Comparing two acromegalic patients with respect to central corneal thickness, intraocular pressure, and tear insulin-like growth factor levels before and after treatment

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The aim of the study was to compare the central corneal thickness (CCT), intraocular pressure (IOP), and tear insulin-like growth factor-1 (IGF-1) levels of 2 patients with acromegaly before and after the surgical treatment of the disease. CCTs, IOP levels, and tear IGF-1 values showed a decrease after the treatment in 2 patients. As we found higher CCT, IOP, and tear IGF-1 levels in the active phase of the disease in two acromegaly patients, detailed information about the activity of the disease may be important before the examination of these patients.

Key words: Acromegaly, central corneal thickness, intraocular pressure

Acromegaly is caused by sustained overproduction of growth hormone (GH) or somatotropin.[1] Most of the actions of GH are mediated through the circulating and locally produced insulin-like growth factor-1 (IGF-1).[2] Plasma IGF-1 concentrations correlate better than plasma GH levels with the clinical manifestations of acromegaly, and successful treatment is associated with normalization of IGF-1 concentrations.[3] High IGF-1 levels in the subretinal fluid of a patient with acromegaly have been reported previously.[4] Bramsen et al. reported that increased central corneal thickness (CCT) was observed as a part of soft tissue thickening in acromegaly patients, and this could be an important indicator for the diagnosis and the control of the acromegaly.[5] In this study, we evaluated the CCT, intraocular pressure (IOP), and tear IGF-1 values of 2 acromegalic patients before and after treatment.

Case Reports

Case 1
A newly diagnosed acromegaly patient aged 45-year-old woman was referred to our clinic for an ophthalmologic examination from the Endocrinology Department of our hospital. Serum IGF-1 level was 750 ng/ml (reference ranges of IGF-1 in ages 46–85: 94–166 ng/ml). Complete ophthalmological examination including CCT with ultrasonic pachymetry (Tomey Corporation, Nagoya, Japan), and standard threshold perimetry with the Humphrey visual field analyzer 24-2 program (Carl Zeiss Meditec, Inc., Dublin, CA, USA) were performed. After informed consent was obtained from the patient, basal tear samples were collected atraumatically from the inferior tear meniscus of both eyes using glass capillary tubes or micropipettes. Tear samples were diluted in phosphate-buffered saline, placed in microtubes, and stored at −70°C until further examination. Tear IGF-1 concentrations were measured using a commercial enzyme-linked immunosorbent assay kit (Quantikine, R and D Systems, Minneapolis, MN, USA) according to the manufacturer’s instructions. Tear IGF-1 level was 0.63 ng/ml. Best-corrected visual acuities were 1.0 in both eyes. Anterior segment and fundus examination were normal. Optic disc examination revealed normal in both eyes (cup-to-disc ratio was 0.3 in both eyes). CCT was 615 μm in the right eye and 612 μm in the left eye. IOP levels were 24 mm Hg in the right eye and 23 mm Hg in the left eye. Visual field examination was normal. After the patient was referred to a neurosurgery by the endocrinology clinic for an operation, he underwent transsphenoidal adenectomy for the pituitary adenoma. Three months after surgery she was admitted to our clinic for a control examination. Anterior segment and fundus examination revealed normal. Visual field examination was normal. The patient’s serum IGF-1 values had fallen to 125 ng/ml. Besides tear IGF-1 values were 0.32 ng/ml. CCT was 585 μm in the right eye and 575 μm in the left eye. IOP levels were 20 mm Hg in the right eye and 19 mm Hg in the left eye. The patient was undertaken to a routine follow-up.

Case 2
Another newly diagnosed acromegaly patient aged 55-year-old woman was referred from endocrinology clinic for an ophthalmologic examination. The complete ophthalmologic examination was performed to the patient. After informed consent was obtained basal tear samples were collected for the IGF-1 measurement. Serum IGF-1 level of the patient was 1340 ng/ml. Tear IGF-1 level was 0.98 ng/ml. Best-corrected visual acuities were 1.0 in both eyes. Anterior segment and fundus examination were normal. CCT was 595 μm in the right eye and 612 μm in the left eye. IOP levels were 20 mm Hg in the right eye and 23 mm Hg in the left eye. Visual field examination was normal.

