The use of Matriderm in the treatment of post traumatic hand’s finger tissue loss.

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Introduction

In Italy about one fifth of all Emergency Department visits are estimated to be for injuries regarding upper extremity (GIUSTINI, 2015), and among those finger injuries are the most common, especially “open wounds of finger(s)” represent 20,8 % of all hand injuries which mechanism can be related to a cut, an avulsion, a blast or a crash.
Traditional Treatments

- Skin grafts (thin or tick)
- Flaps
  - Atasoy flap,
  - Tranquilli-Leali flap,
  - Kutler flap,
  - Hueston flap,
  - homodigital island flap,
  - heterodigital island flap,
  - kite flap.

With those techniques up to 24% of patients are not satisfied with the surgery they had (SODDU, 2014) either for the aesthetic result or the time needed to heal.
Dermal Substitutes

- First traces of cutaneous substitute use are already found during the 15th century A.C. as mentioned in Ebers papyrus.

- Allografts, xenografts and amnion have been considered as temporary dressing.

- That in 1981 that Yannas and Burke developed the first “modern” artificial dermal substitute to treat extensive burn injury.
Dermal Substitutes

Different options have been proposed:

- cultured epidermal autografts as Epicel (Genzyme Biosurgery, Cambridge, MA, USA);

- double-layer dermal substitutes as Integra (Integra LifeSciences Corporation, Plainsboro NJ, USA), Renoskin (Symatese, Ivry-le-Temple, France) or Hyalomatrix (Anika, Boston, MA, USA);

- single-layer dermal substitutes as AlloDerm (LifeCell Corporation, Brachburg, NJ, USA) and Matriderm (MedSkin Solutions DR. Suwelack AG, Billerbeck, Germany);

- skin three-dimensional printing (that is still in very early development stages).
Our Experience

We usually use Matriderm because of the good results found in literature (ATHERTEN, HASLIK, CERVELLI, PETERSEN, GUMBEL, CHOI, MIN, LAMY), because it has been shown that it has overwhelming results compared to other dermal substitute in experimental studies in rats (BOTTCHER-HABERZETH, SCHNEIDER), and because of the good results in the authors personal experience.

In post-traumatic hand’s finger tissue loss, when needed, the authors use Matriderm as described by the manufacturer covering it with a split-thickness skin graft in either a one-step procedure or a two-steps procedure. In most cases of those patients operated with a two-steps procedure, at the three weeks follow-up, when the authors are supposed to cover the dermal substitute with a split-thickness skin graft, as the wound appeared already healed the authors avoided the second step of the procedure.

We decided to evaluate retrospectively aesthetical and functional results comparing patients treated with Matriderm using the traditional two-steps procedure with patients treated only with Matriderm.
Our Study

- **Inclusion criteria**
  - Zone 1/2/3 of Ishikawa's classification
  - Operated within 1 week from the trauma

- **Exclusion criteria**
  - Zone 4 (or more) of Ishikawa's classification
  - Other hand pathology
Our Study

Between October 2017 and October 2018, 65 patients (for 69 fingers) reached our Emergency Room for trauma with loss of substance of the finger’s apex.

Of those, 26 (for 27 fingers) have been included in our study meeting our criteria:
• 15 have been treated only with Matriderm (11 M, 4 W ; mean age 62 y.o.).
• 12 have been treated with Matriderm first, covered with skin graft after 3 weeks. (9 M, 3 W ; mean age 58 y.o.)

Patients have been checked at 3, 6 and 9 weeks and then at 6 months.

At 6 months we evaluated
• Aesthetic results (with Vancouver Scar Scale)
• Functional results (qDASH Score)
• Sensibility (two-point discrimination test)
Clinical Case 1 (Male, 80 y.o.)
Clinical Case 1 (Male, 80 y.o.)
Clinical Case 1 (Male, 80 y.o.)
Clinical Case 1 (Male, 80 y.o.)

6 months after surgery
Clinical Case 2 (Male, 61 y.o.)
Clinical Case 2 (Male, 61 y.o.)
Clinical Case 2 (Male, 61 y.o.)
Clinical Case 2 (Male, 61 y.o.)

3 weeks after surgery
Clinical Case 2 (Male, 61 y.o.)

3 weeks after surgery (Medication with Aquacel)
Clinical Case 2 (Male, 61 y.o.)

6 months after surgery
Clinical Case 2 (Male, 61 y.o.)
Results
(6 months after surgery)

• Mean Vancouver Scar Scale results
  ➢ Matriderm : 2.4
  ➢ Matriderm + graft : 2.1

• Mean qDASH Score
  ➢ Matriderm : 12.5
  ➢ Matriderm + graft : 14.2

• Mean two-point discrimination test results
  ➢ Matriderm : 7.8 mm
  ➢ Matriderm + graft : 7.6 mm

• No infection, no necessity of rehabilitation
Conclusion

The results permit to consider the use of Matriderm alone (without skin graft) as final treatment in small loss of tissue after trauma of the finger apex.

Limitations of the study:

- Small number of patients
- Define criteria for deciding to use skin graft or not