

Multimodal Imaging of Posterior Staphyloma

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Abstract

Recently, many different methods have been used to visualize posterior staphyloma. Each method has its strengths and limitations, thus, multimodal imaging is considered to be useful for visualizing many features of staphyloma.

Keywords

Staphyloma · 3D MRI · Wide-field OCT · Multimodal imaging

7.1 Wide Macular Staphyloma (Fig. 7.1)

Wide macular staphyloma is the most common type of staphylomas. It is usually horizontally long. Nasal margin of the staphyloma is away from the optic disc, and thus acquired megalodisc is often seen (Fig. 7.1a). The margin of the staphylomas shows pigmentary alterations, which is obvious in infrared images. Ultra-wide field OCT (UWF-OCT) shows the changes of scleral curvature along with the gradual choroidal thinning toward the staphyloma edges (Fig. 7.1c). The entire shape of the staphyloma is clearly imaged by 3D MRI. The image viewed from inferiorly clearly shows the degree of staphyloma (Fig. 7.1d), and the image viewed from the back clearly shows the area of staphyloma (Fig. 7.1e). Generally, wide staphylomas tend to be deep, whereas narrow staphylomas tend to be shallow.

7.2 Narrow Macular Staphyloma (Fig. 7.2)

In narrow macular staphyloma, nasal margin of staphylomas is close to the optic disc (Fig. 7.2a). Thus, the optic disc is usually tilted accompanying with temporal conus. Margin of staphyloma shows pigmentary alterations (Fig. 7.2a and b); however, pigmentary changes tend to be less obvious than those of wide macular staphylomas. UWF-OCT shows narrow staphyloma (Fig. 7.2c) with OCT features typical of staphyloma edges which are also seen in wide staphylomas. 3D MRI shows pointed shape of staphyloma (Fig. 7.2d and e).

7.3 Nasal Staphyloma (Fig. 7.3)

In nasal staphyloma, wide-field fundus image shows an ectasia of the nasal fundus (Fig. 7.3a). The optic disc is tilted nasally with the nasal conus. Diffuse choroidal atrophy is seen in the nasal fundus. The area of nasal diffuse atrophy shows an increased brightness in infrared image (Fig. 7.3b). UWF-OCT shows an incline of scleral curvature toward the optic nerve (Fig. 7.3c). Choroidal thickness changes toward staphyloma edges are not so obvious. 3D MRI viewed from inferiorly shows a nasally distorted shape of the eye (Fig. 7.3d). Scleral curvature changes at the border of nasal staphyloma are usually mild.

