

Review Article

The Utility of MatriDerm (Skin Substitute) with Autologous Thin Split Skin Graft to Cover Deperiosted Exposed Tibia 6x4 cm Wound in Diabetic Old Man

Sudhir Singh¹

It has been found that MatriDerm (Skin Substitute) can successfully cover the deperiosted exposed bone if breadth is less than 3cm irrespective of length as vascularization is attained from adjacent vascular bed and migration of newer vascular tissue is at the tune of 15mm from one edge as reported in one study. My case was exposed left tibial bone of about 6x4 cm devoid of periosteum in a diabetic 87 years old man who sustained scald burn with this complication. It was successfully covered with MatriDerm with thin split skin graft in single stage and thus avoided local flap or microsurgical free flap surgery. This proves that MatriDerm can vascularise over the small exposed bone even if it is devoid of periosteum. Another inference is MatriDerm is able to cover beyond 3cm wound breath inspite of loss of periosteum and is first time to be reported in literature with long followup. So no drilling of bone required to sprout granulation tissue from bone marrow to create granulation vascularised bed for second stage skin grafting. It thus avoids local flap or microsurgical free flap surgery for small exposed deperiosted bone.

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Key words : Deperiosted Exposed Bone, MatriDerm the Skin Substitute, Diabetic Wound, Post Scald Burn Wound, Split Skin Graft, Single Stage.

We are reporting the case of simple procedure to cover small exposed bone without periosteum with MatriDerm the skin substitute with split skin graft as single stage. Only single study has come where only 2 cm breadth was successfully covered in 2 out of 6 cases with this⁶. However we are reporting a case of 4 cm breadth exposed tibia bone covered with this successfully that too in 87 years old highly diabetic male patient with 11 months follow-up. This may avoid use of microsurgical free flap or local flaps and aesthetically more pleasing for small exposed deperiosted bone.

History of the Wound :

Eighty seven years old Mr Indrasan Diwedi, Male retired railway employee of Bihar, India with irregularly controlled diabetes on oral antidiabetic treatment for last 10 years had four weeks old infected wound over the left tibia (shin) which was debrided by another doctor outside who had exposed the tibial bone and there was loss of periosteum. Infact two more wounds had also occurred over the either side of left ankle which we later grafted with skin at same time when dealing with exposed bone. The incident was due to patient slipped in bathroom and swelling occurred in the lower half of left leg and hot fomentation created scald burn

¹MBBS, MS, MCh (Plastic Surgery), Hon IMA Professor, Department of Plastic Surgery, Getwell Hospital, Varanasi, Uttar Pradesh 221005 and Corresponding Author

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Editor's Comment :

- MatriDerm, the collagen scaffold, can effectively vascularize over small exposed bone areas, supporting graft uptake and healing without periosteum.
- The positive outcome over an 11-month follow-up indicates MatriDerm as a viable, aesthetically pleasing option for similar complex wounds, eliminating the need for more invasive procedures like local or microsurgical free flaps.
- For the first time, successfully covered a 4 cm breadth defect, irrespective of length.

which ultimately got infected with infected serosanguinous discharge exudation within a week (Fig 1). Patient is diabetic. The patient was treated by local doctor for a week who did debridement exposing the bone and later referred to higher centre where frequent dressing were done and pseudomonas infection was controlled. After total 4 weeks patient referred to us for wound cover.



Fig 1 — Pre-operative infected wound - bone deep on shin area

Proper diabetic control with regular insulin and sensitive antibiotic care were done. Patient was looking frail and weak.

Management and Outcome :

VAC at -125 mercury pressure was applied after debridement on all three wounds for one week. Fig 2 is the status of wound over exposed tibia bone devoid of periosteum with some granulation tissue. This was covered with single stage 37x52 mm MatriDerm 1 mm thickness and very thin split skin graft (Figs 3-6). We also covered the either side of left ankle region soft tissue granulating wound with split skin graft of medium size only. The dressing was done after seven days and 100 percent graft uptake was there (Fig 7). Proper diabetic control and sensitive antibiotics were continued the wound healed completely after three weeks and dressing repeated at 5 days interval. However patient once had electrolyte disbalance due to decrease serum sodium which was managed promptly. The followup at 9 weeks was good (Fig 8).

