OPEN

PRS GLOBAL OPEN

VIEWPOINT

Vacuum-assisted Hydration before the Back-and-forth: A Novel Accelerating Method for Reconstituting Injectable Poly-D,L-lactic Acid

Se-Yi Chen, MD[*†]; Jui-Yu Lin, MD[‡]; Chuan-Yuan Lin, MD[‡§]

Injectable poly-D,L-lactic acid (PDLLA) is a relatively new subdermal collagen-stimulating filler (AestheFill; REGEN Biotech, Seoul, South Korea) containing PDLLA microspheres and carboxymethyl cellulose. Injectable PDLLA treatment is used to correct deep and shallow facial wrinkles. It is supplied as lumps of lyophilized powder in vials. Reconstituting injectable PDLLA with sterile water for injection (SWFI) to form a homogeneous suspension before injection is crucial to reduce the likelihood of complications.[1–3]

We had previously proposed a simple, effortless, and efficient "back-and-forth" method for reconstituting injectable PDLLA.[1,2] A P-syringe containing PDLLA lumps and an S-syringe containing SWFI were tightly connected to a 3-way stopcock. After pushing the SWFI into the P-syringe and letting the PDLLA lumps soak for several minutes, these 2 syringes were pushed back-and-forth gradually until all PDLLA lumps dissolved entirely into a homogeneous suspension. Before injection, we used another syringe to retrieve an appropriate amount of lidocaine by connecting it to the 3-way stopcock and injecting the lidocaine into the suspension. Next, pushing back-and-forth was repeated again for 10–20 seconds to mix the suspension and lidocaine, and it was ready to use. Irrespective of the volume of SWFI and the number of vials of injectable PDLLA used, the total reconstitution time should be approximately 5–10 minutes using the back-and-forth method.

Since the soaking time of the PDLLA lumps is a determinant of this method, we propose a vacuum-assisted hydration (VAH) method before the back-and-forth pushing to accelerate this procedure in the present study. This method is based on Boyle's law,[4,5] which describes the inverse proportional relationship between pressure and volume at a constant temperature with a fixed amount of gas (Fig. 1). By changing the pressure inside the syringe, we can control volume of the air inside the PDLLA lumps and let the SWFI percolate through the PDLLA lumps quickly. This method is described as follows: After pushing the SWFI into the P-syringe, we expel out the air contained in the P-syringe as much as we can (Fig. 2A). Then, we pull the plunger of the P-syringe to build a negative pressure inside it. According to Boyle's law, the air contained in the PDLLA lumps would expand and burst out to form air bubbles. These air bubbles would then float to the upper part of the syringe (Fig. 2B). When the plunger is released, the volume of the residual air contained in these lumps would shrink, causing the SWFI to be sucked into the lumps quickly (Fig. 2C). By repeating these steps 2–3 times, the SWFI percolates through the PDLLA lumps thoroughly, which enables us to push these 2 syringes back-and-forth much more quickly. The total reconstitution time using the VAH method followed by the back-and-forth method is

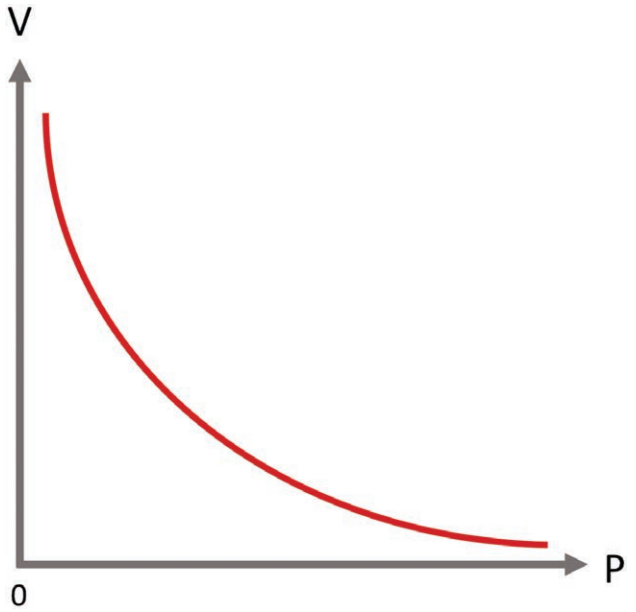

Fig. 1. Boyle's law: graph of the pressure (P) vs. volume (V) curve for a fixed amount of gas kept at a constant temperature.

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.