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eye and 590 µm in the left eye. IOP levels were 22 mm Hg in the right eye and 21 mm Hg in the left eye. Optic disc examination were also normal in both eyes (cup-to-disc ratio was 0.4 in both eyes). Visual field examination was normal. The patient also was referred to the Neurosurgery Department for an operation, and she also underwent pituitary surgery. Three months after surgery the patient’s complete ophthalmological and visual field examination revealed normal. Serum IGF-1 value had fallen to 389 ng/ml. Besides tear IGF-1 value was 0.25 ng/ml. CCT values were 565 µm in the right eye and 560 µm in the left eye. IOP levels were 18 mm Hg in the right eye and 17 mm Hg in the left eye. The patient was also taken to a routine follow-up.

Discussion

In acromegaly, normalization of IGF-I in serum has been used to follow-up the success of surgical and medical therapies. Van Setten et al. reported that the IGF-1 level was elevated not only in the serum, but also in the subretinal fluid and aqueous humor in a patient with acromegaly. This study inspired us to hypothesize that the eyes might be another target organ for the effects of excess GH and IGF-1, hence in our study we measured tear IGF-1 levels and evaluated the relationship with CCT and IOP before and after treatment in two acromegaly patients. Ciresi et al. emphasized that high GH may have stimulatory effects on the cornea, as well as on other target organs. Uncontrolled acromegalic patients had higher CCT values than controlled acromegalic patients in their study. Bramsen et al. divided 27 pituitary adenoma patients into two groups as those with and without acromegaly and reported higher CCT values in the group with acromegaly. In contrast, Polat et al. reported no statistically significant difference regarding median right and left corneal thicknesses and mean CCT values between acromegaly and control groups. They divided 30 patients with acromegaly into two groups as those with active and inactive. The CCT values were also not significantly different between these subgroups.

To our knowledge our study is the first study to measure tear IGF-1 levels. Thus, normal range values have not been established yet. We think that possible growth effect of tear IGF-1 may have an impact on CCT. We found a higher CCT, IOP, and tear IGF-1 values in the active phase of the disease. The activity of the disease may have an impact on ocular parameters such as CCT, IOP, and tear IGF-1 values. However, longitudinal studies including larger populations and controls are needed to confirm this relationship.

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Conflicts of Interest
There are no conflicts of interest.

References

1. Melmed S. Medical progress: Acromegaly. N Engl J Med 2006;355:2558-73.
2. Chang-DeMoranville BM, Jackson IM. Diagnosis and endocrine testing in acromegaly. Endocrinol Metab Clin North Am 1992;21:649-68.
3. Lindholm J, Giwercman B, Giwercman A, Astrup J, Bjerre P, Skakkebaek NE. Investigation of the criteria for assessing the outcome of treatment in acromegaly. Clin Endocrinol (Oxf) 1987;27:553-62.
4. Van Setten G, Brismar K, Algvere P. Elevated intraocular levels of insulin-like growth factor I in a diabetic patient with acromegaly. Orbit 2002;21:161-7.
5. Bramsen T, Klauber A, Bjerre P. Central corneal thickness and intraocular tension in patients with acromegaly. Acta Ophthalmol (Copenh) 1980;58:971-4.
6. Katznelson L, Atkinson JL, Cook DM, Ezzat SZ, Hamrahian AH, Miller KK; AACE Acromegaly Task Force. American association of clinical endocrinologists medical guidelines for clinical practice for the diagnosis and treatment of acromegaly-2011 update: Executive summary. Endocr Pract 2011;17:636-46.
7. Ciresi A, Amato MC, Morreale D, Lodato G, Galluzzo A, Giordano C. Cornea in acromegalic patients as a possible target of growth hormone action. J Endocrinol Invest 2011;34:e30-5.
8. Polat SB, Uğurlu N, Ersoy R, Oğuz O, Duru N, Cakir B. Evaluation of central corneal and central retinal thicknesses and intraocular pressure in acromegaly patients. Pituitary 2014;17:327-32.