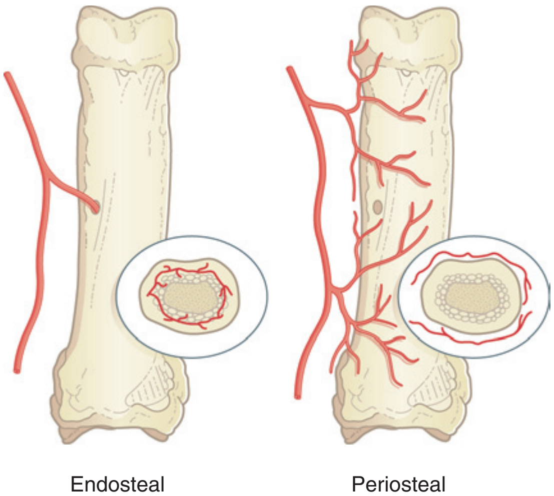

Figure 2.8 Osseous flaps according to Serafin[47] can be classified as either endosteal, where the blood supply directly enters the bone, usually via a nutrient foramen (left), or periosteal, which circumscribes the bone within the periosteum to eventually reach the bone indirectly.

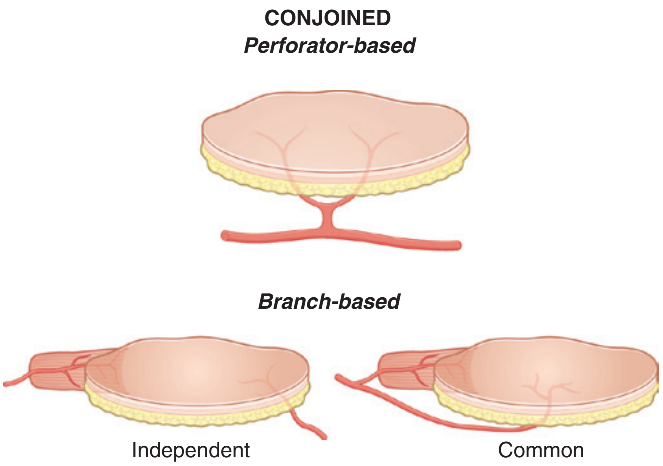

Figure 2.9 Conjoined flaps have two subclasses distinguished by the distinctly different caliber of their source of vascularization. The larger caliber and often subfascial or axial branches of the branch-based form may have completely unrelated origins from different angiosomes (independent type), or these branches may arise from a common source vessel (common type). The perforator-based form usually has multiple deep fascia perforators arising from a common source vessel.

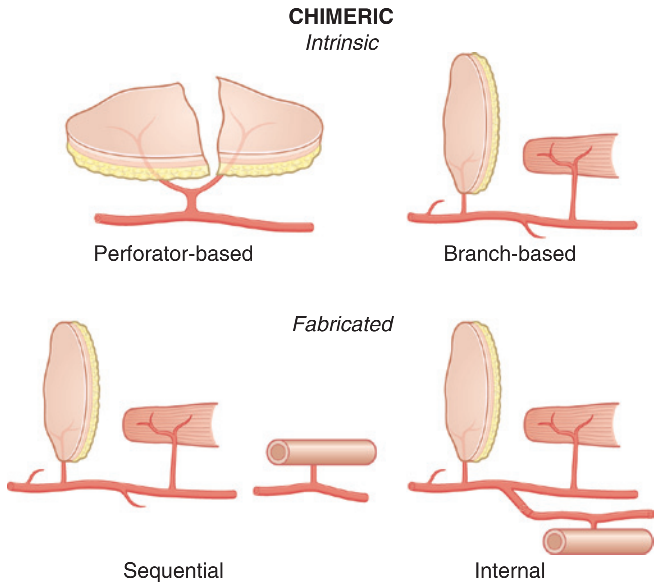

Figure 2.10 Chimeric flaps can be stratified into three subclasses on the basis of either their intrinsic vasculature or whether prefabricated via a microanastomosis. Perforator-based chimeric flaps are nourished by perforators arising from a common source vessel. Larger caliber and usually subfascial vessels to the branch-based chimeric flap also ultimately are connected to a common "mother" vessel. In the fabricated chimeric flap, the added component can be attached to the terminus of the source vessel to create a "flow-through" (sequential type) or to a branch indigenous within the flap (internal type).