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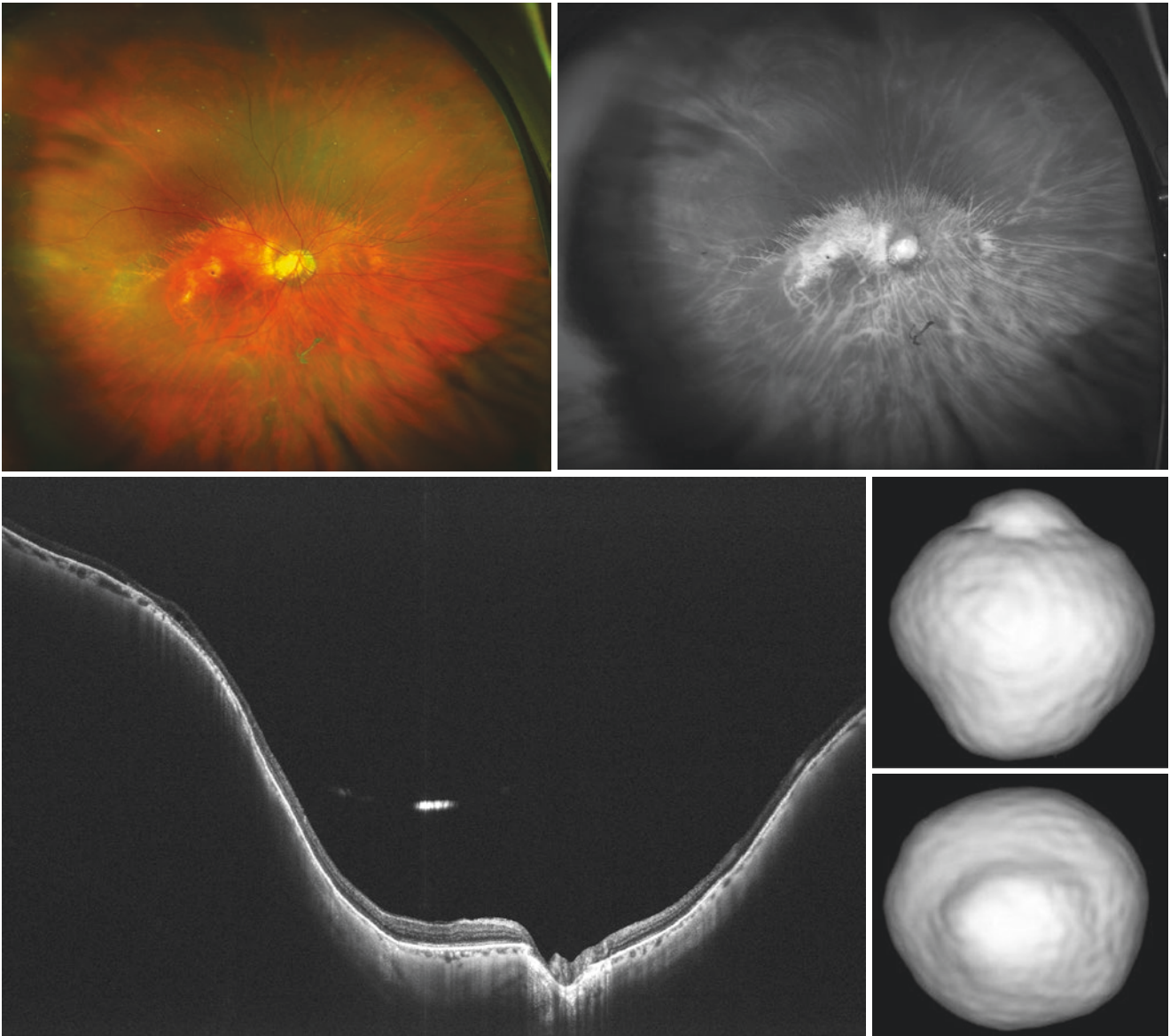


Fig. 7.1 Multimodal imaging of wide macular staphyloma in the right eye of a 73-year-old woman with an axial length of 27.3 mm (equivalent to Curtin's type I). Top Left: Wide-field fundus image shows horizontally long, wide macular staphyloma. The upper edge of the staphyloma shows pigmentary alterations. Top Right: Infrared image shows a pigmentary alteration along the upper edge of staphyloma. Bottom Left:

Ultra wide-field OCT shows a posterior outpouching of the sclera in the staphylomatous area. Gradual choroidal thinning toward the staphyloma edge is clearly seen. Scleral inward protrusion is also seen at the staphyloma edge. Bottom Right: 3D MRI images of the eye. In the image viewed from inferior (upper image) as well as from the back (lower image) show a posterior outpouching of staphylomatous area

