Hand Surgery and Rehabilitation xxx (2017) xxx–xxx

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Literature review

Treatment of defects in the tip and palmar surface of the fingers

Traitement des pertes de substances pulpaires et de la face palmaire des doigts

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ARTICLE INFO

Article history:
Received 26 July 2017
Received in revised form 4 November 2017
Accepted 8 November 2017
Available online xxx

Keywords:
Pulp
Fingertip
Defect
Flap
Coverage

Mots clés :
Pulpe
Extrémité
Perte de substance
Lambeau
Couverture

ABSTRACT

Defects on the palmar surface of the fingers are an important part of hand emergencies, especially fingertip wounds. Luckily, many coverage methods are available. We will review the anatomy of this area and the thought process for treating these defects. We will also propose an algorithm that can be used to select the best technique based on the type of injury present.

RÉSUMÉ

Les pertes de substance de la face palmaire des doigts représentent une part importante des urgences de la main, plus particulièrement les plaies pulpaires dont le choix de couverture est très vaste. Nous proposons dans cet article une revue des connaissances anatomiques nécessaires et des éléments du raisonnement pour prendre en charge ces pertes de substance. Nous proposons également un algorithme pour le choix de la technique en fonction de chaque traumatisme.

1. Introduction

Soft tissue defects on the palmar surface of the fingers are a large component of hand-related emergency cases. This includes fingertip wounds that can be covered using a large variety of methods. We will discuss fingertip injuries separately from more proximal wounds on the palmar surface of the fingers in this review.

2. Fingertip

The tip of the finger has a major functional role. It provides fine grasping and tactile sensibility and is important to the finger's appearance. Reconstruction of the fingertip aims to achieve stable coverage, restore acceptable appearance, obtain sensitivity, preserve length (critical for the thumb) and allow activities to be resumed as quickly as possible [1].

Since there are several coverage options, we will not attempt to review them all here. Instead, we will focus on the most current and practical techniques as a basis for a treatment decision tree that is as universal as possible. Defects of the nail complex will not be reviewed here.

2.1. Anatomy

The distal area of the fingertip must be distinguished from the proximal one, as their anatomy and characteristics differ. The distal fingertip is firm and can withstand deformity. The nail plate, distal phalanx tuberosity and radially arranged fibrous septa contribute to this firmness. It is essential to being able to pinch the fingers

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https://doi.org/10.1016/j.hansur.2017.11.003
2468-1229/

together. In contrast, the proximal finger pad is malleable. Here, the adipose tissue lobules have a spherical shape that allows it to adapt to the contour of objects.

Vascularization of the fingertip is essential for making various coverage flaps. The digital arteries join in front of the insertion of the flexor digitorum profundus to form the digital arcade in the pulp. Several collateral branches emanate from this arcade towards the tip. The largest one is called the central pulp artery.

Each finger has a dominant and non-dominant hemipulp: ulnar side for the thumb, radial side for the 2nd and 3rd fingers and ulnar side for the 4th and 5th fingers. The dominant artery in the pedicle is generally associated with the opposite hemipulp.

2.2. Decision criteria

The most complex aspect is determining which method is best for the patient. Numerous criteria must be taken into consideration. Several classification systems for fingertip injuries have been proposed as a guide (Fig. 1) [2,3]. To simplify the decision making, we have chosen to use the following major determining factors:

- presence of exposed bone;
- thumb or long finger;
- size of defect (i.e. length of advancement required).

Other factors must also be considered: surface anatomy of the defect (palmar or dorsal, oblique or transverse plane), dominant or non-dominant hemipulp, patient's requirements (occupation, pastimes), and dominant hand. Lastly, the surgeon's technical abilities and preferences must be factored in when selecting the treatment.

We have developed a decision tree for fingertip defects based on these various criteria (Fig. 2).

