

Double crescentic edge separation for the management of cap-lenticular adhesion in small incision lenticule extraction

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We describe a modified technique of lenticule extraction for the management of cap-lenticular adhesions (CLAs). In cases where the lenticule edge could not be delineated, a Sinskey hook was introduced through the cap side-cut with the hook facing up (toward the cap), advanced to the periphery of lenticule at 3'o clock (for right-handed surgeons) and used to nudge the underside of the cap in the region of lenticule side-cut. The diagnosis of CLA was confirmed on observing a crescentic gap between the lenticule-side cut and the rolled lenticule edge. The gap was enlarged to create a crescentic area of separation spanning 2–3 clock hours. A similar crescentic area of separation was created on the opposite side (9'o clock). A microforceps was used to segmentally separate the lenticule from both edges toward the midline followed by lenticule extraction. Our technique was successfully applied in 11 cases of CLA with no complications.

Key words: Cap-lenticular adhesion, refractive lenticule extraction, small incision lenticule extraction

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Small incision lenticule extraction (SMILE) is a viable surgical option for the refractive correction of myopia and myopic astigmatism. Its efficacy, safety, and predictability have been well-established in clinical trials.^[1,2] However, the surgical procedure is technically challenging, and difficulties are frequently encountered during lenticule dissection and extraction.^[3-5] CLA may be observed in cases with inadvertent lenticule mis-dissection which may result in suboptimal visual and anatomical outcomes.^[1,4] We herein describe our modified technique of lenticule extraction for the management of CLAs. Further, we also propose a stepwise algorithm for the management of the cases with difficulty in identifying the correct dissection plane.

Surgical Technique

We describe our technique of double crescentic edge separation in cases with cap-lenticular adhesion (CLA) [Video 1]. Ethical clearance was obtained from the institutional review board and the study adheres to the tenets of the declaration of Helsinki. Written informed consent was obtained from all patients.

Cases undergoing small incision lenticule extraction (SMILE) with intraoperative difficulty in identifying the second dissection plane were identified. First, an attempt was made

to delineate the lenticule edge by creating the meniscus sign as described previously, wherein the stromal bed was nudged at the site of the cap side-cut with the Sinskey hook facing down in order to separate the lenticule from the posterior stroma.^[6] The creation of a crescentic meniscus-shaped gap indicated that the anterior plane had been dissected first and the surgeon was unable to identify the posterior dissection plane. The dissector was then introduced beneath the crescentic gap to complete dissection of posterior lenticule plane and extract the lenticule.

In cases where the lenticule edge could not be delineated, a Sinskey hook was introduced through the cap side-cut with the hook facing up (toward the cap), advanced to the periphery of lenticule at 3'o clock (for right-handed surgeons), and used to nudge the underside of the cap in the region of lenticule side-cut [Fig. 1a]. This maneuver separates the lenticule from the overlying cap and pushes it away from the site of lenticule side-cut. The observation of a small crescentic gap between the lenticule-side cut and the rolled lenticule edge confirmed the diagnosis of CLA. The small gap was enlarged with gently nudging motions of the Sinskey hook to create a crescentic area of separation spanning 2–3 clock h. The procedure was repeated on the other side at 9'o clock to create a similar

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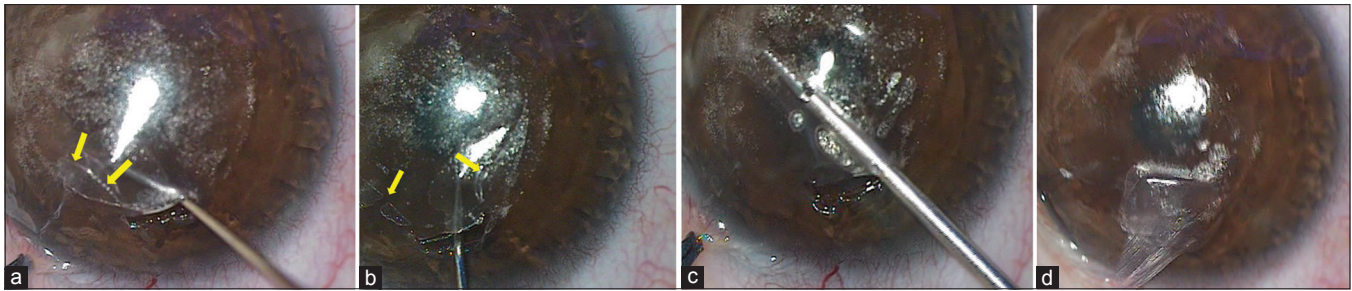


