In article number 2007667, Hyunwoo Yuk, Xuanhe Zhao, and co-workers report a multifunctional patch for sealing tissues in minimally invasive surgery. Integration of a dynamic fluid layer, a microtextured bioadhesive, and a zwitterionic-interpenetrated elastomer enables the patch to be applied amid body fluids, form robust adhesion, and resist fouling. Amenable to origami-based designs, the patch can be deployed using a variety of minimally invasive surgical tools.