CASE REPORT

Punctate keratopathy of West Indians in patients undergoing photorefractive surgery

Virgilio Galvis,^{1,2} Alejandro Tello,^{1,2} Mario L Revelo,¹ David Paredes,¹ Luis Carlos Jaramillo^{2,3}

¹Department of Ophthalmology, Centro Oftalmológico Virgilio Galvis, Floridablanca, Santander, Colombia

²Universidad Autónoma de Bucaramanga, Santander, Colombia

³Fundación Oftalmológica de Santander (FOSCAL), Floridablanca, Santander, Colombia

Correspondence to
Dr Alejandro Tello,
alejandrotello@gmail.com

SUMMARY

We present two cases of patients with corneal lesions compatible with punctate keratopathy of West Indians who underwent photorefractive keratectomy and laser-assisted in situ keratomileusis. Both had good postoperative results. The corneal lesions did not interfere with the refractive surgery.

BACKGROUND

The term punctate keratopathy of West Indians was coined by Rice *et al*¹ in 1968 to describe an asymptomatic condition characterised by one or several small round subepithelial corneal lesions, usually white in colour, which were found in Caribbean immigrants to the UK. Although only one published series from Grenada (Lesser Antilles in the West Indies) studied prevalence of the condition (6.25% rate),² from anecdotal information based on experience of ophthalmologists working in the Antilles, it seems to be rather common among inhabitants of those islands;^{1–2} it has been also described in two Caucasians,^{2–3} two Hindus² and one North American Afro-Caribbean descent,⁴ all of whom had lived in the Antilles. Moreover, the condition has been found in Native Americans and Afro-Americans in Ecuador⁵ and in two mestizoes (mixed European and Native American ancestry) from Guatemala.⁵ However, it has not been described in Caucasians, Africans or Asians who have not lived in the islands of the West Indies. Being a rare condition outside the Antilles, Central and South America, ophthalmologists unaware of its innocuousness may implement unnecessary treatments, thinking the lesions are related to inflammation or infection.⁴

A refractive surgeon facing a patient with punctate keratopathy of West Indians may have some hesitation in recommending excimer laser surgery. Here we present two cases of patients with typical punctate keratopathy of West Indians who underwent an uneventful photorefractive surgery with good results. The corneal lesions did not interfere with the excimer laser surgery.

CASE PRESENTATION

Case 1

A 32-year-old man came for a consultation seeking refractive surgery. In addition, he complained of occasional ocular itching. The patient had no ophthalmological, medical or relevant family history. The patient was born and had lived his entire life in Colombia. The uncorrected visual acuity (UCVA) was 20/200 for distance and 20/20 for near vision in both

eyes. The preoperative refraction was -2.25 to $0.75 \times 45^\circ$ in the right eye and -2.25 to $0.75 \times 135^\circ$ in the left eye with the best corrected visual acuity (BCVA) 20/20 for distance and near vision in both eyes. Preoperative ophthalmological examination with the slit lamp showed one white unilateral round corneal subepithelial opacity (approximately 0.5 mm diameter) corresponding to the clinical findings of punctate keratopathy of West Indians in the superior corneal quadrant of the right eye (figure 1A,B). The rest of the ophthalmic examination was normal in both eyes. The patient underwent photorefractive keratectomy (PRK) with mitomycin-C application in both eyes, which was performed by one of the authors (MLR). Before the procedure the patient was started on moxifloxacin.

Surgical technique included application of 30% alcohol for 30 s, contained inside a ring of 8.5 mm; subsequently, alcohol was absorbed and the epithelium was debrided using a spatula. The corneal lesion of punctate keratopathy of West Indians in the right eye was included within the desepithelisation area. Refractive ablation with an optical zone of 6.5 mm (Amaris Schwind system, Schwind eye-tech-solutions, Kleinostheim, Germany) was performed. The laser treatment did not reach the peripheral corneal lesion in the right eye. Mitomycin-C was applied for 30 s in each eye, after which the stromal bed was irrigated with 30 ml of a balanced salt solution. Therapeutic contact lenses were then placed in both eyes.

Case 2

A 50-year-old female patient consulted seeking refractive surgery. The patient's ophthalmological, medical or family history was unremarkable. The patient was born and had lived her entire life in Colombia. The UCVA was 20/50–2 for distance and 20/100 for near vision in both eyes; the preoperative refraction was $+1.25$ sphere with near addition $+3.00$ D in both eyes, with BCVA 20/20 for distance and near vision. The preoperative ophthalmological examination with the slit lamp showed one unilateral round white dot in the inferior quadrant of the left eye's cornea of approximately 0.5 mm in diameter, compatible with punctate keratopathy of West Indians (figure 2A). The rest of the ophthalmic examination was normal. The patient underwent laser-assisted in situ keratomileusis (LASIK) by one of the authors (VG) using a monovision approach, without complications. Temporal hinge flaps were created using Hansatome microkeratome (Bausch and Lomb, Rochester, New York, USA). The corneal lesion in the left eye remained in the corneal flap.

