Supplementary Information

Prevention of esophageal stenosis via in situ cross-linkable Alginate/Gelatin powder in a new submucosal exfoliation model in rats

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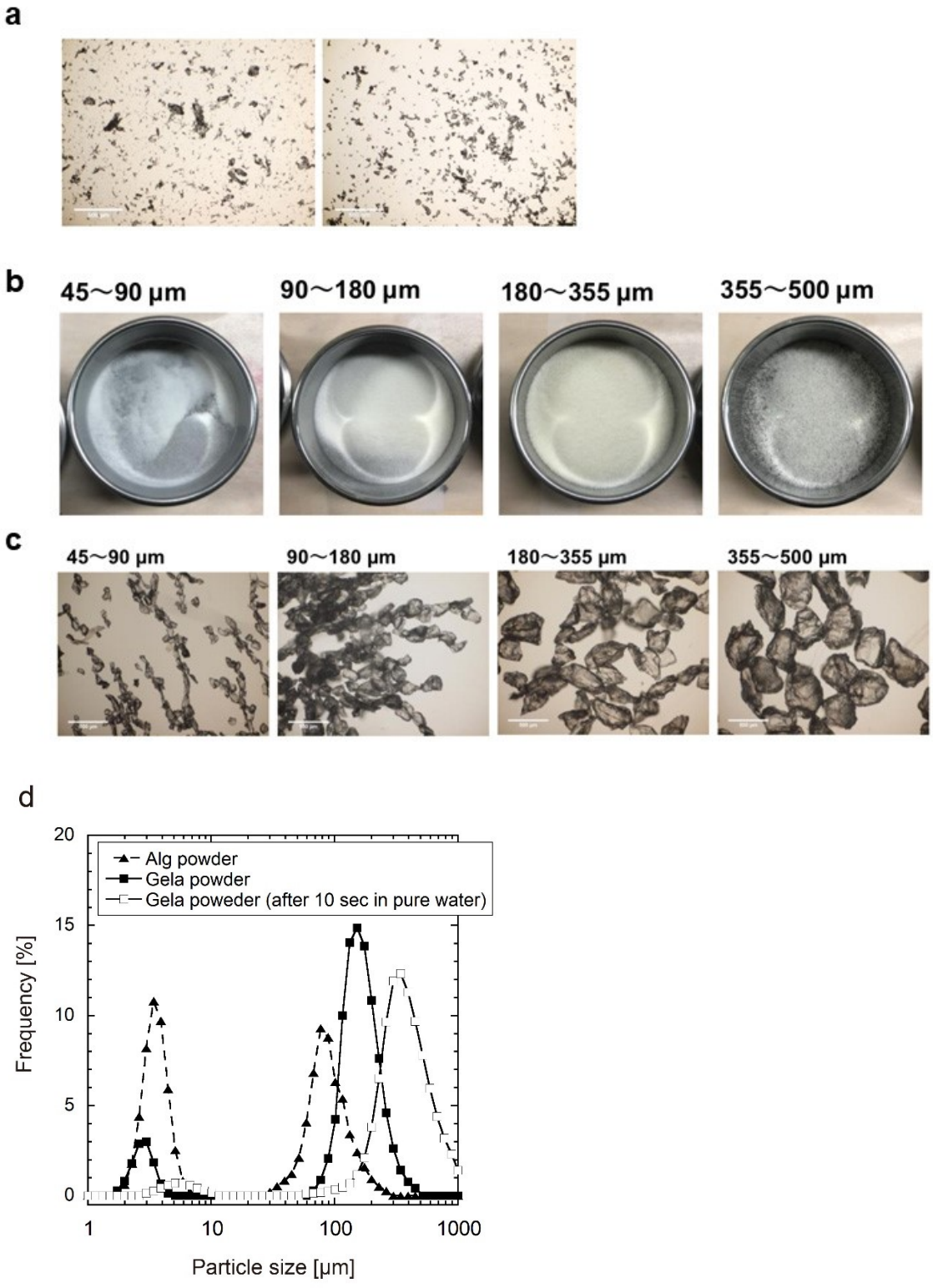

Fig. S1. Characterization of powder materials. (a)Surface structure image Alg powder (I-3G alginate) obtained using an optical microscope. The scale bars are 500 μm long. (b)Size control of Gela powder using different sieves. (c)Surface structure image of Gela powder obtained using

optical microscope. The scale bars are 500 μm long. (d)Size distribution of Alg powder, Gela powder, and Gela powder after 10 sec in pure water. Alg powder swelled so rapidly that its size change could not be measured.