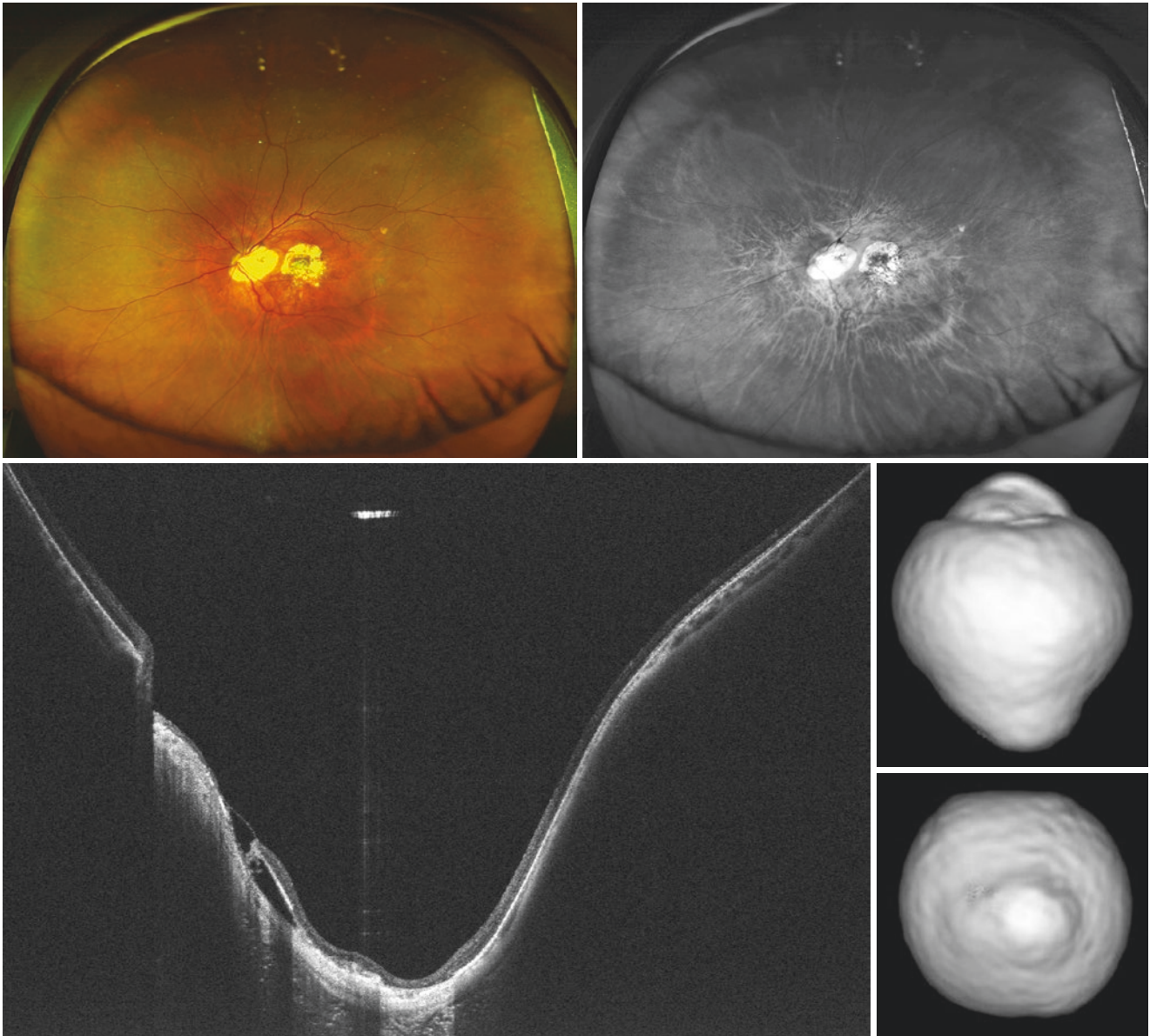


Fig. 7.2 Multimodal imaging of narrow macular staphyloma in the left eye of a 68-year-old man with an axial length of 28.1 mm (equivalent to Curtin's type II). Top Left: Wide-field fundus image shows narrow macular staphyloma. Different from wide staphylomas, the nasal margin of staphyloma is not far from the nasal edge of the optic disc. Staphyloma edges show mild pigmentary alterations. Top Right: Infrared image shows a pigmentary alteration along the edge of staphyloma. Bottom

Left: Ultra-wide field OCT shows a posterior outpouching of the sclera in the staphylomatous area. Gradual choroidal thinning toward the staphyloma edge is clearly seen. Scleral inward protrusion is also seen at the staphyloma edge. Peripapillary intrachoroidal cavitation is seen. Bottom Right: 3D MRI images of the eye. In the image viewed from inferior (upper image) as well as from the back (lower image) show a posterior outpouching of a relative small area of the posterior segment

