بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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MONA MAGHRABY

Ultrasound Assessment Of Muscle Injury Associated With Closed Limb Fracture

A thesis

For fulfillment of Master Degree in Diagnostic Radiology

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بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم

صدق الله العظيم

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List of abbreviations

CSA	cross-sectional area
CZ	central zone
IGF-I	Insulin growth factor-I
IL	interleukin
MRI	magnetic resonance imaging
NMJ	neuromuscular junction
RICE	Rest, ice, compression, and elevation
RZ	regeneration zone
SC	Satellite cells
TGF-ß1	transforming growth factor-ß1
TNF-α	tumor necrosis factor α
US	ultrasound imaging
VEGF	vascular endothelial growth factor

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ABSTRACT

Background; Muscle injuries are extremely common and may have a profound effect on the individual presenting with them. Determination of the severity of injury to the soft tissues is an important component of patient assessment and affects management of closed fractures, **Aim and objectives;** to assess muscle injury associated with upper and lower closed limb fracture using ultrasound, and to develop ultrasound classification criteria for muscle injury, **Subjects and methods;** This study is a prospective observational study, was conducted on 30 patients with closed limb fracture and muscle injury at Diagnostic Radiology Department, Ain Shams hospitals, through of 3 months, **Result;** The mean size of muscle hematoma was 25.16± 6.99 mm with range from 15 mm to 36 mm. The hematoma showed a honeycombed pattern in 3 (10%) cases, **Conclusion;** ultrasonography is useful for diagnosing acute muscle injury associated with limb fracture. The ultrasound classification criteria for muscle injury can be used to predict the severity of injury and guide decision on the type of treatment. However, the criteria need to be verified on a larger sample of patients, and some sections of the proposed criteria may require a more detailed analysis, **Keywords; muscle injuries, ultrasonography, Diagnosis.**

INTRODUCTION

Muscle injuries are increasingly common and are often caused by acute trauma, with traffic accidents and armed conflict accounting for a significant portion of injuries. The skeletal muscle contains a pool of resident stem cells, known as satellite cells are located between the plasma membrane of myofibers and the basal lamina, which are primarily responsible for muscle regeneration. In addition to the expansion of satellite cells, timely and successful muscle regeneration is dependent upon a well-regulated inflammatory cascade **(Muire et al., 2020).**

The complex interplay between muscle tissue and the immune system is directly responsible for the proper regeneration following soft tissue trauma. Intramuscular leukocyte populations are an essential component of healthy skeletal muscle, and these cell populations increase and change drastically following muscle injury. Such injuries are associated with local inflammation and typically heal in the following order of events: inflammatory phase [0–7 days post-injury]; regeneration phase; and remodelling and repair phase **(Simões et al., 2020)**

Muscle injury associated with closed limb fracture is commonly observed in daily medical practice.

However, an early image diagnosis can reduce patient discomfort and guide the decision of whether to implement surgical or conservative treatment **(Liu et al., 2019).**

The muscle is a soft tissue that is most easily studied by ultrasonography. Moreover, ultrasonography has been one of the first

imaging techniques available for the evaluation of muscle disease **(Harlaar et al., 2018).**

Due to advances in ultrasound technology, it offers significant advantages over other imaging techniques in assessing muscle injury. Owing to its multiplanar approach, both transversal and longitudinal, dynamic examination of muscle, excellent spatial resolution, and definition of muscle structure, ultrasonography is on the leading edge in the assessment of muscle pathology. Furthermore, it is faster, more convenient, and cheaper than magnetic resonance imaging (MRI) **(Tang et al., 2020).**

However, at present, muscle ultrasonography is mainly used in sports traumatology to help a physician decide whether a patient should or should not resume professional training and competition. The use of ultrasonography to examine limb fracture associated with muscle injury is uncommon **(Strakowski and Chiou-Tan, 2020).**

When closed limb fracture is associated with muscle injury, it is important to assess the viability of the muscle to decide whether a surgery is required, and which area should be operated on.

The ultrasound assessment foucs on 4 characteristics of injury of muscle fibre and complications of muscle rupture, namely, muscle hematoma, vascular injury, and diameter growth rate of the muscle to develop the ultrasound classification criteria for muscle injury **(McIlwraith et al., 2020).**

AIM OF THE WORK

The study aimed to assess muscle injury associated with upper and lower closed limb fracture using ultrasound, and to develop ultrasound classification criteria for muscle injury.

Research Question:

Are ultrasound classification criteria for muscle injury effective in assessment of the severity of injury and can guide the decision of treatment?

Research hypothesis:

The ultrasound classification criteria for muscle injury can be used to assess the severity of injury and guide the decision of treatment.