AUTOLOGOUS PUNCH-GRAFTING FOR THE MANAGEMENT OF HARD TO HEAL DIABETIC FOOT ULCERS IN THE REARFOOT: A PROSPECTIVE CASE SERIES

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Introduction:

- Hard to heal diabetic foot ulcers (DFU) become nowadays a challenge in the management of DFU. Punch grafting is an alternative treatment to enhance wound healing which has been associated with promising clinical outcomes in various leg and foot wound types.

Aim:

- To evaluate clinical outcomes of Ultrasonic Assisted Wound Debridement and Autologous Punch Grafting as a treatment for hard to heal diabetic foot ulcers (DFU) in rearfoot.

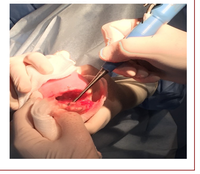
Methods:

- A prospective case series involving a total of 6 patients with hard to heal DFU´s treated with punch grafting was conducted from May 2017 to December 2020 in a specialized diabetic foot unit. DFUs had more than 6 months of evolution, not responding to conventional treatment and did not present local clinical infection based, untreated osteomyelitis and critical limb ischaemia (Median area surface at day 0: 5,9cm²). Median evolution time was 204 [interquartile range 32-344] weeks. This suggests that DFU included in the present study are complicated wounds that have not responded to other treatments previously.

- Wound bed preparation was performed by ultrasonic assisted wound debridement (UAW) (Söring GmbH, Germany) to obtain the most optimal tissue as possible at wound bed.

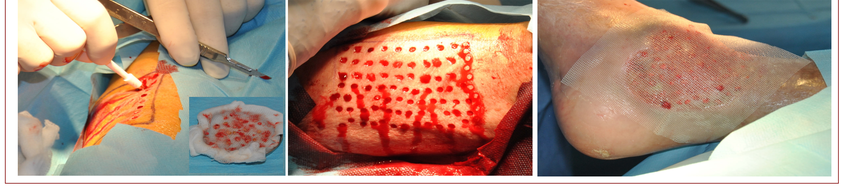


- ✓ Ultrasound low frequency (25kHz)
- ✓ Time: 2 minutes
- ✓ Intensity: 40%
- ✓ Contact Mode



- After that, 4-6 mm punch was taken from the thigh and grafted in the ulcer area with a distance between 2 to 6 millimeters.
- A non-adherent, non-occlusive dressing was used to cover the grafted ulcer.
- In the other hand, negative wound therapy pressure (NWTP) was applied in conjunction with punch grafting in cases of high exudate level. Ulcers were revised once a week.
- Removable knee-high walkers were used to offload.

Punch making | Donor area: lateral leg area | Punch placement and coverage with non-adherent dressing



Baseline characteristics	Patients (n = 6)
General characteristics	
Male/ Female, n (%)	6 (100%)/ 0
Type 1/ Type 2 DM, n (%)	1 (16.7%)/ 5 (83.3%)
DM duration (years), mean ± SD	31.16 ± 10.55
Mean age ± SD (years)	70.33 ± 15.68
BMI (kg/cm²), mean ± SD	30.05 ± 4.98
HbA1c (%), mean ± SD	7.5 ± 0.71
Neurological status	
SWM (affected)	6 (100%)
Biothensiometer (affected)	6 (100%)
Vascular Status	
Presence dorsalis pedis pulse, n (%)	2 (33.3%)
Presence posterior tibial pulse, n (%)	2 (33.3%)
API, mean ± SD	0.99 ± 0.37
TPI, mean ± SD	0.69 ± 0.36
$TcPO_2$ day 0 (mmHg), mean ± SD	36.66 ± 11.67
Comorbidities	
Retinopathy	2 (33.3%)
Nephropathy	1 (16.7%)
Cardiopathy	4 (66.7%)

Table 1: Demographic characteristics at baseline

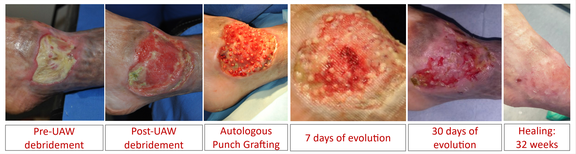
DFU characteristics	Patients (n = 6)
Wound bed tissue characteristics	
• Sloughy tissue, n (%)	4 (66.7%)
• Granulation tissue, n (%)	2(40%
Exudate level	
• Low, n (%)	2(33.3%)
• Medium, n (%)	2(33.3%)
• High, n (%)	2(33.3%)
Edges characteristics	
• Maceration, n (%)	2 (33.3%)
• Rolled edges, n (%)	2(33.3%)
• Hyperkeratosis, n (%)	2(33.3%)
Periwound skin	
• Healthy, n (%)	3 (50%)
• Maceration, n (%)	1(16.7%)
• Dry skin, n (%)	2 (33.3%)

