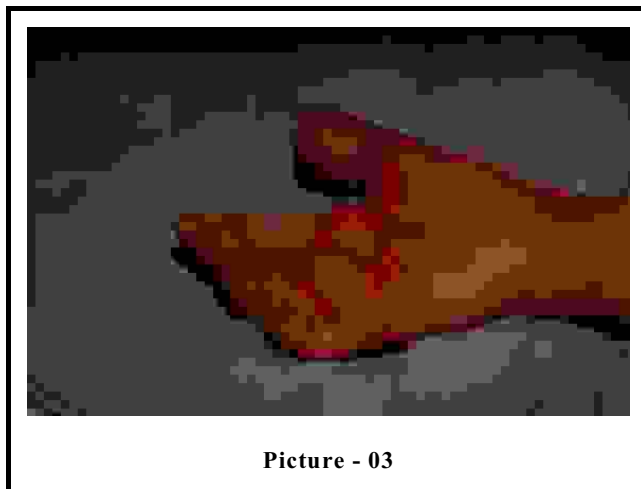
RESULTS

In this study, six cases of digital neuro vascular island flaps were included. All were male patients of age ranging 6-40 years.

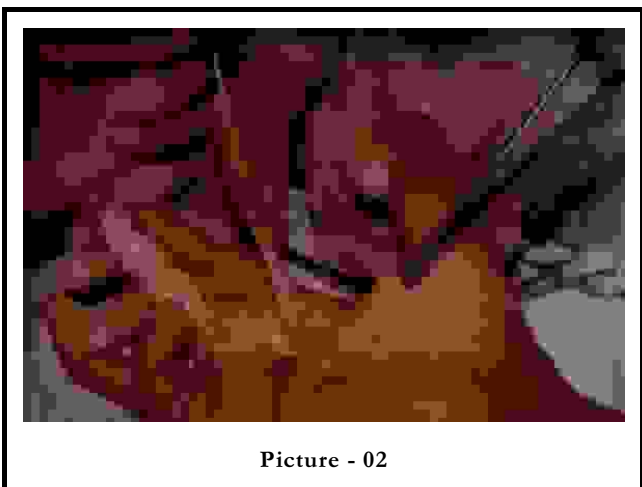
Regarding the mechanism of injury, crush injury was present in two cases (33.3%), flexion deformity of middle phalanx in one case (16.6%) and post-traumatic loss of thumb in three cases (50%).



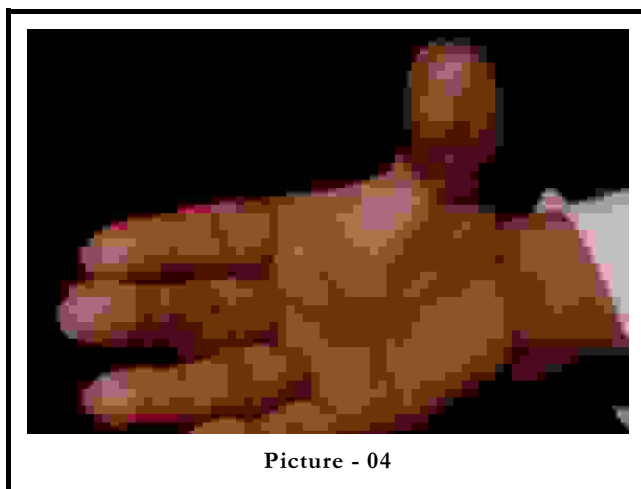
Picture - 01



Picture - 03



Picture - 02



Picture - 04

One patient (16.6%) had loss of tissues over dorsal aspect, two patient (33.3%) had loss of tissues over volar aspect of the hand.

Right hand (dominant) was involved in five cases and left hand (non-dominant) in one case. One patient also had traumatic amputation of the second metacarpal at inter-phalangeal joint. Contamination was found in two cases, which was mud, grass, gravel and sand.

Primary reconstruction was performed in clean cases. Contaminated wounds were washed with plenty of isotonic saline, debrided and secondary reconstruction was made in these cases. The result as shown in table I were categorized according to the following criteria;

- Good: 100% survival of the flap without complication.
- Satisfactory: Marginal or superficial necrosis of the flap but no secondary procedure had to be performed.
- Poor: Failure of survival of the flap and secondary procedure had to be performed.

