

Introduction. The hand dorsum is a very specialized and important functional area regarding the biomechanics of the hand's grip. Three different functional tissues are well recognized on the dorsum of hand:

1. Soft, thin and pliable skin;
2. Subcutaneous gliding tissue;
3. Extensor tendons environment.

In the multi-tissutal loss of substance involving all the three tissues, the 'one stage functional reconstruction' by means of free or pedicled composite flap is mandatory to achieve a good functional recovery[1-3].



Images 1-4: Complex trauma with multi-tissutal loss of substance treated by means of radial forearm composite (skin and vascularized tendon) free flap with excellent functional recover.

In case of skin or composite skin and gliding tissue loss the functional reconstruction is historically done by means respectively of skin graft or gliding flap such as, for example, radial forearm fascial flap or temporalis fascia free flap; such treatments have been integrated, in the last years, by the use of dermal substitute and more recently by new methods of regenerative surgery [4].

[1] Reid CD, Moss LH. One-stage flap repair with vascularized tendon grafts in a dorsal hand injury using the "Chinese" forearm flap. *Br J Plast Surg* 1983;36:473-9. [2] Yajima H, Inada Y, Shono M, Tamai S. Radial forearm flap with vascularized tendons for hand reconstruction. *Plast Reconstr Surg* 1996;98:328-33. [3] Caroli A, Adani R, Castagnetti C, et al. Dorsalis pedis flap with vascularized extensor tendons for dorsal hand reconstruction. *Plast Reconstr Surg* 1993;92:1326-30. [4] Adani R, Rossati L, Tarallo L, Corain M. Use of Integra artificial dermis to reduce donor site morbidity after pedicle flaps in hand surgery. *J Hand Surg Am.* 2014 Nov;39(11):2228-34. doi: 10.1016/j.jhsa.2014.08.014. Epub 2014 Sep 26.

Authors propose a review of their cases which reveals a treatment flowchart allowing for a reduction of the costs associated to the increase of functional outcome .

Patient number	Treatment	Age	Sex	Number of admission	Total days of hospitalization	Mean digital TAM evaluation at F.U. time 180 days	Vancouver Score	Quick Dash score	Tissue involvement: S: Skin, G: Gliding tissue, T: tendons	Costs
1	Radial forearm composite free or pedicle flap	48	M	1	26	50%	7	53	S+G+T	11720,12
2	Skin Graft	16	M	1	7	73%	8	20	S	3124,39
3	Dermal substitute (Integra)	55	F	2	9	85%	6	22	S+G	5305,18
4	ALT free flap	34	M	1	17	66%	12	55	S+G+T	8221,64
5	Radial forearm composite free or pedicle flap	51	M	2	34	82%	12	41	S+G+T	16443,28
6	ALT free flap	65	M	1	13	75%	10	32	S+G	6666,76
7	Dermal substitute (Integra)	13	M	2	11	77%	8	21	S	6082,62
8	Dermal substitute (Integra)	45	M	2	4	85%	7	28	S+G	3361,58
9	Radial forearm composite free or pedicle flap	44	M	1	28	85%	12	37	S+G+T	12487,56
10	Dermal substitute (Integra)	82	M	2	12	87%	4	21	S	6471,34
11	Radial forearm composite free or pedicle flap	19	M	2	17	50%	13	52	S+G+T	9835,04
12	Radial forearm composite free or pedicle flap	51	M	3	29	35%	12	62	S+G+T	16113,08
13	Radial forearm fascial flap or fasciocutaneous flap	24	M	2	13	81%	4	32	S+G	6666,76
14	Radial forearm fascial flap or fasciocutaneous flap	74	F	1	22	75%	9	42	S+G	9358,54
15	Dermal substitute (Integra)	75	M	2	4	73%	8	19	S	3361,58
16	Radial forearm fascial flap or fasciocutaneous flap	69	F	1	19	72%	11	39	S+G	8192,38
17	Dermal substitute (Integra)	44	M	1	13	77%	9	34	S+G	6456,71
18	Skin Graft	83	M	2	16	92%	6	19	S	7026,22
19	Dermal substitute (Integra)	59	M	2	4	85%	6	29	S+G	3361,58
20	Dermal substitute (Integra)	75	M	1	5	92%	7	21	S	3346,95
21	Dermal substitute (Integra)	14	M	2	11	85%	10	19	S+G	6082,62
22	Radial forearm fascial flap or fasciocutaneous flap	36	M	1	36	92%	12	23	S+G	14800,62
23	Radial forearm composite free or pedicle flap	52	F	1	17	38%	10	58	S+G+T	8221,64
24	Radial forearm composite free or pedicle flap	39	M	3	45	31%	13	62	S+G+T	22332,6
25	Skin Graft	31	M	1	5	92%	9	22	S	2346,95
26	Skin Graft	88	M	1	3	90%	10	28	S	1569,51
27	Radial forearm fascial flap or fasciocutaneous flap	53	F	2	17	19%	13	62	S+G	8221,64
28	Skin Graft	30	F	1	6	80%	11	33	S	2735,67
29	Dermal substitute (Integra)	89	M	1	21	85%	6	29	S+G	9666,47
30	Dermal substitute (Integra)	43	M	2	10	27%	10	66	S+G	5693,9
31	Dermal substitute (Integra)	45	F	3	24	31%	11	61	S+G	11539,33
32	Skin Graft	44	M	1	6	78%	10	48	S	2735,67
33	Skin Graft	78	M	1	5	84%	13	34	S	2346,95
34	Radial forearm fascial flap or fasciocutaneous flap	20	F	1	11	65%	8	45	S+G	5082,62
35	Dermal substitute (Integra)	27	F	2	7	92%	9	24	S+G	4527,74
36	Radial forearm composite free or pedicle flap	53	M	1	29	62%	11	49	S+G+T	12886,28
37	Radial forearm composite free or pedicle flap	49	M	1	14	65%	12	45	S+G+T	7055,48
38	Dermal substitute (Integra)	81	M	2	8	88%	7	30	S+G	4916,46
39	Radial forearm composite free or pedicle flap	52	F	1	20	59%	12	50	S+G+T	9387,8
40	Radial forearm fascial flap or fasciocutaneous flap	28	M	1	9	62%	11	44	S+G	4305,18
41	Radial forearm composite free or pedicle flap	40	M	1	14	55%	7	47	S+G+T	7055,48
42	Dermal substitute (Integra)	23	F	2	4	82%	8	34	S+G	3361,58
43	Radial forearm fascial flap or fasciocutaneous flap	54	M	1	12	81%	12	32	S+G	5471,34
44	Skin Graft	72	M	3	4	65%	13	55	S	2764,93
45	Radial forearm composite free or pedicle flap	40	M	1	18	64%	9	44	S+G+T	8610,36
46	Radial forearm composite free or pedicle flap	53	M	1	22	36%	12	62	S+G+T	10165,24
47	Dermal substitute (Integra)	44	M	1	7	96%	9	25	S	4124,39
48	Radial forearm composite free or pedicle flap	36	M	1	22	65%	13	40	S+G+T	10165,24
49	Radial forearm composite free or pedicle flap	23	M	2	30	58%	12	46	S+G+T	14888,4