CHIMERIC FLAPS

The chimeric flap, originally conceived as a combination of local flaps from the same anterolateral thigh angiosome,[26] has become entrenched in our vocabulary, despite the obvious problem that a chimera generally refers to an organism with a mixture of genetically different tissues. The chimeric flap has two or more subunits, each with an independent vascular supply, that are independent of any physical interconnection except where linked by a common source or "mother" vessel. Huang et al.[52] have further subdivided chimeric flaps into three subtypes, based on their specific blood supply (Fig. 2.10). The more traditional chimeric flap or branch-based type will have multiple and relatively large subfascial branches emanating from a common "mother" vessel. The subscapular system epitomizes this subtype, where fascial (dorsal thoracic), muscle (serratus anterior, latissimus dorsi), and osseous (rib, scapula) flaps, based on either the thoracodorsal or circumflex scapular branches, can allow over 60 known different flap combinations, which still permit independent insetting of each part.[53]

If the common boundary of a "perforator-based conjoined flap" is split apart, yet each part based on an individual perforator still remains attached to the same source vessel, these would become perforator-based chimeric flaps.[50] The anterolateral thigh flap is the prototypical donor site for this variation, where it has been split into smaller flaps to allow, for example, simultaneous intraoral and cheek reconstruction without the need for flap infolding or de-epithelialization.[54]

Koshima et al.,[55] in their introduction to the chimeric flap principle, prefabricated combinations by attaching otherwise independent flaps to either side branches of the main source vessel or to its distal continuation.[48] This type of fabricated chimeric flap always requires a microanastomosis. If the added flap is connected to the terminus of the source vessel, this would be a fabricated (sequential) chimeric flap as the circulation must proceed as a "flow-through" across the first flap and then to that attached in sequence. If a side branch of the first flap is used for this microanastomosis, this would be a fabricated (internal) chimeric flap,