From the [*]Department of Neurosurgery, Chung-Shan Medical University Hospital, Taichung, Taiwan, ROC; [†]School of Medicine, Chung-Shan Medical University, Taichung, Taiwan; [‡]Li-An Medical Clinic, Taipei, Taiwan, ROC; and [§]Kaohsiung Jourdenwell Aesthetic Clinic, Kaohsiung, Taiwan, ROC.

Received for publication March 2, 2021; accepted March 16, 2021.

Plast Reconstr Surg Glob Open 2021;9:e3563; doi: 10.1097/GOX.0000000000003563; Published online 13 May 2021.)

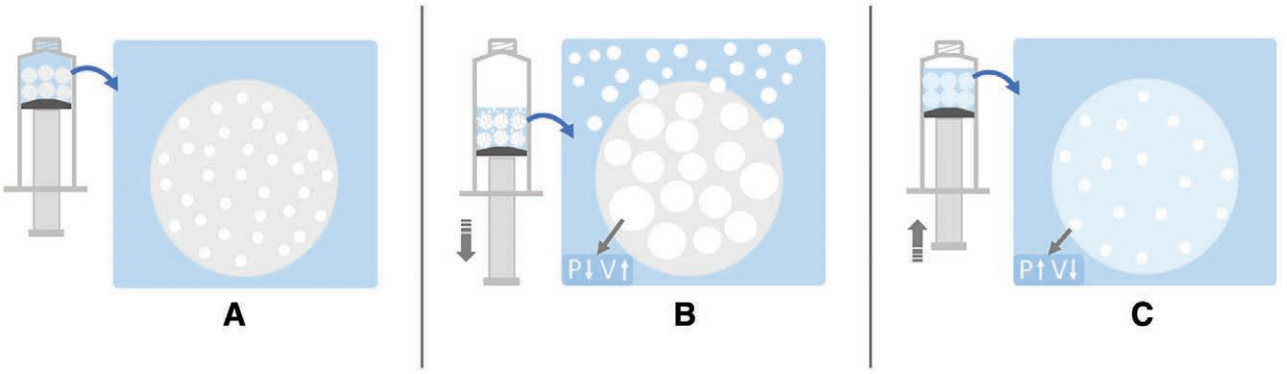

Fig. 2. The vacuum-assisted hydration method. A, Use the SWFI to soak PDLLA dry lumps and then expel the air out of the syringe. B, By pulling the plunger to create a negative pressure inside the syringe, air contained in PDLLA lumps will expand and burst out, then float to surface level of the syringe. C, By releasing the plunger to restore atmosphere pressure inside the syringe, the residual air contained in PDLLA lumps will shrink and the SWFI will be sucked into these dry lumps rapidly.

usually <1 minute. (**See Video [online],** which displays the employment of the VAH method with subsequent back-and-forth method for reconstitution of injectable PDLLA.)

Chuan-Yuan Lin, MD
Kaohsiung Jourdenwell Aesthetic Clinic No. 206-1
Ziyou 2nd Rd, Zuoying Dist.
Kaohsiung City 813019
Taiwan, ROC
E-mail: linchuanyuan@doctortou.com

DISCLOSURE

Dr. Jui-Yu Lin and Dr. Chuan-Yuan Lin are medical directors of REGEN Biotech. Dr. Se-Yi Chen has no financial interest to declare in relation to the content of this article. No funding was received for this article.

ACKNOWLEDGMENTS

The authors want to give special thanks to Sasa Chen for her kind assistance with manuscript editing, and to Chih-Chun Ke for her kind assistance with video clip editing.

REFERENCES

1. Chen SY, Chen ST, Lin JY, et al. Reconstitution of injectable poly-D,L-lactic acid: efficacy of different diluents and a new accelerating method. *Plast Reconstr Surg Glob Open*. 2020;8:e2829.
2. Chen SY, Lin JY, Lin CY. The back-and-forth method: a quick and simple technique for reconstitution of injectable poly-D,L-lactic acid. *Arch Aesthetic Plast Surg*. 2020;26:79–83.
3. Chen SY, Lin JY, Lin CY. Compositions of injectable poly-D,L-lactic acid and injectable poly-l-lactic acid. *Clin Exp Dermatol*. 2020;45:347–348.
4. West JB. Robert Boyle's landmark book of 1660 with the first experiments on rarified air. *J Appl Physiol (1985)*. 2005;98:31–39.
5. West JB. The original presentation of Boyle's law. *J Appl Physiol (1985)*. 1999;87:1543–1545.