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Corneal Opacity Leading to Multiple Myeloma Diagnosis: A Case Report and Literature Review

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Patient: Female, 54
Final Diagnosis: Multiple myeloma
Symptoms: A 9-month history of blurred vision
Medication: Systemic chemotherapy with vincristine • cyclophosphamide • dexamethasone
Clinical Procedure: Multiple myeloma patient presenting with corneal opacity and blurred vision as chief complaint
Specialty: Ophthalmology and Hematology

Objective: Rare disease
Background: A multiple myeloma patient presenting with corneal opacity and blurred vision as chief complaint is rare.
Case Report: A 54-year-old woman with a 9-month history of blurred vision without other systemic symptoms consulted an ophthalmologist. The patient had bilateral diffuse corneal opacity at the corneal epithelium and anterior stroma under slit-lamp examination. Decreased corneal endothelial cells density was found by microscopy. During consultation, the patient was noted to have an anemic face. Laboratory analysis and bone marrow were investigated. Serum protein electrophoresis revealed a raised serum kappa paraprotein band (12.4 g/L). The erythrocyte sedimentation rate (ESR) was accelerated to 49 mm/h (normal <20mm/h). There was mild kidney impairment. The blood urea increased to 8.1 mmol/L (normal <7.1 mmol/L) and creatinine increased to 158 μmol/L (normal <133 μmol/L). Then, a bone marrow biopsy was performed, showing 26% pleomorphic plasma cells (normal <15%). The patient was eventually diagnosed as having MM and was treated with systemic chemotherapy.
Conclusions: Blurred vision due to corneal opacity can be an initial presentation of MM, of which ophthalmologists should be aware.

MeSH Keywords: Antibodies, Monoclonal • Corneal Opacity • Multiple Myeloma

Abbreviations: **MM** – multiple myeloma; **ESR** – erythrocyte sedimentation rate; **BCVA** – best-corrected visual acuity

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/908475

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Background

Multiple myeloma (MM) is a malignant tumor characterized by the proliferation of plasma cells with bone destruction [1,2]. Patients with MM often have complaints of general symptoms like weight loss, fatigue, and bone pain. Most MM patients are diagnosed and treated by hematologists [3], but some MM patients are initially diagnosed by ophthalmologists [4,5].

We report a case of previously unsuspected MM, presenting with corneal opacity as the initial chief complaint, and diagnosed as MM in our hospital. It is noteworthy that cloudy corneas were the initial presentation of MM. Moreover, decreased density of corneal endothelial cells has rarely been reported by ophthalmologists.

Case Report

A 54-year-old woman consulted us for her blurred vision but was without other systemic complaints. She had a 9-month history of impaired visual acuity. The best-corrected visual acuity (BCVA) of the patient was 20/40 OU. Diffuse corneal opacity was seen bilaterally under slit-lamp microscopy. The gray-white deposits were located in the epithelium and anterior stroma (Figure 1). Bilateral endothelium and deep stroma seemed normal based on slit-lamp examination.

Corneal thickness was 538 μm OD and 539 μm OS by specular microscopy. There was no obvious corneal edema on slit-lamp examination. The corneal endothelial cells density was 1685.1/mm^2 in the right eye and 1932.0/mm^2 in the left eye by specular microscopy. However, the endothelium had abnormal appearance under specular microscopy. Some of them were enlarged and lost normal hexagonal appearance. There were diffused dark areas in the corneal endothelium (Figure 2). There were no positive signs in the anterior chamber, lenses, and capsule. The results of a dilated fundus examination were unremarkable. Medical and pharmacological anamnesis was otherwise unremarkable, and there was no family history of corneal dystrophies.

During consultation, the patient was noted to have an anemic face. We asked her to take a blood routine test, which showed that she had pancytopenia. Her leucocyte count

