Appendix 1

Data-acquisition setup

Pressure data is retrieved from the mechanical ventilator (SERVO-I, Maquet Critical Care) through a RS232 link connected to a laptop using the ServoTracker software (version 4.1, Maquet Critical Care). The analog output of this software (-5 to +5V, sample rate 200/s) was then routed through two input-output devices (NI USB-6229 and NI USB-6210), which was then recorded into the analog input recorder application in Simulink (Matlab version R2020a) and oversampled at 1,000/s. Before this signal was saved, it was gained (g =40) and put through a discrete filter (f =50 Hz bandstop) to attain a clean signal in cmH_2O.

Conformability measurements

Surface area expansion calculation

For the surface area expansion (SAE) measurements, marked area (baseline) or sealant covered area (after sealing) of screenshots taken at airway pressures of 5 and 40 cmH_2O were calculated using ImageJ (version 1.53a, Wayne Rasband). The ruler was used to determine the scale in the program. In the case of extensive debonding (mainly in Hemopatch® group), the SAE of the remaining adhesive portion was measured, while tears within sealants (Progel®/Coseal®) were included in the SAE measurements. SAE was calculated as (surface area at 40 cmH_2O)/(surface area at 5 cmH_2O) and the area expansion change (EAC was calculated as (sealed SAE)/(baseline SAE). An EAC of 100% indicates perfect conformability of the sealant to the lung, while <100% indicates a reduced expansion after sealing compared to baseline.

Surface area expansion examples

Examples of how a SAE and consequent EAC measurement was performed. First, at ventilatory pressure settings of PEEP =5 cmH_2O and Pc =35 cmH_2O, screenshots were taken at 5 cmH_2O and 40 cmH_2O (*Figure S1A,S1B*). Then, using ImageJ (version 1.53a, Wayne Rasband), the scale was determined using the ruler and the baseline areas and subsequently sealed areas were calculated. As can be seen in *Figure S1*, these measurements may be influenced by: tears in the sealant, as was mainly seen in the Progel® and Coseal® gels (*Figure S1C,S1D*) and debonding of the sealant, as seen in Hemopatch® (*Figure S1F*). In the case of debonding, only the adhesive area was measured. In the case of tears, the entire area was still measured. Also, the lung was positioned manually above the camera and the exact angle between camera and measured surface was not measured, so some unknown factor of optical distortion may be of influence on these measurements.
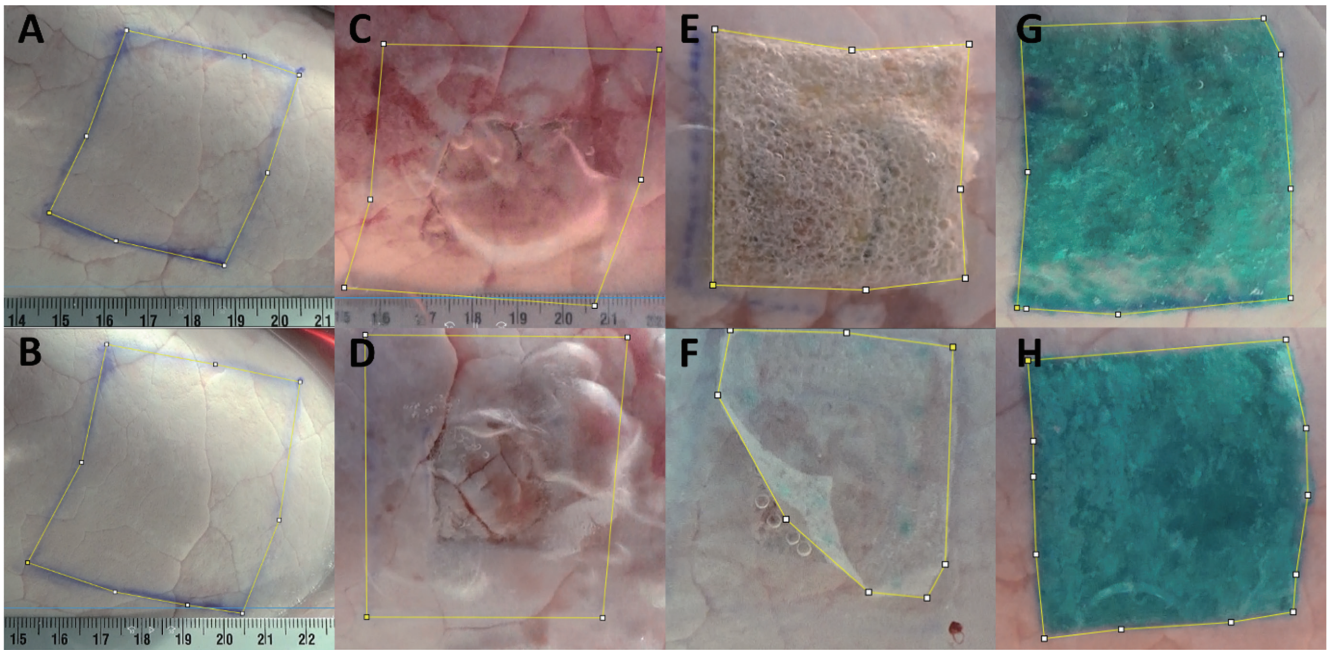
Figure S1 Surface area expansion measurement examples. (A) Baseline surface area measurement at 5 cmH$_2$O; (B) Baseline surface area measurement at 40 cmH$_2$O; (C) Coseal® example with tears; (D) Progel® example with tears; (E) TachoSil® example; (F) Hemopatch® example with debonding; (G) GATT-Patch Single example; (H) GATT-Patch Double example.

Table S1 second experiment baseline characteristics and outcomes

Characteristics	GATT-Patch Single	Hemopatch®	P value
Baseline characteristics			
Sample characteristics			
Ischemic time (minutes)[†]	173±104	180±130	0.90
Left lower lobe (n, %)	8 (80%)	7 (70%)	>0.99
Physical characteristics			
Surface temperature (℃)[†]	31.9±1.7	32.1±1.2	0.70
Water temperature (℃)[‡]	37.3±0.1	37.3±0.2	>0.99
Baseline SAE (%)[‡]	154±23	157±7	0.53
Lung compliance (mL/cmH$_2$O)[†]	25±4	24±6	0.47
Leakage characteristics			
Baseline leaking pressures			
Grade I (cmH$_2$O)[‡]	15±10	20±3	0.08
Grade II (cmH$_2$O)[‡]	20±8	25±11	0.11
Grade III (cmH$_2$O)[b]	23±11	30±11	0.32
AL			
Amount (L/min)[†]	1.5±0.8	0.8±0.5	0.03*
Percent of TVi (%)[†]	12.4±5.1	7.1±3.9	0.02*
Experiment outcomes			
Sealed leaking pressures			
Grade I (cmH$_2$O)[‡]	45±10	40±6	0.04*
Grade II (cmH$_2$O)[‡]	45±10	40±6	0.04*
Grade III (cmH$_2$O)[‡]	50±11	40±6	0.002*
AL reduction (%)[‡]	100±11	68±40	0.04*
Cohesive failure (n, %)	10 (100%)	0 (0%)	<0.001*
Adhesive failure (n, %)	0 (0%)	10 (100%)	<0.001*

*, P value indicate statistical significance (P<0.05). [†], mean ± standard deviation (SD); [‡], median ± interquartile range (IQR). SAE, surface area expansion; AL, air leak; TVi, inspiratory tidal volume.