Macular buckle for myopic retinal detachment

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Macular holes are more frequently accompanied by retinal detachment in highly myopic eyes than in those with lesser or no myopia, and the incidence of retinal detachment increases with the presence and the degree of posterior staphyloma.¹ The main cause of visual impairment in pathological myopia is myopic traction maculopathy (MTM). It comprises of myopic foveoschisis (MS), lamellar or full thickness macular hole and posterior pole retinal detachment (with or without macular hole). Posterior staphyloma, being a component of progressive myopia, predisposes to formation of these tractional maculopathies. In some cases, macular retinal detachment developing at the posterior pole exhibits a shortening of the retina in relation to the steep bowing of the sclera at the staphyloma area. This mismatch usually tends to be the cause of failure of retinal re-attachment in conventional vitrectomies with an internal limiting membrane (ILM) peeling procedure. It is in this scenario where macular buckling helps to support the posterior globe to counteract the sclero-retinal mismatch present at the staphyloma. We present a case of high myopia-related posterior pole detachment and macular hole treated successfully with a macular buckling procedure combined with conventional vitrectomy.

Case report
A 56-year-old high myopic lady presented to us with complaint of painless progressively decreasing vision in her right eye since 15 days. On examination, her best-corrected visual acuity (BCVA) was counting fingers at 1 meter, <N36 in the right eye (OD) with −20 DS and that in the left eye (OS) was 6/18, N6 with −16 DS, −3DC at 150°. The anterior segment examination, pupillary reaction, intraocular pressure and extraocular movements were within normal limits. The fundus images of both eyes are shown in Figure 1. Both eyes revealed a myopic tessellated fundus. OD showed a circumscribed area of myopic macular degeneration with localized retinal detachment (denoted by black arrow) along with a pocket of sub-retinal fluid inferior to the degenerated area. OS showed extensive myopic chorio-retinal atrophy at the macula with pigmentary changes.

A swept source optical coherence tomography (SSOCT) of OD (Figure 2) revealed a full thickness macular hole (thick arrow) and a lamellar hole eccentric to the fovea (thin arrow) with a chronic schitic retina. SSOCT in these cases also helps to look at the severity of the staphyloma at its edges in relation to the retinal layer. Based on the history, clinical findings and investigations, a combined vitrectomy, ILM peeling and macular buckling procedure was planned.

Technique
Morin-Devin wedge, also called as T-shaped macular buckle (France Chirurgie Instrumentation –FCI, France), was used for buckling the macula. The solid silicone [Morin wedge (Figure 3a)] macular plate was threaded onto the 4-mm solid silicone band [Devin band (Figure 3b)]. After a

Figure 1: Colour fundus images of the right and left eye (black arrow denotes the area of localized RD).
360° limbal peritomy and tagging of four recti muscles, one end of this 4-mm band was first passed under the lateral rectus muscle, then posteriorly under the inferior oblique muscle and brought to nasal side of the inferior rectus. Other free end was passed superiorly under superior rectus and oblique to be brought to the nasal side of superior rectus insertion. Both the ends of the Devin band were then temporarily sutured to the sclera at their respective locations between the vertical and medial rectii. Macular plate was slowly manoeuvred posteriorly under the lateral rectus towards the posterior globe. The anterior end of the macular plate was temporarily secured to the sclera by a 5-0 Mersilene suture. A 23-gauge, three-port complete pars plana vitrectomy (PPV) was carried out. The posterior indentation of the macular plate was titrated and optimized by pulling the nasal side band ends. Conventional staining and ILM peeling were performed followed by fluid-gas exchange and silicone oil tamponade. Buckle securing sutures were finalized followed by complete conjunctival closure.

**Follow-up changes**

Clinical findings and SSOCT showed a closed macular hole with good apposition of the retina indented by the convex buckle contour as early as third postoperative day (Figure 4). Six-week follow-up had retinal attachment maintained with closed macular hole appreciated both on slit-lamp biomicroscopic examination and on SSOCT (Figure 5).

BCVA improved to 3/60, N36 at 7 weeks postoperatively and the myopic refractive error reduced to −10 DS from −20 DS due to the indentation at the staphyloma. The anatomical retinal attachment (Figure 6) and vision were maintained months post-silicone oil removal (at 19 months) with moderate cataract changes at the last follow-up 2 years post primary surgery.

Figure 2: Preoperative SSOCT of the right eye demonstrating schitic retina (thicker arrow denotes full thickness macular hole and thinner arrow denotes lamellar hole eccentric to fovea).

Figure 3: (a) Morin macular wedge. (b) Devin band threaded into the plate of the wedge.
Discussion

RD in pathological myopia typically develops at the posterior pole in cases of MTM. The underlying patho-mechanisms that interplay at the posterior pole are rigidity of ILM relative to the retina, stretching of the retinal layers and progression of staphyloma. The entire process leads to the development of schisis followed by lamellar or full thickness hole at the macula leading to posterior pole detachments. RD due to traction maculopathies can be surgically treated by conventional vitrectomy with ILM peeling in most cases, thereby taking care of both anteroposterior and tangential traction at the surface of the inner retina. Macular buckle procedure is effective in cases of maculopathy where there is a gross mismatch between the retinal layers and depth of the scleral out-pouch at the staphyloma. Macular buckle can be performed either as a primary procedure or combined with vitrectomy.

Figure 4: SSOCT right eye—third postoperative day. Note the closure of macular hole with retinal apposition due to the macular buckle effect.

Figure 5: SSOCT right eye—sixth postoperative week.

Figure 6: SSOCT right eye—19 months postoperatively. The closure of macular hole and retinal attachment is well maintained.
Various types of macular buckle are available, namely Ando plombe, T-shaped buckle, AJL macular buckle, L-shaped macular buckle, adjustable macular buckle and the traditional wire-strengthened sponge exoplant, each with their own merits and demerits. The success rates of retinal attachment after macular buckle with/without vitrectomy have been quite promising. Ando et al. reported permanent retinal reattachment in 93.3% of the eyes after the macular buckling procedure with no remarkable intraocular complications, compared with 50% attachment rate with PPV alone. Theodossiadis and Theodossiadis in their 15-year follow-up found the rate of reattachment to be 88% after macular buckle surgery. Ma et al. recently published the results of a randomized study with 24-month follow-up, comparing 23G PPV with ILM peeling to 23G PPV, ILM peeling with macular buckle under direct vision. The initial retinal reattachment rate was significantly higher in the second group (93.48%) compared with the first group (76.92%). Xiong et al. reported resolution of MS in all their patients following the combined procedure of macular buckling, vitrectomy and ILM peeling.

Thus, macular buckling with vitrectomy and ILM peeling seems to be more effective than PPV and ILM peeling alone in myopic retinal detachment with macular hole with posterior staphyloma and failed or recurrent cases of retinal detachment with/without macular hole.

References