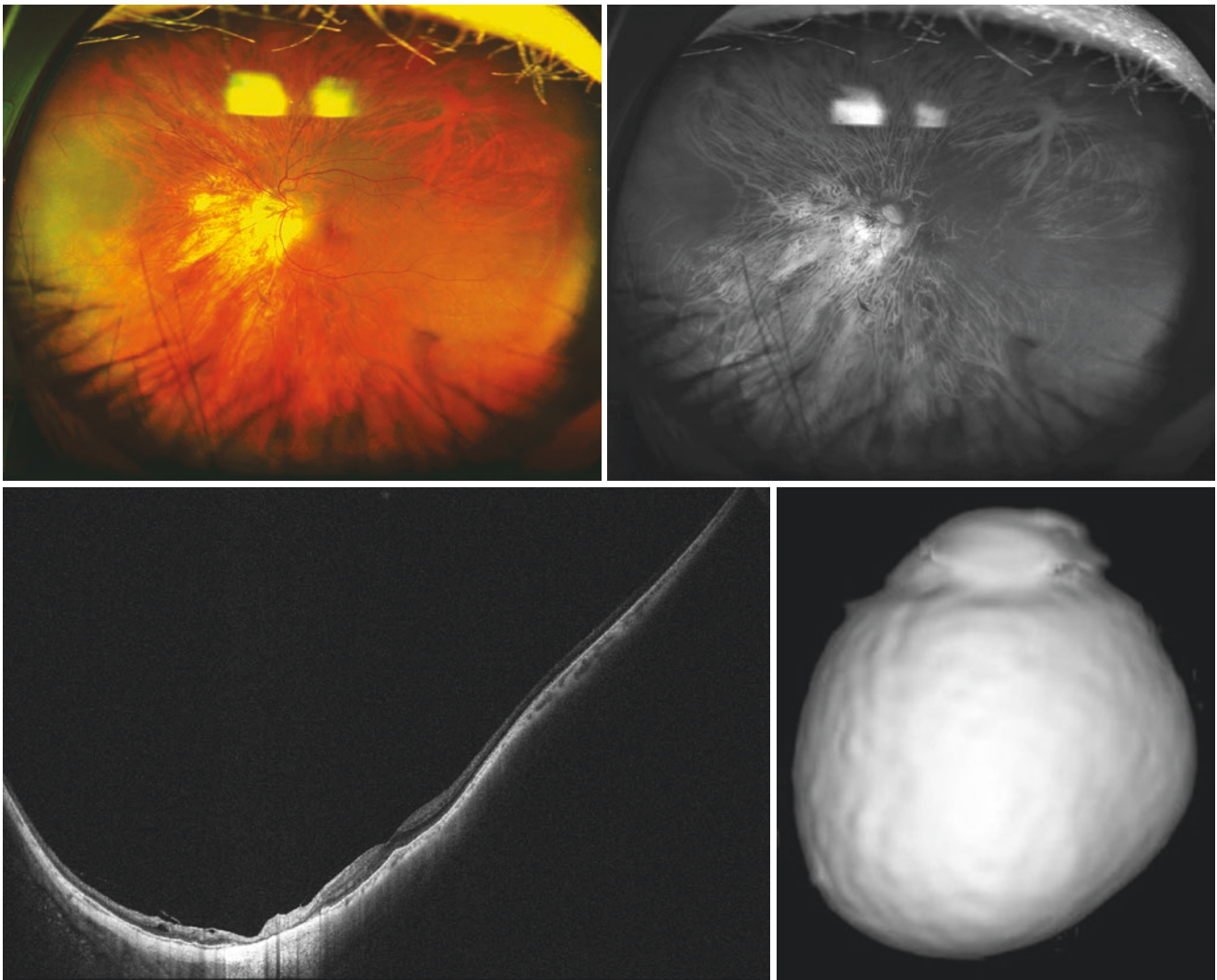


Fig. 7.3 Multimodal imaging of a nasal staphyloma in the left eye of a 70-year-old woman with an axial length of 28.5 mm (equivalent to Curtin's type IV). Top Left: Wide-field fundus image shows nasal staphyloma. The optic disc is tilted nasally and diffuse choroidal atrophy is seen in the nasal fundus. Top Right: Infrared image shows an

increased reflectance in the area of nasal staphyloma. Bottom Left: Ultra wide-field OCT shows a gradual incline of scleral curvature toward the optic nerve. Bottom Right: 3D MRI of the left eye viewed from the inferior shows the nasally distorted shape of the eye

7.4 Inferior Staphyloma (Fig. 7.4)

In inferior staphyloma, wide-field fundus image shows an ectasia of the inferior fundus (Fig. 7.4a). The upper margin of inferior staphyloma shows pigmentary alterations (Fig. 7.4a and b). The optic disc is vertically tilted; however,

some cases have inferior staphyloma without optic disc changes. Because the macula is often outside or along the margin of staphylomas, the axial length is not always long. In some eyes with unilateral high myopia, fellow eyes without high myopia often show this type of staphyloma. UWF-OCT and 3D MRI clearly show the protrusion of inferior segment of the eye (Fig. 7.4c and d).