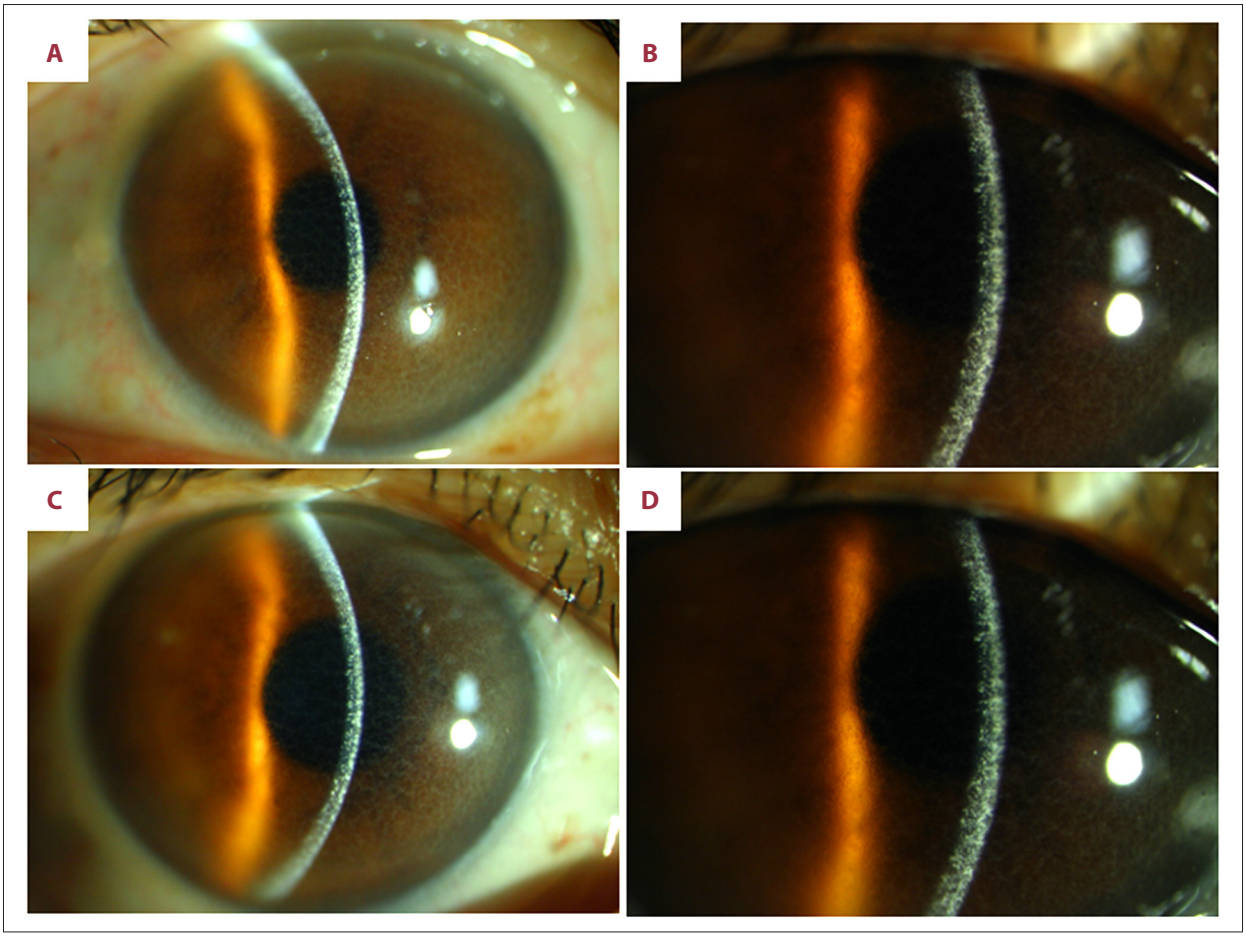

Figure 1. Slit-lamp photograph of the right (**A, B**) and left (**C, D**) cornea. Diffuse gray-white deposits were observed on both corneas.

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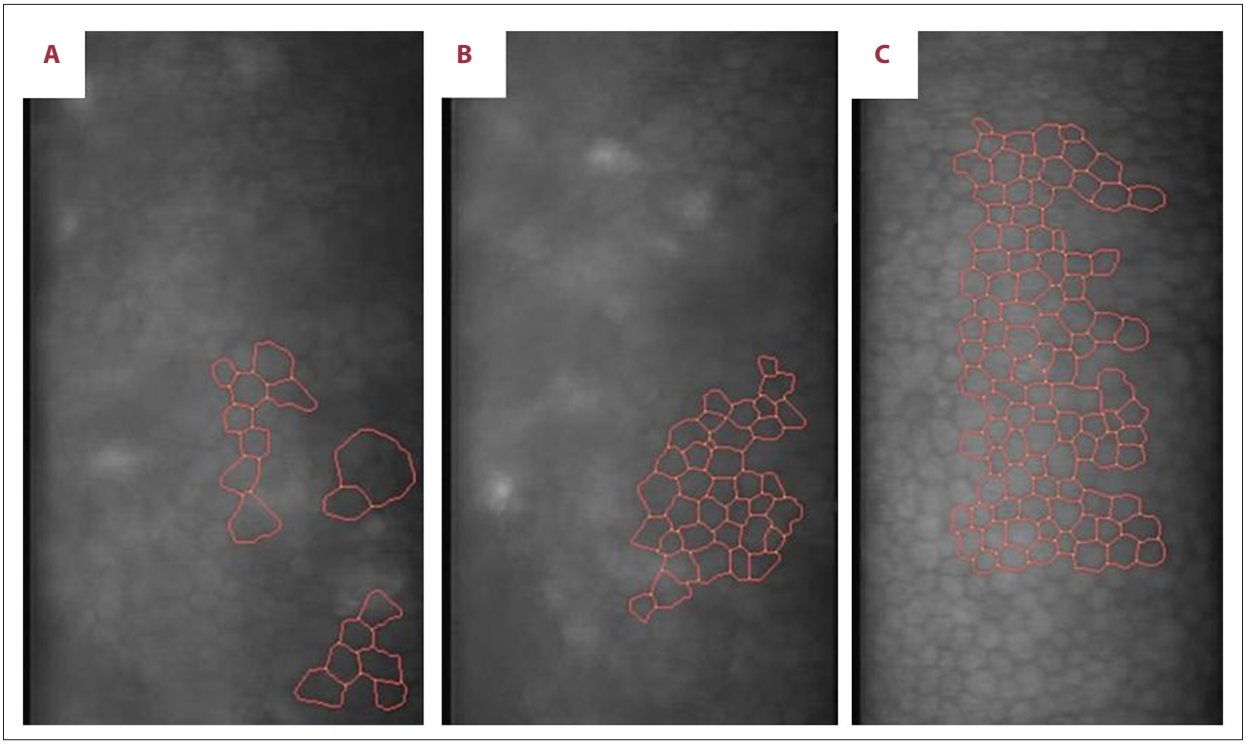

