BrightMEM™ Anterior Keratoplasty

Pearls for Success

1) Case selection

The ideal patient for BrightMEM anterior keratoplasty has non-healing corneal defects (post-herpetic, post-surgical, atopic, etc.).

Patients with 25-75% limbal stem cell deficiency, with or without an epithelial defect are very appropriate.

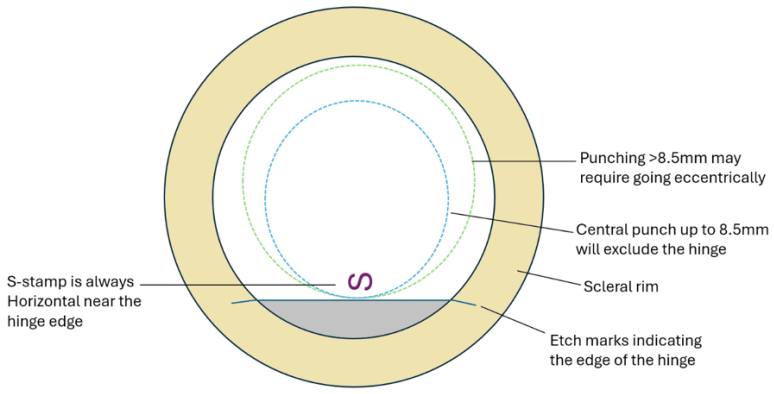
Avoid choosing severe ocular surface problems, particularly cases with active inflammation, stromal edema, uncontrolled IOP or insufficient fornix depth to allow bandage contact lens fitting.

2) BrightMEM Allograft prep

- Warm the tissue for an hour before trephination to prevent premature separation from stroma.
- **Using an operating microscope, check that the allograft is 100% flat and not partially folded.** If there is a small fold, first try a few drops of BSS to float the edge free or use a nontoothed (tying) forceps to unfold it.
- When removing the tissue from the chamber, grasp the tissue by the scleral rim on the hinge side, closest to where the S-stamp is. Gravity helps keep the graft flat as you lift it out of the Optisol while transferring to the Teflon block. Once on the Teflon block of the **vacuum trephine**, if the graft appears wrinkled or partially scrolled, add a few drops of Optisol to the well. Hold the graft by the scleral rim closest to where the S-stamp is and gently wick out fluid by dabbing the scleral rim inferiorly, allowing the graft to lay back down in place.

3) BrightMEM Allograft trephination

- Descemet's membrane has been peeled from stroma up to the shaded hinged area and the S-stamp is located close to the hinge as shown here:



- If you are trephining a larger graft (>8.5mm), you may sometimes need to punch slightly eccentrically to keep the S-stamp close to the edge, so that you don't punch into the area where hinge is. (if you punch into the hinge, the graft may not detach from the stromal button cleanly).

- Smaller grafts (7.5 or 8mm) may be preferable to ensure you do not trephine into the hinge area. In addition, because we are still learning whether the corneal nerves penetrate BrightMEM, leaving space in the peripheral cornea for the corneal nerves to penetrate the epithelium may be better.
- The tissue comes pre-stained with trypan. You may, for your first case, want to re-stain the tissue if the stain is light. Apply several drops of trypan blue to the well of the graft prior to trephination, and stain for 30 seconds, then rinse.

4) Preparing the patient's eye

- It is critical that the stromal surface is completely dry after the superficial keratectomy to remove scar/pannus. If there is significant vascularity or bleeding, you can use direct pressure or a pledget of phenylephrine 2.5% or 10% after the keratectomy, or preoperative phenylephrine drops. It is important to stop the bleeding before putting the graft down.
- Make sure that the area of debridement is larger than your trephined allograft size because you don't want the graft to overlap with any host epithelium. Undersizing by 1mm: diameter, (0.5mm at every edge).