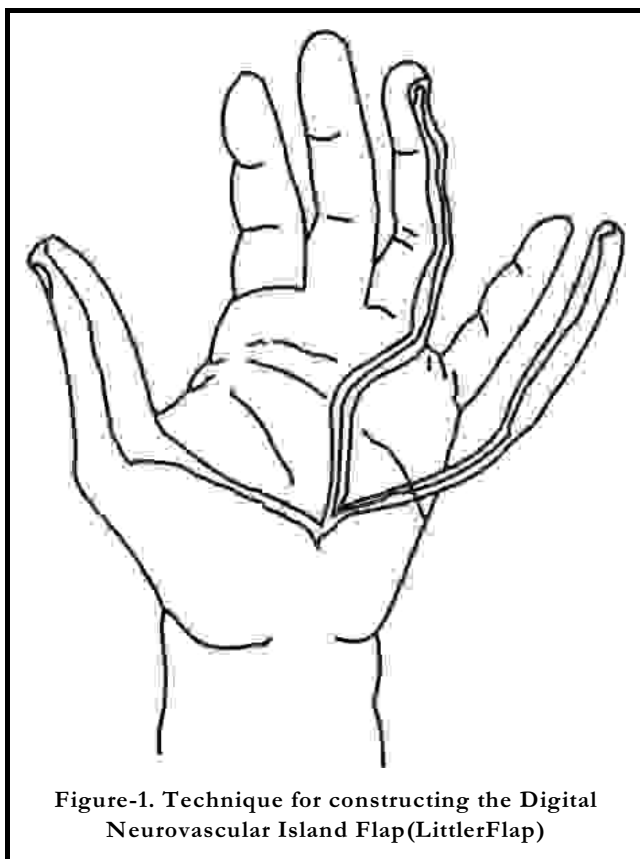


Figure-1. Technique for constructing the Digital Neurovascular Island Flap(LittlerFlap)

Results	No. of patients	Percentage
Good	5	83.3
Satisfactory	1	16.6
Poor	Nil	Nil

DISCUSSION

Hand injury is an important occurrence in industrial and civilian setting. These result in a great deal of morbidity and dysfunction. This is because the hand is highly developed sensory and motor organ capable of performing enormous functions. In the management of hand injuries, the purpose of treatment is to restore the function. Soft tissue coverage is an important factor in hand injuries. The role of early soft tissue coverage in the management of wounds with skin loss has been slowly understood over the last two hundred years. Small to moderate

size defects of the hand overlying joint surface, flexor tendons, silastic implants and tactile surfaces require full thickness skin and subcutaneous tissue. Soft tissue coverage may be provided by graft or flap. A graft is a part of tissue such as skin, bone, fascia or sometimes an entire organ that is severed free and transferred to correct a defect in the body and takes its blood supply from the recipient area

Recent advances in surgery and latest equipments have revolutionized the management of hand injuries. In developing countries like Pakistan, the hand trauma is frequent occurrence. The patients are mostly untrained and unskilled industrial and agricultural workers. Mechanism of injury include fodder cutter machine injuries, thrasher machine injuries, roadside accidental injuries; blast injuries and industrial injuries. The soft tissue coverage in hand injuries has got primary role in the management and salvage of the injured hand.

Engel⁴ reported two cases with mutilated, disabled digit and loss of tissue and sensation due to high - pressure injection injuries of the hand. He performed digital neuro vascular island flap to restore adequate soft tissue and sensation.

Rose⁵ treated six difficult hand wounds which were resurfaced with an arterialized island pedicle from the lateral surface of the near by digits and multistage distant pedicle flap. The lengthy pedicle flap allowed an arc of coverage over the palm, dorsum of the hand and adjacent digits. The results in six cases were favorable.

Our study included six cases of Littler's flap. One patient had loss of tissue over the dorsal aspect, two patients had loss of tissue over the volar aspect of hand and three patients had loss of thumb. We had good results in five patients and satisfactory in one case which is comparable to other studies.

In 1985 Schuind et al⁶ performed homo-digital island flap in digital amputation of the pulp, atrophic or insensitive pulp of the index finger or thumb and painful neuroma. The results were satisfactory.

Stice and Wood⁷ evaluated the neuro vascular island skin flaps in hands in 13 patients. Sensory evaluation was carried out in six patients; all patients were satisfied with the procedure. Authors suggested that Digital neuro vascular island flap was an excellent procedure for restoration of useful digit tip sensibility.

Our study included three patients of post-traumatic loss of thumb. We reconstructed the thumb by iliac bone graft and groin flap. For sensation of thumb, we adopted Digital neuro vascular island flap for useful thumb tip sensibility. The result of our study was good.

CONCLUSION

Digital neuro vascular island flap may be applied to treat permanent sensory defects of radial side of an otherwise normal index finger or on the area of pinch of the thumb. Before transfer, it is essential to consider the dominance of the hand, status of the ipsilateral ulnar nerve, the condition of the opposite hand and the experience of the surgeon.

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