Role of High Resolution Ultrasound in Diagnosing Diabetic Muscle Infarction

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The study was carried out on eight patients with clinical presentation of non-traumatic painful swelling of lower limbs & were examined with high resolution Ultrasound probe of 12 MHz on Logic 700 expert series, with average patients age of about 37 years with H/O of uncontrolled diabetes Mellitus, showed discrepancy of circumference / thickness of Calf muscles compared to the opposite normal lower limb with areas of low echogenicity & one patient showed areas of necrosis / abscesses in muscle planes. All were diagnosed & latter confirmed on biopsy as Diabetic muscle infarctions with superadded inflammation.

Key words: Diabetes mellitus, Diabetic muscle infarction (DMI), Deep venous thrombosis (DVT), High resolution ultrasound.

Diabetic muscle infarction is a rare complication of diabetes mellitus occurring in patients with poorly controlled insulin-dependent Diabetes mellitus[1]. Women are affected 1.3 times more than men[8] The diagnosis is some time very difficult & can be confused with abscess, tumor, cellulitis & myositis. First time this condition was diagnosed in 1965. Increasing awareness has led to prompt recognition of this previously under diagnosed condition. Typically, acute presentation with non-traumatic painful swelling, notably of the calf muscles or thigh muscles is found in diabetic patients with established vasculopathy including retinopathy & nephropathy[7,8].

Patients and material:

Eight patients were referred for Color Doppler ultrasound to rule out the possibility of DVT (Deep venous thrombosis). Six patients were male & two were female with average age of about 37 years. All the eight patients presented with the acute onset of sever pain along with swelling of one of the lower limbs. On examination the area of the calf muscles were very tense and tender to touch. Four of the patients were unable to walk. On Color Doppler all the veins of the involved lower limb was patent and show good blood flow, however five patients show interstitial edema as compared to the opposite normal lower limb. Three patients did not show any edema. One finding were common in seven patients, the calf muscles shows areas of low echogenicity. On Color Doppler no blood flow was noted in these areas of low echogenicity. In eight patients there were areas of necrosis in the calf muscles, which on follow up scan shows development of abscesses, as patient also developed high grade fever. One finding common in all patients is discrepancy in circumference / muscle thickness as compared to the opposite normal lower limb. As all the patients had history of uncontrolled diabetes mellitus, these areas of low echogenicity & areas of necrosis, were diagnosed as muscle infarctions, which were later confirmed on biopsy.

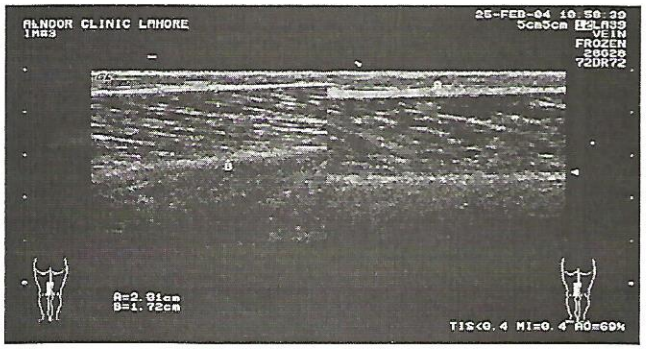
No. of patients examined	8
Sex of patients	6 Male & 2 Female

Age of patients	
1. 31 years	
2. 39 years	
3. 42 years	
4. 36 years	
5. 49 years	
6. 28 years	
7. 34 years	
41 years .	
Average age	37 years

