

Metatarsal head resection for diabetic foot non-infected neuropathic ulcers versus non-surgical treatment

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ABSTRACT: Introduction: Conservative treatment of diabetic foot neuropathic ulcer includes offloading with orthopaedic shoes and plaster casts is usually effective in achieving primary closure of foot ulcers but take along time and recurrence rates are high. The surgery alleviates the pressure under the bony prominence, thus enabling prompt ulcer healing in short time with a lower chance of recurrence. The purpose of this protocol is to compare offloading surgery to non-surgical treatment for patients with diabetic foot neuropathic ulcers.

Methods: This study included fourty patients presented with neuropathic diabetic foot ulcer. Two groups group A twenty cases were managed surgically by tenotomy and metatarsal head osteotomy, group B twenty cases were managed conservatively includes offloading with orthopaedic shoes and plaster casts.

Results: In our study twenty cases group a were managed surgically take three weeks to five weeks to heal with no recurrence, group b twenty cases were managed conservatively take twelve weeks to twenty four weeks to heal with recurrence in eight patients.

Conclusion: The best current strategy for management of diabetic foot neuropathic ulcer is surgical offloading.

Keywords: neuropathic ulcer, non surgical offloading and surgical offloading.

1. INTRODUCTION:

Diabetic foot ulcers (DFUs) are a devastating component of diabetes progression affecting about 15% of patients with diabetes. The underlying pathophysiology of diabetic foot ulcers is a complex interplay between the body's persistent hyperglycaemic state and that of neuropathic, vascular and immune system components.(1)

The mainstay of treating and preventing ulcers is offloading. This may be done with shoes and contact casts. Although these methods are frequently effective in the short run, ulcers often recur for a variety of reasons including lack of patients' compliance, bone prominence over ulcer.(2)

Therefore in our study we will focus on minimally invasive surgical techniques that have the potential to accelerate healing and lower recurrence rate of these ulcers.

2. METHODS:

This is a prospective comparative study conducted in Minia university hospital, Elrae Elsaleh hospital and Elhekma hospital over the period between march 2017 to march 2019. This study included 40 cases presented with non infected diabetic foot neuropathic ulcer. Baseline data will include age, sex, ulcer duration, history of previous ulcer, diabetes type, duration of insulin treatment, comorbidities including complications of diabetes and ambulatory status. Specific physical examination will include ulcer site, length, width, depth, probe-to-bone, redness surrounding the ulcer, discharge, palpation of dorsal pedal & tibialis posterior pulses, ankle Brachial Index (ABI, with Doppler assessment in the absence of pulses or $ABI < 0.9$). Laboratory tests will include a CBC, HbA1c & creatinine.

Inclusion criteria: Cases with non infected diabetic neuropathic ulcer with intact peripheral pulse.

Exclusion criteria: Patients with infected ulcer and ischemia

All patients were informed about the nature of our study with the possible complications and failure rate; also, a written consent was taken before any intervention.

Technique:

Group(a): twenty cases managed surgically. Preoperative antibiotics, spinal or local anesthesia except in patients with neuropathy severe enough to make anesthesia unnecessary, longitudinal incision at the dorsum of the foot opposite the ulcer in the plantar surface tenotomy of the extensor tendon with dissection of metatarsal head then osteotomy.



Fig(1):Neuropathic ulcer over the head of the second metatarsal bone , Longitudinal incision in the dorsum of the foot to made osteotomy of the head of the second metatarsal bone, Complete healing of the ulcer after3 weeks.



Fig (2): Neuropathic ulcer under the head of the third metatarsal bone, osteotomy of the head of the third metatarsal bone, closure of the wound by proline suture.



Fig(3)plain x ray after two months show ossification at the site of metatarsal head

Group(b): twenty cases managed conservatively by diabetic foot shoes plus offloading under the ulceror plaster cast to be exchanged weekly.



Fig(5):Neuropathic ulcer over the head of the first metatarsal bone, below the knee contact plaster cast, partial healing of the ulcer after 8 weeks.



Fig(6)Neuropathic ulcer under the base of the fifth metatarsal head, Diabetic foot shoes with offloading below the ulcer, healing of the ulcer after13 weeks .

3. RESULT

Table(1):patients demographic data .