Materials and method. Authors provide a review of hand dorsum and wrist trauma cases treated at their unit from 2006 to 2016. The sample is made up of 48 patients of which 14 received a one-stage reconstruction of the hand dorsum by means of a radial forearm composite free flap, 2 were treated with free ALT flap, 8 were treated with pedicled radial forearm flap, 16 had their hand dorsum reconstructed with dermal substitute and regenerative surgery and the remaining 8 with skin graft. Valuations are shown in table.

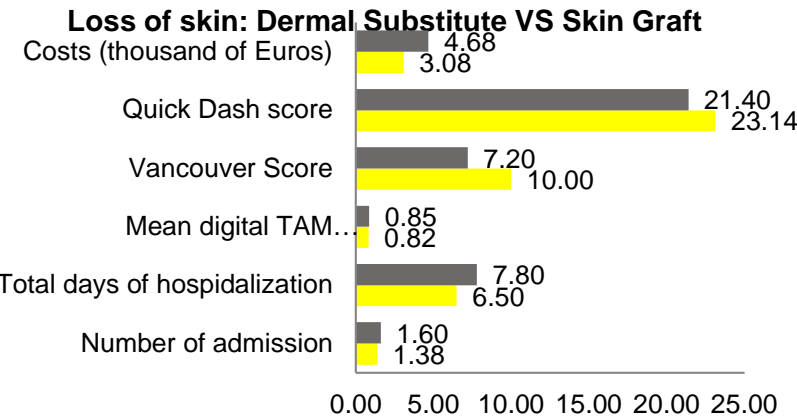


Image 5-6: Skin loss treated by means of dermal substitute and skin graft.

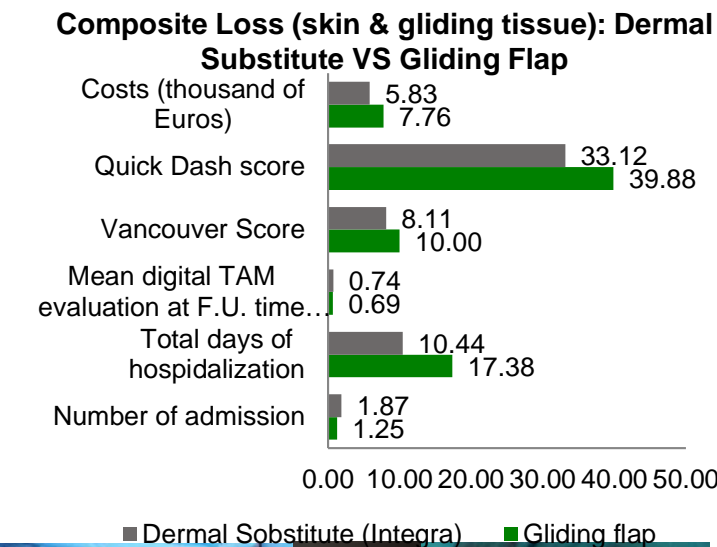


Image 7: Skin loss treated by means of only skin graft.



Images 8-13: Skin and gliding tissue losses treated by means of radial forearm fasciocutaneous pedicle flap. Good functional recovery with poor aesthetically outcome are shown.



Images 14-30: Skin and gliding tissue losses associated with metacarpal fractures treated by means of dermal substitute and skin graft. Great functional and aesthetically recovery is shown.

Results. Our retrospectively review shows that in trauma with combined loss of skin and gliding tissue the use of dermal substitute (Integra) not only significantly improves functional outcome and patient satisfaction but also reduces the cost of the treatment. Meanwhile in case of an isolated skin loss the use of dermal substitute and skin graft - instead of only the skin graft - improves the appearance of the scars but increases the cost of the treatment, despite the differences are not statistically significant.