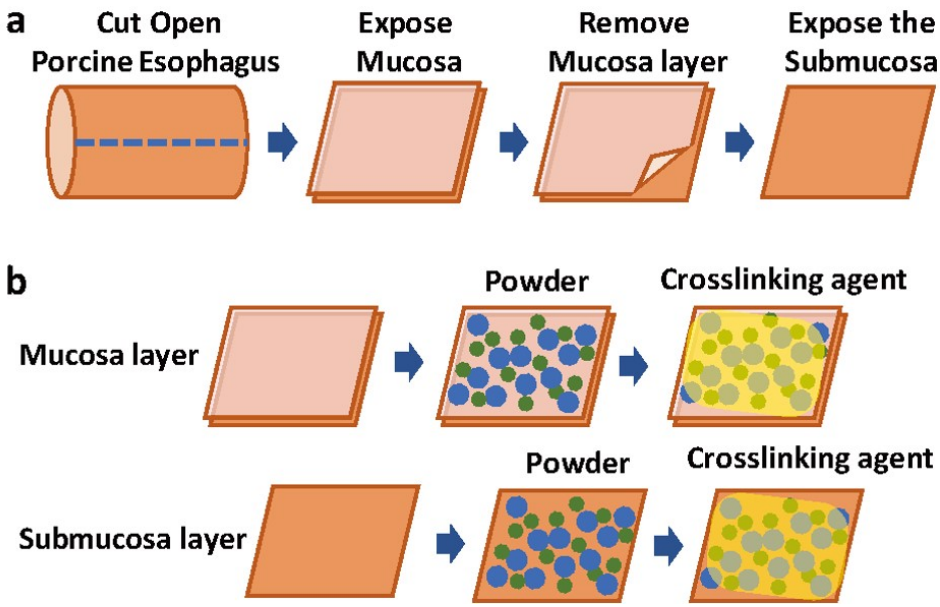

Fig. S2. Procedure diagram of ex vivo adhesion test used in this study. (a)Prepare the porcine esophagus of mucosa layer and submucosa layer. (b)Powder was applied on the mucosa layer or sub mucosa layer, liquid crosslinking agent was applied on the top of it.

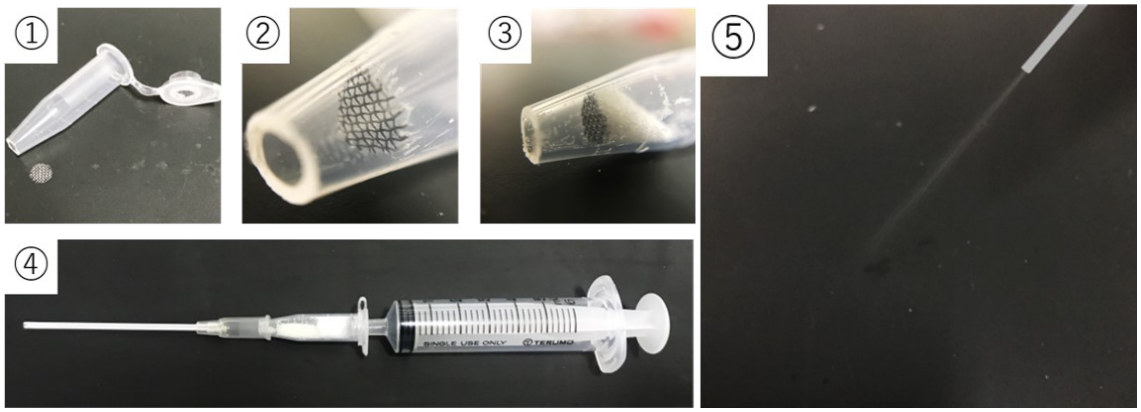

Fig. S3. Applicator used for powder materials in animal experiments. The picture of filled syringe shown in (4) is same picture of Fig. 1 (c).