Figure 1: Double crescentic edge separation to manage cap-lenticular adhesion in a case of SMILE. (a) Sinskey hook used to nudge adherent lenticule from overlying cap and create a crescentic gap to confirm the diagnosis of cap-lenticular adhesion (yellow arrows: Crescentic gap between stuck lenticule and overlying cap). (b) The procedure repeated at 9'o clock to create a similar crescentic area of separation (Yellow arrows: Double crescentic edge separation). (c) Microforceps used to grasp the separated lenticule edge at 3'o clock and peel it from the overlying cap till the midline. (d) Lenticule edge grasped at 9'o clock and the remaining half of the lenticule separated and extracted

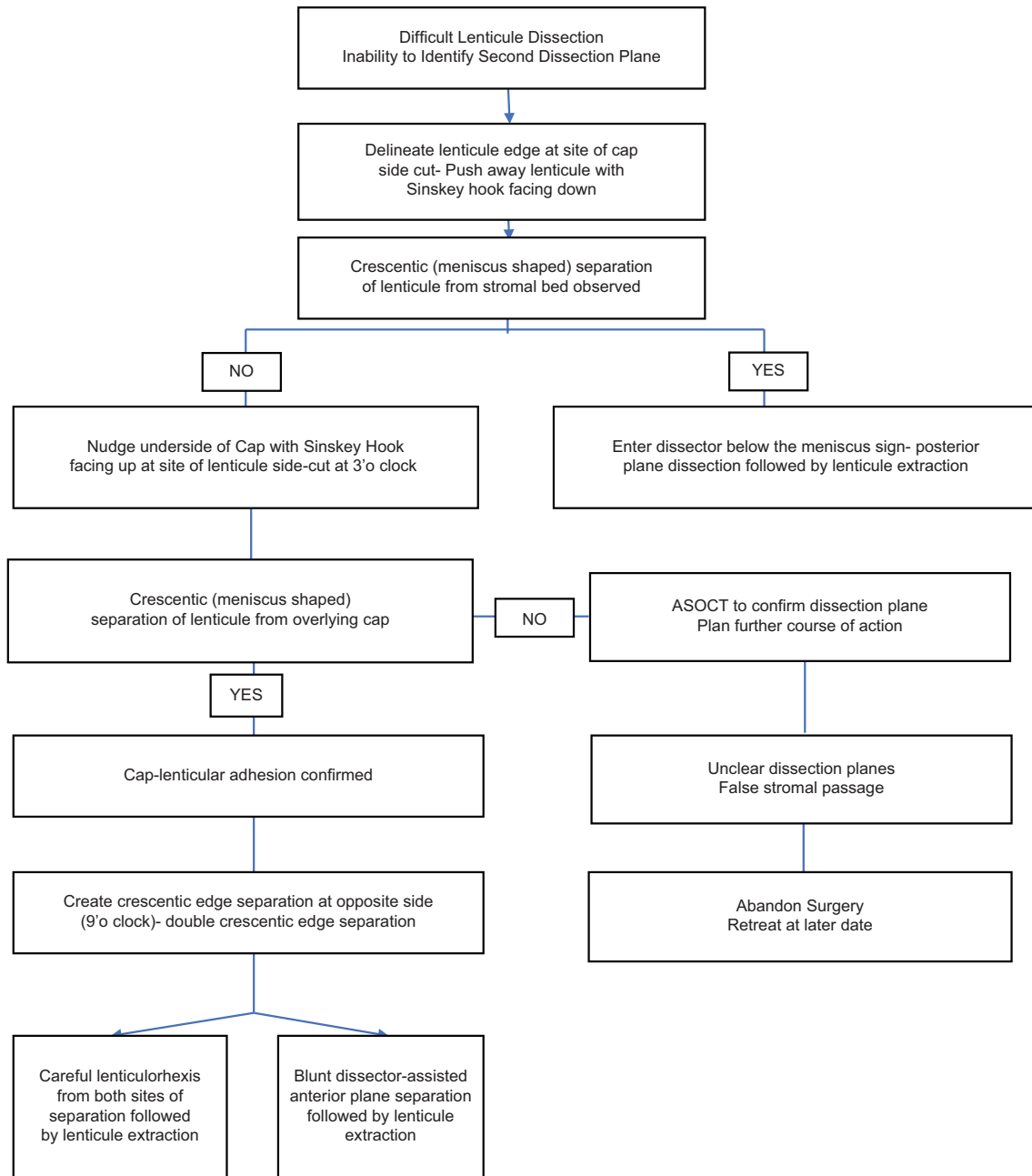


Figure 2: Stepwise Management Algorithm for Difficult Identification of Correct Dissection Plane in SMILE

crescentic area of separation [Fig. 1b]. A microforceps was used to grasp the separated lenticule edge at 3'o clock, and the lenticule was peeled off from the overlying cap in a gentle circumferential manner till the midline [Fig. 1c]. The lenticule edge was then grasped at 9'o clock and the remaining half of the lenticule was separated in a similar manner [Fig. 1d]. Alternatively, in cases where the crescentic edge separation reached till the site of the cap side-cut, a blunt dissector was introduced in the anterior plane through the separated edge followed by anterior plane dissection and lenticule separation. The completely separated lenticule was extracted via the cap side-cut. The extracted lenticule was carefully examined to rule out any torn or retained lenticule fragment.

Based on our experience, we propose a stepwise algorithm to manage cases wherein the surgeon is unable to identify the second dissection plane [Fig. 2].

Results

Our technique of double crescentic edge separation was successfully applied in 11 cases with CLAs. The refractive lenticule could be successfully extracted in all cases. No case developed side-cut tears, cap tears, epithelial defects or retained lenticule fragments. Mild cap edema was present in 8 cases, which resolved by the end of the first postoperative week. All cases regained an uncorrected visual acuity of 20/20 at 1 month of follow-up.

Discussion

Difficult lenticule dissection is one of the most dreaded complications observed in the initial learning curve of SMILE and may result in retained lenticule or its fragments, cap tears, side-cut tears, epithelial defects, irregular interface, and delayed visual recovery.^[3-5] The most common underlying pathophysiology is an inadvertent lenticule mis-dissection wherein the posterior lenticule plane is dissected first and the refractive lenticule becomes adherent to the overlying cap.^[3]

