AN URGENT EVALUATION FOR BILATERAL ELEVATED RETINAL LESIONS

Exploring the diagnosis and appropriate workup for a patient presenting with sclerochoroidal calcification.

BY WENDY LIU, MD, PhD; PATRICK OELLERS, MD; AND DEAN ELIOTT, MD

CASE REPORT

A 77-year-old man with no ocular complaints and a history of systemic hypertension and hyperlipidemia was urgently referred to the eye emergency department for evaluation of bilateral elevated retinal lesions. Review of systems was negative for recent fevers, chills, weight loss, night sweats, or any other symptoms. On examination, the patient’s VA was 20/20 in each eye (OU). His IOP was 19 mm Hg in the right eye (OD) and 15 mm Hg in the left eye (OS). Extraocular motility was full, and the eyes were aligned. There was no proptosis. The pupils were equal, round, and reactive to light, without relative afferent pupillary defect. Visual fields were full to confrontation. Anterior segment examination was unremarkable, other than mild cataract OU. A dilated examination revealed multiple yellowish, placoid, slightly elevated lesions superotemporally along the vascular arcades OU (Figure 1). An ultrasound B-scan showed lesions with high echodensity with posterior shadowing OU (Figure 2), consistent with sclerochoroidal calcification.

The patient’s laboratory workup revealed normal complete blood count,
basic metabolic panel, phosphate, parathyroid hormone, and calcitonin, and borderline high calcium (10.6 mg/dL; normal: 8.5-10.5). He reported no use of diuretic medications. We asked the patient to see his primary care physician and to have his calcium and parathyroid hormone levels rechecked in 3 months. He was informed that he will likely remain asymptomatic from his condition but that he should receive regular dilated eye examinations to monitor for rare complications.

DISCUSSION

Sclerochoroidal calcification is a rare incidental finding in asymptomatic white individuals in their 60s to 80s.\(^1\)\(^\text{-}^3\)

Sclerochoroidal calcification occurs as a result of calcium deposition within the sclera,\(^4\) which leads to elevated, yellowish lesions that may be misdiagnosed as tumors. These lesions are usually bilateral, multiple in number, and located most often in the superotemporal quadrant between the vascular arcade and the vortex veins.\(^1\)\(^,^3\)

Patients with sclerochoroidal calcification are usually asymptomatic and without progression, even after years. There are rare reports, however, of choroidal neovascularization, subretinal fluid, and serous retinal detachment associated with sclerochoroidal calcification.\(^1\)\(^,^5\)\(^,^6\)

SECONDARY SCLEROCHOROIDAL CALCIFICATION

Sclerochoroidal calcification is most often idiopathic. However, in up to 21% of patients it is secondary to abnormal calcium-phosphorus metabolism as seen in conditions such as hyperparathyroidism, pseudohypoparathyroidism, vitamin D intoxication or deficiency, sarcoidosis, hypophosphatemia, and chronic renal failure.\(^3\) For an outline of several causes of hypercalcemia and the systemic associations of each with sclerochoroidal calcification, see Etiologies of Hypercalcemia and Systemic Associations With Sclerochoroidal Calculcation*.

ETIOLOGIES OF HYPERCALCEMIA AND SYSTEMIC ASSOCIATIONS WITH SCLEROCHOROIDAL CALCIFICATION*

*Reported systemic associations of sclerochoroidal calcifications are shown in bold.

- **Idiopathic**
  - Primary hyperparathyroidism
    - Parathyroid adenoma
  - Secondary hyperparathyroidism
    - Chronic renal failure
    - Vitamin D deficiency
    - Malabsorption
    - Other
  - Renal disorders
    - Diuretic use
    - Familial hypocalciuric hypercalcemia
    - Primary renal tubular hypokalemic metabolic alkalosis syndrome
      - Gitelman syndrome (due to hypomagnesemia)
      - Bartter syndrome (due to hypomagnesemia)
  - Vitamin D excess
    - Granulomas (Sarcoid, other)
    - Vitamin D intoxication
  - Malignancy
    - PTH-related peptide producing (eg, squamous cell cancer, renal cancer, other)
    - Local osteolysis (eg, breast cancer, myeloma)
    - Cytokine and vitamin D producing (eg, hematologic malignancy)
  - Increased bone turnover
    - Hyperthyroidism
    - Immobilization
    - Paget disease
  - Miscellaneous
    - Calcium intake (eg, milk-alkali syndrome, calcium based antacids)
    - Adrenal insufficiency