5) Securing the BrightMEM Allograft

- After putting the trephined corneal button onto the bare stromal surface, wicking fluid out of the interface, and allowing it to dry for 1-2 minutes, you can often gently nudge the stromal button to the side to test if it separates from the BrightMEM. If the BrightMEM is dried down well, the stromal button will often slide over without disturbing the allograft If the allograft is still attached to the button, then they will both move. In that case, reposition the button, dry more, and try the nudge again.
- When you are relatively confident that the stromal button will separate from the allograft you can peel the button off. It helps to have a second instrument, such as tying forceps or a Paton spatula, to keep the allograft down if it looks like it wants to stay attached to the stromal button.
- **There will almost always be some wrinkles.** Make sure to smooth them all out. First try a few drops of BSS, then advance to "squeegee" the allograft using gentle sweeps with a 27 or 30G cannula on the BSS. You may need to intermittently dab at the periphery of the allograft to wick out interface fluid if the graft shifts while trying to "squeegee." Over-folds can be easily straightened using a cannula or tying forceps. Under-folds can be straightened by dragging the allograft away from the fold using tying forceps. If there are larger under-folded areas, refloating the graft with a gently injection of BSS while sweeping a cannula under the graft, can be effective. Alternatively, more aggressive sweeping with or spreading the tongs of a blunt tying forceps can be used to straighten larger folds.
- Once the allograft is well centered within the area of debridement, meticulously wick fluid from the edge to get out interface fluid for 2-3 minutes. Then, once again, squeegee out any residual fluid with gently sweeps of a 30g cannula. This is a very important step. You know the graft is adhering well, without interface fluid, if you can do a pretty aggressive sweep (similar to how you might sweep to shift a DSAEK graft) without the membrane moving at all. Once adherent, it should be hard to catch and lift an edge when you sweep from outside in.
- The reason to use Tisseel / fibrin glue is to ensure the BrightMEM allograft edges adhere well to stroma and to prevent epithelium growing under (rather than on top of) the allograft. Use as little glue as possible to cover the edges of the graft. Two drops of thick is enough. Some surgeons prefer to transfer both the thick and thin components of Tisseel / fibrin glue into separate 3cc syringes with 27g cannulas, while some replace the (large) Tisseel / fibrin cannulas with 25 / 27 / 30G cannulas. First apply two small "dew drops" to the superior and inferior edges of the graft, then use the cannula to break the surface tension and spread the thick component 360 degrees around the graft edge. After that, apply just one drop of thin (again priming a dew drop on the tip of the cannula in order to apply it) and allow it to polymerize for 45 seconds.
- Make sure the bandage contact lens fits well. A flat base curve is recommended (e.g. Night & Day BC 8.8). This is important to ensure the graft does not dislodge in the early post-op period. If there are large air bubbles under the contact lens, try to milk out as much of the air as possible using

the two 30g or 27g cannulas (you can use the ones from the Tisseal glue. Don't worry, the graft shouldn't move if you've dried it well. You can be aggressive with sweeping out air bubbles.

6) Post-operative management

- Strongly advise your patients to avoid eye rubbing. Use an eye-shield at night for the first post-op week. This is to prevent dislodging the graft.
- If your patient had severe or near total limbal stem cell deficiency, it can take some time for the cornea to re-epithelialize, partly because epithelial cells still have to migrate across that 0.5mm margin (or larger according to your debridement) of bare stroma before it can grow onto the BrightMEM.
- Leave the bandage contact lens in place for 1 month before disturbing it in patients with severe or near total LSCD. It can be removed earlier in patients with mild to moderate LSCD (<50% of limbus involved) but should stay at least two weeks.
- Use antibiotics QID for at least one week and hypertonic saline 5% QID until the bandage contact lens comes off and the membrane is noted to be epithelialized. Corticosteroids should be used as appropriate for each patient (some need higher dosing) but you can use a standard QID, TID, BID, daily pred taper over several weeks.
- Note that the S-stamp is usually visible, even months out and will fade slowly.

7) Managing complications

- Epithelial ingrowth under the membrane can occur if the graft overlaps with any host epithelium, or the membrane gets partially dislodged. In those cases, the membrane will usually dislodge over time. There is no rush, as the membrane will likely still stay on the eye and remain clear for weeks to months (with a bandage lens – it will behave like a clear Ambiodisk), but the membrane will need to be replaced eventually. You can remove it at the slit lamp, or let it fall off on its own.