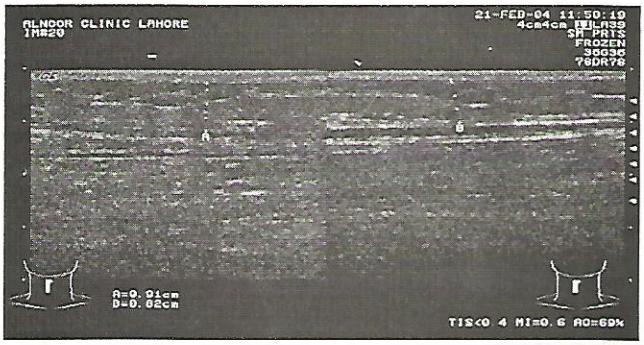
Discrepancy of circumference / thickness of Calf muscles compared to opposite normal lower limb
1. First patient shows increase circumference / thickness of 3 mm
2. Second patient shows increase circumference / thickness of 5 mm
3. Third patient shows increase circumference / thickness of 9 mm
4. Fourth patient shows increase circumference / thickness of 3.5 mm
5. Fourth patient shows increase circumference / thickness of 6.1 mm
6. Fourth patient shows increase circumference / thickness of 5.9 mm
7. Fourth patient shows increase circumference / thickness of 4.3 mm
8. Fourth patient shows increase circumference / thickness of 3.8 mm

Longitudinal sonogram of calf muscle showing :

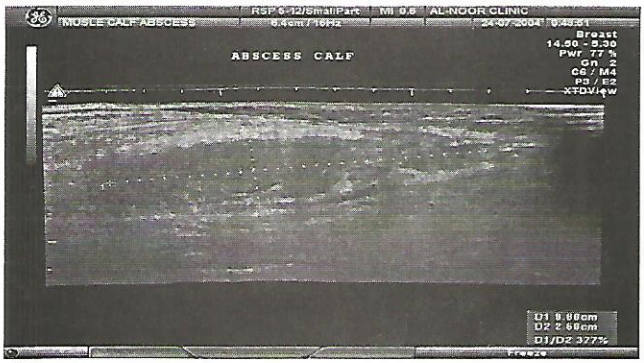
1. Image A and B show 3-4 mm discrepancy in the circumference of calf muscles and showing abnormal echotexture with alternating hypo and hyperechoic segments of muscle.
2. Image C shows Pyomyositis with heterogenous texture of the calf muscle containing thick debrinous fluid.



(A)



(B)



(C)

Discussion:

Diabetic muscle infarction is a rare complication that has become more frequently recognized in the past few years. It should be suspected in a patient with longstanding diabetes who presents with a painful swollen lower limb[1,3]. The infarction is usually preceded by severe pain that develops over a period of several days to weeks[2,5]. Over the time, the swelling diminishes & well defined mass like lesion becomes apparent[8,9]. The patient typically presents with an exquisitely tender muscle in absence of trauma & fever. The patient's range of motion is limited, but muscle strength is normal[4]. Pain is present at rest and is exacerbated with muscle contraction[7,10]. In our experience, these lesions occur most commonly in muscles of lower limbs. Poorly controlled diabetes mellitus is the major predisposing factor, typically in patients with nephropathy, neuropathy, & hypertension. Occlusive atherosclerosis has been postulated to have major role in diabetic muscle infarction[6,7]. The affected muscles are hypo-echoic. The echo-pattern is often very inhomogeneous. Some time the hyper-echogenicity may be seen due to gas bubbles within regions of necrosis[1]. Muscle biopsy under high resolution ultrasound guidance typically reveals regions of hemorrhage & necrosis, with evidence of myocytic infiltration. MRI is the best modality for the diagnosis of diabetic muscle infarction (DMI)[6,7,8,9]. Typically, acute presentation with non-traumatic painful swelling, notably of the calf or thigh muscles, is found in diabetic patients with established vasculopathy including retinopathy & nephropathy. Laboratory investigations generally show high erythrocyte sedimentation rate, normal white cell count, & normal or mild elevation of creatine phosphokinase. Magnetic resonance imaging (MRI) findings are invariably characterized by increased signal intensity of the diffusely enlarged muscle groups on T2 weighted sequences, in-version-recovery & gadolinium enhanced images[9]. The disease is generally believed to be self limiting, although recurrence can occur in 50% of the cases.

Conclusion:

In author's experience the high resolution ultrasound is highly diagnostic in diagnosing the muscle infarctions in patients with uncontrolled diabetes mellitus. This should always be considered when there is some discrepancy in the circumference / thickness of Calf muscles with areas of low echogenicity in patients with non-traumatic painful swelling of the lower limbs.

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