Calcification. It can also be associated with primary renal tubular disorders, such as Bartter or Gitelman syndrome (Table).\(^1,^3,^7\) Bartter and Gitelman syndromes are autosomal recessive disorders characterized by hypokalemic metabolic alkalosis due to defects in sodium-chloride transport in the renal tubules.\(^8\)

Classic Bartter syndrome is caused by defects in the sodium–potassium-chloride cotransporter, the apical potassium channel, or the basolateral chloride channel in the ascending loop of Henle. Patients with this syndrome present in childhood with polydipsia, polyuria, dehydration, and growth retardation and have occasional hypomagnesemia and decreased urine concentrating ability.\(^8\)

In contrast, Gitelman syndrome is caused by mutations in the sodium-chloride cotransporter in the distal nephron. Patients with Gitelman syndrome present later in life with mild symptoms, such as fatigue, muscle weakness, and tetany. Hypocalciuria and hypomagnesemia are also commonly found in these patients.\(^8\) Magnesium is a cofactor for alkaline phosphatase; hypomagnesia may reduce the activity of alkaline phosphatase, thereby resulting in extracellular pyrophosphate crystal deposition manifesting as sclerochoroidal calcification.\(^9\)

**DIFFERENTIAL DIAGNOSIS**

The differential diagnosis of sclerochoroidal calcification includes choroidal osteoma, metastasis, amelanotic nevus or choroidal melanoma, lymphoma, and granuloma. One differentiating feature is that lesions associated with these conditions arise mainly from the choroid, whereas lesions due to sclerochoroidal calcification involve primarily the sclera.\(^4\) Sclerochoroidal calcification and choroidal osteoma both characterizedly cause posterior shadowing on ultrasonography, clearly differentiating them from alternative diagnoses. In contrast to sclerochoroidal calcification, choroidal osteoma is typically unilateral, solitary, and located in the juxtapapillary area.

**SUGGESTED WORKUP FOR SCLEROCHOROIDAL CALCIFICATION**

- Blood and urine testing for calcium, phosphorous, potassium, and magnesium
- Serum testing for parathyroid hormone and calcitonin
- Obtain history of diuretic use
- Consider referral to internal medicine

**TABLE. CLINICAL AND BIOCHEMICAL FEATURES OF BARTTER AND GITELMAN SYNDROMES**

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Bartter Syndrome</th>
<th>Gitelman Syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of presentation</td>
<td>Infancy or childhood</td>
<td>Childhood or adulthood</td>
</tr>
<tr>
<td>Site of nephron affected</td>
<td>Ascending limb of Henle</td>
<td>Distal convoluted tubule</td>
</tr>
<tr>
<td>Polycythemia/prematurity</td>
<td>Common</td>
<td>Absent</td>
</tr>
<tr>
<td>Growth retardation</td>
<td>Present</td>
<td>Occasionally present</td>
</tr>
<tr>
<td>Polydipsia and polyuria</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>Dehydration</td>
<td>Common</td>
<td>Absent</td>
</tr>
<tr>
<td>Muscle weakness/tetany</td>
<td>Occasionally present</td>
<td>Present</td>
</tr>
<tr>
<td>Chondrocalcinosis</td>
<td>Absent</td>
<td>Occasionally present</td>
</tr>
<tr>
<td>Nephrocalcinosis</td>
<td>Absent</td>
<td>Occasionally present</td>
</tr>
<tr>
<td>Metabolic alkalosis</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Hypokalemia</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Hypomagnesemia</td>
<td>Occasionally present</td>
<td>Present</td>
</tr>
<tr>
<td>Urinary sodium and chloride excretion</td>
<td>High</td>
<td>Normal or high</td>
</tr>
<tr>
<td>Urinary calcium excretion</td>
<td>Normal or high</td>
<td>Low</td>
</tr>
<tr>
<td>Urinary concentrating ability</td>
<td>Impaired</td>
<td>Normal</td>
</tr>
<tr>
<td>Hyperreninism and hyperaldosteronism</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Hyperprostaglandinism</td>
<td>Present</td>
<td>Absent</td>
</tr>
</tbody>
</table>

Sclerochoroidal calcification is often idiopathic, asymptomatic, and nonprogressive; however, testing should be done to ensure that it is not secondary to abnormal calcium-phosphorus metabolism.

Patients with sclerochoroidal calcification should be advised to obtain blood and urine testing for calcium, phosphorus, potassium, and magnesium, as well as serum testing for parathyroid hormone and calcitonin.

Causes of secondary sclerochoroidal calcification include abnormal calcium-phosphorus metabolism and primary renal tubular disorders.