Figure 2. The endothelium had abnormal appearance of the right (**A**) and left (**B**) cornea compared with control (**C**). Some of them were relatively large and had lost their normal hexagonal shape.

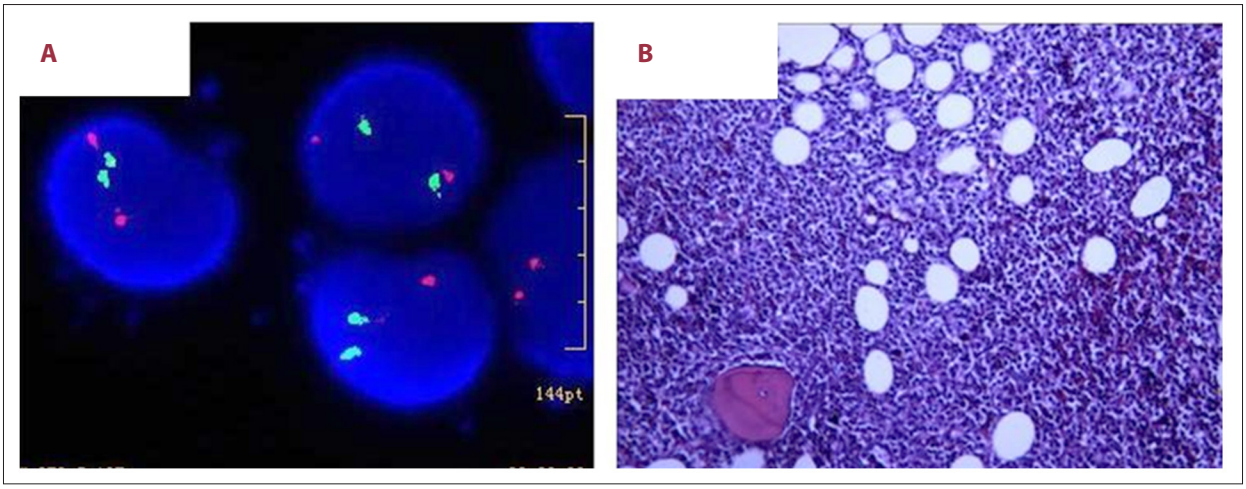

Figure 3. A bone marrow biopsy was carried out and showed increased plasma cells (26.0%) with pink staining crystals in the cytoplasm.

was 2.80×10^9/L (4–10×10^9/L), hemoglobin concentration was 87 g/L (110–150 g/L), and platelet count was 97×10^9/L (100–300×10^9/L). Serum protein electrophoresis revealed a raised serum kappa paraprotein band (12.4 g/L, normal <7.1 g/L). The erythrocyte sedimentation rate (ESR) was accelerated to 49 mm/h (normal <20 mm/h). There was mild kidney impairment. The blood urea increased to 8.1 mmol/L (normal <7.1 mmol/L) and creatinine increased to 158 μmol/L (normal <133 μmol/L). The results of a random blood glucose test, liver function, electrolytes, and lipid profile were all normal. Bence-Jones proteins in the urine were increased. Then, we performed a bone marrow biopsy, showing 26% pleomorphic plasma cells (normal <15%). Many pink-staining crystals were seen in the cytoplasm (Figure 3). These findings were consistent with the diagnosis of MM [3].