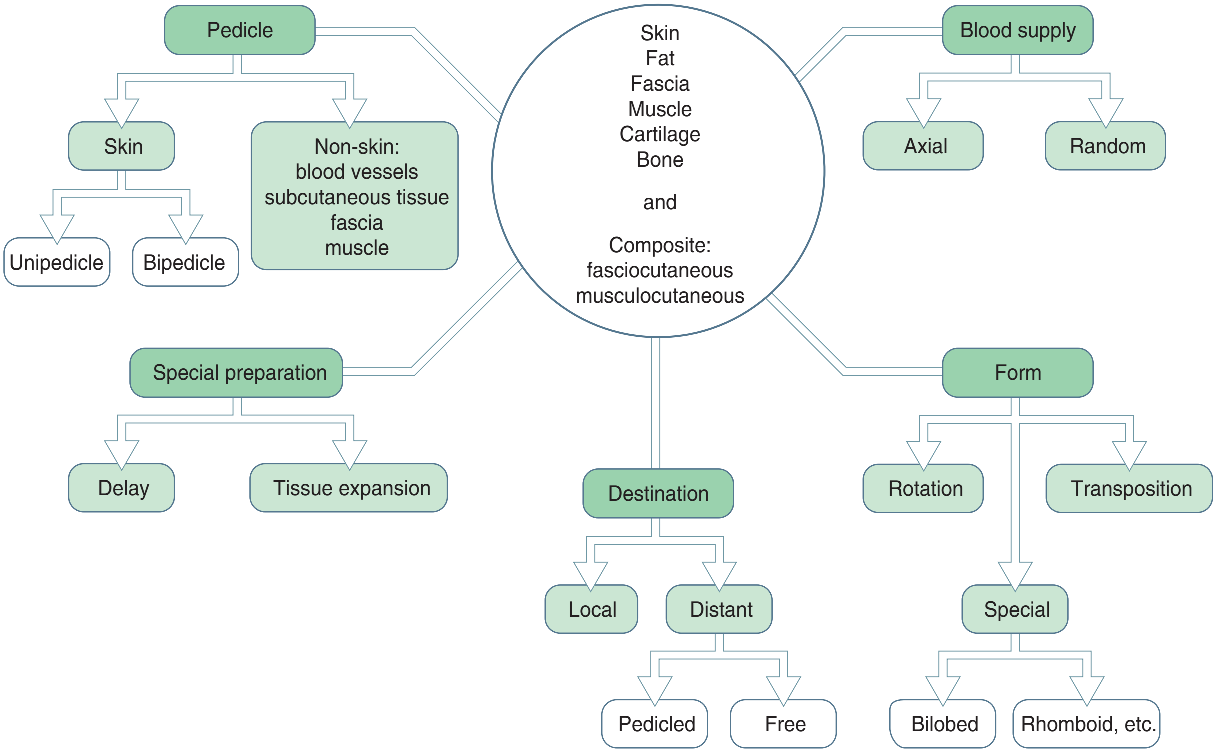

Figure 2.11 The "atomic system" that enumerates all known characteristics that are essential to fully describe any flap. (Reprinted with permission from Tolhurst DE. A comprehensive classification of flaps: the atomic system. Plast Reconstr Surg 1987; 80:608–609).

as there would be flow only internally within the combination and no "flow-through."

SECONDARY CHARACTERISTICS

There is no system that can perfectly categorize all types of flaps,[56] and most likely one never would be universally accepted anyway. This is a Herculean task, just considering the primary attributes of all flap types. To be absolutely complete, other secondary characteristics must also be accounted for. Tolhurst[57,58] listed all possible distinguishing characteristics that should be enumerated in his "atomic system" but flap composition, rather than circulation was his primary focus (Fig. 2.11). Cormack and Lamberty[30,59] used a similar format with their anatomic system for complete flap classification, but advocated using the source of circulation as the nucleus or most critical factor in flap selection. They also proposed a mnemonic of the "6 Cs" for complete flap identification that, in addition to the circulation, included constituents (composition), conformation (form/shape), contiguity (destination), construction (type of pedicle), and conditioning (preparation) (Table 2.1).[32]

PERFORATOR FLAPS

A perforator flap may be defined as a vascularized tissue transfer based on a cutaneous perforator (direct, septocutaneous, or musculocutaneous). The individual perforators are quite variable but the underlying source vessels and regional vascular supply (angiosome) are quite consistent. Therefore, a nomenclature system for describing perforator flaps was reported, which identifies all skin flaps according to the source vessel (e.g., lateral circumflex femoral, LCF); artery perforator (AP, or septocutaneous S), and the muscle penetrated by the perforator if required (e.g., tensor fascia lata, tfl). Therefore, an upper anterolateral thigh flap would be LCFAP-tfl.[23,24]

VASCULARIZED COMPOSITE ALLOTRANSPLANTATION CLASSIFICATION

In the continued quest for perfection, sources other than autogenous tissues have shown promise for better results with less donor site morbidity. Although tissue engineering or regeneration may ultimately be the final answer, at the present time, vascularized composite allotransplantation is more pragmatic with stunning results, especially in face and upper extremity reconstruction (see Chs 64 and 65). Other body parts and organ systems such as the penis, abdominal wall, and uterus have been transferred, but in comparably smaller numbers (see Ch. 66). Successful transfer of flaps such as muscle VCA has been reported,[60] as has a DIEAP (deep inferior epigastric artery perforator) free flap for breast reconstruction[61] and a temporoparietal scalp flap for alopecia,[62] with the latter two unique, in that they were between identical twins, so no immunosuppression was required. Since in all cases, VCA differs from autogenous tissue transfers only in that the donor and recipient are not the same individual, it would seem reasonable not to have