DISCUSSION

This was exposed left tibial bone of about 6x4 cm devoid of periosteum was successfully covered with MatriDerm and Split skin graft in single stage



Fig 2 — Exposed bare bone devoid of periosteum after debridement and VAC application



Fig 3 — 37 X 52 X 1 mm sizematriDerm to cover the bone



Fig 4 — MatriDerm applied



Fig 5 — MatriDerm and SSG over bone exposed shin area



Fig 6 — Wound covered



Fig 7 — 1st dressing after 7 days - matriDerm + skin graft on bone area

successfully and thus avoided local flap or microsurgical free flap surgery. This patient was highly uncontrolled diabetes with decreased sensation so had scald burn complicating to infected wound. The followup at 3 months was without any complication (Fig 9). Here we prove that MatriDerm can vascularise over the small exposed bone even if it is devoid of periosteum. It is natural to assume that MatriDerm can cover exposed bare bone area of at least 15 mm on either side as nutrient diffusion from near by vascularised bed of granulation tissue but we have gone beyond it inspite of loss of periosteum and no drilling of bone done to sprout granulation tissue from bone marrow. In the past skin substitute MatriDerm used to cover successfully in extensive scalp bare bone where outer table removed or in second stage after getting good granulation tissue by multiple drilling of outer cortex. Beside that over exposed bone of extremity where periosteum is present or as second stage after getting granulation tissue by multiple drilling of bone followed by VAC application¹⁻⁵. Until now few cases were done on extensive deperiosted tibia to extent of 12 cm in length but breadth not more than 2 cm so MatriDerm was successful in a sense that can easily form the bridge for successful neodermis vascularization⁶. Infact in that only two cases out of six were successful. But here small area beyond 3 cm in either dimension we were able to cover the bare devoid of periosteum tibia bone in single stage successfully without help of drilling

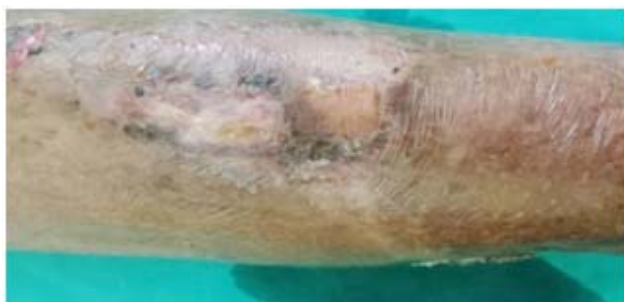


Fig 8 — After 2 months and 1 week follow-up



Fig 9 — After 3 months follow-up

the bone and this has been reported by me of initial result as Letter to Editor without long term follow-up for first time in any literature till date⁴. It is but natural that essentially skin substitute should at least go beyond bare bone by 1cm to cover vascular area at the edges to get vascularized as the former behave as vascularising bridge

to support thin autoskin split graft applied over it as a single stage. Experimental studies⁷ showed 2 cm oxygen transmission potential which is clinically approved by our this case of 4 cm width defect but It needs further elaborate study by doing more cases like this.

Long Term Result : At the 11th-month follow-up, the patient showed significant improvements, with excellent pliability, elasticity, and movements of the skin over the bone (Figs 10-12). There was also no tension or stretching observed over the healed skin during leg movements. Even subjective assessment showed an excellent outcome with free pinching of the skin and marked wrinkles indicative of good graft take. It's also noted that the sensation returned, being similar to the surrounding skin.

CONCLUSION

This proves that MatriDerm can vascularise over the small exposed bone even if it is devoid of periosteum. Oxygen transmission from the periphery to the center of wounds is crucial.

MatriDerm® exhibited the best oxygen transmission with a 2cm oxygen transmission length⁷.

Further studies and improvements are needed in the experimental model. Another inference is MatriDerm is able to cover beyond 3cm wound breath inspite of

loss of periosteum and is first time to be reported in literature. So no drilling of bone required to sprout granulation tissue from bone marrow to create granulation vascularised bed for second stage skin grafting. It thus avoids local flap or microsurgical free flap surgery for small exposed deperiosted bone. The combination of MatriDerm and skin grafting was found to be more effective than skin grafting alone in the treatment of post-traumatic severe and chronic wounds with bone exposure, resulting in shorter healing time, reduced wound contraction, and improved elasticity and quality of scar tissue. It has been found to enable effective healing and improve elasticity in these difficult-to-heal wounds.

MatriDerm® is recommended for avascular-based wounds.



Fig 10 — 11 months follow-up

Fig 11 — 11 Months
Postoperative wrinkles can be seen after pressing the skinFig 12 — 11 Months
Postoperative - skin can be pinched with forcep

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