An anterior segment optical coherence tomography (ASOCT) and Sinsky-hook guided dissection has been previously described for the management of CLAs; however, peeling off the entire lenticule from one side can result in side-cut and cap tears and also carries the risk of peripheral lenticule tears.^[7]

The advantages of the double-edged crescentic separation technique are threefold—first, it helps in the on-table diagnosis of CLA without the need to rely on sophisticated imaging analysis systems such as ASOCT. Second, separating the adherent lenticule in a segmental fashion from two directions (3'o and 9'o clock) allows controlled separation of the lenticule and minimizes the risk of lenticule tears and retained fragments. This is especially relevant in cases where a smaller width of the cap side-cut is used in the range of 2–3 mm. Third, the arc of movement of the instruments used to separate the

lenticule is also less, as the lenticule is only separated till the midline in one go. This reduces the risk of side-cut extension and cap tears. Moreover, in cases where two side-cuts are employed, it is more convenient to separate the lenticule in two halves from the two different side-cuts.

The crescentic separation is created at the sides (3'o and 9'o clock) and not at the site of cap side-cut as forceful surgical manipulations in difficult cases may result in intraoperative edema at the site of cap side-cut. The localized edema may hinder visibility and result in an inadvertent creation of a false stromal passage.

The meniscus sign has been described to help prevent lenticule mis-dissection in cases of SMILE.^[6] The crescentic meniscus shaped gap can also be created in cases with the inability to identify second dissection plane, wherein it will help identify the lenticule edge, indicate the absence of CLA and help guide further dissection of the refractive lenticule.

Conclusion

To conclude, in cases with CLAs, separating the lenticule edge from the cap at both edges and peeling off the lenticule in a segmental fashion helps in the smooth extraction of the lenticule. Our stepwise algorithm helps in the diagnosis of CLA and guides the management of cases with difficult identification of the second dissection plane.

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Conflicts of interest

There are no conflicts of interest.

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