The patient was eventually found to have a previously unsuspected MM. Then, she was further treated with systemic

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chemotherapy. Vincristine, cyclophosphamide, and dexamethasone were administered in the Hematology Department in our hospital. The patient had a positive prognosis in the following 12 months, but there was no significant improvement in corneal clarity.

Discussion

MM is a malignant plasma cell disorder characterized by production of monoclonal serum protein, with multi-organ involvement and immunodeficiency [3,4]. Its prevalence is 0.02% [6,7]. Excessive homogeneous immunoglobulin is produced in MM. Elevated immunoglobulin appears in the aqueous humor, tears, and limbal vessels. Abnormal plasma cells exist in bone marrow. MM patients may suffer anemia, infections, renal insufficiency, osteolytic bone lesions, and urinary Bence-Jones proteins [6,8,9].

General symptoms of MM include weight loss, lassitude, and bone pain [1]. Ocular findings include subconjunctival hemorrhage, hyper-viscous retinopathy, and ciliary body cyst [5,10]. However, corneal lesions are rare [1,5,11], and corneal opacity as an initial presentation of MM is also uncommon [1,2,4,5,11,12]. Here, we report the case of a female MM patient with blurred vision due to corneal opacity as the initial presentation. The diagnosis process suggests that ophthalmologists should be aware of such a presentation, which can be an indication of systemic MM, and corneal opacity may be the initial presentation of a more serious disease entity, such as underlying MM. Systemic work-up should therefore be performed in cases of corneal opacity without known pathological causes.

Corneal opacity can be a sign of several diseases, such as corneal dystrophy and gammopathy [6,13]. Ophthalmologists should differentiate corneal dystrophy from possible systemic diseases. In this report, diffuse gray-white deposits were found in the bilateral corneal epithelium and stroma. About 1% of patients with gammopathies have corneal crystals [9,13]. The rarity is partly due to diagnosis depending on detection of IgG-kappa light chains [9,13,14]. Corneal deposits in MM were first reported by Buerki in 1958 [15], and can be found through all the corneal layers. The opacities dystrophies are limited to a single layer of the cornea [9]. The endothelium in our patient had abnormal appearance in bilateral cornea. Some of them were relatively large and had lost the normal hexagonal shape.

The pathophysiology of corneal opacity in MM is inferred. The proliferation of plasma cells produced a high level of immunoglobulin, after which, high concentrations of immunoglobulin are deposited in the cornea. One report suggested that the deposits in the cornea came from tears, aqueous humor, or limbal blood vessels [16]. Some researcher report that the keratocytes synthesize immunoglobulin on their own. The reasons for immunoglobulin deposits are: 1) a natural tendency of immunoglobulin to crystallize; and 2) local factors in the cornea that may accelerate deposition, such as water content and temperature [17]. Immunoglobulin deposits have been found in urine, bone marrow, serum, cornea, and tears [2,5].

Ophthalmic presentations usually occur in the late phase of MM. Rarely, blurred vision due to corneal opacity is an initial presentation of MM [1,2,7]. Ocular manifestations of MM are diverse, including cloudy cornea, subconjunctival hemorrhages, peripheral ulcerative keratitis, and band keratopathy [2,10,11,18,19]. Intriguingly, in our case, the only complaint was decreased vision. Diffuse corneal opacity was found in the corneal epithelium and anterior stroma under slit-lamp examination. The treatments included superficial keratectomy, penetrating keratoplasty, and systemic support therapy [1]. Firkin reported the case of an MM patient with corneal immunoglobulin deposition; the patient was a 69-year-old man diagnosed with MM during a visit to his local hospital, with chief complaint of glare in his vision, and was found to have bilateral golden corneal crystals [20]. Hill et al. reported the case of a 46-year-old woman with IgG lambda disseminated myeloma with corneal deposits after a decade [21]; despite treatment with irradiation of upper and lower body halves, paraprotein levels and corneal deposits remained unchanged. Chong et al. described a 52-year-old woman presenting initially with vortex keratopathy and finally diagnosed as having IgG-kappa MM [16].

In addition, diagnostic procedures of this case are noteworthy. Impaired vision can lead to an early diagnosis of MM. Early detection can improve prognosis and reduce the total medical cost [1,11]. The patient in our study had a positive prognosis in the following 12 months, but there was no significant improvement in corneal clarity. Early and prompt chemotherapeutic treatment can lead to a positive prognosis [11]. Laboratory tests can help diagnose any potential MM. Thus, ophthalmologists should pay attention to similar presentations in the future.

The limitation of this report is that we could not obtain any corneal or conjunctival specimens for biopsy, and we did not examine corneal deposits by confocal microscopy.

Conclusions

Blurred vision due to corneal opacity could be an initial presentation of MM. Ophthalmologists should be aware of such a presentation of MM.

Conflict of interest

None.

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