The first lower-jaw reconstruction with a fibular flap, using osteotomies to mimic the shape of the mandible, was described in 1989 by Hidalgo. Since then the fibular free flap (FFF) has become the workhorse of mandibular reconstruction. Although the skin island of the osteocutaneous FFF may be adequate for the coverage of both the inner lining and outer face in oromandibular defects, it is often inadequate for replacement of soft tissue volume in composite defects. Several solutions have been proposed to overcome these problems, including simultaneous double free-flap. More recently, thanks to further advances in knowledge of vascular anatomy and improvement of technique, free tissue transfers based on chimeric principles have been used in head and neck reconstructions.

In 2003 Domingo Sicilia-Gastro et al. first reported the combined use of a fibula osteomyocutaneous free flap with a fasciocutaneous lateral supramalleolar paddle as a chimeric flap. This type of flap provides an adequate bone stock together with a cutaneous fibular paddle and a second truly independent supramalleolar skin paddle, all with a single set of microanastomosis. Later, Massarelli et al. gave strong evidence in the literature of its feasibility and successful reliability in 3D-reconstruction of composite head and neck defects and gave it the current denomination of chimeric lateral supramalleolar artery perforator fibula free flap (chimeric LSMAP FFF).

However, the already well-known main disadvantage of the fibular graft is its small circumference, which makes

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.
A fibular skin paddle of 11 × 4 cm and an LSMA flap were designed using the proper perforator skin paddle relative to the bone shaft. The primary skin paddle should be designed over the distal septocutaneous perforators, always centered on the segment that will reconstruct the basal mandible or closest to the one that will be removed, so that once this has been removed, the skin paddle can have the best rotational pivot and can fall inward of the oral cavity without jeopardizing its vascularity (Fig. 1).

A fibular skin paddle of 11 × 4 cm and an LSMA flap of 8 × 4 cm were drawn, both centered on the identified perforating branches, and tailored to properly fill the defect. The fibular skin paddle was planned for the intraoral soft tissue defect reconstruction and LSMA for the oropharyngeal one. The flap was harvested using the usual technique (Fig. 2).

The double-barrel shaping shown in Supplemental Digital Content 1 demonstrates a step-by-step surgical modeling for a proper insetting technique. (See figure, Supplemental Digital Content 1, which shows a double-barrel bone modeling and a proper insetting of soft tissue portions of flap. Upper-left: Paper template of the chimeric LSMA FFF in anatomic position in the right leg in which linear and wedge ostectomies (for mandibular resection and fibular segmentation) have been already planned; Upper-right: The flap tilted clockwise at 180 degrees with respect to its original position; Center-left: The B and D-segments were discarded to allow proper apposition and rotation of the other fragments; Center-right: A and C-segments juxtaposed; Lower-left: The distal segment (segment E) is freed to rotate upwards and be positioned above the segment C in double-barrel way;
A 17-cm-long bone was raised (SDC 1, upper-left). Six osteotomies, four of which were linear and two of which were wedge, were performed after rotating the transplant clockwise by 180 degrees (upper-right). Five segments (S) were achieved as follows: SA, 3 cm; SB, 2 cm (measured at level of the inferior border) triangular shaped; SC, 5.5 cm; SD, 2 cm; SE, 4.5 cm (center-left). The most proximal (related to the peroneal pedicle) SA was placed to reconstruct the lower part of left mandibular ascending ramus. The SB was removed subperiosteally and discarded to help a proper mandibular angle shape. The SC was placed along the lower border of the mandible and together with the first forms the mandibular angle of 240 degrees (center-right). The SD was removed subperiosteally and discarded to prevent stretching or compressing the vascular bundle, leaving the periosteum intact between the SC and E, allowing a safe rotation of the latter (lower-left). Finally the SE was rotated upward and placed over the lower border of the mandible parallel to SC to reconstruct the upper part of alveolar ridge of the mandible body, which served as the osteointegrated teeth carrier (lower-right). The bone fragments were fixed, and a good neomandible shaping was reestablished (Fig. 3). The end-to-end microanastomosis was performed in the left recipient vessels (Fig. 4).

CONCLUSIONS
This report illustrates how the chimeric LSMAP FFF is safely modeled into a double-barrel shape, providing a reliable bone hardware for further dental rehabilitation, together with a sufficient amount of soft tissues to achieve one-stage composite lateral head and neck reconstructions. This technique can be a useful tool for surgical armamentarium for head and neck surgeons.

Olindo Massarelli, MD, PhD, FEBOMFS
Maxillofacial Surgery Operative Unit
University Hospital of Sassari
Viale San Pietro 43/B
07100 Sassari, Italy
E-mail: molindo74@gmail.com

ACKNOWLEDGMENTS
The author thanks Meloni Silvio Mario, DDS, Assistant Professor School of Dentistry, University of Sassari, Viale San Pietro 43/B, Sassari 07100, Italy and Private Practice, 07021 Arzachena, Italy, for having rehabilitated the patient on a fixed implant-supported prosthesis. Due to its retrospective nature, this study did not require ethical committee approval. Written informed consent for publication of clinical details and/or clinical images was obtained from the patient.

REFERENCES
1. Hidalgo DA. Fibula free flap: a new method of mandible reconstruction. Plast Reconstr Surg. 1989;84:71–79.
2. Wei FC, Demirkan F, Chen HC, et al. Double free flaps in reconstruction of extensive composite mandibular defects in head and neck cancer. Plast Reconstr Surg. 1999;103:39–47.
3. Hallock GG. Simultaneous transposition of anterior thigh muscle and fascia flaps: an introduction to the chimera flap principle. Ann Plast Surg. 1991;27:126–131.
4. Liu WC, Yang KC. One-stage through-and-through cheek, lips, and oral commissure reconstruction using a double-paddle peroneal chimeric flap: an innovative method. Head Neck. 2015;37:662–669.
5. Sicilia-Castro D, Garcia-Perla A, Infante-Cossio P, et al. Combined fibula osteoseptocutaneous-lateral supramalleolar flap for reconstruction of composite mandibular defects. Plast Reconstr Surg. 2003;111:2003–2008.
6. Massarelli O, Gobbi R, Biglio A, et al. Chimeric lateral supramalleolar artery perforator fibula free flap in the reconstruction of composite head and neck defects. Plast Reconstr Surg. 2014;133:130–136.
7. Horiuichi K, Hattori A, Inada I, et al. Mandibular reconstruction using the double barrel fibular graft. Microsurgery. 1995;16:450–454.
8. Urken ML, Futran N. Fibular Osteocutaneous flap inset techniques. In: Urken ML, Cheney ML, Blackwell KE, Harris JR, Hadlock TA, Futran N, eds. Atlas of Regional and Free Flaps For Head and Neck Reconstruction. 2nd ed. Philadelphia, Pa.: Lippincott Williams & Wilkins; 2012:419–420.
9. Yu P, Chang EI, Hanasono MM. Design of a reliable skin paddle for the fibula osteocutaneous flap: perforator anatomy revisited. Plast Reconstr Surg. 2011;128:440–446.
10. Nobis CP, Kesting MR, Wolff KD, et al. Development of a template tool for facilitating fibula osteotomy in reconstruction of mandibular defects by digital analysis of the human mandible. Clin Oral Investig. 2020;24:3077–3083.