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MRI findings of orbicularis oculi hypertrophy due to heavy resistance training on the inferior orbital rim

[1,4]Hasyma Abu Hassan *MRad (UM)*, [1]Norlisah Mohd Ramli *FRCR (UK)*, [2]Kenneth CS Fong, [3]Khean-Jin Goh

[1]University Malaya Research Imaging Centre (UMRIC), [2]University of Malaya Eye Research Centre (UMERC), [3]Department of Medicine, Faculty of Medicine, University of Malaya, Kuala Lumpur; [4]Imaging Department, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Selangor, Malaysia

Abstract

Increase in cross-sectional muscle area of major muscle groups associated by heavy resistance training has been well documented. However, there has been no published article of changes in the inferior orbicularis oculi muscle when heavy resistance training is applied. We present a case of inferior orbicularis hypertrophy detected on MRI in a gentleman who practised heavy resistance training using his lower eyelids.

INTRODUCTION

Heavy resistance training is associated with an increased size in the cross-sectional muscle area. These changes have been documented in both type 1 and type 2 muscle fibres involving several muscle groups such as quadriceps, trapezius and iliopsoas.[1]

To date, there has been no reported evidence of changes occurring in the inferior orbicularis oculi muscle when heavy resistance training is applied to that area. This paper presents an unusual case of inferior orbicularis hypertrophy detected on MRI occurring in a gentleman who practised heavy resistance training using his lower eyelids.

CASE REPORT

A 37 year-old male circus performer presented with baggy lower eyelids. He can pull a truck with his lower eyelids, using blunt metal hooks attached to his inferior orbital rim (Figure 1). He trains by hanging 5kg weights from each lower eyelid daily. On examination, he had prominent lower eyelids with a provisional diagnosis of hypertrophy of the inferior orbicularis oculi.

A magnetic resonance (MR) examination of the orbits was performed in a 1.5T GE Medical System MR machine. Axial and sagittal images of the orbits in T1W and T2W sequences, as well as thin sliced axial images of FSPGR and 3D FIESTA sequences for better visualisation and three-dimensional reconstruction, were obtained. These images showed thickened inferior orbicularis oculi and inferior rectus muscles bilaterally. The right and left inferior orbicularis oculi measured 4.4mm and 5.0mm respectively (Figure 2). The inferior recti measured 4.0mm on the right and 3.7mm on the left. The rest of the patient's extra-ocular muscles were unremarkable. As a comparison, the authors measured the orbicularis muscle thickness

Figure 1. The subject is pulling a truck with blunt metal hooks attached to the inferior orbital rim via the orbicularis oculi

Address correspondence to: Hasyma Abu Hassan, Imaging Department, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Selangor, Malaysia. Tel: +603 89472512, Fax: +603 89426957, Email: hasyma_hassan@yahoo.com.my

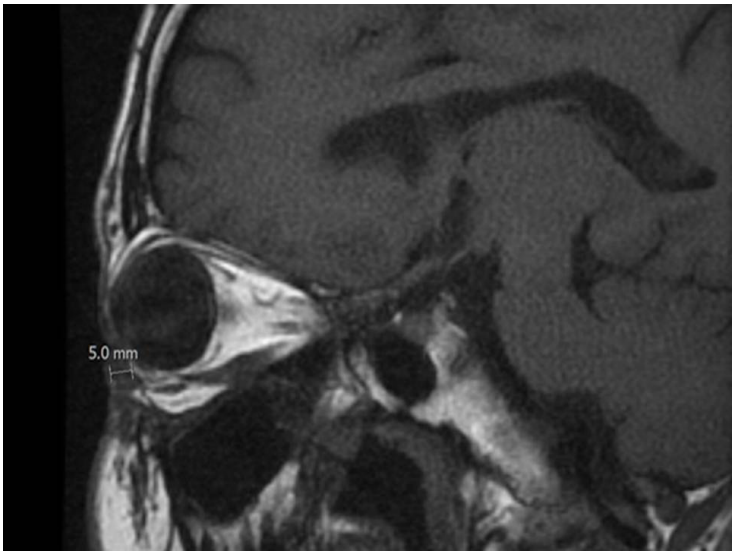

Figure 2. T1W sagittal image showing thickened left inferior orbicularis oculi muscle measuring 5.0 mm in thickness

in a 37 year-old male patient who had an MRI to exclude optic neuritis. This measured 2.5mm (Figure 3).

DISCUSSION

The orbicularis oculi muscle is a thin skeletal muscle that surrounds the eye. The main function of this muscle is to close the eye. The muscle is divided into inferior and superior fibres, which are further divided into palpebral and orbital fibres. The palpebral portion is used in blinking and voluntary winking, while the orbital portion is used in forced closure.[2] The forced strength of the orbicularis oculi muscle was found to be so diverse that no normal range of strength was established.[3]

The inferior orbicularis oculi muscle makes up the anterior lamellae of the lower eyelid complex together with the skin, and is involved in the aging process.[4] The lower eyelid complex age-related changes may also include orbicularis oculi muscle hypertrophy.[5] Furthermore, hammock-like folds of the orbicularis oculi muscle in the lower eyelid, "festoons", are not uncommon in a male patient.[6] To correct for this, the authors obtained

Figure 3. T1W sagittal image of age-controlled subject showing normal width of inferior orbicularis muscle

an age-matched manly subject as a comparison to determine the degree of the inferior orbicularis muscle hypertrophy in the examined subject.

The striking feature on MR was the examined subject's thickened inferior orbicularis oculi bilaterally, compared with the age-matched individual. The examined subject's inferior orbicularis muscle was twice as thick as the age-matched individual. There may be various reasons for the hypertrophy of the orbicularis oculi muscle, but the most likely cause is the load applied through the orbicularis muscle when pulling the truck. The effect is similar to that seen in resistive training. A study on the effect of resistance training in elderly women[7] showed a significant increase in the muscle strength of the exercising subjects compared with baseline values (28-115%) in all muscle groups, with an associated increase in the cross-sectional area of Type 2 muscle fibres in the vastus lateralis muscle only. However, subsequent studies involving both elderly men and women revealed an increase in both Type 1 and Type 2 muscle fibres of vastus lateralis[1] with an associated increase in muscle strength. This may explain the patient's ability to pull a 2-tonne truck using his lower eyelids.

A literature search revealed that the normal thickness range of the orbicularis oculi muscle on MR imaging has not been reported before. In the case presented here, the diagnosis of orbicularis oculi hypertrophy was made mainly based on clinical presentation and assessment. Orbicularis oculi hypertrophy has been described by some authors as thickened pretarsal lower eyelid muscle and redundancy of the overlying skin.[8] However, in this case, the authors have demonstrated conclusively with MR imaging that there is a distinct increase in the thickness of the orbicularis oculi muscle compared to an age- and sex-matched control subject. While the general public are not encouraged to perform such stunts, it is of interest to note the diverse strength of the human body to resist such heavy loads, even in a small area like the lower eyelid.

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