Table 2: DFUs characteristics at baseline

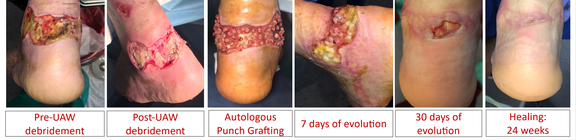
Results/Discussion:

- Four (66.7%) DFUs were located in the heel, one (16.7%) in the dorsal aspect of the foot and one (16.7%) in the Achilles tendon. The median evolution time was 172 [Interquartile Range (IQR), 25th–75th; 44–276] weeks with a median area of 5.9 [IQR; 1.87–37.12] cm² before grafting. Complete epithelization was achieved in three (50%) patients at 12 weeks follow-up period with a mean time of 5.67±2.88 weeks *(Case 3, 4 and 5)*. Two of the remaining patients achieved wound healing at 32 and 24 weeks, respectively *(Case 1 and 2)*, and one patient showed punch graft unsuccessful in adhering *(Case 6)*. The median time of wound healing of all patients included in the study was 9.00 [IQR; 4.00 – 28.00] weeks. The wound area reduction (WAR) at 4 weeks was 38.66% and WAR at 12 weeks was 88.56%. No adverse effects related to the ulcer were registered through the follow-up period.

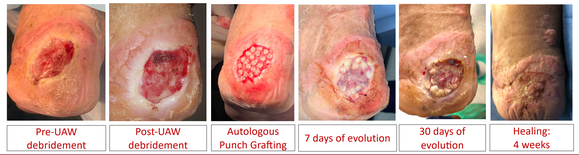
CASE 1:
- ✓ Male
- ✓ 85 years
- ✓ Wound duration: 6 months
- ✓ DM Type II
- ✓ Location: dorsal surface of the ankle
- ✓ Area: 44.7cm²
- ✓ SOC



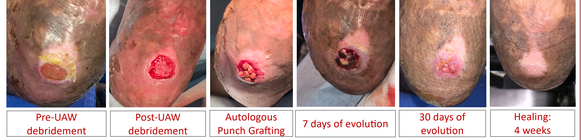
CASE 2:
- ✓ Male
- ✓ 56 years
- ✓ Wound duration: 8 months
- ✓ DM Type II
- ✓ Location: Aquilles tendon
- ✓ Area: 52.8cm²
- ✓ SOC



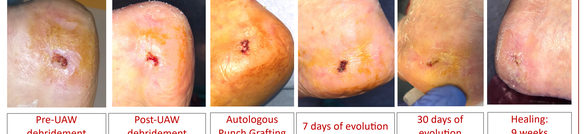
CASE 3:
- ✓ Male
- ✓ 71 years
- ✓ Wound duration: 3 years
- ✓ DM Type II
- ✓ Location: Heel (posterior)
- ✓ Area: 6,9cm²
- ✓ SOC



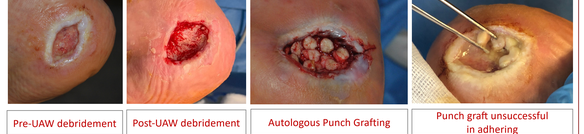
CASE 4:
- ✓ Male
- ✓ 48 years
- ✓ Wound duration: 51 months
- ✓ DM Type I
- ✓ Location: Heel (plantar)
- ✓ Area: 2,4cm²
- ✓ SOC



CASE 5:
- ✓ Male
- ✓ 78 years
- ✓ Wound duration: 14 months
- ✓ DM Type II
- ✓ Location: Heel (lateral)
- ✓ Area: 0,3cm²
- ✓ SOC



CASE 6:
- ✓ Male
- ✓ 78 years
- ✓ Wound duration: 24 months
- ✓ DM Type II
- ✓ Location: Heel (lateral)
- ✓ Area: 2,6cm²
- ✓ SOC



Conclusion:

- Autologous punch graft is an easy procedure that promotes healing, achieving wound closure in chronic DFU´s. It represents an alternative of treatment for hard to heal DFU´s in which conservative treatment has been unsuccessful.

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