5 Prefabrication and Prelamination

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INTRODUCTION

Flap prefabrication and prelamination are distinct techniques designed to address complex reconstructive needs. While these techniques are generally not primary reconstructive options, their usage has increased in response to demands for more sophisticated reconstructive efforts. In reconstructive surgery, a delicate balance exists between the availability of matching donor tissue and the complexity of the recipient defect. Prefabrication and prelamination techniques have been applied to areas where a special surface, contour, or structure is desired and reconstructive goals cannot be met by conventional means. Areas of the body where prefabrication (Fig. 5.1) and prelamination have played a role in reconstruction include facial subunits, facial cartilage, facial skeleton, oropharynx/esophagus, and the penis (Tables 5.1–5.5).[1–26] This chapter focuses on problems of the head and neck region, where aesthetic, structural, and functional needs are complex and demanding, with scarce reconstructive options.

They terms flap "prefabrication" and "prelamination" are two distinctive entities in reconstructive surgery. Flap *prefabrication*, first introduced by Shen in 1982,[27] describes a two-stage process: the introduction of a vascular pedicle into a body of tissue that bears desired characteristics of the area to be reconstructed, followed by a transfer of this neovascularized tissue into the defect based on its implanted vascular pedicle. Flap *prelamination*, a term coined by Pribaz and Fine in 1994,[28] also refers to a two-stage process, whereby one or more tissues are engrafted into a reliable vascular bed to create a composite flap. This flap is subsequently transferred on its original vascular supply, *en bloc*, for reconstruction. A clear understanding of these two techniques is helpful in choosing the appropriate method to deal with a specific clinical problem and also for scientific communication.

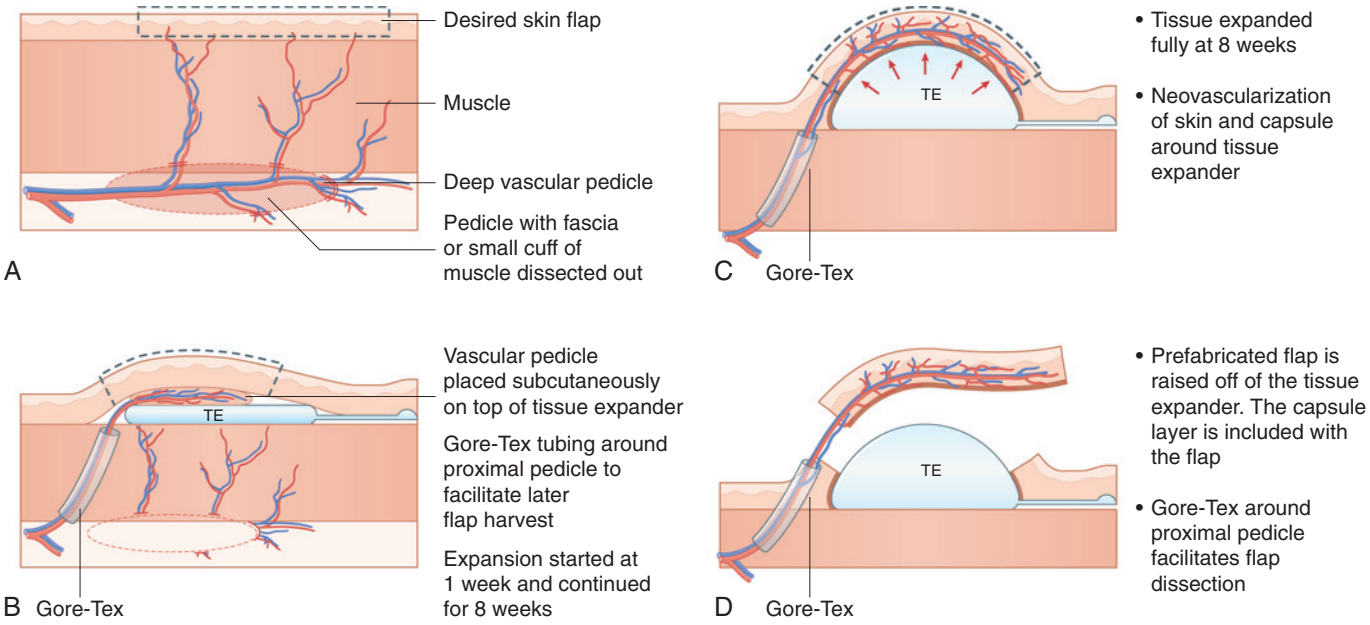

Figure 5.1 Flap prefabrication technique.

Table 5.1 Clinical applications of prefabrication and prelamination: Facial soft tissue subunits

Defect	Technique	Flap location	Technique description	References
Lips				
(a) Superficial (hair-bearing) lip loss (b) Full-thickness upper lip loss (c) Upper and lower lip (mouth) loss	Direct axial flap Prefabrication Prelamination Prelamination	Scalp/submental scalp Submental forearm	Staged transfer of hair-bearing flap from scalp/submental Vascular pedicle implant + secondary transfer Tissue expander + skin graft on underside of submental platysma flap Subfascial skin grafts in radial forearm flap	Hyakusoku et al.[1] Pribaz and Guo[2] Pribaz and Fine[3] Costa et al.[4] Baudet[5]
Cheek				
(a) Partial thickness (e.g., burn) (b) Full thickness	Direct axial flap Prefabrication Prelamination	Submental neck/ upper chest or distant forearm	Submental island flap to cheek Implant vascular pedicle beneath skin and over a tissue expander with secondary transfer Subfascial skin graft over a tissue expander in radial forearm territory, or subfascial mucosal graft and silicone sheeting in radial forearm territory (± nerve)	Martin et al.[6] Faltaous et al.[7] Kim[8] Khouri et al.[9] Pribaz et al.[10] Pribaz et al.[3,11] Rath et al.[12] Rath et al.[13]
Neck				
Burn contracture	Prefabrication	Thigh forearm upper chest	Implantation of pedicle subcutaneously placed over a tissue expander and subsequently transferred to neck	Khouri et al.[9] Pribaz et al.[10]

Table 5.2 Clinical applications of prefabrication and prelamination: Facial soft tissue with cartilage

Defect	Technique	Flap location	Technique description	References
Nose				
(a) Partial or full-thickness loss (b) Total	Existing laminated flap Prelamination Prelamination	Ear Forehead Forearm	Ascending helical free flap based on superficial temporal artery Skin graft for lining and cartilage for support in paramedian forehead flap Skin graft for lining and cartilage for support in radial forearm flap	Pribaz and Falco[14] Gilles[15] Pribaz et al.[11] Costa et al.[4] Baudet[5]
Ear				
Absent ear	Prelamination	Forearm	Carved costal cartilage graft or silicone framework covered with radial forearm fascia and skin graft with secondary transfer to ear	Costa et al.[4] Baudet[5] Hirase et al.[16]
Trachea/Larynx				
(a) Tracheal defect/ stenosis (b) Hemilarynx defect	Prelamination Prefabrication	Radial forearm Radial forearm fascia	Mucosa or ear cartilage prelaminated onto antebrachial fascia for tracheal defects Free radial forearm fascial flap wrapped around upper trachea, which is subsequently moved for hemilarynx reconstruction	Vranckx et al.[17] Delaere et al.[18]