		Group A	Group B	P value
		N=20	N=20	
Age	Range	(33-64)	(40-66)	0.071
	SD±Mean	48.4±8.7	53.1±7.2	
Sex	Male	10(50%)	12(60%)	0.525
	Female	10(50%)	8(40%)	

- *Independent samples T test for quantitative data between the two groups*
- *Chi square test for qualitative data between the two groups*
- **: Significant level at P value < 0.05*

In our study 40patients in two group each group twenty patients ,in group (A) patients aged from 33 upto64 years old with *Mean ± SD*(48.4±8.7) , in group (B) patients aged from 40 upto60 years old with *Mean ± SD*(53.1±7.2) with non-significant p value0.071.

In group (A) ten male (50%)and ten female (50%), in group (B)twelve male(60%) and eight (40%) female non-significant p value0.525.

Table(2): ulcer characteristic.

		Group A	Group B	P value
		N=20	N=20	
Ulcer site	1st metatarsal	11(55%)	13(65%)	0.519
	2nd metatarsal	9(45%)	7(35%)	

Ulcer size	<i>Range</i> <i>SD±Mean</i>	(1.5-2.5) 1.9±0.4	(1.5-2.5) 1.8±0.3	0.459
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- *Independent samples T test for quantitative data between the two groups*
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- **: Significant level at P value < 0.05*

In group(A) ulcers were at the plantar surface of the head of the first metatarsal bone in eleven patients (55%),head of the second metatarsal bone in nine patient (45%),in group (B)thirteen ulcers (65%)at the head of the first metatarsal bone,seven ulcers (35%) at the plantar surface of head the first metatarsal bone with non-significant p value 0.519.

Ulcer size in group (A)range was (1.5-2.5)cm with *mean ± SD* (1.9±0.4) ,in group(B)range was (1.5-2.5) with *mean ± SD*(1.8±0.3) with non-significant p value0.459.

Table3:Healing rate and recurrence rate.

		Group I N=20	Group II N=20	P value
Time to heal(weeks)	<i>Range</i> <i>SD±Mean</i>	(3-5) 3.9±0.8	(12-24) 19.7±3.8	<0.001*
Recurrence	<i>No</i> <i>Yes</i>	20(100%) 0(0%)	12(60%) 8(40%)	<0.001*
Time to recurrence (months)	<i>Range</i> <i>SD±Mean</i>	-----	(6-12) 8.5±1.9	-----

- *. Independent samples T test for quantitative data between the two groups*
- *Chi square test for qualitative data between the two groups*
- **: Significant level at P value < 0.05*

In group (A) time of healing was from three to five weeks with *mean ± SD*(3.9±0.8) but in group (B) time of healing was from twelve to twenty four weeks with *Mean ± SD*(19.7±3.8) , significant p value<0.001*

In group (A)no recurrence occur over the period of two year close follow up while in group (B)eight patient recurrence (40%) with significant p value ,0.001*

4. DISCUSSION:

Foot ulcers in patients with diabetes is very common, and probably leads to lower limb amputation unless a prompt, rational, multidisciplinary approach to therapy is taken. The main components of management that can ensure successful and rapid healing of DFUs include education, blood sugar control, wound debridement, advanced dressing, offloading, surgery, and advanced therapies, which are used clinically. These approaches should be used whenever feasible to reduce high morbidity and risk of serious complications resulting from foot ulcers.(3)

Time of ulcer healing vary according to the age of the ulcer, those with the duration less than 3 months have a higher rate of healing compared with older one.(4) This parameter has an implication in the conservative cases ; in our study non-surgical cases healed within 12 to 24 weeks which correlate with the result of other reports (5,6,7).

One of the most important considerations in the management of diabetic foot ulcer is the recurrence rate. Although non-surgical offloading, even in the form of non-removable devices, showed good short-term results. It demonstrated a remarkably high long-term recurrence rate. Pound et al have reported a recurrence rate of 40% and Armstrong et al have estimated that approximately 40% of patients have a recurrence within 1 year after ulcer healing and approximately 60% exhibit the same within 3 years which correlate with our results.(8,9)

Yamine, Armstrong and Motamediet al compared metatarsal head resection with non surgical treatment in a total of 152 patients with non-infected ulcers and had a mean follow-up period of 26 months. They had 93 % healing rate with mean duration of 2.8 weeks which correlate with our result.(10,11,12)

Limitations of this study are being with relatively small number of patients and short follow-up period.

5. CONCLUSION:

Surgical offloading is more effective than non surgical offloading in time of healing and recurrence rate.

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