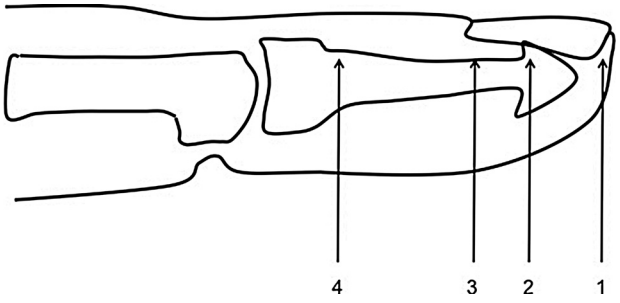

Fig. 1. Classification for fingertip amputations according to Merle and Dautel. 1: very distal, distal phalanx is not exposed; 2: transection through nail bed with sufficient length preserved to limit the risk of hook-nail deformity; 3: transection near proximal nail fold and nail matrix; 4: transection near distal interphalangeal joint.

2.3. Non-flap coverage techniques

2.3.1. Simple second-intention healing

This guides tissue regeneration to allow the fingertip's padding and contour to be restored. It typically uses petrolatum wound dressings and is mainly reserved for small defects with no exposed bone.

2.3.2. Occlusive bandage

There has been more interest recently in the use of occlusive dressings [4,5]. They are simple and low-cost, but patients have a hard time accepting them psychologically. Hence, this requires careful patient selection and especially strict monitoring. After debridement and lavage of the wound, it is covered with a completely occlusive dressing (such as Tegaderm™ transparent film dressing or finger sheath). The dressing is only changed every 3 days to preserve the temperature and pH, and allow cells, immunoglobulins and humidity to accumulate at the wound site [1]. The wound must not be cleaned when the dressing is changed. The skin will appear macerated and release very strong, unpleasant odors that the patients must be forewarned about. Coverage is obtained in 2–8 weeks and results in a shapely fingertip.

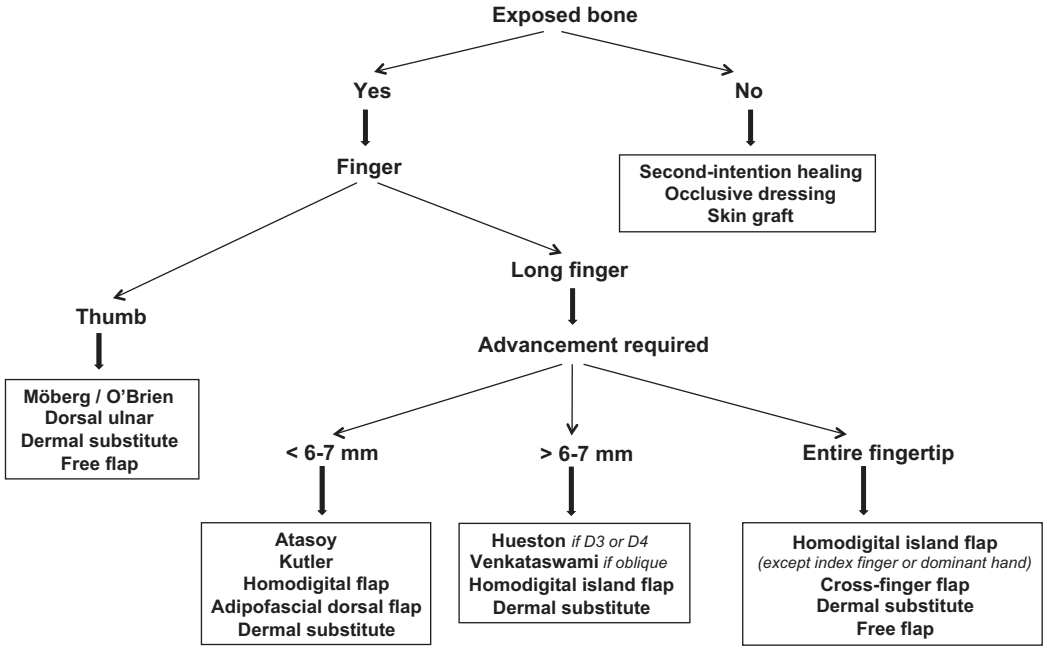

Fig. 2. Decision tree for treating fingertip injuries proposed by the authors.

Please cite this article in press as: Abi-Chahla M-L, et al. Treatment of defects in the tip and palmar surface of the fingers. Hand Surg Rehab (2018), https://doi.org/10.1016/j.hansur.2017.11.003