The  $\frac{R \times [-1,1]}{Z}$  geometry realizing the 4d lift of  $B_c$  has an orbifold singularity. It can be smoothed out to the shape on the right-hand side of the picture, with the orbifold singularity mapped to an interior point. We pick the initial corner so that no co-dimension 2 defect is present at the interior point.