Case Report

Proptosis with Increased Orbital Fat in an Obese Patient

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Computational tomography (CT) is a well-documented modality in the workup of proptosis. We present a case of proptosis due to increased orbital fat in an obese patient. We review the literature to discuss the most likely causes of increased orbital fat, and we discuss the utility of CT imaging in assessing this pathology.

1. Introduction

Proptosis is the abnormal forward protrusion of the globe from the orbit. CT imaging is useful both to diagnose and quantify the degree of protrusion.

2. Case Presentation

A 51-year-old male known with diabetes, hypertension, ischemic heart disease, chronic kidney disease, upper gastrointestinal bleeding, and morbid obesity was referred for a CT brain by the ophthalmology department as part of the workup of proptosis. The patient had no clinical features to suggest Graves’ disease or Cushing’s syndrome. The TSH (15.3 pmol/L) as well as the 08:00 serum cortisol (345 nmol/L) were normal.

The CT brain showed bilateral proptosis measuring 29.9 mm from the anterior aspect of the globe to the interzygomatic line, and the posterior aspect of the globe was 6.3 mm anterior to the interzygomatic line (Figure 1). Marked prominence of retroorbital fat was evident. The globe, extraocular muscles, skeletal structure, and vessels were normal. Importantly, there were no ocular, intraconal, or extraconal masses. The rest of the intracranial structures, including the pituitary gland, were normal with no features of hydrocephalus.

3. Discussion

Proptosis is the abnormal protrusion of the globe and can be measured accurately with CT. In 1989, Gibson established a reliable and reproducible method of measuring proptosis using CT [1]. In order to measure the anterior protrusion of the globe, a line is drawn across the zygomatic bone, known as the interzygomatic line. The normal reference values are as follows: the posterior aspect of the sclera is 9.9 mm ± 1.7 mm posterior to the interzygomatic line, and the anterior aspect of the sclera is less than 23 mm from the interzygomatic line [2, 3].

The differential diagnosis for increased retroorbital fat primarily includes Graves’ disease, Cushing’s disease/syndrome, and obesity.

Graves’ disease is the most common cause of proptosis. It can frequently cause an increase in orbital fat volume giving it a “dirty” appearance [4]. It may also result in a spindle-shaped enlargement of the extraocular muscles (most frequently the inferior rectus) sparing the tendons [4, 5] as well as an increase in the bony orbital volume [6]. Graves’ ophthalmopathy typically causes extraocular muscle enlargement early on, followed by an increase in orbital fat. In a small subset of patients, increase in orbital fat can occur independently [7]. However, whilst Potgieser and colleagues also agree that over time Graves’ disease causes an increase in
Furthermore, they showed that the correlation coefficient between orbital fat volume and proptosis was even larger ($r=0.79$) in the group of patients with obesity and without endocrinopathy (Graves’ disease and Cushing’s syndrome).

In addition, Schmidt and colleagues used MRI to demonstrate the positive correlation between body mass index (BMI)/waist circumference and the degree of proptosis ($p < 0.001$) [15].

4. Conclusion

Studies have shown that Graves’ disease, Cushing’s syndrome, and obesity are the most likely causes of increased orbital fat causing proptosis. Reported case studies focusing exclusively on increased orbital fat secondary to obesity are limited. Given that our patient did not have either Graves’ or Cushing’s disease/syndrome and considering available literature, we present a case of marked proptosis due to obesity. It is important for the radiologist to be aware of obesity as a cause of proptosis.

Consent

Consent has been obtained from the late patient’s wife. The patient is deceased. The patient is sufficiently anonymised.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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