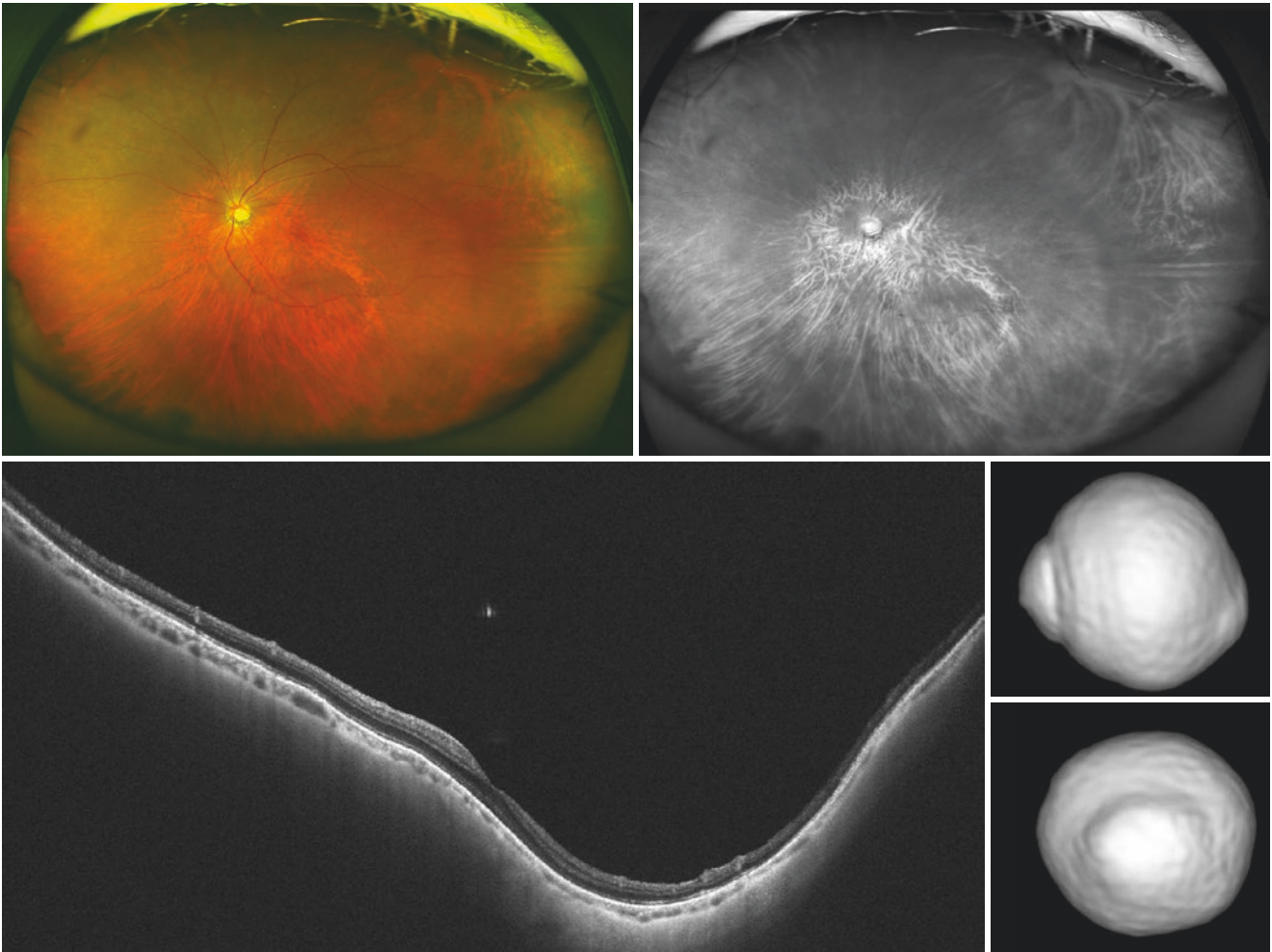


Fig. 7.4 Multimodal imaging of an inferior staphyloma in the left eye of a 74-year-old man with an axial length of 24.7 mm (equivalent to Curtin's type V). Top Left: Wide-field fundus image shows an inferior staphyloma. The upper margin of inferior staphyloma is slightly depigmented. Top Right: Infrared image shows an increased reflectance in the area and along the margin of inferior staphyloma. Bottom Left: A

vertical section of ultra-wide field OCT shows a posterior outpouching of inferior fundus. Bottom Right: 3D MRI viewed from the side (upper image) shows an outpouching of the inferior segment of the eye. Inferior staphyloma is also seen in the image from the back (lower image)