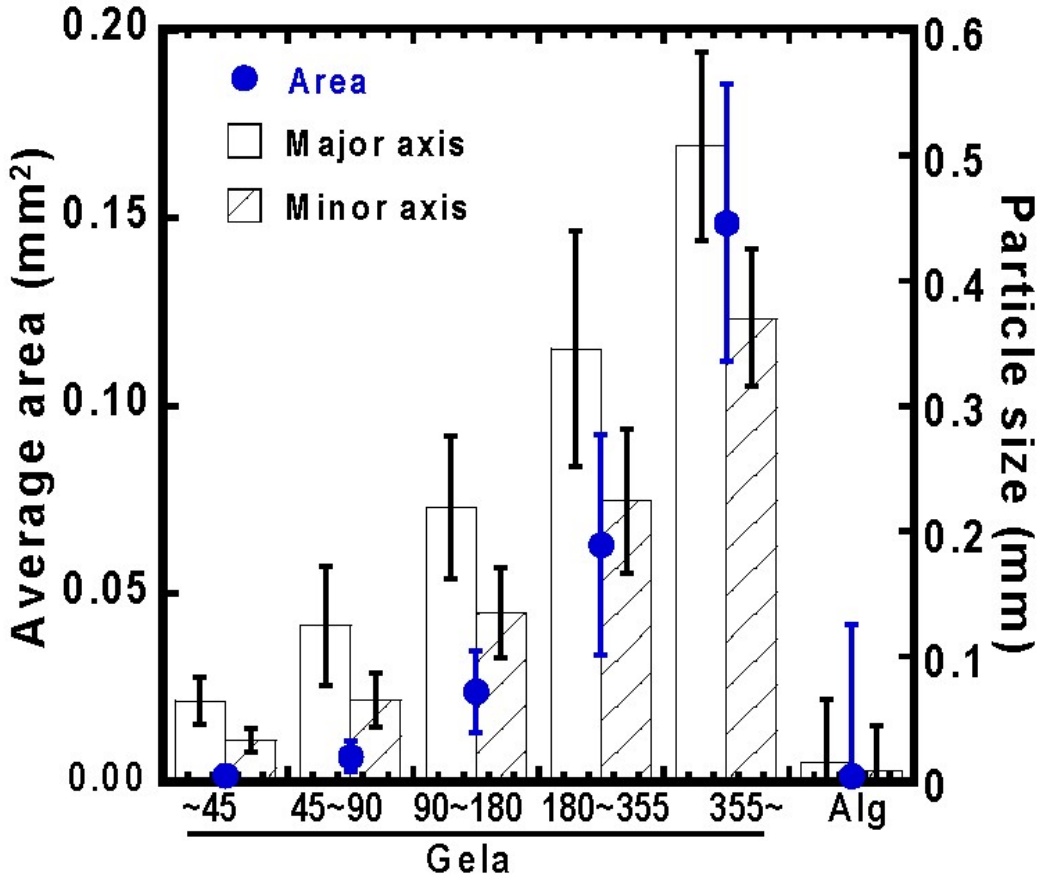

Fig. S4. Comparison of Alg and Gela powders. (a)Size comparison between Alg and sieved Gela powders.

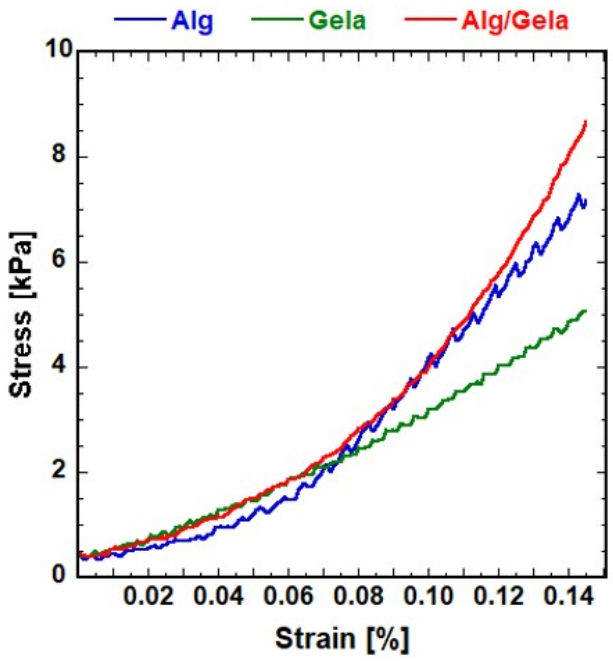

Fig. S5. Strain stress curves of Alg, Gela, and Alg/Gela measured by compression tests.