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Figure 1 (A and B) Preoperative images of the small round white lesion in the right eye of patient from Case 1. (C) The same lesions 22 months after photorefractive keratectomy.

A small amount of bleeding occurred. Ablation was performed using the Amaris Schwind system. Therapeutic contact lenses were placed in both eyes.

DIFFERENTIAL DIAGNOSIS

Establishing a diagnosis of punctate keratopathy of West Indians is usually straightforward, since the typical clinical appearance at slit lamp examination is always present and is pathognomonic. Additional data from other studies are not necessary. Moreover, the lesions always seem to be asymptomatic (in one reported case, the referred symptoms of photophobia and foreign body sensation were probably unrelated to the condition).⁴

The corneal lesions are round, 0.5 mm or less in diameter, are found at the level of Bowman's membrane, and usually extend just into the superficial stroma. They usually have a central dot, are intensely white in colour and are surrounded by a paler halo which merges with the adjacent cornea.^{1–3} The corneal epithelium appears normal and almost never stains with fluorescein.^{1–5}

Unlike punctate keratopathy of West Indians, patients suffering superficial punctate keratitis of Thygeson usually have a long history of exacerbations and spontaneous remissions of foreign body sensation, photophobia, burning and tearing. Clinical findings, which are quite different from that of punctate keratopathy of West Indians, usually include 15–20 oval or round in shape, grouped punctate intraepithelial deposits, which are composed of numerous discrete, fine, granular, white to grey, dot-like opacities that often have a raised centre that breaks through the epithelial surface and may appear like tiny hair-like filaments.⁶

Patients with infectious small corneal infiltrates usually complain of pain, have mucous discharge and an overlying corneal epithelial defect in addition to frequent anterior chamber reaction.⁷ Infiltrates related to contact lenses, whether infected or sterile, are usually 1 mm or larger in diameter, unlike the typical lesions of punctate keratopathy of West Indians infiltrates, which are 0.5 mm or even smaller.⁷

Stages IV and V of subepithelial infiltrates related to adenoviral epidemic keratoconjunctivitis usually presents in, or after, the third week of the disease; they are usually multiple in number, tend to coalesce and frequently cause visual symptoms. They are usually larger and without the characteristic well-defined centre and peripheral halo found in corneal lesions of punctate keratopathy of West Indians. Moreover, a history of preceding epidemic keratoconjunctivitis some weeks before may be elicited.^{8,9}

Staphylococcal marginal keratitis (catarrhal) is another differential diagnosis. Unlike punctate keratopathy of West Indians, it usually presents with mild-to-moderate pain, photophobia, foreign body sensation and conjunctival injection. Catarrhal stromal infiltrates tend to locate where the lid margin crosses the limbus, (ie, 2, 4, 8 and 10 o'clock positions) and although usually round-shaped, frequently become oval; and these can coalesce into broader lesions and ultimately, the corneal epithelium overlying the stromal infiltrates can ulcerate.¹⁰

Epithelial basement membrane dystrophy (Cogan's mycrocystic dystrophy, map-dot-fingerprint dystrophy) is associated with polymorphous findings in the cornea. Lesions may resemble maps and fingerprint lines and frequently display microcysts. The disease presents with symptoms of blurred vision and pain, usually from recurrent corneal erosion. Both symptoms and clinical features during slit lamp examination differentiate this condition from punctate keratopathy of West Indians.^{11,12}

OUTCOME AND FOLLOW-UP

Case 1

Postoperative evolution was uneventful. The first day post-PRK the patient did not have any complaints; the therapeutic contact lens remained well-positioned, and the white corneal opacity in the right eye did not disappear, but was less visible. The patient continued applying moxifloxacin and started with topical steroids (prednisolone), tear substitutes and oral non-steroidal anti-inflammatory drugs. Following corneal epithelisation, contact

Figure 2 (A) Intraoperative image of the left eye of the patient from Case 2. It is visible the small round white inferior lesion. (B) The same lesion 1 month after laser-assisted in situ keratomileusis. (C) The lesion does not stain with fluorescein.

lenses were removed. The small corneal lesion in his right eye showed a less defined border and was less intense in colour.

