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Kite Flap Technique for Skin defects in Hand Injuries- Technical Note

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Introduction

Reconstruction of skin defects in hand injuries requires flaps to be thin, pliable and most importantly sensate. The innervated first metacarpal artery flap also called as 'Kite Flap' is a good and simple method for reconstruction of these defects. It first described by Tessier et al in 1961, however he did not publish it [1] and so credit of describing the technique goes to Holevich who published it in journal of bone and joint surgery (Br) in 1963 [2]. The technique of the kite flap is described below with a case presentation.

Indications

1.Coverage for defects on the dorsum of the thumb

2.Coverage of amputation of the thumb at the metacarpophalangeal joint level

Steps for the Kite Flap

STEP 1

1.Confirm the presence of an artery in the dorsal web space with Doppler ultrasound examination. In most patient who are not obese, the artery is well palpable and is just over the first metacarpal.

2.Patient is supine with the hand on an arm table. A tourniquet is applied around mid arm level and it is preferable to do this surgery under a brachial block. Use an Esmarch bandage lightly around the hand to avoid complete obliteration of the vessel.

3.Use Loupes for this surgery. You may need around 4 X magnification to identify the vessel.

4.Identify the first dorsal metacarpal artery running in the dorsal first web space. It runs approximately from the level of the dorsal carpometacarpal joint along the first dorsal interosseous muscle to the lateral side of the second MCP joint.

5.Mark the outline of the skin flap over the index metacarpal head and the index MCP joint.

STEP 2:

Do a thorough debridement of the defect to ensure that the margins of the defect are viable and bleeding (Figure 1).

Figure 1a: 8 week old defect on the dorsum of the thumb showing proximal phalanx of the bone exposed with unhealthy granulation tissue and sutures applied elsewhere. Doing an adequate debridement is an important step as the initial defect may be a lot bigger then you would anticipate.

Figure 1b: Post debridement the wound is clean and margins are bleeding well.

STEP 3

With the help of a skin marker – Mark the line of the first dorsal metacarpal artery. Mark the with help of a guaze or a glove material you could take an impression of the defect from the dorsum and mark it at the distal end of the first metacarpal artery ensuring that you are over the dorsum of the proximal phalanx o the index finger. Ensure that your proximal margin is at least mid-way over the first metacarpal joint (Fig 2).

Figure 2: Careful pre-incision planning will ensure that you are not short in flap dimensions.

STEP 4

Make the skin incision over the marked first dorsal metacarpal artery. Elevate the skin off the superficial veins overlying the artery. Keep all tissue including the veins in the pedicle. Once you have identified the pedicle- ensure that you free the pedicle proximally as well as distally to the level of the flap. Your aim would be to ensure that there is no kinking of the pedicle ultimately. You may have to ligate or cauterize with a bipolar small branches of the vessel.

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Figure 3: The vascular pedicle elevated with the veins and the soft tissue

STEP 5

Elevate the skin flap and the pedicle from the tendon. The first dorsal interosseous fascia from distal to proximal, taking muscle fascia with the flap. Elevate the pedicle to the base of the first dorsal interosseous space. Important to note the plane of elevation of the flap to include the pedicle with it.

Figure 4: Elevation of the flap and pedicle

STEP 6

Create a tunnel from the base of the pedicle under the intact skin of the first web space through the dorsal thumb skin to the area of the defect. Note the tunnel must be atleast large enough to allow the passage of a finger to ensure that the tunnel is wide enough to accommodate the flap. Also ensure that there is no twist or kinking of the pedicle. Once the flap has been tunneled through below the skin over the first space the inset of the flap should be perfect to ensure good uptake.

Figure 5: The tunneled graft stabilized over the defect

Figure 6: Full thickness graft covering the defect over the index finger

STEP 7

The skin defect over the index finger can be easily covered with a full thickness skin graft. The graft can be taken from the volar aspect of the elbow over the elbow crease and the defect can be closed primarily.

Figure 7: 3 weeks post –operative photograph showing good uptake of the flap with no edge necrosis.

STEP 8

Immobilise with a thumb spica splint for three weeks. Suture removal after two weeks.

References

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