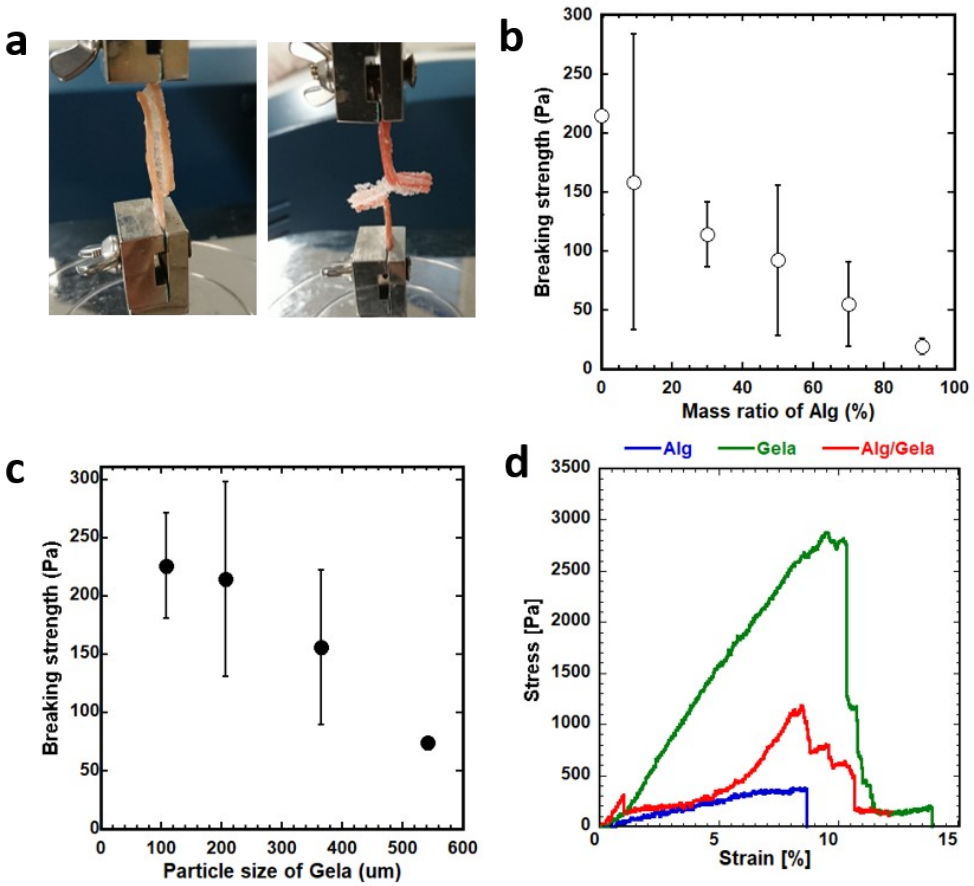

Fig. S6. Adhesive strength measurement (a) Measurement of adhesive strength by tensile test (b)force curve of tensile test (c) Breaking strength of Gela with different size (d) Breaking strength of Alg/Gela with different mass ratio

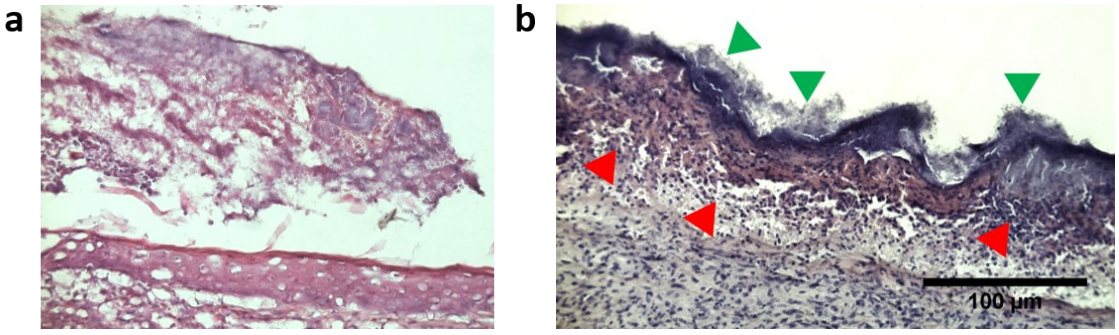

Fig. S7. HE staining result with magnified details. (a) Neutrophils(red) and Microbials infection (green) were seen on the non-epithelialized wound surface (b) Regenerated epithelium sneak beneath the materials in Alg/Gela group