At the last follow-up visit 22 months after PRK, UCVA was 20/20 in both eyes and the BCVA was also 20/20—with refraction of plano—0.50 dioptres in both eyes, reaching 20/20; punctate West Indians keratopathy lesion did not experience any additional change (figure 1C).

Case 2

The first postoperative day the patient had no complaints. After removing the contact lenses, UCVA was 20/25 for distance and 20/100 for near vision in the right eye and 20/100 for distance and 20/20 for near vision in the left eye, as expected (monovision); BCVA was 20/20—in both eyes with refraction of −0.25 sphere in the right eye and −2.25 sphere in the left eye. During the slit lamp examination, mild de-epithelialisation with minimal blood in the interface of the periphery of the superior corneal quadrant of the left eye was found. The white dot remained with the same characteristics as before surgery. The patient continued applying moxifloxacin and started with soft topical steroids (fluorometalone) and tear substitutes.

At the last follow-up visit 1 month after LASIK, her distance UCVA was 20/20 in the right eye and 20/100 in the left eye. Refraction was plano and −2.25 dioptres for her right and left eyes, respectively. BCVA was 20/20 in both eyes. The white peripheral lesion in her left cornea remained stable (figure 2B,C).

DISCUSSION

Punctate keratopathy of West Indians was described in 1968 by Rice *et al*¹ in 26 patients who were Caribbean immigrants, living in the UK. Some patients were seen for up to 18 months, and the opacities remained unchanged.¹ It seems to be rather common in the Antilles,^{1 2} but other publications confirmed that the condition was not restricted to people of African-Caribbean descent; it was also found in Caucasians and Hindus who had lived in the Antilles,^{2 3} in addition to other peoples of Central and South America.⁵ Curiously, it seems to be non-existent in Caucasians, Africans or Asians who have not lived in the Antilles or Central/South America. So, for many ophthalmologists in North America, Europe, Africa and Asia this might be an unknown condition and patients may be exposed to unneeded studies and treatments.⁴

The cause of this medical condition is unclear. Several hypotheses about its etiopathology have been proposed: micro-traumas of an unidentified nature;¹ seasonal air pollution due to winds carrying dust from the Sahara desert across the Atlantic ocean² or agricultural-related factors.²

In the case series reported by McLendon *et al* which included 128 patients (147 eyes) from Grenada (Lesser Antilles), 85% had unilateral involvement, and 81% of eyes had three or fewer lesions. Twenty-one eyes (14.3%) had five or more dot lesions. Rice *et al*¹ reported one case with 13 lesions in one cornea.

Rice *et al*¹ and McLendon *et al*² performed histopathological studies, which currently given the known harmless nature of the condition are unwarranted, and found that the lesions essentially consist of a sharply circumscribed area of fatty degeneration in Bowman's membrane. Rice *et al*¹ also performed electron microscopical studies and found that electron-dense bodies packed into the centre of the lesion seemed to correspond to lipid deposits, although differing chemically in their varying degrees of instauration; the bodies corresponded to calcification within lipid globules.

Recently, Tietze *et al* performed in vivo confocal microscopy in one case, a North American Afro-Caribbean male, and it showed a lesion containing multiple punctate opacities located

above the Bowman layer. There were no findings of round cell infiltrate as a sign of inflammatory origin and adjacent epithelial cells appeared to be normal.⁴

Occasionally, we see these kinds of lesions in our practice in Bucaramanga (Colombia). To our knowledge, no reports have been published of cases of punctate West Indians keratopathy undergoing PRK or LASIK. In the two patients we report herein, who underwent photorefractive corneal surgery in the presence of punctate West Indians keratopathy, the results of the procedure were not affected by their condition. In our PRK patient who underwent corneal de-epithelialisation including the lesion, which was located outside the ablation area, it faded, but persisted up to the last follow-up visit, 22 months after the procedure. In our LASIK patient, the corneal lesion was included in the corneal flap and remained consistent in appearance.

In conclusion, this non-infectious, non-inflammatory, asymptomatic condition of unknown aetiology did not cause any negative effects in our patients who were operated on with an excimer laser.

Learning points

- ▶ Punctate keratopathy of West Indians, appearing as small, round, intensely white subepithelial opacities, is an asymptomatic condition that requires no treatment.
- ▶ Punctate keratopathy of West Indians is rather common in the Caribbean islands and in people who have lived in that geographical region. It is also seen in Central and South America but is practically non-existent in North America, Europe, Asia and Africa.
- ▶ Patients presenting corneal lesions corresponding to punctate keratopathy of West Indians may undergo photorefractive surgery (photorefractive keratectomy or laser-assisted in situ keratomileusis) without any additional risk.

Competing interests None.

Patient consent Obtained.

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